

## EIGHTEEN NEW SPECIES OF BRUCHIDAE, PRINCIPALLY FROM COSTA RICA, WITH HOST RECORDS AND DISTRIBUTIONAL NOTES (INSECTA: COLEOPTERA)

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*Abstract.*—Diagnostic descriptions, illustrations of salient characters, geographic distribution, and host plants are given for the following new species: *Amblycerus epsilon*, *A. imperfectus*, *A. multiflocculus*, *A. pterocarpae*, *A. spondiae*, *A. vegai*, *Zabrotes chavesi*, *Merobruchus santarosae*, *M. boucheri*, *M. hastatus*, *M. paquetae*, *M. sonorensis*, *M. terani*, *Acanthoscelides hectori*, *A. johnsoni*, *A. megacornis*, *A. petalopygus*, and *A. triumfettae*.

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Blackwelder's checklist (1946) of neotropical Coleoptera included only 9 species of Bruchidae from Costa Rica. Essentially no biological data were available for any of the Central American species at that time. In the last 15 years, however, largely through the intensive efforts of D. H. Janzen, University of Pennsylvania, Philadelphia, and his students, a prodigious amount of specimens and data has accumulated on the bruchids of Costa Rica, both in numbers of species represented, and in knowledge of life histories and host plant associations. The number of species now known from that country is 135, more than one-half of them undescribed when collected. Approximately 75% of these species have been reared from field collections of seeds, making this fauna one of the best known in the world for bruchids. Janzen's comprehensive studies on seed-seed predator interaction systems resulting from his collecting and rearing activities has stimulated a number of taxonomic papers on bruchids from Costa Rica including this paper.

The purpose of this paper is to describe for the first time 18 species of Bruchidae involved in Janzen's ecological studies.

Keys to species described in this paper are not provided because the genera represented are large, and all are being taxonomically revised at this time. Species herein included comprise only small parts of their respective genera.

Primary type-specimens are deposited in the United States National Museum of Natural History, Washington, D.C. (USNM). Paratypes of all species are deposited in USNM, in the C. D. Johnson Collection, Flagstaff, AZ, and in the Canadian National Collections, Ottawa, Ontario (CNCI).



Some paratypes are deposited in the British Museum (Natural History), London (BMNH), in the Muséum National d'Histoire Naturelle, Paris (MNHP), and in the American Museum of Natural History, New York (AMNH), and are indicated by the initials. The number of paratypes for each locality is listed in parenthesis after each block of data.

Three structural terms are introduced in this paper. *Cervical boss* is applied to a small, polished gibbosity on the anterolateral margin of the prothorax at the ventral extremity of the cervical sulcus. It usually forms the base for 1, 2, or 3 slender setae and is apparently the remnant of the anterolateral corner of the generalized pronotum of bruchids just as the cervical sulcus is probably the surviving portion of the sublateral sulcus. In the Pachymerinae, probably the most generalized of the bruchid subfamilies, 2 or 3 setae are located at the anterolateral corner of the pronotum on the sublateral carina. *Supraocular sulcus* is applied to the shallow furrow delimiting the dorsomedial margin of the compound eye in many bruchids. This sulcus may correspond to the ocular suture in more generalized insects, or it may be secondary. *Postmesocoxal sulcus* is applied to the furrow or groove delimiting the posterior rim of the mesocoxal cavity. In generalized bruchids (Pachymerinae, some Amblycerinae), this sulcus connects laterally with the parasutural sulcus of the metasternum.

Terminology for the male genitalia was proposed by Kingsolver (1970), and for the metatibia by Johnson and Kingsolver (1973).

Host plant names and authors, their family placement, and the names of associated Bruchidae are summarized in Table 1.

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### AMBLYCERINAE

This subfamily is distinguished by the presence of movable spurs (calcaria) at the apex of the metatibia; mesepimeron and mesepisternum being of subequal size; and metacoxal face being broader than the metafemur.

Two genera are known from the Western Hemisphere—*Amblycerus* and *Zabrotes*. They can be differentiated by the presence of carinae on the metatibia in *Zabrotes* and their absence in *Amblycerus*.

#### *Amblycerus* Thunberg

*Amblycerus* Thunberg, 1815:121.

This is a large genus found only in continental Western Hemisphere with the exception of two species in the Galapagos Is. and one in the Marquesas Is., the latter likely an introduction.



Table 1.—Host Plants and Associated Bruchidae.

Host plant	Plant family	Bruchid species
<i>Acacia angustissima</i> (Mill.) Kuntze	Leguminosae	<i>Merobruchus terani</i>
<i>Acacia berlandieri</i> Benth.	Leguminosae	<i>Merobruchus terani</i>
<i>Acacia collinsii</i> Safford	Leguminosae	<i>Acanthoscelides</i> <i>petalopygus</i>
<i>Acacia dolichostachya</i> Blake	Leguminosae	<i>Merobruchus santarosae</i>
<i>Acacia tenuifolia</i> (L.) Willd.	Leguminosae	<i>Merobruchus terani</i>
<i>Aeschynomene americana</i> L.	Leguminosae	<i>Acanthoscelides megacornis</i>
<i>Albizia adinocephala</i> (Donn.-Smith) Britt. & Rose	Leguminosae	<i>Merobruchus sonorensis</i> <i>Merobruchus paquetae</i>
<i>Albizia caribaea</i> (Urb.) Britt. & Rose	Leguminosae	<i>Merobruchus sonorensis</i> <i>Merobruchus paquetae</i>
<i>Albizia lebbek</i> (L.) Benth.	Leguminosae	<i>Merobruchus sonorensis</i>
<i>Albizia ortegae</i> Britton & Rose	Leguminosae	<i>Merobruchus sonorensis</i>
<i>Albizia sinaloensis</i> Britton & Rose	Leguminosae	<i>Merobruchus sonorensis</i>
<i>Albizia tomentosa</i> (Micheli) Standl.	Leguminosae	<i>Merobruchus sonorensis</i>
<i>Banisteriopsis cornifolia</i> H.B.K. Robins.	Malpighiaceae	<i>Amblycerus multiflocculus</i>
<i>Cassia emarginata</i> L.	Leguminosae	<i>Amblycerus epsilon</i>
<i>Cassia leptocarpa</i> Benth.	Leguminosae	<i>Zabrotes chavesi</i>
<i>Combretum farinosum</i> H. B. K.	Combretaceae	<i>Amblycerus imperfectus</i>
<i>Cordia alliodora</i> (Ruiz. & Pav.) Cham. ex DC.	Boraginaceae	<i>Amblycerus vegai</i>
<i>Cordia dodecandra</i> DC.	Boraginaceae	<i>Amblycerus spondiae</i>
<i>Heteropterys beechyana</i> A. Juss.	Malpighiaceae	<i>Amblycerus multiflocculus</i>
<i>Hippomane mancinella</i> L.	Euphorbiaceae	<i>Amblycerus spondiae</i>
<i>Lysiloma desmostachys</i> Benth.	Leguminosae	<i>Merobruchus santarosae</i>
<i>Lysiloma seemannii</i> Britt. & Rose	Leguminosae	<i>Merobruchus sonorensis</i>
<i>Macroptilium atropurpureum</i> (DC.) Urb.	Leguminosae	<i>Acanthoscelides hectori</i>
<i>Piptadenia flava</i> (Spreng.) Benth.	Leguminosae	<i>Merobruchus hastatus</i>
<i>Pithecellobium mangense</i> (Jacq.) MacBride	Leguminosae	<i>Merobruchus boucheri</i>
<i>Pithecellobium sonora</i> S. Wats.	Leguminosae	<i>Merobruchus sonorensis</i>
<i>Pithecellobium undulatum</i> (Britt. & Rose) Gentry	Leguminosae	<i>Merobruchus boucheri</i>
<i>Prosopis juliflora</i> (SW.) DC.	Leguminosae	<i>Amblycerus epsilon</i>
<i>Pterocarpus rohrii</i> Vahl	Leguminosae	<i>Amblycerus pterocarpae</i>
<i>Rhynchosia minima</i> (L.) DC.	Leguminosae	<i>Acanthoscelides hectori</i>
<i>Spondias mombin</i> L.	Anacardiaceae	<i>Amblycerus spondiae</i>
<i>Spondias radlkoferi</i> Donn.-Smith	Anacardiaceae	<i>Amblycerus spondiae</i>
<i>Triumfetta lappula</i> L.	Tiliaceae	<i>Acanthoscelides</i> <i>triumfettae</i> <i>Acanthoscelides johnsoni</i>
<i>Ziziphus mexicana</i> Rose	Rhamnaceae	<i>Amblycerus spondiae</i>



Whereas most bruchid genera are associated with the seeds of the Leguminosae, *Amblycerus* is found in seeds of a number of plant families, including Leguminosae.

*Amblycerus epsilon*, new species

Figs. 1, 30, 48, 60, 66, 67

*Body length*.—5.7–6.0 mm; *width*.—3.3–3.5 mm; *pronotal length*.—1.3–1.4 mm, *width*.—2.6–2.8 mm.

*Color*.—Integument dark red throughout except eyes piceous. Vestiture of yellowish gray slender hairs throughout; pronotum (Fig. 1) with three faint dorsal stripes of densely placed setae, i.e., an antescutellar stripe and two lateral curved stripes forming an approximation of the Greek letter *epsilon*, and an indistinct sublateral spot; elytra (Fig. 1) with similar stripes on sutural, third, fifth, seventh, and ninth intervals; disk of pronotum and elytra with minute bare spots marked by isolated slender setae; pygidium with narrow median stripe; venter of body with vestiture evenly distributed except for mesal one-third on metacoxal face.

*Structure*.—Body subelliptical, widest at basal one-third of elytra. Head turbiniform, eyes strongly protuberant laterally, coarsely faceted, ocular sinus about one-fourth length of eye; frons nearly flat, densely punctulate and setose, without frontal carina, frontoclypeal suture obtusely angulate; clypeus more coarsely punctate than frons, less densely setose; antenna (Fig. 48) long, reaching middle of metacoxa, subserrate from fourth segment, apical segment elliptical. Pronotum (Fig. 1) semicircular in dorsal aspect, basal margin bisinuate, disk convex, more strongly so in apical one-half, integument densely punctulate with a few coarser punctures in lateral areas; lateral carina somewhat obtuse, ventral submarginal channel extending about one-half distance from base to cervical boss, cervical sulcus fine, extending dorsad nearly to midline, cervical setae 3; prosternum short before coxae, intercoxal piece narrow, separating apices of procoxae. Scutellum (Fig. 60) short, scutiform. Elytra (Fig. 1) widest at basal one-third, lateral margins gently curved, bases sinuate, apices unevenly rounded; striae evident but not prominent, intervals of subequal width in basal three-fourths, of unequal widths in apical one-fourth, striae 4 and 5 and 6 and 7 conjoined apically; mesosternum short, linguiform; postmesocoxal sulci meeting mesally at obtuse angle, then extending laterally and connecting to parasutural sulci; vertical sulcus of metepisternum at obtuse angle with short parasutural sulcus. Abdomen with basal segment about as long as remaining 4 segments together; fifth segment slightly emarginate in male for reception of pygidial apex, truncate in female with slight transverse, subapical tumidity; pygidium nearly flat in both sexes. Male genitalia with median lobe (Fig. 66) about 3 times as long as wide; ventral valve broad at base, ogival



to acute apex; dorsal valve more narrow at base than ventral valve, obtusely rounded apically; internal sac with paired irregular masses of blunt denticles and a pair of curved, rodlike sclerites basally, a large, subcylindrical, membranous sclerite mesally, and a pair of small, curved sclerites near apex; apical closure valve crescentic, attached to a pair of slender rods; lateral lobes (Fig. 67) short, Y-shaped; apical emargination rightangled. Pro- and mesolegs normal for genus; metacoxa reniform, densely punctulate and setose in lateral two-thirds with scattered larger punctures in lateral one-half; mesal one-third bare, polished, with dense cluster of punctures near insertion of trochanter; metafemur normal for genus; metatibia (Fig. 30) gradually widened to oblique apex, with row of fine punctures on dorsolateral face, apical margin micro serrulate; lateral calcar slightly less than one-half length of metabasitarsus, mesal calcar four-fifths length of lateral calcar.

*Holotype* ♂.—COSTA RICA: Guanacaste Prov., Finca La Pacifica, 16 March 1971, D. H. Janzen (#632), in fruits of *Cassia emarginata*. (USNM Type #72379). Allotype ♀ and 23 paratypes, same data. Other paratypes.—COSTA RICA: Guanacaste Prov., 5 mi E Cãnas, 4 March 1972, D. H. Janzen (#VI-20-1972-I), in *Cassia emarginata* (88); Santa Rosa N.P., nr. El Naranjo, dry river bed, 15 March 1972, D. H. Janzen et al. (#VI-19-1972-XVIII), ex *Cassia emarginata* (6); 2 mi N Playa del Coco, 14 March 1971, D. H. Janzen (#615), in *Cassia emarginata* (45); Playa del Coco, 14 March 1971, D. H. Janzen (#618), in *Cassia emarginata* (23); Santa Rosa N. P., 6 March 1975, D. H. Janzen in *Prosopis juliflora*, (7); GUATEMALA: Barranquillo, 8 June 1920, F. H. B. Quarantine 36617, L. L. Spessard (#362a), ex "Vainillo" (*Cassia emarginata*) (6).

*Amblycerus epsilon*, n. sp., is closely related to and externally is indistinguishable from *A. martorelli* Bridwell; however, details of the armature of the internal sac (cf. fig. 1, p. 492, Kingsolver, 1970), especially the shape of the curved, rodlike sclerites and the median sclerite, as well as the relative shapes of the ventral and dorsal valves, are diagnostic. In addition, the apical emargination between the lateral lobes is relatively shallow in *A. epsilon*, whereas in *A. martorelli* it is deep and rounded.

*Amblycerus martorelli* breeds in seeds of *Prosopis juliflora* (SW.) DC. in the West Indies, and an undescribed species in this group in Venezuela also lives in *P. juliflora*.

The name *epsilon* refers to the markings on the pronotum.

*Amblycerus imperfectus*, new species

Figs. 2, 22, 31, 49, 61, 68, 69

*Body length*.—4.0–5.7 mm, width.—2.4–3.0 mm; pronotal length.—1.1–1.3 mm, width.—1.7–2.1 mm.

*Color*.—Integument dark red, eyes black, Vestiture of yellowish gray,



brown, and golden aciculate hairs with yellowish brown and golden hairs forming faintly mottled pattern on elytra (Fig. 2) with brown hairs concentrated in small spots, pattern variable in development from that in Fig. 2 to nearly complete absence of dark spots, these sometimes faintly marked by golden spots; pronotum (Fig. 2) appearing slightly darker than elytra with somewhat variable, paired, sinuate, yellowish markings extending from base to apex and flanked by oval sublateral spots; legs and antennae uniformly red with yellowish vestiture; mesepisternum with 2 irregular, brown spots; abdominal sterna each with sublateral brown spot, sometimes with incomplete row of spots mesad of sublateral spots; pygidium with pattern as in Fig. 22 in more intensely marked specimens varying to unicolorous.

*Structure*.—Body subelliptical, widest at basal one-third of elytra. Head turbiniform, eyes moderately convex, protruding laterally, ocular sinus shallow; frons evenly, finely punctulate, convex, lacking frontal carina; clypeus finely, evenly punctulate except apical margin granulose; labrum finely punctate basally; postocular fringe narrow, postocular furrow moderately deep; antenna (Fig. 49) reaching middle of metepisternum, subserrate from fourth segment, eleventh subelliptical. Pronotum (Fig. 1) nearly semicircular, somewhat narrowed apically, basal margin bisinuate, disk transversely, evenly arcuate, basal lobe slightly depressed, sublateral carina traceable in middle of basal margin, along entire lateral margin, and connecting with cervical sulcus which extends dorsad nearly to middle of pronotum; cervical boss bisetose, posterior angle of pronotum with 1 seta; pleural area deeply concave, sublateral sulcus parallel to lateral carina; prosternum flat, constricted at middle, slightly expanded apically, face with nearly impunctate lateral ridges. Scutellum as in Fig. 61. Elytra (Fig. 1) 1.4 times as long as wide, apices evenly rounded, lateral margins arcuate; striae narrow, deep, regular in course, 4 and 5 conjoined at apical one-fourth, 6 and 7 conjoined near apex of elytron, intervals of subequal width; mesosternum semicircular, slightly channeled longitudinally; postmesocoxal sulci meeting on midline at right angle, extending laterally to join parasutural sulci, the latter extending nearly to posterior margin of metasternum. Abdomen with first sternum equal in length to remaining sterna together, terminal sternum slightly emarginate in male, evenly arcuate in female; pygidium (Fig. 22) transversely flat, slightly arcuate in lateral aspect, surface evenly punctulate. Male genitalia with median lobe (Fig. 61) 4 times as long as wide, ventral valve ogival with apex acute, dorsal valve arched, less acute than ventral valve, armature of internal sac consisting of large, paired, externally serrate, flat sclerites near base, a complex of elongate, flat, tapered blades and smaller bladelike spines, and a wishbone-shaped sclerite with serrate stem, a patch of fine spicules near apex, closure valve semicircular with paired rods attached; lateral lobes (Fig. 68) fused basally, lobes divergent, emargination between them shallow. Pro- and mesolegs not modified; meta-



coxae reniform, slightly concave, densely punctulate and setose except for subtriangular polished area in mesal one-half, lateral one-half sparsely foveolate, circular cluster of punctures near trochanteral insertion; metafemur normal for genus; metatibia (Fig. 31) with lateral calcar one-half as long as metabasitarsus, mesal calcar two-thirds as long as lateral calcar; metabasitarsus elongate, curved, nearly as long as metatibia.

*Holotype* ♂.—COSTA RICA. Guanacaste Prov.: Santa Rosa (N.P.), beach area, 15 March 1972, D. H. Janzen et al. (#VI-19-1972-XII), ex seeds of *Combretum farinosum* (USNM Type #76374). Allotype ♀ and 41 paratypes, same data. Other paratypes.—Santa Rosa (N.P.), road to El Naranjo, 9 March 1972, D. H. Janzen et al. (#VI-20-1972-XXVIII), *Combretum farinosum* (2); Santa Rosa (N.P.), road to Casona, 20 April 1976, D. H. Janzen, *Combretum farinosum* (1).

This species is closely related to *A. perfectus* (Sharp) described from Tehuantepec, Mexico, that has been collected in Costa Rica in the same reared lots with *A. imperfectus*, new species. These two can be distinguished with certainty only by examination of the male genitalia. The color pattern in *A. perfectus* is usually more intensely brown but the range of variation overlaps that of *A. imperfectus*. Differences in the male genitalia to separate *A. perfectus* are: dorsal valve rounded apically, not acute; internal sac with basal sclerites more slender and less strongly serrate; blade-like sclerites in middle of sac longer and with serrate margins; wishbone sclerite more semicircular; spines surrounding complex smaller.

The name refers to the imperfectly developed color pattern as compared to that of *A. perfectus*.

*Amblycerus multiflocculus*, new species

Figs. 3, 23, 32, 62, 70, 71

*Body length*.—4.0–6.0 mm, width.—2.6–3.9 mm; pronotal length.—2.25–2.75 mm, width.—2.0–3.0 mm.

*Color*.—Integument dark red throughout except eyes black. Vestiture of gray, white, brown, and golden aciculate hairs; pronotum (Fig. 3) with mostly white hairs but with scattered vague patches of mostly golden hairs, 4 intensely white spots in slightly arcuate, transverse median row, 1 spot each side midway between transverse line and apical margin, the 6 spots forming 2 triangles; elytra (Fig. 3) with intermixed golden and gray hairs on intervals with very narrow stripe of gray hairs on either side of each stria, pattern of small, intensely white tufts as follows: third interval with 8–10 tufts, fifth with 6–7 tufts, seventh with 5–6 tufts, ninth with 7–8 tufts, eleventh with 4 or 5 vague white patches in basal one-half; pygidium (Fig. 23) unevenly covered with white hairs, punctures showing through vestiture, median line sometimes marked by narrow line of white hairs; venter of body evenly



covered with intermixed golden and gray hairs but with golden sheen; abdominal sterna with lateral row of whitish spots.

*Structure*.—Body elliptical, widest at middle of elytra. Head turbiniform; eyes strongly protuberant laterally, coarsely faceted, ocular sinus shallow; frons finely, densely punctulate, faintly carinate medially; clypeus slightly wider than long, more coarsely punctulate than frons; labrum impunctate except for transverse row of setiferous punctures; antenna subserrate, long, reaching metacoxa. Pronotum (Fig. 3) trapezoidal, mostly convex but flattened in basal one-half; basal margin bisinuate with fine submarginal carina in middle one-third; lateral margin of disk with fine carina nearly concealed by vestiture, continuous with fine apical carina, the latter obsolete in middle one-fourth; disk punctulate, middle one-third with scattered coarser punctures, these much denser in lateral areas of disk, surface nearly concealed by dense vestiture; cervical boss bisetose, occasionally with 3 setae; pleural region deeply concave, limited dorsally by prominent submarginal sulcus. Prosternum Y-shaped, short before coxae, intercoxal piece narrow, somewhat arched, slightly expanded apically, the apex articulating against mesosternal lobe. Scutellum (Fig. 62) about 1.6 times as long as wide, slightly attenuate, rounded apically, bisulcate. Elytra (Fig. 3) about 1.3 times as long as wide, striae moderately deeply impressed; intervals convex, imbricate-punctate; elytral apices evenly rounded; disk subdepressed medially to about apical one-third; sutural interval prominent in apical one-half. Mesosternum linguiform, medially sulcate; postmesocoxal sulci continuous across midline, connected laterally with parasutural sulci which extend posteriorly to metacoxal margin; metepisternal sulcus deep anteriorly, angulate, ending posteriorly in elongate, polished boss; metepisternum with several prominent foveolae. Abdomen with first sternum about as long as remaining sterna together; posterior margin of fifth sternum truncate in male, arcuate in female; pygidium (Fig. 23) subtriangular, lateral margins arcuate, apex truncate. Male genitalia with median lobe (Fig. 70) slender, about 4.5 times as long as wide; ventral valve subtriangular with lateral margins incurvate, base broad, apex acute; armature of internal sac consisting of a pair of thin plates near base each bearing dense cluster of acute spines, a pair of small, falcate and serrate blades, a median C-shaped blade with 2 cusps, and a pair of angular, spiny sclerites; apex of sac lined with rows of fine spicules; closure valve crescentic with paired, slender rods attached; lateral lobes (Fig. 71) short, expanded apically, apical margin shallowly emarginate. Pro- and mesolegs not modified; metacoxal face reniform, densely clothed except in basal one-fourth, lateral one-half with about 40 small foveolae, proximal polished area with about 16 rounded, small punctures; metafemur short, stout; metatibia (Fig. 32) short, with prominent row of punctures on dorsolateral face, lateral calcar about 0.6 as long as metabasitarsus, mesal calcar about 0.6 as long as lateral calcar, both calcaria slightly curved laterad.



*Holotype* ♂.—COSTA RICA. Guanacaste Prov.: Santa Rosa N. P., dry river bed, 15 March 1972, D. H. Janzen (#VI-19-1972-V), reared from *Heteropterys beechyana*, (USNM Type #76383). Allotype ♀ and 8 paratypes, same data. Other paratypes.—COSTA RICA. Guanacaste Prov.: Santa Rosa N. P., 10 February 1978, Liesner (#5268), reared from *Banisteriopsis cornifolia* (14). PANAMA. Chiriqui Prov.: Cerro Punta, 8,000 ft., 18–24 July 1961, J. M. Campbell (2). EL SALVADOR. San Salvador: Tonocatepeque, 20 June 1958, L. J. Bottimer (Coll. #102j) (1). MEXICO. Oaxaca: 24 mi N Matias Romero, 24 June 1969, Bright and Campbell (1).

This species is most closely related to *Amblycerus geminatus* (Sharp). The latter is relatively smaller, has fewer and larger flocculent white spots on the pronotum and elytra, and is distinctly different in details of the male internal sac armature. In *A. geminatus*, the apex of the ventral valve is more sharply acute, the apex of the dorsal valve is arched with arcuate lateral margins, the spiny, paired sclerites near the base of the sac are more arcuate, the wishbone sclerite is narrower with cusps relatively longer, and the median sclerites are serrate rather than spiny. The terminal margin of the lateral lobes is truncate rather than emarginate.

The specific name is derived from the white flocculent spots.

*Amblycerus pterocarpae*, new species

Figs. 4, 33, 50, 63, 72, 73

*Body length*.—5.9–7.6 mm, width.—4.0–4.9 mm; pronotal length.—2.4–2.6 mm, width.—3.5–3.7 mm.

*Color*.—Integument reddish brown on anterior part of clypeus, pronotal disk and flanks, elytra, abdomen, and 3 terminal segments of each tarsus; dark red on metatibial calcaria and sometimes on apex of metafemur and of metatibia; piceous to black on head and antenna, venter of thoracic segments, legs except tarsal segments mentioned above. Vestiture evenly distributed over entire body, that on reddish parts yellowish red, that on piceous parts silvery gray.

*Structure*.—Body elliptical (Fig. 4), depressed above, widest at basal one-third of elytra. Head subtriangular, eyes protuberant, moderately coarsely faceted; frons slightly convex, densely, finely punctulate, lacking frontal carina but with short, impunctate line immediately above fronto-clypeal suture; clypeus densely punctate, coarser than on frons, apical margin granulate; vestiture on head densely set except for labrum and paired elliptical bare spots at level of dorsal margins of eyes; antenna (Fig. 50) long, slender, subserrate from fourth segment. Pronotum (Fig. 4) trapezoidal, lateral margins moderately arcuate, apex truncate, disk convex except depressed and canaliculate on basal lobe, disk punctulate over entire surface and with small, shallow rounded foveolae evenly distributed except in median one-



fourth; lateral margin entire, delimited by dorsal and ventral submarginal sulci, dorsal sulcus connected to cervical sulcus, the latter fine, shallow; cervical boss with 3 setiform punctures; prosternum Y-shaped, precoxal length about equal to width of intercoxal piece, the latter flat, slightly constricted between procoxal apices with apex bluntly angulate. Scutellum (Fig. 6) elongate, two times as long as wide, tridenticulate apically. Elytra (Fig. 4) one-third longer than wide, disk depressed around scutellum and slightly depressed longitudinally between fifth intervals; stria punctures shallow, rounded, striae scarcely impressed basally but with channeling more evident in apical two-thirds; intervals subequal in width, flat, striae 4 and 5 conjoined at apical one-fourth; elytral apices subtruncate; mesosternum linguiform, depressed medially for reception of prosternal apex; conjoined postmesocoxal sulci slightly arcuate on midline; vertical metepisternal sulcus at right angles to parasutural sulcus, the latter extending caudad to small fusiform, polished boss at posterior margin of metepisternum. Abdomen with first ventral segment slightly shorter than remaining segments together, fifth segment slightly emarginate in male, evenly arcuate in female; pygidium semicircular in male, subtriangular and apically truncate or slightly emarginate in female. Male genitalia with median lobe (Fig. 72) three and one-half times as long as wide; ventral valve acute apically, lateral margins incurvate, base broad; dorsal valve with margin arcuate; internal sac with two pairs of hollow, thin-walled, denticulate sclerites, anterior pair flanking wishbone-shaped sclerite; apical transfer valve circular with two slender rods attached; lateral lobes (Fig. 73) expanded apically, setose, apical margin with paired angulate lobes separated by angulate median emargination. Pro- and mesolegs normal for genus; metacoxal face densely setose in lateral four-fifths, bare and polished in mesal one-fifth with cluster of punctures near insertion of trochanter; middle of anterior border with narrow, transverse, polished ridge; metafemur normal for genus; metatibia (Fig. 33) lacking dorsolateral row of punctures; lateral calcar one-half length of metabasitarsus, mesal calcar one-half length of lateral calcar.

*Holotype* ♂.—COSTA RICA. Guanacaste Prov.: Santa Rosa N. P., Rio Caldera, 8 May 1976, D. H. Janzen (#310359), coll. ex seeds of *Pterocarpus rohrii* (USNM Type #76375). Allotype ♀ and 83 paratypes, same data. Other paratypes.—Guanacaste Prov.: Santa Rosa N.P.; Rio Caldera, 15 May 1978, *Pterocarpus rohrii*, D. H. Janzen, coll. (1); (Limon Prov.), Hamburg Farm, Reventazon, Ebene Limon, 17 July 1931, at light, F. Nevermann, coll. (1). The colloquial name of *Pterocarpus rohrii* Vahl. is "Sangre Drago."

*Amblycerus pterocarpae* appears to be closely related to *A. pollens* (Sharp) and *A. tachigaliae* Kingsolver in color and body form, and the male genitalia support this relationship to a degree. All three species are uniformly reddish yellow to reddish brown dorsally with the sternal thoracic seg-



ments piceous to black. In *A. pterocarpae* and *tachigaliae* the abdomen is red, whereas in *A. pollens* the abdomen is the same color as the thoracic sterna. *A. pollens* alone possesses a stridulatory file on the metepisternum scraped by a blunt tooth on the metafemur.

*Amblycerus pterocarpae* and *A. tachigaliae* can be distinguished by the following (characters of *tachigaliae* in parentheses): Scutellum narrow, twice as long as wide (broad, nearly quadrate); lateral calcar one-half length of metabasitarsus (three-fourths length of basitarsus); frons only slightly convex (frons strongly convex); cervical sulcus evenly arcuate at ventral end (sulcus strongly hooked ventrally); apex of prosternum more than one-half as wide as mesosternum (one-third as wide); armature of internal sac, Fig. 72 (see fig. 2, p. 151, Kingsolver, 1976).

The fruit of *Pterocarpus* is a wafer-like samara with a centrally placed seed. *Amblycerus pterocarpae* is the only known bruchid to develop in seeds of this genus. Eggs are deposited on the fruit after they have fallen from the tree.

The host of *A. tachigaliae* is *Tachigalia versicolor* Standley and Williams, a tall tree found in tropical Central America. Its fruit is a large (25–30 cm), elongate samara with a centrally placed seed upon which *A. tachigaliae* oviposits after the samara falls to the ground.

In the original description of *A. tachigaliae* (Kingsolver, 1976), the specific name was spelled both as *tachygaliae* and as *tachigaliae*. The latter spelling was intended since the name of the host is *Tachigalia*.

*Amblycerus spondiae*, new species

Figs. 5, 34, 64, 74, 75, 76, 77

*Body length*.—4.4–5.9 mm, width.—2.5–3.5 mm; pronotal length.—1.1–1.3 mm, width.—1.8–2.3 mm.

*Color*.—Integument deep red to piceous throughout except tarsi reddish brown. Vestiture of very fine yellowish hairs evenly distributed over body except condensed into narrow stripes on elytra intervals, those on intervals 3, 5, 7, and 9 more prominent especially in apical one-half (Fig. 5); vestiture partly concealing surface sculpture; pronotum with fine median stripe and vaguely condensed patches of hairs; pygidium with narrow median stripe of vestiture.

*Structure*.—Body oblong-ovate, widest at middle of elytra. Head subtriangular; eyes strongly protuberant laterally; frons convex, finely punctate with scattered coarser punctures, densely setose except for two round, denuded spots at level of dorsal margins of eyes; clypeus densely, coarsely punctate; postocular lobe narrow, sparsely setose. Pronotum (Fig. 5) semi-circular in dorsal aspect, widest at base; disk convex, more strongly so apically; basal lobe shallow, vaguely sulcate; integument evenly, densely



punctate, each puncture rounded and setiferous; basal margin densely fringed with hairs; lateral carina obtuse, finely sulcate ventrally, extending anteriorly to cervical boss, boss with 3 setiferous punctures, cervical sulcus short, extending dorsad about one-half distance of midline; pleural area deeply concave; prosternum T-shaped, short before coxae, intercoxal piece narrow, arched, slightly constricted in middle. Scutellum (Fig. 64) elongate, twice as long as wide, trilobed and bisulcate apically. Elytra (Fig. 5) together one-third longer than wide; striae prominent, narrow, deep, regular in course with strial punctures closely set, each bearing a short, thin seta, vestitural hairs of two types, one short, aciculate, the other long, slender; mesosternum short, linguiform. Metasternum finely punctate; metepisternum with prominent vertical sulcus connecting mesally at obtuse angle with parasutural sulcus, terminating caudally in shining, narrow, curved boss; postmesocoxal sulci meeting medially behind angulate ridge, connecting laterally with parasutural sulcus on metasternum and extending to its caudal margin. First abdominal segment equal in length to remaining four together; caudal margin of fifth segment in male distinctly emarginate; in female truncate; pygidium subtriangular, truncate apically; disk densely, finely foveolate, each foveola the base of a slender, black hair; intervals with densely set, yellowish, aciculate hairs; median line marked with narrow stripe of yellowish hairs. Male genitalia with median lobe (Fig. 72) about 4 times as long as wide; ventral valve broad, ogival, with apex acute; dorsal valve elongate, obtusely rounded apically; internal sac armed with paired, thorn-like sclerites near base, an elongate, wishbone-shaped sclerite, and paired, complex, elongate sclerites with serrate ridges at middle of sac; transfer valve at end of sac semicircular with paired, slender rods attached; lateral lobes (Fig. 73) narrow basally, abruptly expanded apically, lobes setose, terminal margin angulately emarginate. Pro- and mesolegs normal for genus; metacoxal face densely setose in lateral three-fourths with scattered large punctures nearly hidden by vestiture; polished area near trochanteral insertion with dense cluster of about 15 punctures; metafemur normal for genus; metatibia (Fig. 34) with lateral calcar one-half as long as metabasitarsus, mesal calcar about one-half as long as lateral calcar.

*Holotype* ♂.—COSTA RICA. Guanacaste Prov.: Taboga, 16 km SW Cañas, hillside, 17 November 1971, *Spondias mombin* or *radlkoferi*, Bag 3, R. Carroll (USNM Type #76377). Allotype ♀ and 144 paratypes, same data. Other paratypes.—Guanacaste Prov.: Palo Verde, OTS, COMELCO A, 17 November 1971, R. Carroll, *Spondias mombin* or *radlkoferi*, Bag 2, (93); Finca La Pacifica, 6 km N Cañas, emerg. 29 December 1972, R. Carroll, *Spondias mombin* or *radlkoferi*, Bag 1, (9); 4 mi. N Bagaces, 17 November 1971, R. Carroll, *Spondias mombin* or *radlkoferi*, Bag 4, (29); same data but 15 November 1971, Code 019 (21); Santa Rosa N.P., Playa Naranjo, ca. 15



July 1974, D. H. Janzen, reared from endocarps *Hippomane mancinella* L. (33); Finca La Pacifica, 5–6 March 1973, D. R. Whitehead, dry leaf litter, riparian forest (1); Santa Rosa N.P., nr. Choros Salina Windsor, 24 February 1973, D. H. Janzen, *Hippomane mancinella*, (2); Taboga, 30 June 1968, C. D. Johnson (1); San Jose Prov.: La Caja b. San Jose, October 30 (no year), F. Nevermann (3); Curridabat bei San Jose, 15 May 1932, F. Nevermann, on leaf (1); Alajuela Prov., Surrubres (no date) (3). PANAMA. Alajuelo, 17 April 1911, August Busck (1). EL SALVADOR. San Salvador, 9 June 1958, L. J. Bottimer coll. 101h (1); Santa Tecla, 5 June 1958, L. J. Bottimer coll. 101z (1); Vol. Conchagua, 27–29 May 1958, Cartwright and Bottimer coll. 101n and o (2). GUATEMALA. Salama, 29 July 1947, 3,000 ft., C. & P. Vaurie, (1) (AMNH); Amatitlan, 24 August 1947, 4,000 ft., C. & P. Vaurie (3) (AMNH); Rabinal, 2 August 1947, 3,000 ft., C. & P. Vaurie (1) (AMNH); 8 km W San Vicente Pacaya, Esq., 14 May 1966, 4,500 ft., J. M. Campbell, beating (1); 34 km N El Rancho, El Pro., 22 June 1966, 2,000 ft., J. M. Campbell (1). MEXICO. Chiapas: 2 mi N Simojovel, 9 June 1969, J. M. Campbell (6); Cd. Cuauhtémoc, 5 June 1969, J. M. Campbell, (3); Ocosingo, 1 June 1969, Bright and Campbell (1); 12 mi N Tuxtla Gutierrez, 7 June 1969, J. M. Campbell (4); 12 mi N Tuxtla Gutierrez, 7 June 1969, J. M. Campbell (4); Cintalapa, intercepted U.S. Plant Quarantine, Laredo, TX, 13 April 1951, in seed *Cordia dodecandra* (2); Guerrero: Rio Balsas (no date), Wickham (1); Jalisco (state): intercepted U.S. Plant Quarantine, El Paso, TX, 15 November 1976, in fruits *Ziziphus mexicanus* (8).

*Amblycerus spondiae*, named from one of its host genera, is most closely related to *A. alternatus* (Pic) and *A. lineolatus* (Motschulsky), differing consistently in the shape of the paired sclerites near the base of the internal sac of the male genitalia. In *A. spondiae*, these are thorn-like (Fig. 72); in *A. alternatus*, they are contiguous basally, divergent, rounded, and granulate apically; and in *A. lineolatus* they are fleshy with thorn-like spines attached apically. Both *A. alternatus* and *lineolatus* are distinctly striped on elytral intervals 3, 5, 7, and sometimes 9, and in addition to a median stripe, the pronotum is striped contiguous to and in line with elytral stripes 3 and 5.

The host plants of *A. spondiae* fall into 4 plant families—*Spondias mombin* L. and *radlkoferi* Donn.-Smith belong to the Anacardiaceae, *Hippomane mancinella* L. to the Euphorbiaceae, *Cordia dodecandra* DC. to the Boraginaceae, and *Ziziphus mexicana* Rose to the Rhamnaceae. This is the first recorded species of bruchid to have four plant families in its host list.

Oviposition by *A. spondiae* is apparently on fruits or endocarps on the ground. Adults have been observed on clumps of *Spondias* endocarps that had passed through the alimentary tract of monkeys, and on endocarps of *Hippomane* from which the fleshy exocarp had sloughed off. Eggs were observed on fruits of *Ziziphus dodecandra*.



*Amblycerus vegai*, new species

Figs. 6, 35, 51, 65, 78, 79

*Body length*.—2.5–3.1 mm, width.—1.4–1.8 mm; pronotal length.—0.7–0.9 mm, width.—1.1–1.3 mm.

*Color*.—Integument reddish yellow throughout except eyes black. Vestiture of silvery gray and reddish brown slender hairs in distinct mottled pattern on elytra (Fig. 6), condensed silvery gray spot at base of fifth and occasionally third interval, mottling less evident on pronotum; head, venter of body, and appendages with evenly distributed silvery hairs; pygidium with ovate, median spot of brown hairs flanked by silvery patches, brown spot sometimes divided by narrow line of silvery hairs.

*Structure*.—Body subelliptical, widest at basal one-third of elytra, dorsal profile arcuate. Head subtriangular; eyes large, strongly protuberant laterally, coarsely faceted, ocular sinus one-fifth length of eye; postocular fringe absent; frons nearly flat, frontal carina absent, surface of frons and clypeus punctulate; antenna (Fig. 51) slender, reaching caudal margin of metepisternum, subserrate from fourth segment. Pronotum (Fig. 6) trapezoidal, lateral margins gently arcuate, apex truncate; disk evenly convex, without depressions or elevations, surface finely, densely punctulate with scattered coarser punctures in lateral areas; lateral margin bluntly carinate, submarginal sulcus present beneath carina only, dorsal submarginal sulcus absent; cervical sulcus and cervical boss absent, the latter represented by two setiferous punctures; prosternum before coxae very short, intercoxal piece narrow, slightly expanded apically. Scutellum subtriangular (Fig. 65). Elytra (Fig. 6) 1.4 times as long as wide; disk slightly depressed around scutellum, otherwise evenly convex; striae shallow, narrow, punctures scarcely evident, intervals flat, uniform in width except fourth narrowed basally, fourth, fifth, and sixth narrowed apically; apices of elytra arcuate; mesosternum triangular, slightly concave medially; postmesocoxal sulci meeting medially at obtuse angle, sulci meeting parasutural sulcus of metasternum; metepisternal vertical sulcus arcuate at its juncture with parasutural sulcus. Abdomen with first sternum slightly longer than remaining four together in male, slightly shorter in female; pygidium subtriangular, rounded apically, slightly convex, finely, evenly punctulate. Male genitalia with median lobe (Fig. 78) about 5 times as long as wide; ventral valve ogival, acute apically; dorsal valve subtriangular, rounded apically; armature of internal sac consisting of saddle-shaped sclerite near base of sac, an elongate, wishbone-shaped sclerite and paired, elongate, clavate sclerites each with cluster of spines, paired, serrate, bladelike sclerites, and paired, hollow, triangular, thin-walled sclerites articulated with apices of fork of wishbone, apex of sac with circular transfer valve with two appended, slender rods; lateral lobes (Fig. 79) expanded apically, setose, apical margin shallowly emarginate.



*Holotype* ♂.—COSTA RICA. Guanacaste Prov.: Finca La Pacifica, Cañas, 9 April 1971, in seeds of *Cordia alliodora*, Janzen #688 (USNM Type #76376). Allotype ♀ and 6 paratypes, same data. Other paratypes.—COSTA RICA. Guanacaste Prov.: Santa Rosa, 15 March 1972, D. H. Janzen et al. (#VI-20-1972-VIII), *Cordia alliodora*, dry hillside (10); Finca La Pacifica, 26 March 1976, D. H. Janzen, in flowers of *Enterolobium* (13). EL SALVADOR. Vol. Conchagua, 27–29 May 1958, Depto de La Union, L. J. Bottimer cl. #1010 (39).

This species is most closely related to *Amblycerus caymanensis* Kingsolver described from the West Indies. It differs in the following details (*caymanensis* in parentheses): Average body length 2.8 mm (3.5 mm); saddle-shaped sclerite in internal sac of male genitalia with basal projection bent ventrad and arms broad and thin (basal projection dorsal and arms slender); paired bladelike sclerites broad with serrations fine (sclerites slender with serrations coarse); lateral lobes with apical margin incurvate (margin subtruncate with median incision).

*Cordia alliodora* (Ruiz and Pav.) Cham. ex DC. (Boraginaceae) is widespread in subtropical and tropical New World, and its fruits are hosts for several closely related species of *Amblycerus*.

*Amblycerus vegai*, new species, is named for Gerado Vega, who has contributed much to field studies by D. H. Janzen in Costa Rica.

### *Zabrotes* Horn

*Zabrotes* Horn, 1885:156.

*Zabrotes* is known, with one exception, only from the Western Hemisphere. One species, *Z. subfasciatus* (Boheman), attacks seeds of *Phaseolus* spp. and has spread through commerce to Africa and Asia. Host associations of species of *Zabrotes* are so far known only to be with leguminous seeds.

### *Zabrotes chavesi*, new species

Figs. 7, 8, 36, 52, 80, 81

*Body length*.—1.9–2.0 mm, *width*.—1.1–1.3 mm; *pronotal length*.—0.5–0.6 mm, *width*.—0.6–0.7 mm.

*Color*.—Integument black in both sexes except antennal segments 1 and 2 reddish brown. Vestiture of male (Fig. 7) of brown and gray slender hairs in following pattern: Head with sparse gray hairs; pronotum with broad, median, brown stripe bisected by gray cruciate mark, lateral one-third of disk predominantly gray enclosing brownish spot, basal and lateral margins with continuous, narrow, brown band; scutellum gray; elytra predominantly brown with intervals 3 and 5 gray, occasionally with gray spot at base of



interval 7, narrow transverse gray band extending from middle of interval 3 to interval 9; pygidium with about equal proportions of brown and gray hairs with median brown stripe bisected by narrow, gray stripe, lateral one-third each side mostly gray but with lateral, brown spot; venter of body mostly gray with brown spot in lateral one-half of metacoxal face, in lateral one-fourth of first abdominal sternum, a few scattered brown hairs laterally on telescoped sterna 2 to 4, and large spot on sternum 5; appendages gray. Variation in male: transverse bars on elytra are sometimes indistinct. Vestiture of female (Fig. 8) mostly dark brown dorsally with gray pattern, mostly gray beneath; head gray; pronotum with large, cordate median area brown with small, median gray spot, flanks with large, diffuse, gray spot, basal lobe with gray marginal stripe; scutellum gray, elytra largely dark brown, fifth interval with intermittent gray stripe reaching from base to midpoint of elytra, there joining irregular, transverse gray band spanning intervals 3 to 9, narrow band of golden brown hairs on anterior and posterior margins of transverse band; pygidium mostly brown with narrow, median gray stripe and broad, transverse basal gray band; venter of body with evenly distributed mostly gray hairs except all but extreme distal end of metacoxal face brown, and brown spots laterally on abdominal sterna.

*Structure*.—Body short, broadly ovate; head in repose strongly opisthognathous concealing procoxae. Head turbiniform, eyes strongly protuberant, subtriangular, nearly flat anteriorly; ocular sinus deep, nearly bisecting eye; frons with faint vertical carina; frontoclypeal suture faint; frons and clypeus densely punctulate; labrum sparsely punctulate; antenna (Fig. 52) long, reaching hind coxa, subserrate from fifth segment, not sexually dimorphic. Pronotum (Figs. 7, 8) broad, base strongly bisinuate, lateral margins strongly arcuate, apex briefly truncate; disk finely punctulate medially, more coarsely punctate laterally; vestiture posteriad of transverse bar of cruciate mark directed at  $60^\circ$  toward midline; in lateral aspect, lateral margin carinate, arcuate, meeting vertical supracoxal carina behind eye, then extending to anterior margin; margin dorsad of lateral carina with two setiferous punctures set in distinct depression; prosternum much reduced, depressed, triangular, concealed by head in repose, procoxae connate. Scutellum (Fig. 7) small, equilaterally triangular. Elytra (Figs. 7, 8) together broader than long, lateral margins arcuate, apices separately, evenly rounded; striae narrow, shallow, stria punctures fine, setiferous, intervals finely imbricate, sparsely punctate; intervals nearly equidistant basally, but 3, 5, and 7 narrowed apically, all striae free apically; mesosternum linguiform, rounded apically; postmesocoxal sulci meeting at a right angle mesally, reaching metasternal-mesepisternal suture laterally. Abdomen short, first ventral segment longer than remaining four together; second, third, and fourth strongly telescoped, fifth emarginate in both sexes, more deeply so in male; pygidium convex,



finely, densely punctate. Male genitalia with median lobe (Fig. 80) short, cucullus broad; ventral valve triangular, lateral margins nearly straight; dorsal valve spatulate, slightly longer than ventral valve; base of internal sac with curved, thickened margins, middle of sac with 2 curved, acute spines, apex of sac armed with fine denticles; lateral lobes (Fig. 81) straplike basally, with fleshy, setiferous lobes apically. Pro- and mesolegs not modified; metacoxal face reniform, nearly flat, densely punctulate with a few faintly depressed foveolae, and densely setose in lateral three-fifths, remainder polished, slightly depressed, and with cluster of coarse punctures near insertion of trochanteral condyle; metafemur somewhat falcate, dorsal margin perceptibly curved in basal one-half, arcuate in apical one-half, ventral margin sinuate and carinate externally, channeled on ventral face for reception of tibia; metatibia (Fig. 36) gradually widened from base to obliquely truncate apex, lateral face with 2 distinct carinae, mesal face with 1 carina, apex with two short, unequal calcaria on ventral margin, apical margin finely serrate.

*Holotype* ♂.—COSTA RICA. Guanacaste Prov.: Santa Rosa N. Park, 12 March 1976, D. H. Janzen, ex seeds of *Cassia leptocarpa* (USNM Type #76374). Allotype ♀ and 5 paratypes, same data. Other paratypes.—San Jose Prov.: La Casa s. San Jose, July 1932, Schmidt, leg., Nevermann Coll. (4). EL SALVADOR. San Salvador, 14 June 1958, L. J. Bottimer Coll. No. 101H (1); S C Porrillo, 5 June 1958, Depto San Vicente, L. J. Bottimer Coll. No. 102A (1). MEXICO. Jalisco: Chapingo, 15 August 1949, L. J. Bottimer Coll. No. 125T (1). Guerrero: km 383 Acapulco Rd., 28 July 1934, C. C. Plummer, coll., Bottimer No. 70B (1). Sinaloa: Mazatlan, 10 May 1961, Howden and Martin (1). Michoacan: Apatzingan, 28 March 1970, USDA Plant Quarantine, Laredo No. 818 (1).

*Zabrotes chavesi*, new species, belongs to a group of species with a dense cluster of punctures on the hind coxa near the trochanteral condylic insertion. Included in this group are *Z. cruciger* Horn, *spectabilis* Horn, *planifrons* Horn, *interstitialis* (Chevrolat), and *arenarius* Wolcott. The male genitalia in this group, however, indicate that diversity exists, and that the group may not be natural. Only *Z. interstitialis* has previously been illustrated (Kingsolver, 1970:204) but genitalia of all of the above species have been examined and were found to be distinctive.

*Zabrotes chavesi* is the only species in the group with a spatulate apex on the dorsal valve in the male genitalia. *Zabrotes planifrons*, *Z. interstitialis*, and *Z. arenarius* have no distinguishable pattern in either sex, and this effectively separates them from *Z. chavesi*. Both *Z. cruciger* and *Z. spectabilis* have strongly contrasting patterns of pronotum, elytra, and pygidium in both sexes and can be distinguished from female *Z. chavesi* by the strongly contrasting white triangular mark at the base of the pronotum as well as the genital character mentioned above.



This species is named for Franklin Chaves, Park Director of Santa Rosa National Park in northwestern Costa Rica.

## BRUCHINAE

This subfamily is the largest in the Bruchidae, and much study is needed toward a reclassification of the genera, especially on a world basis. Thirty-four genera are now assigned to this subfamily.

### *Merobruchus* Bridwell

*Merobruchus* Bridwell, 1946:54.

*Merobruchus* is a medium-sized genus found only in the Western Hemisphere, and is known so far to breed only in leguminous plant seeds. It is related to the *Gibbobruchus-Caryedes* complex of genera but also shows some affinity with some species now placed in *Acanthoscelides* (*s. lat.*). The limits of the genus have not been satisfactorily circumscribed, but a taxonomic study of North American species is now underway.

Characters that tentatively can be used to recognize species belonging to *Merobruchus* are: metafemur swollen, pecten with 1 long and 2 or 3 shorter denticles, metatibia arcuate basally to fit ventral margin of metafemur, head short, base of elytra with low gibbosity from which third and fourth striae arise, male genitalia with ventral valve broad, internal sac usually with at least a wishbone-shaped sclerite.

### *Merobruchus santarosae*, new species

Figs. 9, 10, 11, 24a, 24b, 37, 82, 83

*Body length*.—3.1–4.2 mm, width.—1.9–2.1 mm; *pronotal length*.—0.9–1.3 mm, width.—1.3–1.4 mm.

*Color*.—Integument deep red above with piceous spots on elytra; venter of body usually somewhat darker especially on thoracic sterna; eyes black; antenna reddish yellow with segments 8–10 piceous; pro- and mesolegs reddish yellow, metalegs usually dark red. Vestiture of yellowish gray and dark brown, slender, recumbent hairs, brown hairs only on piceous integumental spots on elytra and occasionally on pronotum; elytral disk usually with large brown lateral spot and numerous smaller spots (Figs. 9, 10, 11); pronotal disk occasionally with broad, dark stripe but usually concolorous; pygidium (Fig. 24a) of female with distinct, median, yellowish stripe, this less distinct in male (Fig. 24b).

*Structure*.—Body ovate, widest at basal one-third of elytra. Head short, subtriangular; eyes protuberant laterally, convex, ocular sinus about one-half length of eye; postocular fringe narrow; supraocular sulcus short, shallow, bottom of sulcus with tuberculate, setiferous punctures; vertex finely



punctulate, punctures on frons and clypeus somewhat coarser and denser, those on frons tending to be strigose, frontal carina prominent, strigose, impunctate, connected dorsally to transverse depression between vertex and frons; labrum vaguely punctulate; antenna gradually clavate from third segment, segments 8–10 wider than long, segment 11 elliptical. Pronotum (Fig. 10) campaniform, lateral margins nearly straight in dorsal aspect, disk strongly convex except depressed subbasally near posterior angles, basal lobe shallowly canaliculate medially, surface punctulate-imbricate with scattered umbilicate, setiferous punctures; lateral carina ridge-like extending from posterior angle nearly to procoxal cavity; cervical sulcus short, deep; cervical boss bisetose; prosternum T-shaped, moderately short before procoxae, intercoxal piece sharply triangular, barely separating coxae apically. Scutellum short, broader than long, shallowly emarginate and bidentate apically. Elytra (Fig. 10) together slightly longer than broad; disk slightly depressed medially between fifth intervals; striae regular in course, narrow, nearly concealed by vestiture, stria 2 arising behind scutellum, 3 and 4 arising from denticles set on low gibbosity, 5 and 6 from subbasal denticles in slight depression, all striae ending free apically; intervals of subequal width, surface imbricate-punctate; mesosternum triangular, truncate apically; postmesocoxal sulci meeting medially at right angle, angulate behind coxae. Abdomen with first sternum equal in length to remaining 4 together, fifth sternum of male with deep, broad emargination, lateral margins of emargination slightly raised, last sternum of female with deep, narrow emargination, lateral margins prominent, angulate; pygidium (24a and b) subtriangular, lateral margins arcuate, disk convex, finely punctulate. Male genitalia with median lobe (Fig. 82) about 4 times as long as wide; ventral valve broad, quadrate, apical margin slightly emarginate; dorsal valve absent; internal sac with fine denticles in basal one-half, a short wishbone-shaped median sclerite, and paired, flattened, thornlike sclerites in apical one-half; closure valve crescentic; lateral lobes (Fig. 83) short, deeply cleft, spatulate apically. Pro- and mesolegs not modified; metacoxal face reniform, densely punctate except narrow, bare, transverse strip near anterior border; meta-femur and metatibia as in Fig. 37, pecten with 1 long and 3 short denticles; metatibia with lateral, lateroventral, ventral, and dorsomedial carinae distinct and complete; mucro short, length about one-half width of tibia at apex.

*Holotype* ♂.—COSTA RICA. Guanacaste Prov.: Santa Rosa N.P., rd. to El Naranjo, 9 March 1972, D. H. Janzen et al. (#VI-20-1972-XXXI), *Lysiloma* sp. (USNM Type #72820). Allotype ♀ and 269 paratypes, same data. Other paratypes.—Same data as type except (#VI-19-1972-II) (6); Santa Rosa N.P., 12 March 1976, D. H. Janzen (#10355, 10356, 10357), *Lysiloma desmostachys* (295); Santa Rosa N.P., 9 March 1973, D. H. Janzen (3). MEXICO. San Luis Potosi: El Salto de Agua, 28–30 July 1960, H. Howden



(1); Puebla (state), 11 January 1965, USDA Plant Quarantine interception, El Paso 64581, in "palo amarillo" (6); Sonora: Yecora, 7,000', 20–22 May 1961, Gibson et al. (1); Guerrero: 13 mi N Chilpancingo, 25 August 1958, H. Howden (1).

This species is most closely related to *M. sonorensis*, new species, and the differences are discussed under that species. The color pattern of *M. santarosae* resembles that of the darker forms of *M. paquetae*, new species, but the white pygidial triangle and male genitalia are distinctive.

The specific name is taken from the type-locality.

*Merobruchus boucheri*, new species

Figs. 12, 25, 38, 53, 84, 85.

*Body length*.—3.2–3.7 mm, width.—1.5–2.2 mm; pronotal length.—0.8–1.3 mm, width.—1.1–1.5 mm.

*Color*.—Integument yellowish red to piceous. Vestiture of yellowish gray and dark brown slender hairs with scattered coppery hairs of elytra in pattern shown in Fig. 12; head densely setose except middle of frons and clypeus; pronotum (Fig. 12) with broad, dark, median stripe, lateral areas yellowish with vestiture dense concealing sculpture; elytra with dark brown hairs on piceous spots, yellowish gray and coppery spots on lightly colored areas; pygidium with basal triangular spot yellowish (Fig. 25), median and lateral spots brown with median spot and lateral areas yellowish; venter of body yellowish; pro- and mesolegs yellowish red, metalegs dark red; antennae (Fig. 53) yellowish except segments 7, 8, and 9 dark brown.

*Structure*.—Body ovate, widest at middle one-third of elytra. Head turbiniform; eyes moderately protruding, ocular sinus one-half length of eye; supraocular sulcus sharply limited, bottom of sulcus with setiferous tubercles; postocular fringe narrow; vertex finely variolate, each variole with centrally placed hair; frons more deeply variolate tending to be costulate; frontal carine obtuse, impunctate; clypeus bimodally punctate, granulate apically; antenna (Fig. 53) reaching posterior angle of pronotum, subserrate and gradually clavate from fifth segment, segments 6 to 10 wider than long, eleventh subelliptical. Pronotum campaniform (Fig. 12), in dorsal aspect, lateral margins incurved, apex rounded, disk strongly convex with basal lobe briefly canaliculate, basal margin slightly depressed laterad of basal lobe, basal one-half of disk with short, obtuse longitudinal ridges posterolaterally; surface of disk densely variolate, each variole with a centrally placed hair; in lateral areas, varioles less dense, indistinctly defined, concealed by dense vestiture, intervals finely punctate; lateral carina present only briefly in middle of margin, concealed by dense vestiture; cervical boss bisetose; cervical sulcus short, concealed by vestiture; prosternum T-shaped, acutely triangular between coxae, incised apically but separating



coxae. Scutellum quadrate, deeply incised and bidentate apically. Elytra (Fig. 12) together slightly longer than wide, disk subdepressed medially, convex laterally; striae regular in course, intervals 3, 5, and 7 slightly wider than 2, 4, and 6; striae shallow, narrow, with strial punctures close-set, stria 2 arising basally in deep, basal pit with fine anterior ridge, striae 3 and 4 arising basally in prominent denticles set on low gibbosity, all striae free apically except 4 and 5 approximate or conjoined; mesosternum subtriangular, apex rounded; postcoxal sulci angulate. Abdomen with first sternum longer than remaining sterna together; fifth sternum in both sexes with deep, angulate notch, that of female deeper than that of male, lateral margins of notch in male obtusely rounded, those in female with caudoventrally directed, minutely serrate lobes, each with prominent tuft of yellowish setae; pygidium slightly convex, disk minutely punctate. Male genitalia with median lobe (Fig. 84) elongate, cucullus broad, apex slightly expanded; ventral valve arcuate, nearly as broad basally as apex of median lobe; dorsal valve absent, replaced by membranous lobe extending slightly beyond apex of ventral valve; armature of internal sac consisting of dense rows of denticles in basal one-half, a quadrate median plate with projecting thornlike spine, a pair of subapical spines set in cluster of fine denticles, and an apical cluster of close-set, rounded denticles; apical closure valve circular; lateral lobes (Fig. 85) each narrow but expanded apically, strongly bowed, the cleft between them deep. Pro- and mesolegs not modified; metacoxal face slightly convex, densely punctate except for polished, transverse area near anterior margin; metaleg as in Fig. 38, pecten with 1 long and 3 short denticles; metatibia arcuate, lateral, lateroventral, ventral, and dorsomedial carinae distinct and complete, mucro shorter than width of tibia at apex, corona with 3 or 4 fine denticles.

*Holotype* ♂.—COSTA RICA. Guanacaste Prov.: 2 mi E Bagaces, 23 February 1972, D. H. Janzen (#VI-20-1972-XXXXIV), in seeds *Pithecellobium mangense* (USNM Type #72819). *Allotype* ♀ and 161 paratypes, same data. Other paratypes.—COSTA RICA. Guanacaste Prov.: Santa Rosa N. P., nature trail, 15 March 1972, D. H. Janzen (#IV-19-1972-XV), in seeds *Pithecellobium mangense* (324); Santa Rosa N. P., nature trail, 10 March 1976, D. H. Janzen, in seeds of *Pithecellobium mangense* (78); 6 km SE Bagaces, 23 February 1973, R. Carroll (8). HONDURAS. Aguan Valley, Culuco, March 1979, G. V. Manley, in seeds of *Pithecellobium* prob. *mangense* (2); Comayagua, 2 February 1979, G. V. Manley, ex seeds *Pithecellobium* prob. *mangense* (2); Coyoles, 16 February 1978, G. V. Manley, ex seeds *Pithecellobium* prob. *mangense* (1); same data except 15 March (14). PANAMA. Canal Zone, Ft. Clayton, 30 March 1964, L. J. Bottimer, (#121Q), ex seeds of *Acacia?* (20); Canal Zone, March 1920, H. L. Lyon (Bottimer #56k) (2). MEXICO. (all collected by C. D. Johnson) Sonora: 13 mi NW Alamos, 23 December 1976 (CDJ #165-76) and 4 mi NW Alamos, 23 December 1976



(CDJ #175-76), both in *Pithecellobium undulatum* (16); 5 mi W Alamos, 23 December 1976 (CDJ #186-76), in *Pithecellobium undulatum* (22); 6 mi W Alamos, 27 December 1977 (CDJ #168-77), in *Pithecellobium undulatum* (50); 2 mi E Alamos, 29 December 1977 (CDJ #189-77), in *Pithecellobium undulatum* (12). Sinaloa: 38 mi S Culiacan, 25 February 1973 (CDJ #196-73), in *Pithecellobium* aff. *mangense* (4). Nayarit: 2 mi NW Acaponeta, 10 March 1973 (CDJ #482-73)(90).

Among the described species, *Merobruchus boucheri*, new species, is most closely related to *M. solitarius* (Sharp), but its nearest relatives are yet to be described. The distinctive broad, median stripe of the pronotum combined with the pygidial pattern and the male genital characters will easily separate this species.

Except for the host label "Acacia" on the Panamanian specimen, this species is apparently restricted to *Pithecellobium mangense* (Jacq.) MacBride and *P. undulatum* (Britt. & Rose) Gentry, the latter apparently replacing *P. mangense* as the host plant in northern Mexico.

This species is named for Douglas Boucher, who showed D. H. Janzen the seed crop that contained the first collection of this bruchid.

*Merobruchus hastatus*, new species

Figs. 13, 26, 39, 86, 87

*Body length*.—3.25–3.75 mm, width.—2.0–2.7 mm; pronotal length.—1.9–2.0 mm, width.—1.4–1.5 mm.

*Color*.—Integument reddish to piceous; eyes black; prolegs, metatibia, and usually apex of metafemur reddish yellow; antenna with basal 7 and eleventh segments reddish yellow, segments 8–10 piceous to black. Vestiture of grayish yellow and dark brown slender hairs above, silvery gray beneath, dark brown hairs generally placed on piceous spots of pronotum, elytra, and pygidium in pattern shown in Figs. 13 and 26.

*Structure*.—Body ovate, widest at basal one-third of elytra. Head turbiniform; eyes strongly protuberant laterally, slightly convex anteriorly, ocular sinus about one-half length of eye, supraocular sulcus short, bottom of sulcus with minute, setiferous, tuberculate punctures, postocular fringe narrow; vertex punctulate-reticulate, punctures crowded, intervals narrow, ridge-like, frons more coarsely punctate, frontal carina prominent, minutely strigulate, frontal region separated from vertex by prominent, transverse depression above level of eyes; clypeus punctate-reticulate with apex finely granulose; antenna short, scarcely reaching humerus, clavate from fourth segment, apical segments strongly transverse, eleventh subelliptical. Pronotum (Fig. 13) campaniform, lateral margins incurvate, basal margin strongly bisinuate, disk convex except subdepressed near basal angles and briefly



sulcate on basal lobe, surface with irregularly placed, umbilicate foveolae, each with long seta in middle of depression; intervals punctulate, lateral carina effaced except for short section in middle of lateral margin; cervical sulcus short, deep, nearly hidden by vestiture; cervical boss bisetose; prosternum T-shaped, apex acutely triangular, procoxae connate apically. Scutellum quadrate, slightly wider than long, emarginate and bidentate apically. Elytra (Fig. 13) together slightly longer than wide, striae prominent, deep, narrow, regular in course; first stria arising behind scutellum, second, fifth, and sixth arising basally, third and fourth arising from subbasal denticles set on low gibbosity, stria punctures 1 to 2 diameters apart; intervals 3, 5, and 7 slightly wider than 2, 4, and 6, all intervals finely strigose-punctulate, all striae free apically except 4 and 5 sometimes conjoined; mesosternum triangular, linguiform, postmesocoxal sulci arcuate but not angulate behind coxae, not meeting on midline. Abdomen with first sternum slightly longer than remaining four together, fifth sternum deeply, broadly emarginate in male, with small angulate notch with raised margins in female; pygidium subtriangular, lateral margins gently arcuate, convex, apex in male strongly reflexed, disk densely punctulate, intervals granulose, color pattern as in Fig. 26, piceous areas somewhat variable in shape. Male genitalia with median lobe (Fig. 86) moderately slender, 4 times as long as wide; ventral valve subquadrate, truncate apically; internal sac with elongate mass of fine denticles in basal one-half, a pair of large thornlike sclerites, a large, median, thornlike or wishbone-shaped sclerite, and another pair of thornlike sclerites in middle, and large mass of very fine spicules in apical portion; closure valve circular; lateral lobes (Fig. 87) broad, expanded toward midline at apices, cleft between lobes about two-thirds their length. Pro- and mesolegs not modified, metacoxal face densely punctulate except for polished, bare, transverse area near anterior margin; metafemur (Fig. 39) rather strongly incrassate, pecten with 1 long denticle followed by 3 shorter denticles; metatibia (Fig. 39) arcuate basally, straight and slightly expanded apically; lateral, lateroventral, ventral, and dorsomedial carinae distinct and complete; mucro short, its length about one-third width of tibia at apex, lateral denticle prominent, coronal denticles 4.

*Holotype* ♂.—COSTA RICA. Guanacaste Prov.: Santa Rosa N. P., 12 March 1976, D. H. Janzen (#10357), ex seeds of ?*Piptadenia flava* (USNM Type #72821). Allotype ♀ and 44 paratypes, same data.

This species is most closely related to *M. paquetae*, new species, among the described species. It differs in the form of the pygidial markings (cf. Figs. 26 and 27), in the color pattern of the elytra (cf. Figs. 13 and 14), and in the form of the ventral valve and of the internal sac armature (cf. Figs. 86 and 88).

The specific name is derived from the triangular pygidial spot.



*Merobruchus paquetae*, new species

Figs. 14, 27, 40, 88, 89

*Body length*.—2.0–3.1 mm, width.—1.1–1.9 mm; pronotal length.—0.6–1.0 mm, width.—0.9–1.4 mm.

*Color*.—Integument dark red to piceous; pro- and mesolegs and antenna reddish yellow, in darker forms with segments 8–10 piceous; eyes black; metafemur mostly piceous with dorsal one-third dark red; pronotum with broad median stripe darker than lateral areas; elytra with lateral margins usually clouded with piceous, sometimes with a lateromedian, dark, rounded spot similar to that of *M. acaciae*, new species (Fig. 11); pygidium usually with paired, median, irregular dark areas showing through vestiture, more prominent in darker specimens. Vestiture of yellowish gray, silvery gray, white, and dark brown slender hairs in pattern in Figs. 14 and 27, dark brown hairs restricted to piceous areas; scutellum white; basal triangle and median diamond-shaped mark on pygidium (Fig. 27) of yellowish gray to white with paired, darker, integumental areas encroaching; venter of body with evenly distributed silvery gray hairs.

*Structure*.—Body ovate, widest at basal one-fourth of elytra. Head short, turbiniform, eyes strongly convex and protuberant laterally, ocular sinus about two-thirds length of eye, supraocular sulcus short, shallow, with bottom of sulcus set with minute, setiferous tubercles, postocular fringe narrow; vertex densely punctulate, frons more coarsely punctulate, frons and vertex separated by transverse depression, frontal carina ridge-like, impunctate; clypeus densely punctate-reticulate; antenna gradually clavate, reaching humerus, subserrate from fifth segment, 7–10 wider than long, 11 elliptical. Pronotum (Fig. 14) campaniform, lateral margins perceptibly sinuate, basal margin sinuate with basal lobe rectangular; disk strongly convex except for subbasal depressions near posterior angles, and for subbasal median sulcus; surface closely, minutely foveolate, each foveola circular, umbilicate, and setose; lateral carina prominent, arcuate, extending from posterior angle nearly to procoxal cavity; cervical sulcus deep, narrow; cervical boss bisetose; prosternum T-shaped, apex acute, short, barely separating procoxal apices. Scutellum quadrate, deeply emarginate apically, bidentate. Elytra (Fig. 14) together slightly longer than wide, depressed in postscutellar area; striae narrow, shallow, distinct, slightly sinuate, first stria arising at scutellar depression, second arising from basal pit with anterior carina, third and fourth arising from individual denticles on slight basal elevation, fifth and sixth strongly convergent basally, arising from individual denticles which have a common base set in a subbasal depression, all striae free apically except 4 and 5 sometimes conjoined; intervals 3, 5, 7, and 9 slightly wider than 2, 4, 6, and 8; mesosternum triangular, lingulate apically; post-mesocoxal sulci not meeting on midline, obtusely angulate behind coxae.



Abdomen with first sternum about 1.5 times as long as remaining sterna together; fifth sternum in male broadly, deeply emarginate, nearly divided; emargination in female shallow but with lateral margins of emargination slightly flared; pygidium (Fig. 27) subtriangular, lateral margins arcuate, apex bluntly rounded, more strongly reflexed in male, disk convex, surface minutely punctulate. Male genitalia with median lobe (Fig. 88) nearly 4 times as long as wide; ventral valve with apical margin arched in ventral aspect; internal sac with armature consisting of clusters of fine denticles basally, a pair of larger denticles near base, a wishbone-shaped sclerite and 2 large thornlike sclerites in middle of sac, apex of sac lined with small, rounded and acute denticles and fine spicules; closure valve circular; lateral lobes (Fig. 89) short, broad, the cleft between them about two-thirds their length. Pro- and mesolegs not modified; metacoxal face reniform, densely punctulate except for elongate polished area near anterior border; metafemur (Fig. 40) moderately incrassate, dorsal margin arcuate, ventral margin sinuate near apex, pecten consisting of 1 long denticle followed by 2 or 3 shorter denticles; metatibia (Fig. 40) strongly arcuate in basal one-half with lateral, lateroventral, ventral, and dorsomedial carinae complete, distinct; mucro short, acute, length about one-half width of tibia at apex, lateral denticle short, coronal denticles 3 or 4.

*Holotype* ♂.—COSTA RICA. Guanacaste Prov.: 1 mi W Tilaran, 4 March 1972, D. H. Janzen et al. (#VI-20-1972-XII), *Lysiloma* sp. (USNM Type #72823). Allotype ♀ and 55 paratypes, same data. Other paratypes.—COSTA RICA. Guanacaste Prov.: Santa Rosa N. P., beach area, 15 March 1972, D. H. Janzen (#VI-19-1972-VII), *Lysiloma* sp. (2); Santa Rosa N. P., 3 March 1978, D. H. Janzen (#10970), *Albizia adinocephala* (32); Santa Rosa N. P., monument hill, 25 February 1977, D. H. Janzen, *Albizia adinocephala* (27); Santa Rosa N. P., rd to El Naranjo, 9 March 1972, D. H. Janzen (#VI-19-1972-II), *Lysiloma* sp. (2); Finca La Pacifica, Cañas, 19 March 1974, D. H. Janzen (#1974-51), reared from *Lysiloma* sp. (3); La Pacifica, Tenorio Rd., 7 March 1976, *Albizia caribaea* (95); Rio Cañas, Cañas, 7 March 1975; D. H. Janzen, *Lysiloma* sp. (68); Bagaces, COMELCO, great swamp, 13 March 1971, D. H. Janzen (#606), *Albizia caribaea* (3). NICARAGUA. Granada, Divia, 1 July 1963, L. J. Bottimer (coll. #114o) (1). PANAMA. Canal Zone: Gamboa, 16 March 1964, L. J. Bottimer (#120u) (1). COLOMBIA. Magdalena: Rio Frio, Darlington (4); Antioquia; Sopetran, 750 m, 15 March 1974, J. Escobar, in seeds *Pseudosamanea* sp. (21). VENEZUELA. Merida; Merida, 19 May 1978, in Saman (1). Surinam, USDA Plant Quarantine intercep. N.Y. 9521, 17 April 1979, *Mimosa* sp. (4). BRAZIL. Rio de Janeiro; Paqueta Is., June 1954, N. L. H. Krauss (1); Seropedica, Univ. Rural km 47, October 1958, J. Hercio (1). Mato Grosso: Rosario Oeste, October 1963, M. Alvarenga (1); Corumba, Acc. No. 2966, lowlands, March (8).



The generally darker lateral margins of the elytra, approximate fifth and sixth stria bases, and contrasting dark areas on the pygidium are characteristic in combination, but the arched ventral valve, paired basal denticles, wishbone and thornlike sclerites in the male genitalia are definitive. Because of the somewhat variable color pattern and possible confusion in external characters with *M. santarosae*, especially in the darker forms, male genitalia should always be examined.

*Stator limbatus* (Horn) and *Merobruchus sonorensis*, new species, have been reared in company with *M. paquetae* in the same lots of *Lysiloma* sp. and *Albizia adinocephala*.

This species is named for the Paqueta Is. locality.

*Merobruchus sonorensis*, new species

Figs. 15, 28, 41, 90, 91

*Body length.*—2.9–3.5 mm, width.—1.6–2.0 mm; pronotal length.—0.9–1.2 mm, width.—1.2–1.4 mm.

*Color.*—Integument mostly dark red with some piceous clouding on head, pronotum, and pygidium, eyes black, antenna yellowish red with segments 8, 9, and 10 piceous, pro- and mesolegs yellowish red; vestiture of yellowish gray, dark brown, and white slender hairs; vestiture on head, pronotum, and venter of body yellowish gray, midline of pronotum with narrow, condensed stripe of hairs in most specimens (Fig. 15); scutellum white; elytra yellowish gray except dark brown hairs on dark integumental spots; pygidium (Fig. 28) mostly yellowish gray but with dark brown on piceous integument; basal triangle and median spot white.

*Structure.*—Body ovate, widest at basal one-third of elytra. Head short, turbiniform; eyes strongly convex, protuberant laterally, ocular sinus about two-thirds length of eye, supraocular sulcus short, shallow, its bottom with row of tuberculate, setiferous punctures; postocular fringe very narrow; vertex densely punctulate, frons more coarsely punctulate, frons and vertex separated by shallow, transverse depression above eye level, frontal carina ridgelike, impunctate, minutely strigulate; clypeus punctate-reticulate with apical margin granulose; antenna short, reaching posterior angle of pronotum, gradually clavate from fourth segment, segments 6–10 strongly transverse, eleventh elliptical. Pronotum (Fig. 15) campaniform, lateral margins vaguely sinuate, basal margin sinuate, basal lobe transverse, arcuate; disk convex except subdepressed subbasally near lateral angles, basal lobe shallowly sulcate; surface minutely, irregularly foveolate, each foveola circular, umbilicate, and setose; lateral carina arcuate, extending from posterior angle one-half distance to procoxal cavity; cervical sulcus deep, narrow, short, nearly hidden by vestiture, cervical boss bisetose; prosternum T-shaped, apex acutely triangular, barely separating apices of procoxae. Scutellum



quadrate, bilobate. Elytra (Fig. 15) slightly longer than wide, subdepressed medially; striae narrow, lightly impressed, regular in course, not laterally deflected basally, first stria arising behind scutellum, second from basal pit with marginal carina, third and fourth from subbasal denticles set on low gibbosity, fifth and sixth from small basal denticles; all striae free apically except fourth and fifth sometimes conjoined apically; strial punctures close-set, separated by a diameter; intervals of subequal width, sometimes with second and fourth perceptibly wider, transversely strigose and sparsely punctate; mesosternum triangular, apex lingulate; postmesocoxal sulci sharply angulate behind coxae. Abdomen with first sternum 1.5 times as long as remaining sterna together in male, 1.25 times in female; fifth sternum broadly, deeply emarginate in male, angulately emarginate in female with angles slightly flared ventrad; pygidium (Fig. 28) subtriangular, briefly truncate apically, apex more reflexed in male, lateral margins arcuate, disk convex, minutely foveolate, with white pubescent spots essentially alike in both sexes. Male genitalia with median lobe (Fig. 90) about 4 times as long as wide, ventral valve subquadrate, apical margin slightly emarginate; internal sac lined with fine denticles in basal one-third, middle one-half with wish-bone-shaped sclerite and a pair of broad-based, thornlike sclerites, apical area with a patch of fine spicules, closure valve circular; lateral lobes (Fig. 91) short, rather broad, slightly expanded toward midline at apices, cleft between lobes about two-thirds their length. Pro- and mesolegs not modified; metacoxal face reniform, densely punctulate except for semicircular polished area near anterior margin; metafemur (Fig. 41) moderately incrassate, dorsal margin strongly arcuate, ventral margin moderately arcuate, sinuate apically, pecten with 1 long denticle followed by 2 or 3 shorter denticles; metatibia (Fig. 41) strongly arcuate basally, nearly straight in apical three-fourths, lateral, lateroventral, ventral and dorsomedial carinae complete, prominent, mucro short, its length about one-third width of tibia at apex, lateral denticle short, coronal denticles 4.

*Holotype* ♂.—COSTA RICA. Guanacaste Prov.: Santa Rosa National Park, Central Barranca, 6 March 1975, D. H. Janzen, reared from seeds of *Lysiloma seemannii* (USNM Type #72822). Allotype ♀ and 1,200 paratypes, same data. Other paratypes.—COSTA RICA. Guanacaste Prov.: Cañas, La Pacífica, 18 April 1974, D. H. Janzen, reared from *Albizia adinocephala* (20); La Pacífica, Tenorio Rd., 7 March 1976, D. H. Janzen, *Albizia caribaea* (37); nr. Cañas, 100 m Rio Sandillal Bridge, 3 March 1972, D. H. Janzen et al. (#VI-20-1972-III), *Lysiloma* sp. (50); 8 km NE Cañas, 4 March 1972, D. H. Janzen et al. (#VI-20-1972-XVII), *Lysiloma* sp. (4); Rio Cañas nr. Cañas, 3 March 1972, D. H. Janzen (#VI-20-1972-XXXIII), *Albizia* sp. (37); Cañas, Rio Cañas, 7 March 1975, D. H. Janzen, *Lysiloma* sp. (250); Santa Rosa N. P., beach area, 15 March 1972, D. H. Janzen et al. (#VI-19-1972-VII), *Lysiloma* sp. (24); same data except (#VI-19-1972-XI)



(31); Santa Rosa N. P., top of hill, 3 March 1977, D. H. Janzen, *Albizia adinocephala* #2 (45); Santa Rosa N. P., monument hill, 25 February 1977, D. H. Janzen, *Albizia adinocephala* (125); Santa Rosa N.P., 3 March 1978, D. H. Janzen (#10970), *Albizia adinocephala* (31); 1 mi W Tilaran, 4 March 1972, D. H. Janzen et al. (#VI-20-1972-XII), *Lysiloma* sp. (4); nr. Bagaces, COMELCO Area B, 9 March 1976, D. H. Janzen, *Lysiloma seemanii* (40). MEXICO. Sonora: Chinobampo, Rio Mayo, 10 January 1937, H. S. Gentry (#2980), *Albizia sinajoensis* (1); San Carlos Bay, Gulf Calif., 9 July 1921, E. C. VanDyke (1); Alamos, 23 February 1963, P. H. Arnaud, Jr. (1). Sinaloa: Culiacan, 25 October–18 November 1891, E. Palmer (#1774), *Pithecellobium sonora* (1); Los Mochis, 9 October 1938; G. Frey (1); 26 mi N Pericos, 13 August 1960, P. H. Arnaud, Jr. et al. (1). Nayarit: La Palma, 1923, J. G. Ortega (#90), *Albizia ortegae* (1 abdomen only). Guerrerro: Acapulco, 4-1-1963, in *Albizia lebbek* (1). Chiapas: Tuxtla Gutz., 27 December 1949, F. Miranda (#5870), *Albizia tomentosa* (1); Berriozabal, 18 December 1949, F. Miranda (#5868), *Albizia tomentosa* (1); 2 mi S Simojovel, 5 July 1969, Campbell and Bright (1). COLOMBIA. Magdalena: Rio Frio (no date), Darlington (9).

This species appears to be most closely related to *M. santarosae*, new species, in the armature of the male internal sac, but the divided pygidial spot (cf. Figs. 24 and 28) and the elytral pattern (cf. Figs. 9, 10, 11, and 15) serve to separate the species; however the male genitalia should be examined for positive identification.

The name *sonorensis* is taken from Sonora State from where the species was first determined to be new. Sonora is apparently the northern limit of its geographical distribution. Costa Rica was selected as the type-locality because of its more nearly central location in the range.

This species has been found with *M. paquetae*, new species, and *Stator limbatus* (Horn) in *Albizia adinocephala* and *Lysiloma seemannii*.

*Merobruchus terani*, new species

Figs. 16, 29, 42, 92, 93

*Body length*.—3.6–4.4 mm, width.—2.1–2.5 mm; pronotal length.—1.1–1.5 mm, width.—1.5–1.9 mm.

*Color*.—Integument deep red to piceous; pro- and mesolegs and basal 5 or 6 and terminal antennal segments reddish yellow. Vestiture of light orange, cinerous, and dark brown recumbent hairs; head, pronotum, and pygidium light orange; elytra (Fig. 16) with light orange, cinerous, and brown, with broad, transverse band and basal spots orange, apical one-third mottled with orange, brown, and cinerous hairs intermixed; scutellum orange; body beneath with mostly cinerous with orange on mesepimeron, and orange spots on mesepisternum and laterally on fourth and fifth abdominal seg-



ments; pygidium with densely set orange vestiture, dark areas (Fig. 29) often with brown hair but usually bare; legs cinerous with apices of pro- and mesotibia and tarsal pads yellowish.

*Structure*.—Body ovate, broadest at middle of elytra. Head short, subtriangular; eyes protuberant laterally, ocular sinus about one-half length of eye, postocular lobe narrow, setose; vertex finely, densely punctate, punctures on clypeus, frons, and lateral mandibular face somewhat coarser, deeper, and closer together, sometimes merging, each puncture with slender hair arising from its center; frontal carina well-marked but not sharply ridged, expanded into T-shape dorsally, impunctate but finely strigulate; ventral sulcus of head terminating dorsally in a deep postocular pit; supraocular sulcus shallow, bottom of sulcus tuberculate, each tubercle bearing a short, slender seta; antenna reaching posterior angle of pronotum, strongly clavate, segments 1 through 4 slender, 5 through 10 eccentric, 11 subtriangular. Pronotum (Fig. 16) subcampaniform, convex, subdepressed basally, posterolateral corners of disk strongly depressed, depressions delimited anteriorly by obtuse, oblique ridges, basal lobe shallowly sulcate, disk densely foveolate, each foveola round, flat-bottomed, and bearing a single seta in its center, foveolae generally crowded, separated by less than a diameter, sometimes coalescing; lateral carina extending from posterolateral corner about two-thirds distance to procoxal insertion, cervical sulcus extending dorsad from bisetose cervical boss to level of dorsal margin of eye; prosternum T-shaped, acutely triangular between bases of procoxae, apex acute narrowly separating coxal apices. Scutellum quadrate, deeply emarginate and bidentate apically. Elytra together (Fig. 16) as long as wide, lateral margins subparallel in middle one-half; striae regular in course, intervals of uniform width, stria punctures round, flat-bottomed near base of elytra, gradually decreasing in size toward apex, each puncture bearing a seta on its anterior margin, stria sulci shallow basally, deepening toward apex, intervals finely imbricate, stria 1 arising from scutellar depression, 2, 5, and 6 from deep, basal pits, 3 and 4 from prominent, basal, bidentate gibbosity, all striae free apically; mesosternum with intercoxal strap truncate apically; postmesocoxal sulci not meeting on midline, angulate behind coxae. Metasternum finely variolate. Abdomen with first sternum longer than remaining segments together, fifth ventral in both sexes deeply emarginate for reception of apex of pygidium, that of male with lateral margin of notch evenly carinate but not prominent, that of female with lateral margin prominently and angulately carinate; pygidium (Fig. 29) of male slightly reflexed and somewhat truncate apically; of female vertical and rounded apically, disk of pygidium finely, obscurely variolate. Male genitalia with median lobe (Fig. 92) broad apically, cucullus emarginate basally, ventral valve broad, arcuate; armature of internal sac consisting of single wishbone-shaped sclerite, apex of sac with large patch of fine denticles; lateral lobes (Fig. 93) long,



bowed, cleft to two-thirds their length. Pro- and mesolegs normal for genus; metacoxal face reniform, densely punctate except for elongate, polished area near anterior border; metaleg as in Fig. 42.

*Holotype* ♂.—COSTA RICA. Guanacaste Prov.: Santa Rosa (N.P.), 15 March 1972, D. H. Janzen, in seeds *Acacia tenuifolia* (USNM Type #72818). Allotype ♀ and 19 paratypes, same data. Other paratypes.—COSTA RICA. Santa Rosa N. P., 12 March 1976, D. H. Janzen, in seeds *Acacia tenuifolia* (24); Santa Rosa N.P., 10 March 1976, D. H. Janzen, in seeds *Acacia tenuifolia* (18); Santa Rosa N.P., 12 May 1976, D. H. Janzen (#10347), in seeds *Acacia tenuifolia* (1); Santa Rosa N.P., 18 January 1977, D. H. Janzen, in seeds *Acacia tenuifolia* (18); Finca La Pacifica, 7 March 1976, D. H. Janzen (#10317), in seeds *Acacia tenuifolia* (13); La Pacifica, 2 February 1973, D. H. Janzen (#VI-20-1972-XXXXVIII), in seeds *Acacia tenuifolia* (15); Cañas (La Pacifica), 13 March 1973, P. Opler, in seeds *Acacia tenuifolia* (1); Taboga, 26 February 1973, R. Carroll (#VI-20-1972-XXXVIII), in seeds *Acacia tenuifolia* (1). HONDURAS. Coyoles, 21 June 1978, G. V. Manley (1). MEXICO. Sonora: Alamos, 7 April 1966, M. W. Neilson (2). Nuevo Leon: 3 mi NW Linares, 20 June 1964, C. D. Johnson, reared from seeds *Acacia berlandieri* (1); Monterrey, Chipinque Mesa, 24–26 July 1960, H. F. Howden (1). Jalisco: 56 mi S Puerto Vallarta, 9 March 1973, C. D. Johnson (446-73), *Acacia* sp. (28). Puebla: Tehuacan, 30 June 1954, D. G. Kissinger (1). Guerrero: 18 mi N Chilpan, 26 August 1958, H. F. Howden (1); between Iguala and Chilpancingo, January 1945, N. L. H. Krauss, ex legume seeds (2); Acapulco (no date), Chittenden (19). Oaxaca: 14 mi W Niltepec, 7 July 1971, Clark et al. (1); 75 mi SE Oaxaca, 2,500', 6 July 1968, C. D. Johnson (#225-68), reared from seeds *Acacia angustissima*, emerged 15 August 1968 (1).

This species is most closely related to *M. lineaticollis* (Sharp), the latter easily recognized by the dark red body with narrow, intensely white median line of the pronotum and pygidium, and longer arms on the wishbone sclerite in the male genitalia.

I name this species for my good friend and colleague, Arturo Terán, of Tucumán, Argentina.

### *Acanthoscelides* Schilsky

*Acanthoscelides* Schilsky, 1905:C, No. 95.

*Acanthoscelides* is a large, varied genus as presently understood with many forms quite unlike the type-species, *A. obtectus* (Say). C. D. Johnson has underway an extensive study of the North American species. Because of the diversity of forms, a generic diagnosis is impractical now. The five



species herein characterized are tentatively placed in *Acanthoscelides* until the investigations mentioned above determine their true relationships.

*Acanthoscelides hectori*, new species

Figs. 17, 43, 54, 94, 95

*Body length*.—2.50–2.75 mm, width.—1.50–1.75 mm; pronotal length.—1.25–1.30 mm, width.—1.60–1.75 mm.

*Color*.—Integument reddish to black with head, pronotum, pro- and mesolegs, apical one-half or more of metafemur, all of metatibia and tarsi, and pygidium reddish, elytra, eyes, meso- and metathorax black, abdominal sterna variable, apical one-half of each antennal segment piceous. Vestiture of mostly gray, short, slender hairs with darker spots of pattern (Fig. 17) bronze; pronotum with vague cruciate mark in middle, pygidium with indistinct median stripe.

*Structure*.—Body subelliptical, widest behind elytral humeri. Head turbiniform, eyes protuberant laterally, convex, ocular sinus about one-half length of eye, supraocular sulcus short, shallow, bottom of sulcus with setiferous tubercles, postocular lobe narrow but distinct; vertex densely punctulate, setose, frons more coarsely punctate, frontal carina prominent, extending dorsally to transverse depression between upper limits of eyes; basal two-thirds of clypeus punctate, apical portion minutely strigulate; antennae (Fig. 54) reaching middle of metepisternum, subserrate from fifth segment, terminal segment elliptical. Pronotum (Fig. 17) campaniform, lateral margins moderately arcuate, base subtruncate except for semicircular basal lobe, disk nearly evenly convex, briefly canaliculate on basal lobe, surface of disk minutely foveolate, nearly concealed by vestiture; lateral carina represented by low ridge extending from posterior angle about one-half distance to procoxal cavity; cervical sulcus short, deep, partly concealed by vestiture; cervical boss bisetose; prosternum T-shaped, acutely triangular between coxae, not separating coxal apices. Scutellum quadrate, densely pubescent, apex emarginate and bidentate. Elytra (Fig. 17) together as long as wide, evenly convex, striae distinct, narrow, striae punctures close-set, striae regular in course except occasionally some striae slightly sinuate in middle, striae 2, 5, and 6 arising from small basal pits, 3 and 4 each with small basal denticle, all striae free apically except 5 and 6 conjoined; intervals 3 and 5 slightly wider in middle than others; mesosternum subtriangular, apex lingulate; postmesocoxal sulci meeting medially at obtuse angle, laterally following contour of mesocoxal cavities. Abdomen with first sternum slightly longer than remaining sterna together, fifth sternum deeply, broadly emarginate for reception of apex of pygidium in male, slightly emarginate in female; pygidium convex in both sexes, apex more strongly reflexed in male; disk finely, densely foveolate. Male genitalia with median



lobe (Fig. 94) slender, 5 times as long as wide; ventral valve short, broad, ogival to obtuse apex; dorsal valve absent; armature of internal sac with dense, linear cluster of fine spicules near apical orifice, a large, compressed, helmet-shaped sclerite in basal one-half, a slender spine and several fine spicules in middle, 2 clusters of fine spicules near apex; closure valve circular; lateral lobes (Fig. 95) long, slender, slightly expanded in apical one-third, apices acute. Pro- and mesolegs not modified; metacoxal face reniform, densely, finely punctulate except for bare transverse area near anterior margin; metafemur (Fig. 43) moderately incrassate, dorsal margin evenly arcuate, ventral margin straight except slightly sinuate near apex, pecten with 1 long denticle followed by 2 smaller denticles; metatibia (Fig. 43) arcuate in basal one-third, straight and perceptibly expanded apically, lateral, ventral, and dorsomedial carinae distinct and complete, lateroventral carina obsolete toward apex, mucro slender, acute, slightly shorter than apical width, coronal denticles 5.

*Holotype* ♂.—COSTA RICA. Guanacaste Prov.: Taboga, 16 km SW Cañas, 16 March 1972, D. H. Janzen et al. (#VI-20-1972-XXII) (USNM Type #76384). Allotype ♀ and 36 paratypes, same data. Other paratypes.—COSTA RICA. Guanacaste Prov.: 1.6 mi W Hwy. 21, Comunidad, 14 March 1971, D. H. Janzen (624), in seeds of herbaceous legume (8); La Pacifica, 19 March 1974, D. H. Janzen (#1974-10), reared from *Calpogonium caeruleum* (21); Puntarenas Prov.: Barranca Site, 6 mi NW turnoff to Puntarenas on Pan-American Hwy., 11 March 1971, D. H. Janzen (1); MEXICO. Tabasco: Teapa, Feb. and Mar. (1908), Godman Salvin 1908-146, H.H.S. (3). EL SALVADOR. intercepted USDA Plant Quarantine, Washington, D.C. #315, in *Macroptilium atropurpureum* (5). PANAMA. Canal Zone: Paraiso (no date), Schwarz, ex pods *Rhynchosia*, (19); Paraiso, 6 April 1911, E. A. Schwarz, ex pods *Rhynchosia minima* (3).

As is indicated in the discussion of *A. triumfettae*, new species, this species is one of numerous small *Acanthoscelides* that do not at present seem to belong to any of the characterized groups nor appear to be closely related to any of the described species. The ogival ventral valve and the helmet-shaped sclerite in the internal sac are distinctive, and the combination of integumental colors may be helpful in relating *hectori* to other species when *Acanthoscelides* is treated.

*Acanthoscelides hectori*, new species, is named for Hector Luis Arriola, the Park Ranger for Santa Rosa National Park, who has been invaluable in assisting D. H. Janzen in ecological studies in the Park.

*Acanthoscelides johnsoni*, new species

Figs. 18, 44, 55, 96, 97

*Body length*.—1.50–2.25 mm, *width*.—0.90–1.25 mm; *pronotal length*.—0.60–0.75 mm, *width*.—0.75–1.00 mm.



*Color*.—Integument black except pro- and mesolegs, apical one-half to one-third of metafemur in most females, and basal 4 segments of antenna in both sexes reddish (some males may have reddish infusion on meta-femoral apex; basal one-half of mesofemur in some specimens piceous). Vestiture evenly distributed (Fig. 18), silvery gray with bronzy sheen above, ashy gray beneath; distinct pattern usually lacking, faint median stripe of close-set hairs on pronotum and on pygidium or pygidium with only a basal triangular spot, some specimens with faint striping on elytra. Scutellum gray.

*Structure*.—Body ovate, widest at basal one-third of elytra. Head short, turbiniform, eyes moderately protuberant laterally, not strongly convex anteriorly, ocular sinus deep, only 3 or 4 rows of facets on dorsal rim of eyes, supraocular sulcus shallow, reaching vertical axis of eye, sulcus minutely tuberculate-setose, postocular fringe narrow; vertex and frons punctulate-granulate, sparsely setose, frontal carina represented by impunctate median costa; clypeus coarsely punctulate; antenna of male (Fig. 55) long, reaching posterior margin of metacoxa, serrate from fifth segment, segments 5–10 as long as wide, eleventh elongate-elliptical; antenna of female reaching middle of metepisternum, subserrate from fifth segment, segments 5–10 wider than long, eleventh elliptical. Pronotum (Fig. 18) campaniform, lateral margins moderately arcuate, sinuate at basal angles, basal margin bisinuate, basal lobe semicircular, briefly canaliculate, disk strongly, evenly convex except slightly depressed basally near posterior angles, surface of disk finely foveolate, nearly concealed by vestiture; lateral carina arcuate, obtuse, about one-half length of pronotum; cervical sulcus short, deep, ventrally delimiting bisetose cervical boss; prosternum short before coxae, acutely triangular, procoxae connate apically. Scutellum quadrate, slightly longer than wide, emarginate and bidentate apically. Elytra (Fig. 18) together wider than long, margins moderately arcuate, disk convex, slightly depressed along suture; striae distinct, narrow, deep, regular in course, first and second striae arising from basal pits, third, fourth, fifth, and sixth each with minute denticle basally, all free apically except conjoined fifth and sixth; intervals imbricate, sparsely foveolate, unequal in width, with third, fifth, and seventh wider than others; mesosternum lingulate; postmesocoxal sulci not meeting medially, distinct, laterally following contour of coxal cavities. Abdomen with first sternum about as long as remaining sterna together, male with long, slender, golden hairs in middle of first sternum, fifth sternum of male deeply, broadly emarginate, of female evenly arcuate on posterior margin; pygidium triangular, convex, apex of male slightly reflexed, of female vertical at apex but slightly longitudinally swollen, disk in both sexes minutely foveolate. Male genitalia with median lobe (Fig. 96) elongate, slender, about 7 times as long as wide; ventral valve ovate, ogival apically, with base set in circular cavity at apex of lobe; armature of internal sac consisting of fine spicules



lining apical orifice; middle of sac with, in succession, a cluster of minute, transverse denticles, a group of large, thornlike denticles, a group of minute denticles, and a small patch of fine spicules near apex; closure valve not evident; lateral lobes (Fig. 97) elongate, strongly, eccentrically expanded at apices, cleft between lobes about one-half their length. Pro- and mesolegs not modified; metacoxal face reniform, minutely punctulate over all but anterior margin; metafemur (Fig. 44) not strongly incrassate, elongate-elliptical, pecten with 1 long denticle followed by 2 minute denticles; metatibia (Fig. 44) nearly straight with lateral, ventral, and dorsomedial carinae distinct and complete, lateroventral carina indistinct or absent, mucro short, length less than one-half apical width of tibia, coronal denticles 5, subequal in size.

*Holotype* ♂.—COSTA RICA. Guanacaste Prov.: 2 mi W Tilaran, 4 March 1972, D. H. Janzen et al. (#VI-20-1972-XIII), in *Triumfetta lappula* (USNM Type #76382). Allotype ♀ and 7 paratypes, same data. Other paratypes.—Costa Rica. Alajuela Prov.: 4 km SE San Ramon, 10 March 1971, D. H. Janzen (#534) in seeds of *Triumfetta lappula* (15).

This species superficially resembles *A. megacornis*, new species, but the male genitalia indicate that the two are not closely related. It does not appear to be closely related to any of the described species in the Western Hemisphere. The uniformly distributed vestiture, short mucro, elongated male antennae, and details of male genitalia are definitive.

It should be noted that the 2 collections of this species also yielded specimens of *Acanthoscelides triumfettae*, new species, but the two species are not closely related.

I am pleased to name this species for my colleague and good friend, C. D. Johnson, who has made many significant contributions to the knowledge of New World Bruchidae.

*Acanthoscelides megacornis*, new species

Figs. 19, 45, 56, 57, 98, 99

*Body length*.—1.6–1.8 mm, width.—1.0–1.1 mm; pronotal length.—0.6–0.7 mm, width.—0.7–0.8 mm.

*Color*.—Integument black except pro- and mesolegs and antennal segments 1–3 or 1–4 partly or completely reddish. Vestiture evenly distributed over entire body; greenish gray, short, slender hairs above except scutellum white, silvery gray beneath, pygidium with faint, gray median line.

*Structure*.—Body ovate, widest at basal one-third of elytra. Head turbiform, eyes protuberant laterally, somewhat flattened anteriorly, ocular sinus deep leaving only 3 or 4 rows of facets on dorsal rim of eye, supra-ocular sulcus extending dorsolaterally to connect with postocular sulcus,



bottom of supraocular sulcus with minute, setiferous tubercles, median margin of sulcus bordered by fine carina, postocular fringe narrow; vertex and frons punctulate, frons with prominent median tubercle (?frontal carina), setae of vertex directed toward dorsal margin of tubercle; clypeus slightly more coarsely punctulate than frons; antenna dimorphic, in male (Fig. 56) reaching posterior margin of metacoxa, strongly serrate from third segment, segments 4–10 each broadly triangular, eleventh segment elliptical; in female, antenna (Fig. 57) reaching middle of metepisternum, subserrate from fifth segment, segments 5–10 subtriangular, eleventh elliptical. Pronotum (Fig. 19) campaniform, lateral margins moderately sinuate, base subtruncate, basal lobe semicircular, disk evenly convex, briefly canaliculate on basal lobe and lightly depressed near posterior angle, surface minutely foveolate, foveolae distributed unevenly, sometimes coalescing, sometimes separated as much as 2 or more diameters; lateral carina represented by obtuse ridge extending from posterior angle to tumidity dorsad of procoxal cavity; cervical sulcus distinct, deep, delimiting at its ventral end the bisetose cervical boss; prosternum acutely triangular, short before procoxae, apex not separating coxal apices. Scutellum quadrate, emarginate apically, minutely bidentate. Elytra (Fig. 19) together slightly longer than wide, subquadrate, lateral margins evenly arcuate, disk evenly convex except subdepressed in basal one-third between third intervals, striae deep, distinct, regular in course, strial punctures barely evident, first stria arising near apex of scutellum, second in a deep basal pit sometimes with a blunt denticle on anterior rim, third and fourth each in a subbasal, rather prominent denticle, fifth and sixth arising from basal margin, fifth and sixth usually conjoined apically, fourth and seventh occasionally conjoined, remaining striae free apically; intervals of subequal width, minutely imbricate, each with 4 or 5 irregular rows of hairs; mesosternum subtriangular, apex slightly constricted, truncate; postmesocoxal sulci meeting medially at obtuse angle, strongly impressed behind coxae. Abdomen with first sternum about twice length of remaining sterna together, fifth sternum deeply, broadly emarginate for reception of pygidium, evenly arcuate, evenly convex, disk faintly punctulate. Male genitalia with median lobe (Fig. 98) elongate, about 7 times as long as wide; ventral valve equilaterally triangular, lateral margins slightly arcuate; armature of internal sac consisting of elongate patch of fine spicules near apical orifice, middle one-half of sac lined with minute, blunt denticles, apical one-fourth of sac with rows of small, thornlike denticles; closure valve minute, circular; lateral lobes (Fig. 99) slender basally, suddenly clavate apically, cleft between them deep. Pro- and mesolegs not modified; metacoxal face reniform, finely, densely foveolate except along anterior margin; metafemur (Fig. 45) moderately incrassate, pecten with 1 long denticle and 2 increasingly smaller denticles; metatibia (Fig. 45) with base



strongly arcuate, apical four-fifths straight, with lateral carina barely traceable, lateroventral carina obsolete apically, ventral carina distinct, dorso-medial absent, mucro minute, shorter than the 4 or 5 denticles in corona.

*Holotype* ♂.—COSTA RICA. Guanacaste Prov.: Santa Rosa N.P., 31 December 1975, D. H. Janzen (#JHJ 341), in *Aeschynomene americana* (USNM Type #76385). Allotype ♀ and 1,200 paratypes, same data. Other paratypes.—COSTA RICA. Guanacaste Prov.: Finca Taboga, 6 mi SW Cañas, 9 February 1967, D. H. Janzen, sweeping riparian forest understory at night (2); San Mateo, Hiquito, Pablo Schild (1). MEXICO. Jalisco: Guadalajara, Crawford, Carn. Mus. acc. 3901 (1); Morelos; Cuernavaca, December 1944 and November 1966, N. L. H. Krauss (3); Cuernavaca, Fenyes Coll. (1); Pte. de Ixtla, Wickham (1); Veracruz: Cotaxtla, 28 October 1961, Krauss (1); Boca del Rio, November 1960 (4); Cordoba, 22 November 1963, N. L. H. Krauss (1). GUATEMALA. USDA Plant Quarantine interceptions, all in dried chrysanthemum heads at Houston, #644, 9 March 1972 (1), #632, 9 March 1972 (1), #667, 20 March 1972 (1), #698, 7 April 1972 (1). HONDURAS. Ocotepeque, 12 April 1979, G. V. Manley, cloud forest at pass (32); Tegucigalpa, 20 February 1918, 9 February 1915, 15 October 1917 (20). EL SALVADOR: Monte Cristo, 7–9 May 1958, O. L. Cartwright (3). NICARAGUA. Madriz, 8 July 1957, D. R. Lauck (1); Chinandega (no date) Baker Coll. (8); Managua (no date) Baker Coll. (3).

The relationships of this species are as yet obscure. It does not appear to be closely related to any of the described species, although it superficially resembles *Acanthoscelides johnsoni*, new species; however, the male genitalia are distinctly different in the two species. Distinctive characters for *A. megacornis*, new species, include the elongated, strongly serrate male antenna, uniform coloration, tuberculate frons, small mucro, and details of the male genitalia.

The name *megacornis* is derived from *mega* (Gr.—large), and *cornu* (Gr.—horn) referring to the long antenna.

*Acanthoscelides petalopygus*, new species

Figs. 20, 46, 58, 100, 101

*Body length*.—3.2–3.9 mm, width.—2.0–2.5 mm; pronotal length.—0.9–1.2 mm, width.—1.5–1.9 mm.

*Color*.—Integument evenly dark red throughout except eyes black. Vestiture of evenly distributed, short, slender gray hairs with golden sheen; pronotum (Fig. 20) with narrow median strip of close-set hairs; elytra with denuded, reddish brown, quadrate spots at basal one-third and apical three-fifths of third elytral interval, at middle of seventh and of ninth intervals; pygidium with short, basal, triangular spot, its apex extending as a narrow



median stripe to apex of pygidium, round spot of close-set hairs midway between median line and lateral border.

*Structure*.—Body subelliptical, widest at middle of elytra. Head turbini-form, eyes large, convex, protuberant laterally, ocular sinus about one-half length of eye, supraocular sulcus short, crescentic, bottom of sulcus with setiferous tubercles, postocular fringe narrow; frons and vertex densely, finely punctate, frontal carina lacking; clypeus punctate basally, transversely striolate apically; labrum bare except for basal row of setiferous punctures, middle of apical margin with low gibbosity; antenna (Fig. 58) moderately long, reaching middle of metepisternum, subserrate from fourth segment, segments 5–10 transverse, each slightly wider than long, eleventh elliptical. Pronotum (Fig. 20) broadly triangular, lateral margins arcuate, basal margin truncate except for rectangular basal lobe; disk evenly convex except for brief, median, subbasal sulcus; surface of disk densely foveolate, intervals minutely punctulate; lateral carina present as an obtuse ridge extending from posterior angle two-thirds distance to procoxal cavity; cervical sulcus short, fine; cervical boss bisetose; prosternum Y-shaped, acutely triangular apically, intercoxal piece vertical, thin, separating procoxae apically. Scutellum broader than long, apically emarginate and bidentate. Elytra (Fig. 20) together slightly longer than wide, subdepressed between sixth intervals; striae regular in course, shallow, punctures evident, striae 1 arising in scutellar depression, 2 and 5 each in deep basal pit with carinate border, 3 and 4 in smooth, basal gibbosity; intervals 3, 5, and 7 slightly wider than 2, 4, and 6, surface finely imbricate; mesosternum subtriangular, rounded apically, disk imbricate; postmesocoxal sulci meeting medially at obtuse angle, parallel to margin of coxal cavities. Abdomen with first sternum as long as remaining four together; fifth sternum in male slightly emarginate, evenly arcuate in female; pygidium broad, flat in basal one-half, convex in apical one-half in male, evenly convex in female. Male genitalia with median lobe (Fig. 100) about 4 times as long as wide, flattened; ventral valve short, broad, subtruncate apically; dorsal valve a membranous lobe as long as apex of ventral valve; apical orifice flanked by large, spatulate plates, middle of sac lined with minute spines, apex trilobed, lateral sacs lined with fine spicules; closure valve circular; lateral lobes (Fig. 101) divergent, the cleft between deep, rounded, each lobe broad, spatulate. Pro- and mesolegs not modified; metacoxal face reniform, with densely placed, fine, setiferous punctures except elongate, transverse area near anterior border bare, polished; metafemur (Fig. 46) moderately incrassate, lateral ventral margin with strong sinuation subapically, mesal ventral margin with 1 large denticle and 2 shorter denticles, one or both denticles on posterior slope of large denticle; metatibia (Fig. 46) moderately arcuate basally, ex-



panded apically, with lateral, lateroventral, ventral, and dorsomedial carinae complete and distinct, mucro short, acute, coronal denticles 4.

*Holotype* ♂.—COSTA RICA. Guanacaste Prov.: Santa Rosa (N.P.), nature trail, 15 March 1972, D. H. Janzen et al. (#VI-19-1972-XIX), *Acacia collinsii* (USNM Type #76380). Allotype ♀ and 20 paratypes, same data. Other paratypes.—Santa Rosa N.P., salt pan pasture, 12 March 1976, D. H. Janzen, *Acacia collinsii* (3).

*Acanthoscelides petalopygus*, new species, does not belong to any of the species groups characterized in Johnson (1970), Slobodchikoff and Johnson (1973), or Kingsolver (1980). It appears to be most closely related to *A. gregorioi* (Pic) described from Brazil, and perhaps more distantly related to *A. mexicanus* (Sharp) and *A. lapsanae* (Motschulsky) from Mexico and Central America.

The specific name is derived from *petalos* (Gr.—broad) and *pygus* (Gr.—rump).

*Acanthoscelides triumfettae*, new species

Figs. 21, 47, 59, 102, 103

*Body length*.—1.50–1.75 mm, width.—0.9–1.2 mm; pronotal length.—0.5–0.7 mm, width.—0.7–0.9 mm.

*Color*.—Integument of pronotum, elytra, abdomen, legs and antennae light red with spots of pronotum and elytra dark red (Fig. 21), head and venter of thorax piceous, head sometimes red with piceous clouding, metafemur sometimes dusky basally, antennal segments often partly piceous. Vestiture of yellowish, white, and dark brown slender hairs, pronotum (Fig. 21) with cruciate pattern medially; elytra (Fig. 21) with brown vestiture on dark red spots, light red integument covered with yellowish hairs, third interval with elongate spot of densely placed hairs; pygidium densely setose, yellowish with narrow median line of close-set hairs.

*Structure*.—Body ovate, widest at middle of elytra. Head turbiniform, eyes convex, laterally protuberant, ocular sinus about one-half length of eye, supraocular sulcus shallow, setiferous, postocular fringe narrow, vertex and frons finely punctulate, densely setose, hairs oriented toward dorsal end of indistinct frontal carina; clypeal punctation coarser than that of frons; antenna of male (Fig. 59) reaching metacoxal margin, of female reaching humerus, subserrate in both sexes from fourth segment, eleventh segment elliptical. Pronotum (Fig. 21) campaniform, briefly canaliculate on basal lobe, basal margin truncate except for semicircular basal lobe; surface finely foveolate, densely setose; lateral carina absent; cervical sulcus short, deep; cervical boss bisetose; prosternum short, triangular, intercoxal piece not separating procoxal apices. Scutellum slightly longer than wide, emarginate and bidentate apically. Elytra (Fig. 21) together slightly longer than wide,



convex, widest at middle; striae prominent, regular in course, stria punctures separated by a diameter, stria 1 arising in scutellar depression, 2–6 arising basally each with a minute denticle on basal margin, all striae ending free apically except 5 and 6 abbreviated and conjoined; mesosternum triangular, apex bluntly rounded; postmesocoxal sulci meeting medially at acute angle, parallel to margin of coxal cavity laterally. Abdomen with first sternum 1.5 times as long as remaining sterna together; fifth sternum deeply emarginate in male, evenly arcuate in female; pygidium subtriangular, disk evenly convex, densely, finely punctulate, punctures concealed by vestiture. Male genitalia with median lobe (Fig. 102) slender, 8 times as long as wide, ventral valve triangular, short, subacute, dorsal valve lacking; internal sac in basal one-half lined with fine denticles, middle of sac with patch of fine spicules, apical portion of sac with long, slender spines and patch of slender spicules; closure valve oval; lateral lobes (Fig. 103) long, slender, uniform in width, cleft between lobes deep. Pro- and mesolegs not modified; metacoxal face reniform, finely punctulate-reticulate except for elongate, transverse bare area near anterior border; metafemur (Fig. 47) with dorsal margin arcuate, ventral margin slightly sinuate, pecten composed of 1 short denticle about as long as basal width of tibia followed by 2 minute denticles; metatibia (Fig. 47) gradually expanded from arcuate base, lateral, ventral, and dorsomedial carinae distinct and complete, lateroventral carina abbreviated apically; mucro short, acute, its length about one-half width of apex of tibia, corona with 4 or 5 minute denticles.

*Holotype* ♂.—COSTA RICA. Guanacaste Prov.: 2 mi W Tilaran, 4 March 1972, D. H. Janzen et al. (#VI-20-1972-XIII), in *Triumfetta lappula* (USNM Type #76381). Allotype ♀ and 123 paratypes, same data. Other paratypes.—COSTA RICA. Guanacaste Prov.: Santa Rosa N.P., nature trail, 15 March 1972, D. H. Janzen et al. (#VI-19-1972-XXII), *Triumfetta lappula* (40); 5 mi N La Cruz, 11 March 1976, D. H. Janzen, *Triumfetta lappula* (61); Santa Rosa N.P., humid forest, 10 March 1976, D. H. Janzen, *Triumfetta lappula* (98); Alajuela Prov.: 4 km SE Ramon, 10 March 1971, D. H. Janzen (#534), *Triumfetta lappula* (8).

This species is not closely related in male genital characters to any of the described species in this large, composite genus; however, the slender median lobe with its pattern of denticles and spicules, and the large, thornlike spine (Fig. 102) in the internal sac as well as the slender lateral lobes (Fig. 103) are diagnostic. Externally, the color pattern resembles any number of small, brownish *Acanthoscelides*. It must remain for the first revisor of the genus to place this species in its proper relationship.

Two of the collections of *A. triumfettae*, new species, also yielded *A. johnsoni*, new species, but the two species do not appear to be closely related.

The specific name is derived from the generic name of the host plant.

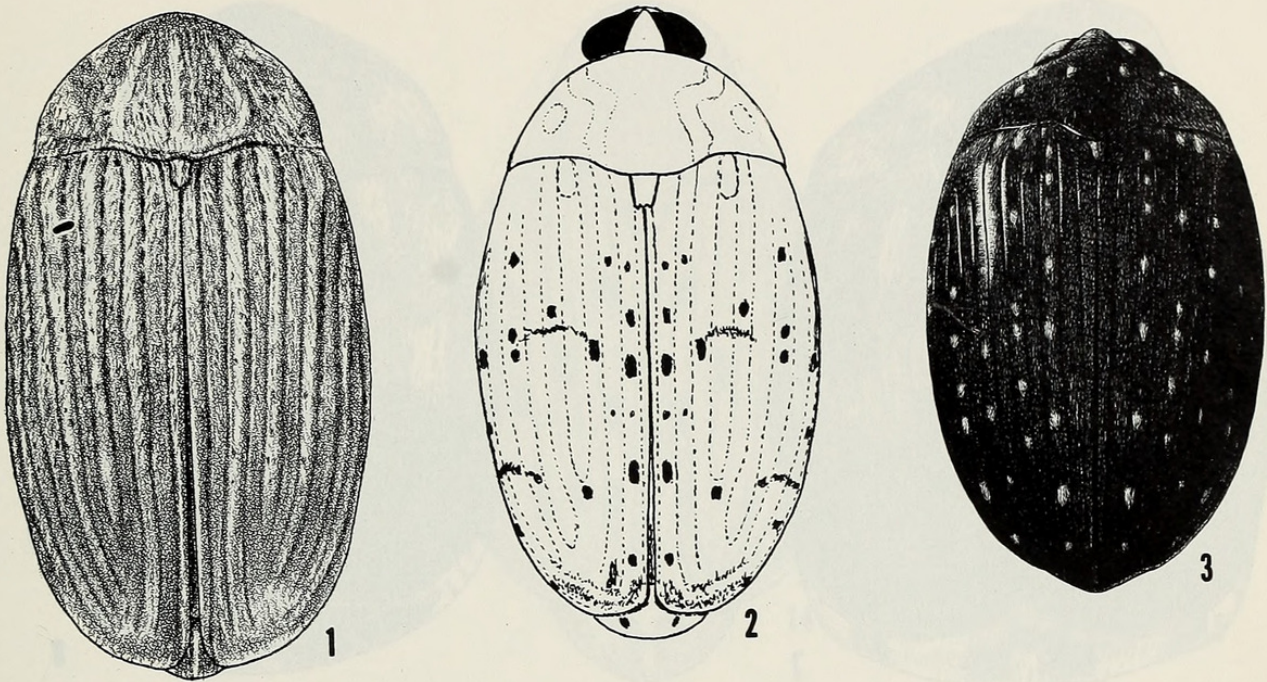


## Literature Cited

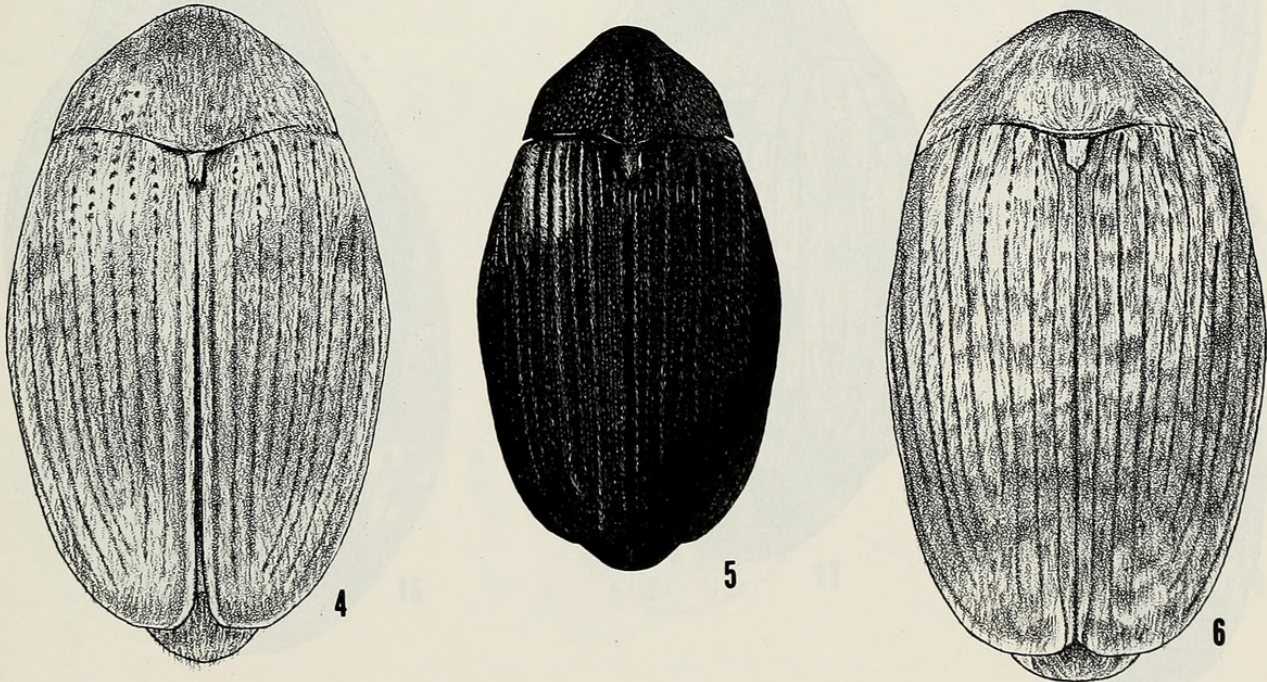
- Blackwelder, R. E. 1946. Checklist of the coleopterous insects of Mexico, Central America, the West Indies, and South America.—U.S. National Museum Bulletin 185:551–763.
- Bridwell, J. C. 1946. The genera of beetles of the family Bruchidae in America north of Mexico.—Journal of the Washington Academy of Sciences 36:52–57.
- Horn, G. H. 1885. Contributions to the coleopterology of the United States.—Transactions of the American Entomological Society 12:128–162.
- Johnson, C. D. 1970. Biosystematics of the Arizona, California, and Oregon species of the seed beetle genus *Acanthoscelides* Schilsky (Coleoptera: Bruchidae).—University of California Publications in Entomology 59:1–116.
- Johnson, C. D. and J. M. Kingsolver. 1973. A revision of the genus *Sennius* of North and Central America.—U.S.D.A. Technical Bulletin 1462:1–135.
- Kingsolver, J. M. 1970. A study of male genitalia in Bruchidae.—Proceedings of the Entomological Society of Washington 72:370–386.
- . 1970. A synopsis of the subfamily Amblycerinae Bridwell in the West Indies with descriptions of new species (Coleoptera: Bruchidae).—Transactions of the American Entomological Society 96:469–497.
- . 1970. The identity of a bruchid feeding in seeds of *Cassia grandis* L. (Leguminosae) (Coleoptera: Bruchidae: Amblycerinae).—Proceedings of the Entomological Society of Washington 72:203–206.
- . 1976. A new species of *Amblycerus* from Panama (Coleoptera: Bruchidae).—Journal of the Washington Academy of Sciences 66:150–151.
- . 1980. The quadridentatus group of *Acanthoscelides*: descriptions of three new species, notes, synonymies, and a new name (Coleoptera: Bruchidae).—Brenesia (in press).
- Schilsky, J. 1905. In Küster and Kraatz, Die Käfer Europas, pp. 41 a–f, 41 A–MM, Nos. 1–100. Bauer and Raspe. Nurnberg.
- Slobodchikoff, C. N. and C. D. Johnson. 1973. A phenetic and a phylogenetic approach to the classification of a new genus of seed beetles (Coleoptera: Bruchidae).—Systematic Zoology: 22:280–294.
- Thunberg, C. P. 1815. De Coleopteris rostratis.—Nova Acta Regiae Societatis Scientiarum Upsaliensis 7:104–125.

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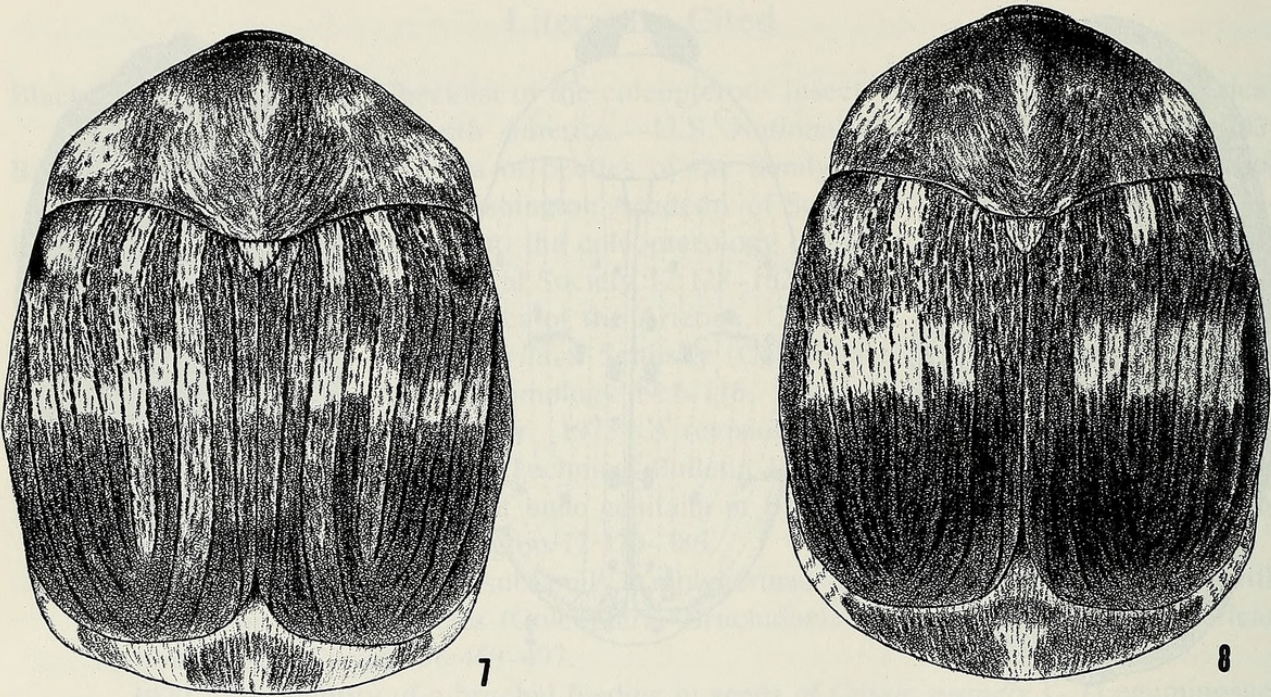


Figs. 1–3. *Amblycerus* spp., dorsal habitus: 1, *A. epsilon*; 2, *A. imperfectus*, 3, *A. multiflocculus*.

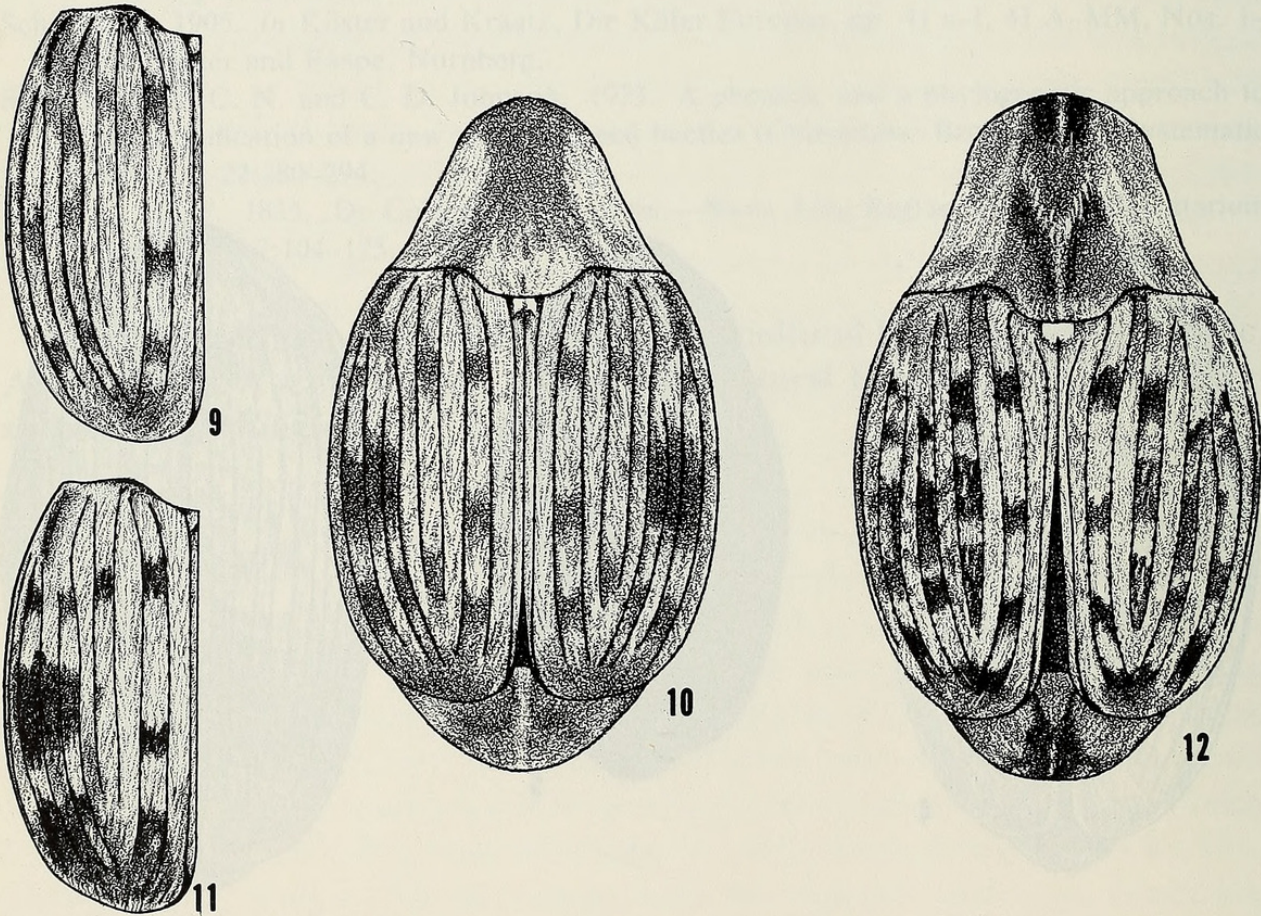


Figs. 4–6. *Amblycerus* spp., dorsal habitus: 4, *A. pterocarpae*; 5, *A. spondiae*; 6, *A. vegai*.



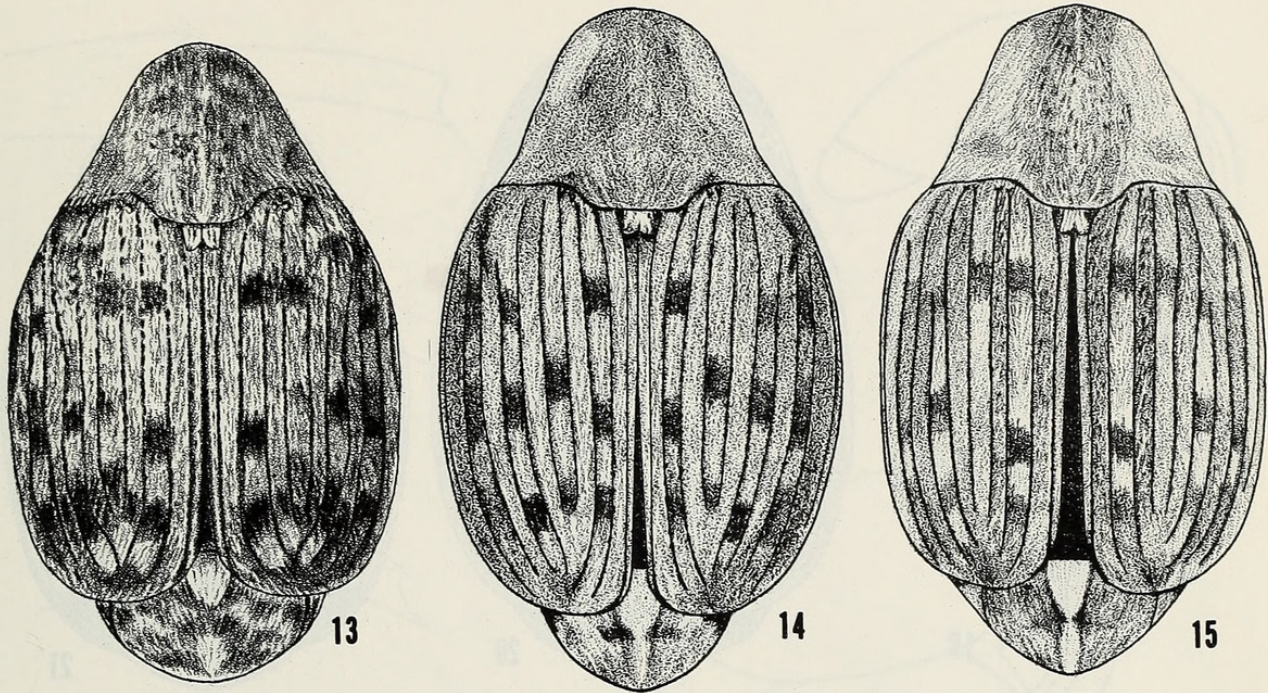


Figs. 7-8. *Zabrotes chavesi*, dorsal habitus; 7, Male; 8, Female.



Figs. 9-12. *Merobruchus* spp., dorsal habitus: 9, 10, 11, *M. santarosae*; 12, *M. boucheri*.





Figs. 13–15. *Merobruchus* spp., dorsal habitus: 13, *M. hastatus*; 14, *M. paquetae*; 15, *M. sonorensis*.

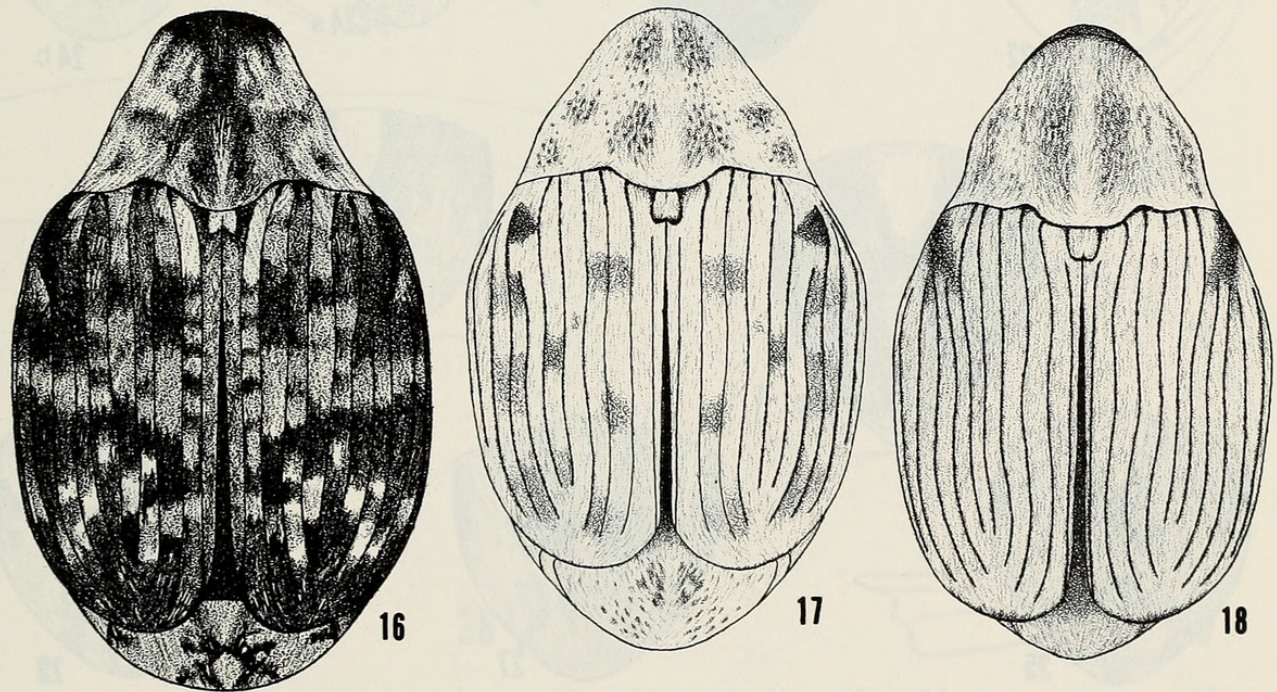
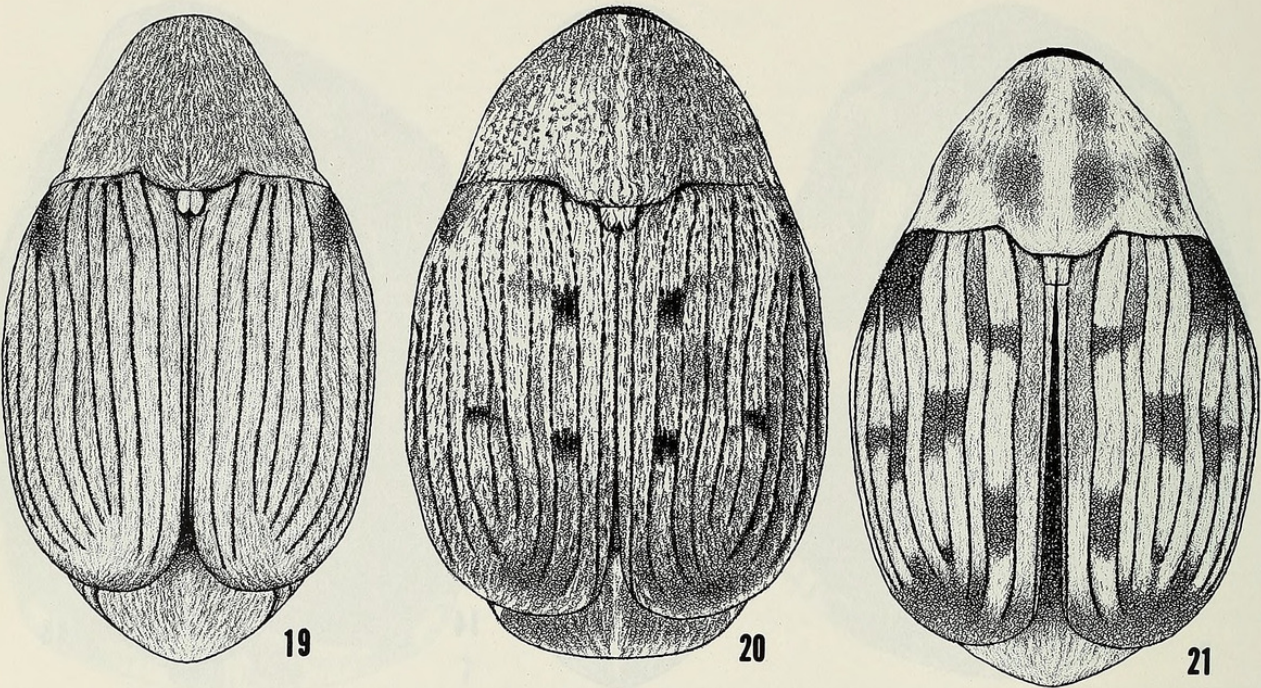
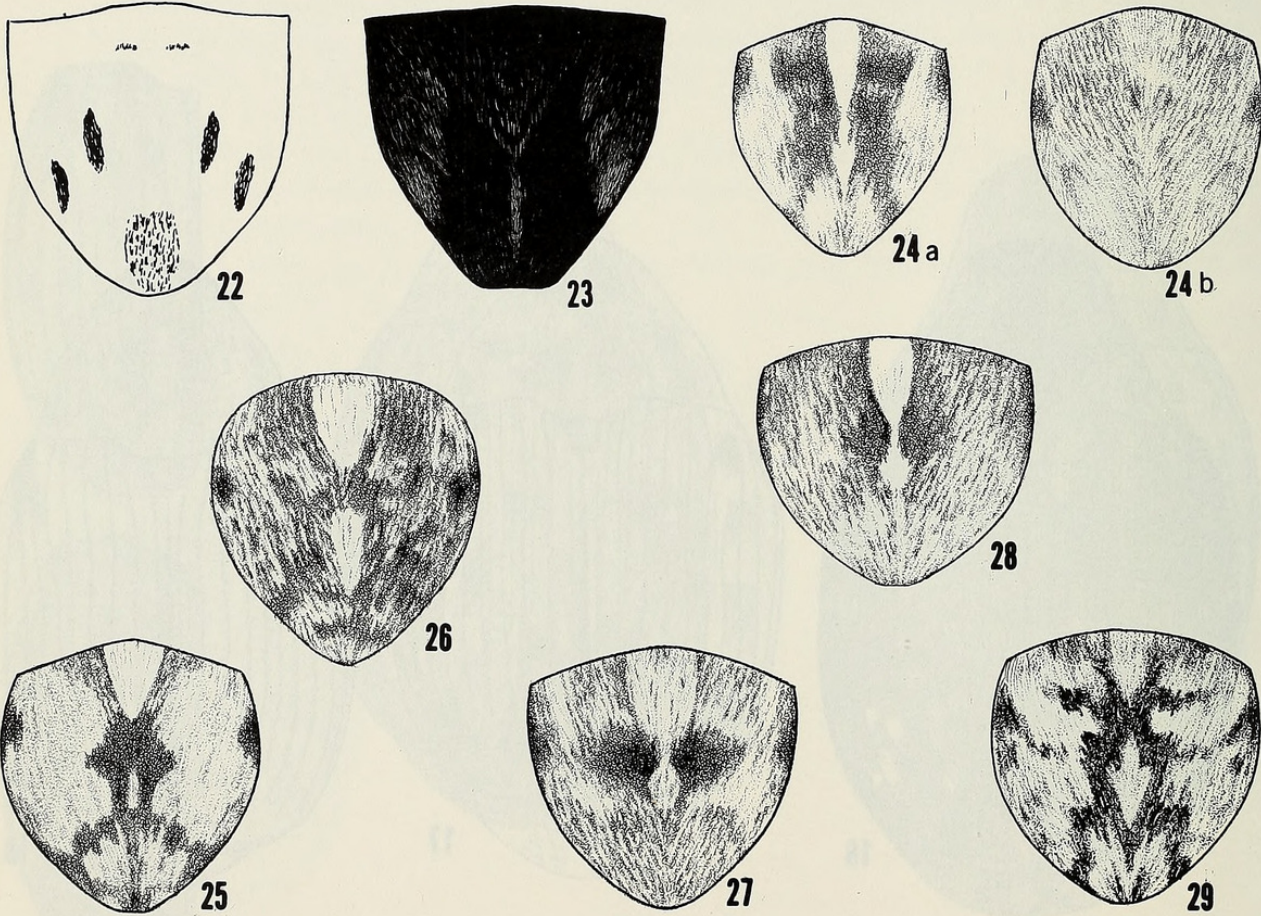


Fig. 16. *Merobruchus terani*, dorsal habitus; Figs. 17–18, *Acanthoscelides* spp., dorsal habitus: 17, *A. hectori*; 18, *A. johnsoni*.



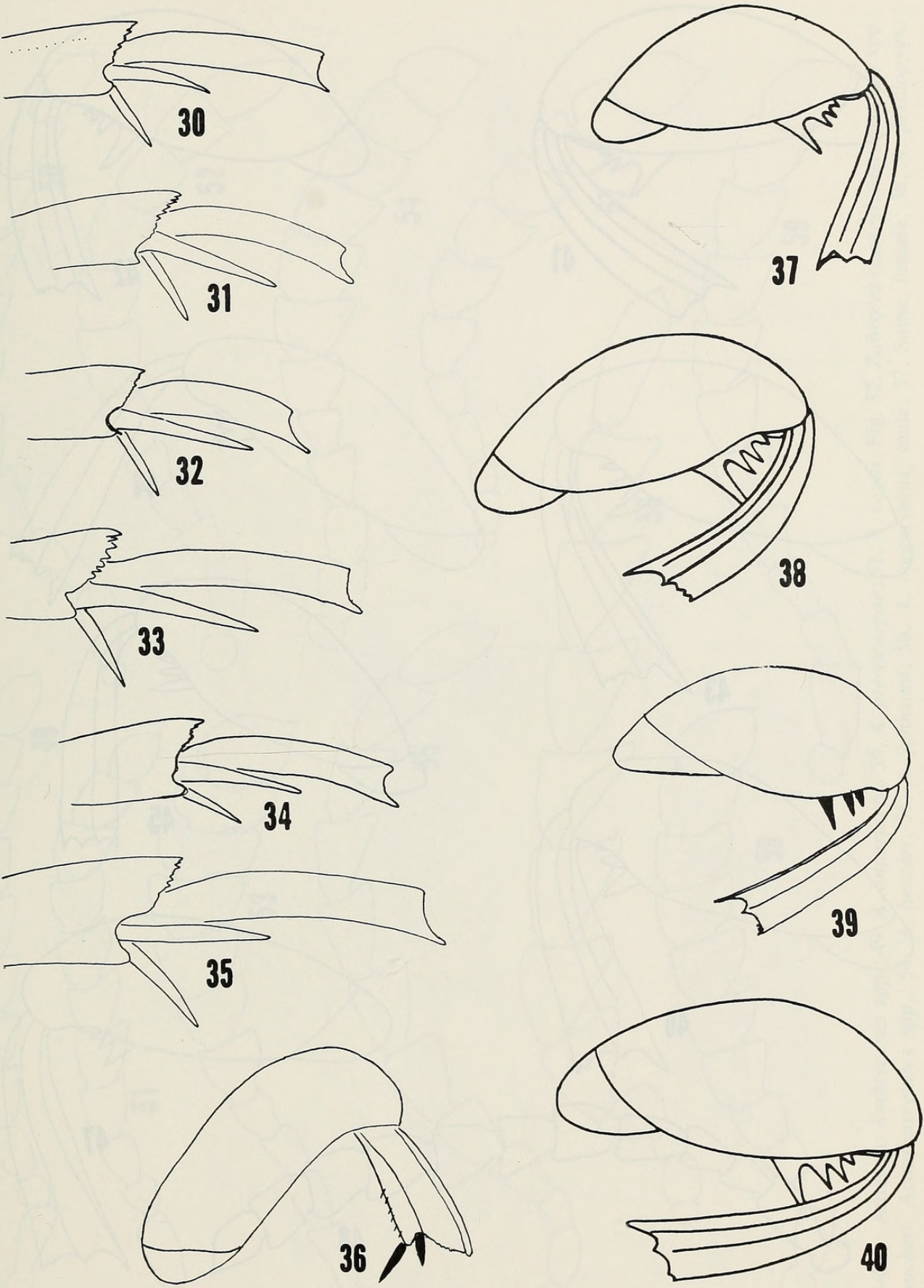


Figs. 19–21. *Acanthoscelides* spp., dorsal habitus: 19, *A. megacornis*; 20, *A. petalopygus*; 21, *A. triumfettae*.



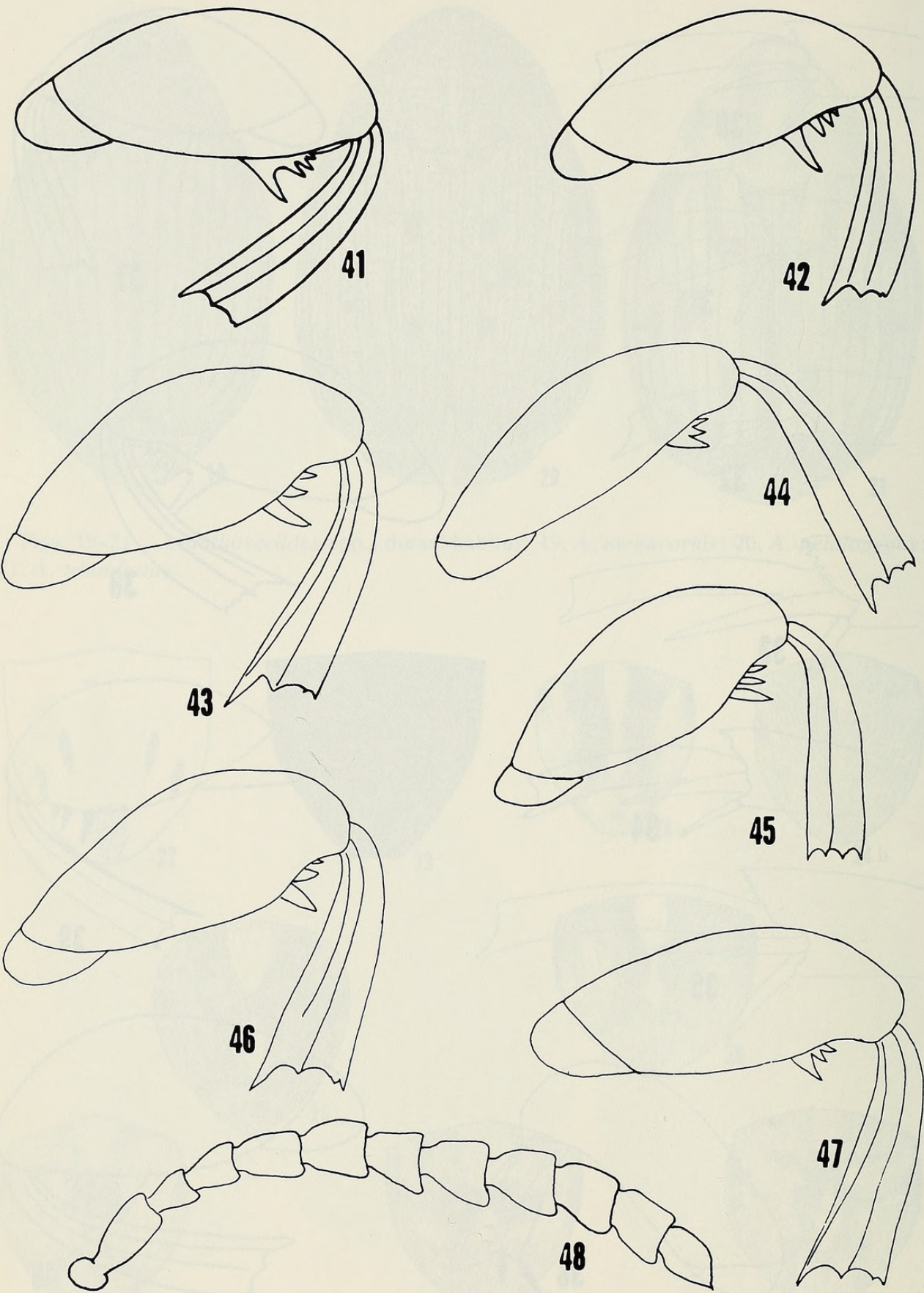
Figs. 22–29. Pygidia: 22, *Amblycerus imperfectus*; 23, *A. multiflocculus*; 24a, *Merobruchus santarosae*, female; 24b, Same, male; 25, *M. boucheri*; 26, *M. hastatus*; 27, *M. paquetae*; 28, *M. sonorensis*; 29, *M. terani*.





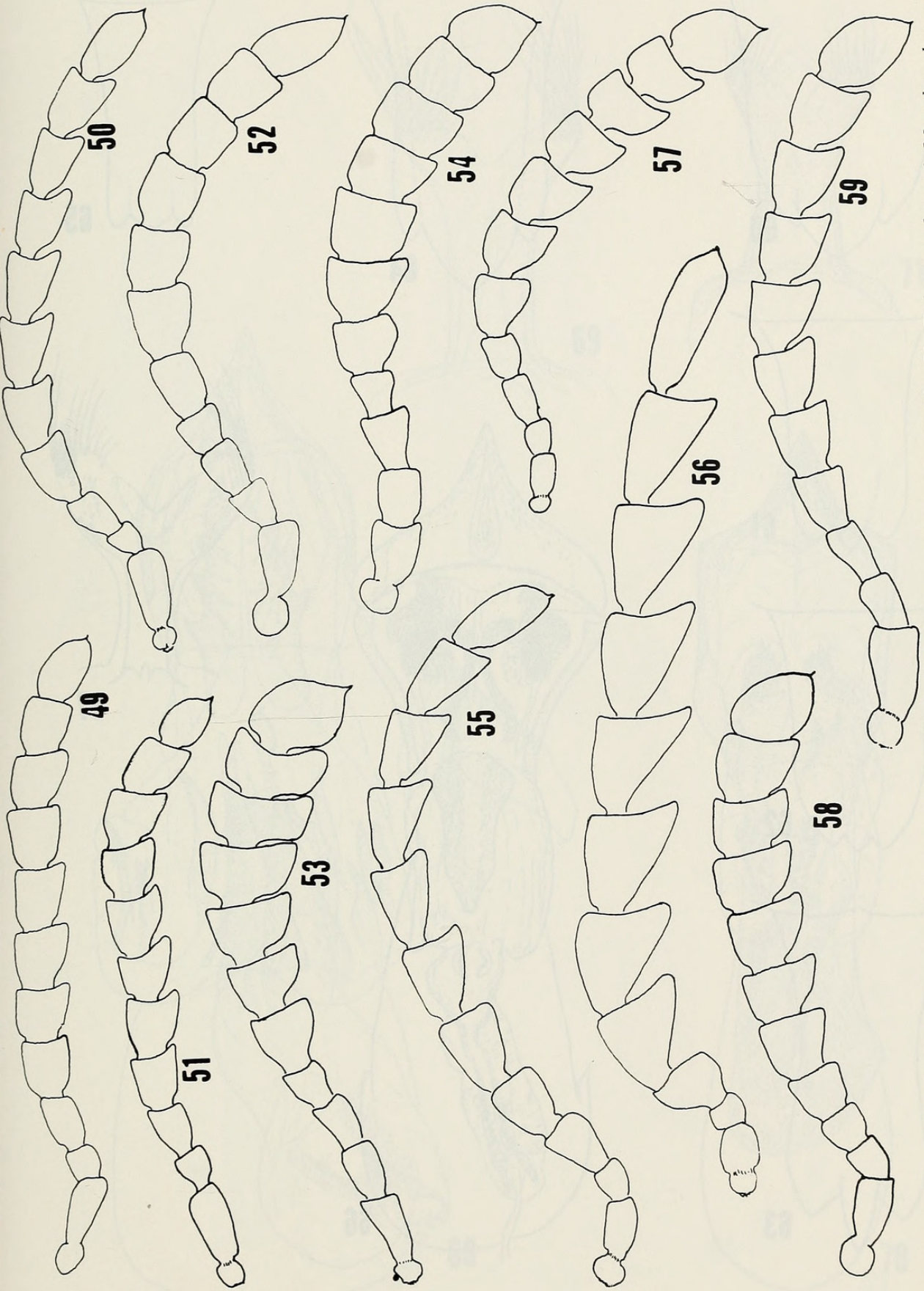
Figs. 30–35. *Amblycerus* spp. apex of metatibia: 30, *A. epsilon*; 31, *A. imperfectus*; 32, *A. multiflocculus*; 33, *A. pterocarpae*; 33, *A. pterocarpae*; 34, *A. spondiae*; 35, *A. vegai*. Fig. 36, *Zabrotes chavesi*, metaleg. Figs. 37–40, *Merobruchus* spp., metaleg: 37, *M. santarosae*; 38, *M. boucheri*; 39, *M. hastatus*; 40, *M. paquetae*.





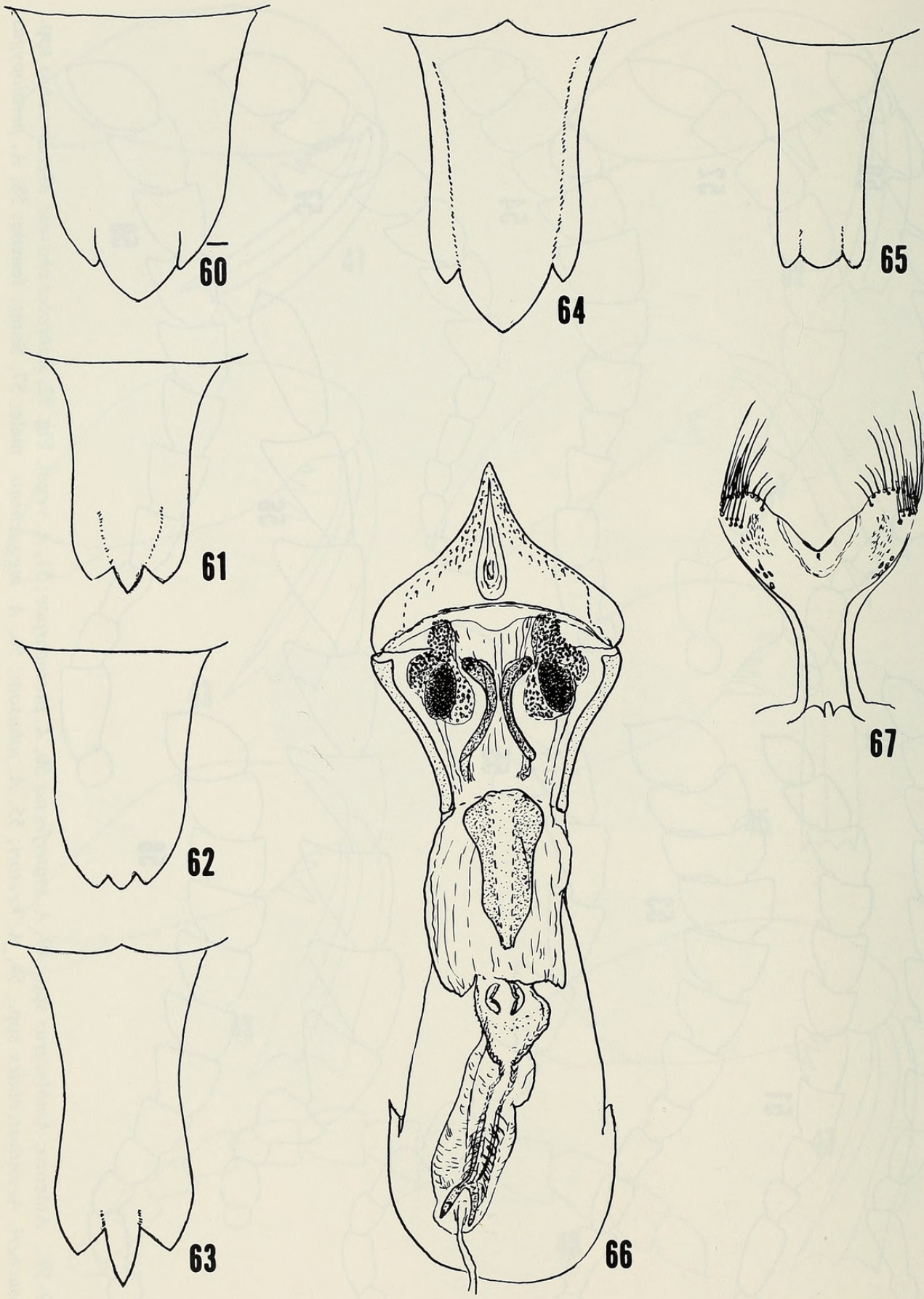
Figs. 41–47. Metaleg: *Merobruchus* spp.; 41, *M. sonorensis*; 42, *M. terani*. *Acanthoscelides* spp., metalegs: 43, *A. hectori*; 44, *A. johnsoni*; 45, *A. megacornis*; 46, *A. petalopygus*; 47, *A. triumfettae*. Fig. 48, *Amblycerus epsilon*, antenna.





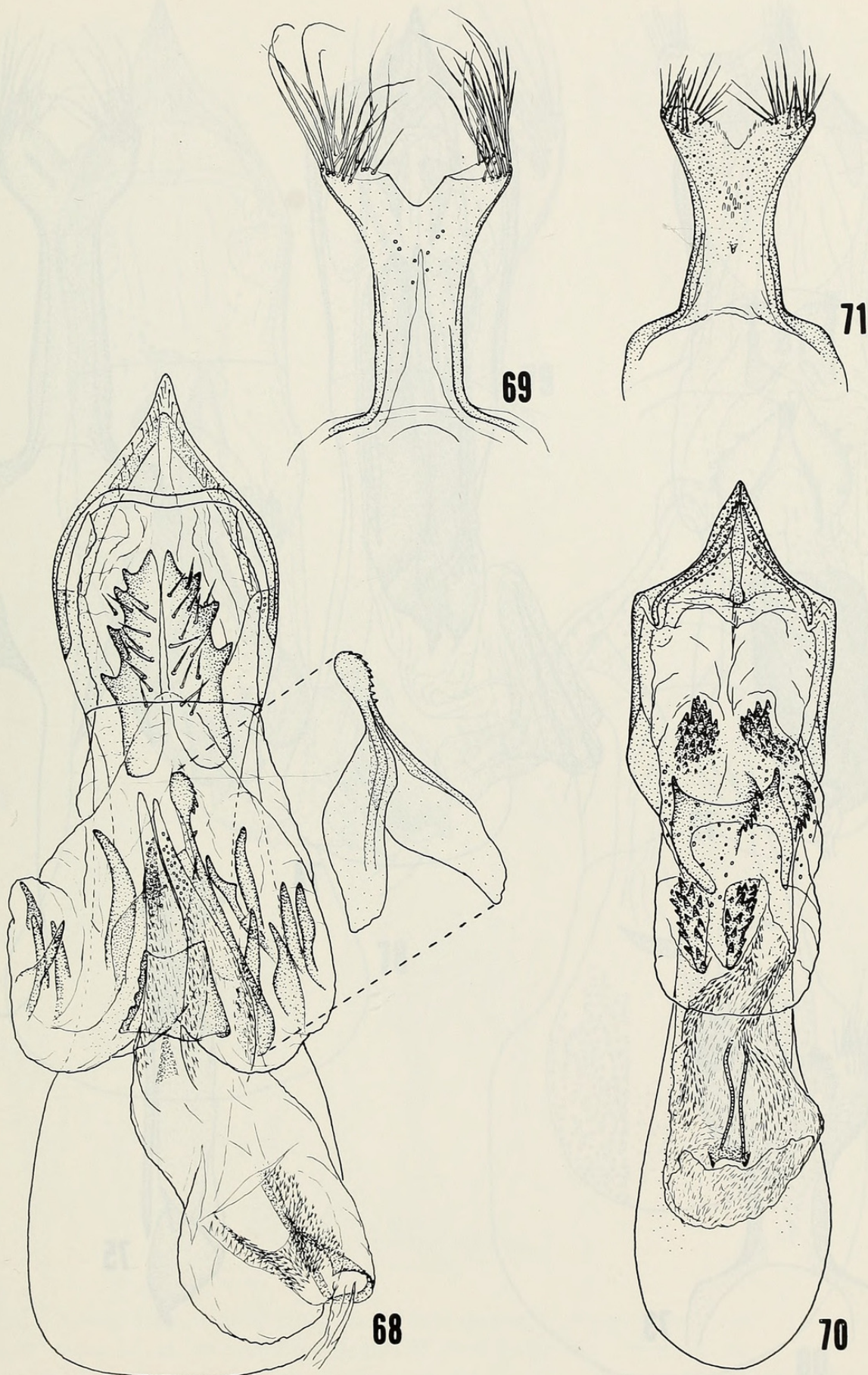
Figs. 49–59. Antenna: *Amblycerus* spp.; 49, *A. imperfectus* 50, *A. vegai*. Fig. 52, *Zabrotes chavesi*. *Merobruchus* spp.; 53, *M. boucheri*. *Acanthoscelides* spp., 54, *A. hectori*; 55, *A. johnsoni*; 56, *A. megacornis*, male; 57, Same, female; 58, *A. petalopygus*; 59, *A. triumfettae*, male.





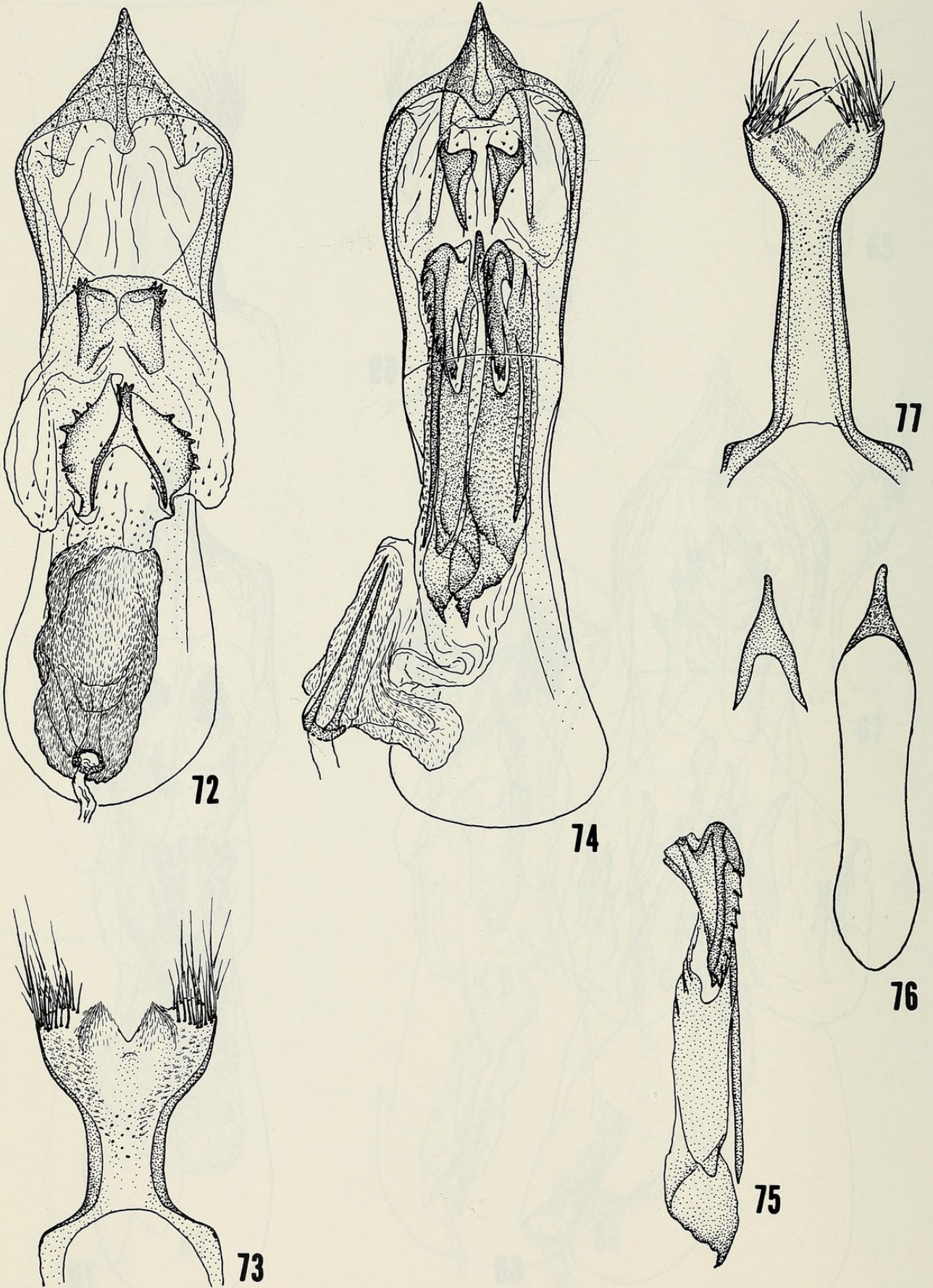
Figs. 60–65. *Amblycerus* spp., scutella: 60, *A. epsilon*; 61, *A. imperfectus*; 62, *A. multiflocculus*; 63, *A. pterocarpae*; 64, *A. spondiae*; 65, *A. vegaii*. Figs. 66–67, *Amblycerus epsilon*, male genitalia: 66, Median lobe; 67, Lateral lobes.





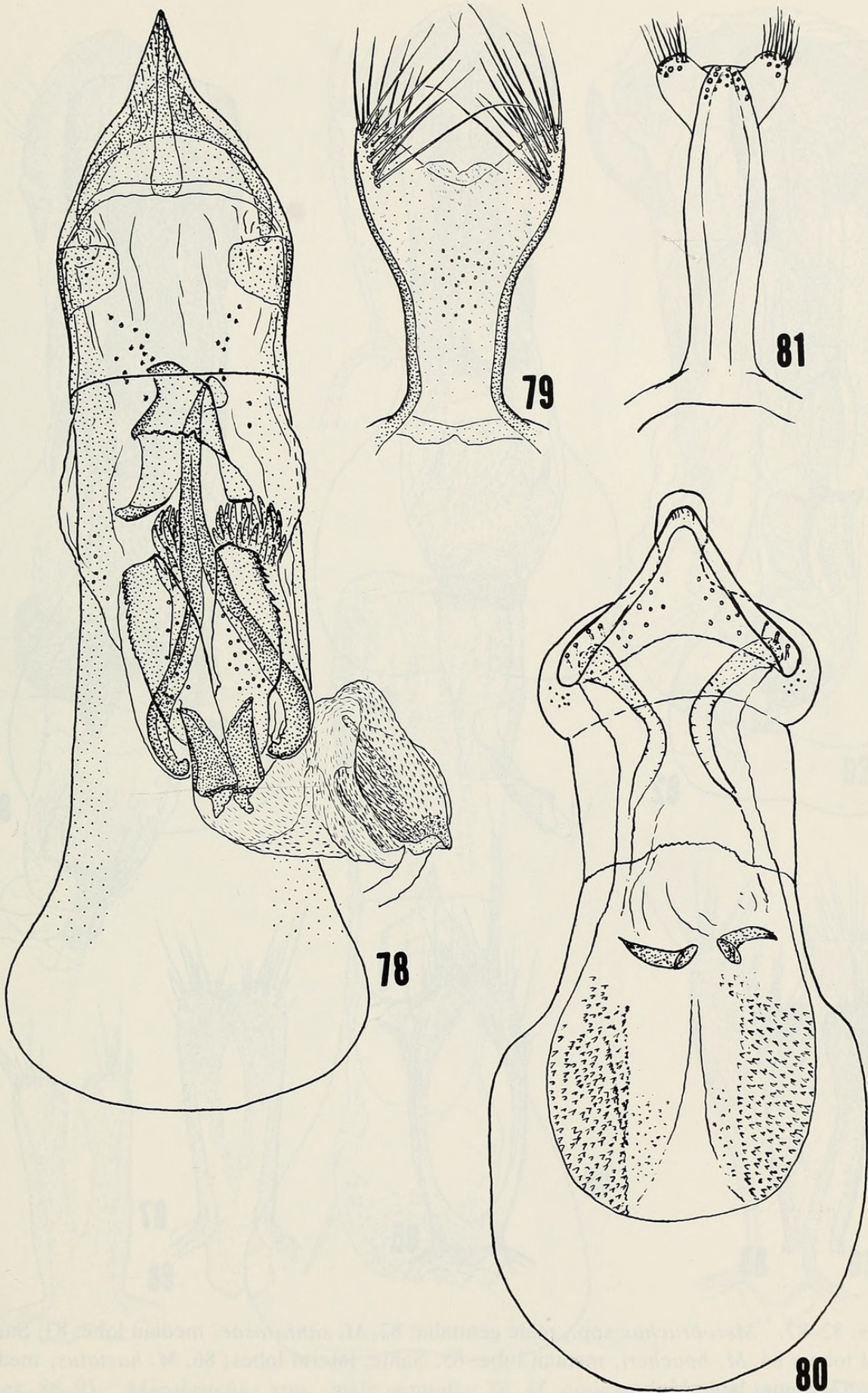
Figs. 68–71. *Amblycerus* spp., male genitalia: 68, *A. imperfectus*, median lobe; 69, Same, lateral lobes; 70, *A. multiflocculus*, median lobe; 71, Same, lateral lobes.





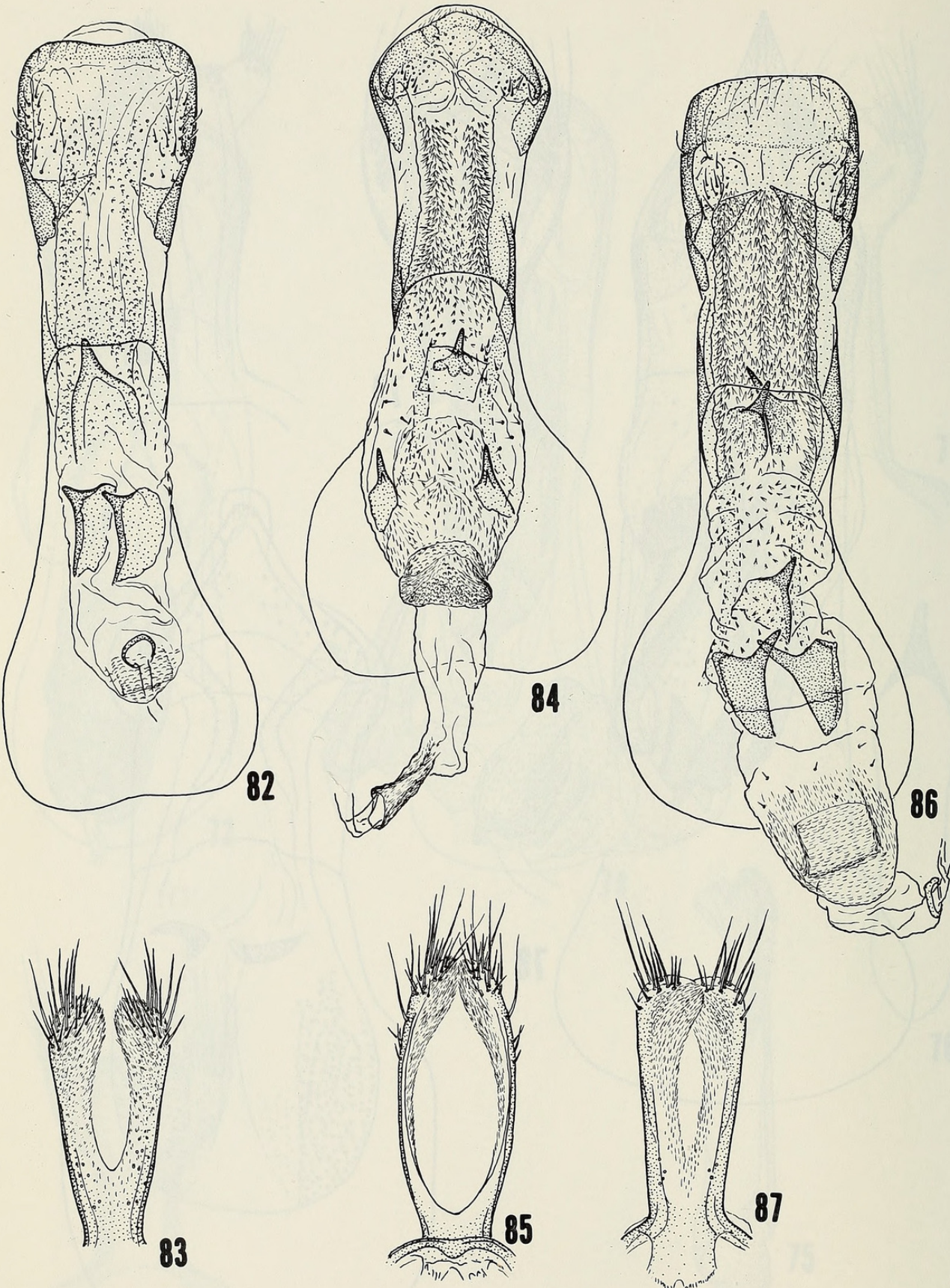
Figs. 72-77. *Amblycerus* spp., male genitalia: 72, *A. pterocarpae*, median lobe; 73, Same, lateral lobes; 74, *A. spondiae*, median lobe; 75, Same, sclerite of internal sac, dorsal aspect; 76, Same, wishbone sclerite, ventral and dorsal aspects; 77, Same, lateral lobes.





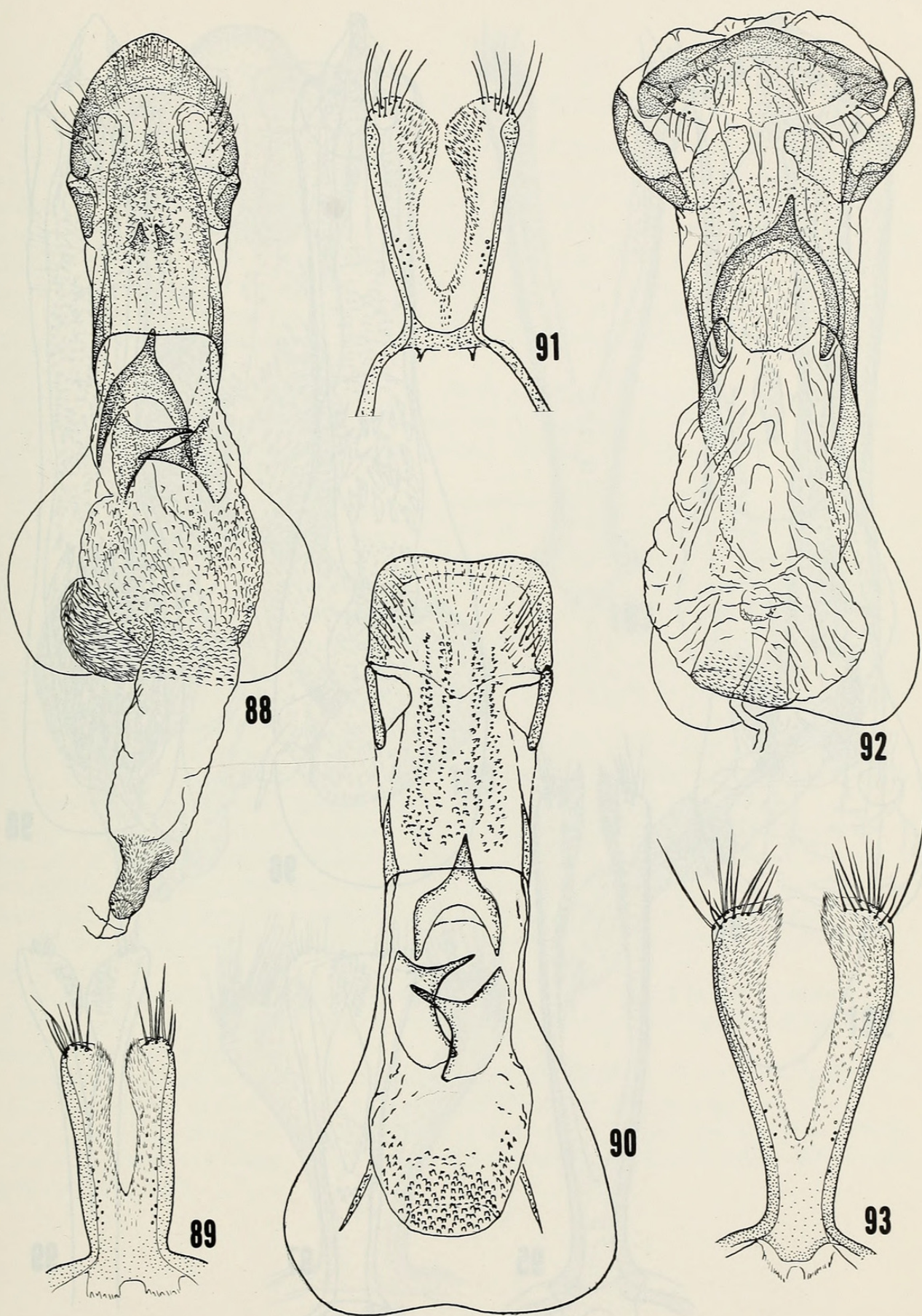
Figs. 78–81. *Amblycerus vegai*, male genitalia: 78, Median lobe; 79, Same, lateral lobes. Figs. 80–81, *Zabrotes chavesi*, male genitalia: 80, Median lobe; 81, Lateral lobes.





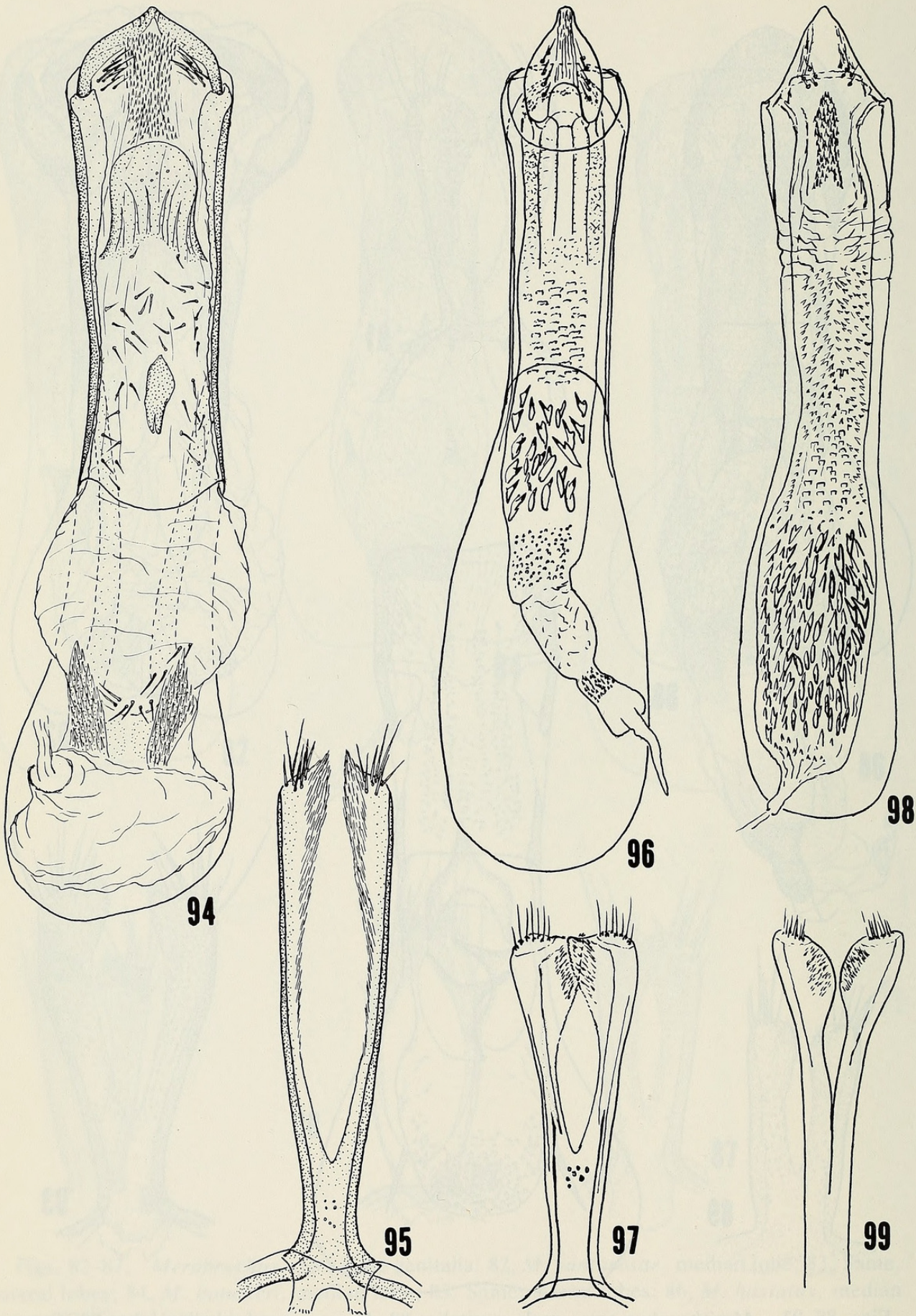
Figs. 82–87. *Merobruchus* spp., male genitalia: 82, *M. santarosae*, median lobe; 83, Same, lateral lobes; 84, *M. boucheri*, median lobe; 85, Same, lateral lobes; 86, *M. hastatus*, median lobes; 87, Same, lateral lobes.





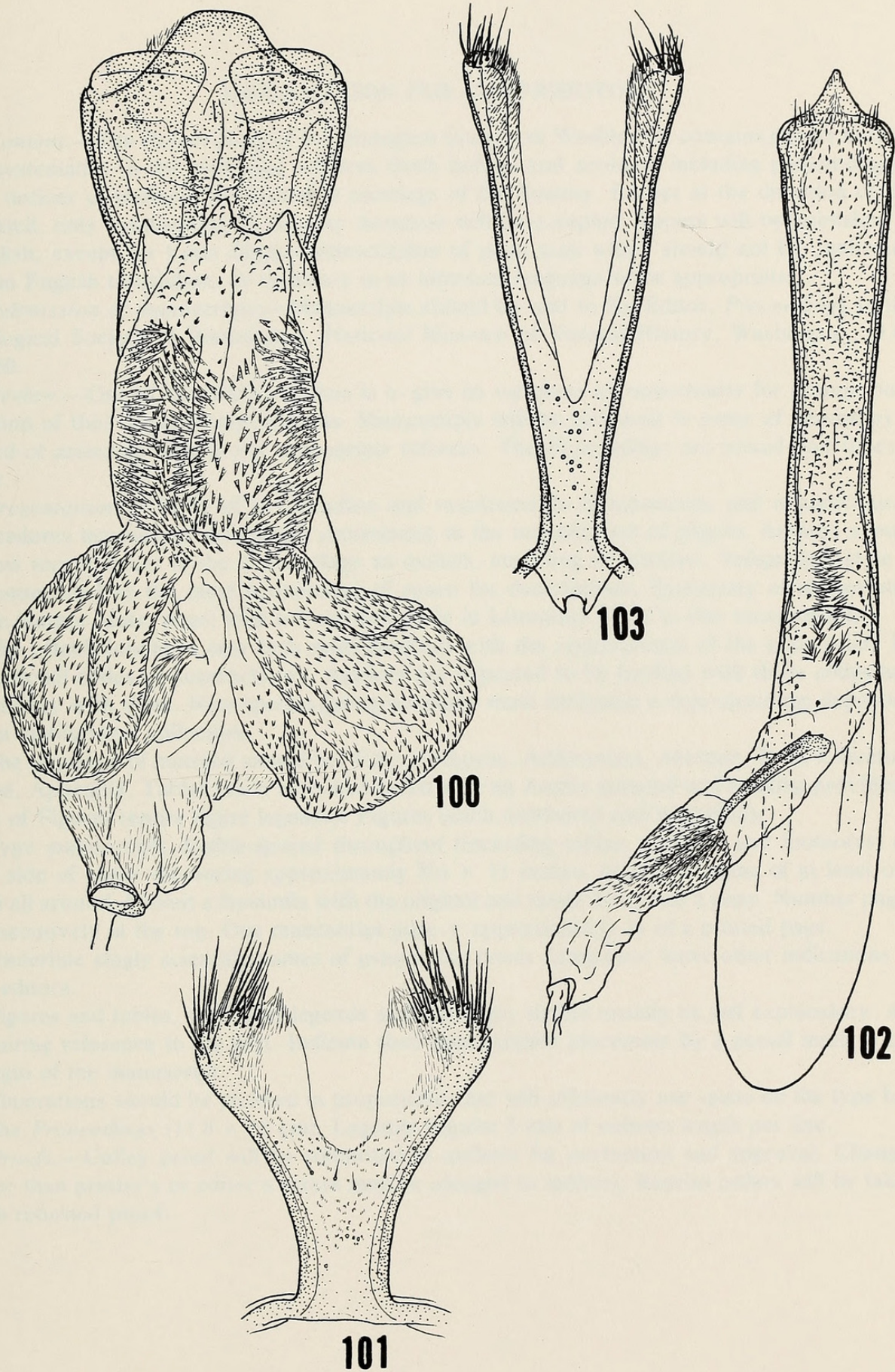
Figs. 88-93. *Merobruchus* spp., male genitalia: 88, *M. paquetae*, median lobe; 89, Same, lateral lobes; 90, *M. sonorensis*, median lobe; 91, Same, lateral lobes; 92, *M. terani*, median lobe; 93, Same, lateral lobes.





Figs. 94–99. *Acanthoscelides* spp., male genitalia: 94, *A. hectori*, median lobe; 95, Same, lateral lobes; 96, *A. johnsoni*, median lobe; 97, Same, lateral lobes; 98, *A. megacornis*, median lobe; 99, Same, lateral lobes.





Figs. 100–103. *Acanthoscelides* spp., male genitalia: 100, *A. petalopygus*, median lobe; 101, Same, lateral lobes; 102, *A. triumfettae*, median lobe; 103, Same, lateral lobes.





Kingsolver, John M. 1980. "18 New Species Of Bruchidae Principally From Costa-Rica With Host Records And Distributional Notes Insecta Coleoptera." *Proceedings of the Biological Society of Washington* 93, 229–283.

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