A New Genus and Species of Jumping Shore Beetle from Mexico

(Coleoptera: Limnichidae)

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In the fall of 1966 William G. Evans of the University of Alberta collected insects, pseudoscorpions, and chilopods from the intertidal zone of the western coast of Mexico. As he says in his introductory report (1968), he studied about one thousand miles of Mexican mainland coast from Guaymas in Sonora to Barra De Navidad in Jalisco; this coast and that of the southern tip of Baja California and the Hawaiian Islands comprise a distinct marine littoral faunal zone, which Evans designates the Subtropical Zone. His objective was, among other things, to compare the ecology of the Mexican coast with that of others he had studied. However, an interesting by-product of his trip came at the southernmost point when he discovered a remarkable new genus and species of intertidal beetle.

These little beetles, about two millimeters long, dark, compact and somewhat streamlined, have long hind legs bearing heavy long setae or spurs. Their morphology, given below in formal descriptions, places them in the subfamily Thaumastodinae of the Dryopoid family Limnichidae. Evans' beetles were aggregated in groups of six to twelve in high and mid-tide rock crevices, and they jumped an inch or two when disturbed but were otherwise slow moving. One other member of the subfamily, *Martinius ripisaltator* Spilman, lives in the marine intertidal zone of Cuba and also jumps. Although all other Thaumastodinae do live near water, either fresh or salt water, none of those near fresh water has been recorded as being a jumper.

Heretofore this subfamily contained three genera: *Acontosceles* Champion, with one species in India and another in the Philippines; *Pseudeucinetus* Heller, with a single species in the Philippines and Malay Penninsula; *Martinius* Spilman, with one species in the Canal Zone and another in Cuba. I reviewed the taxonomy and morphology of the subfamily (1959) and then added the Cuban species (1966). In the first article I tried to indicate similarities and relationships of the three genera and came to the conclusion that *Pseudeucinetus*

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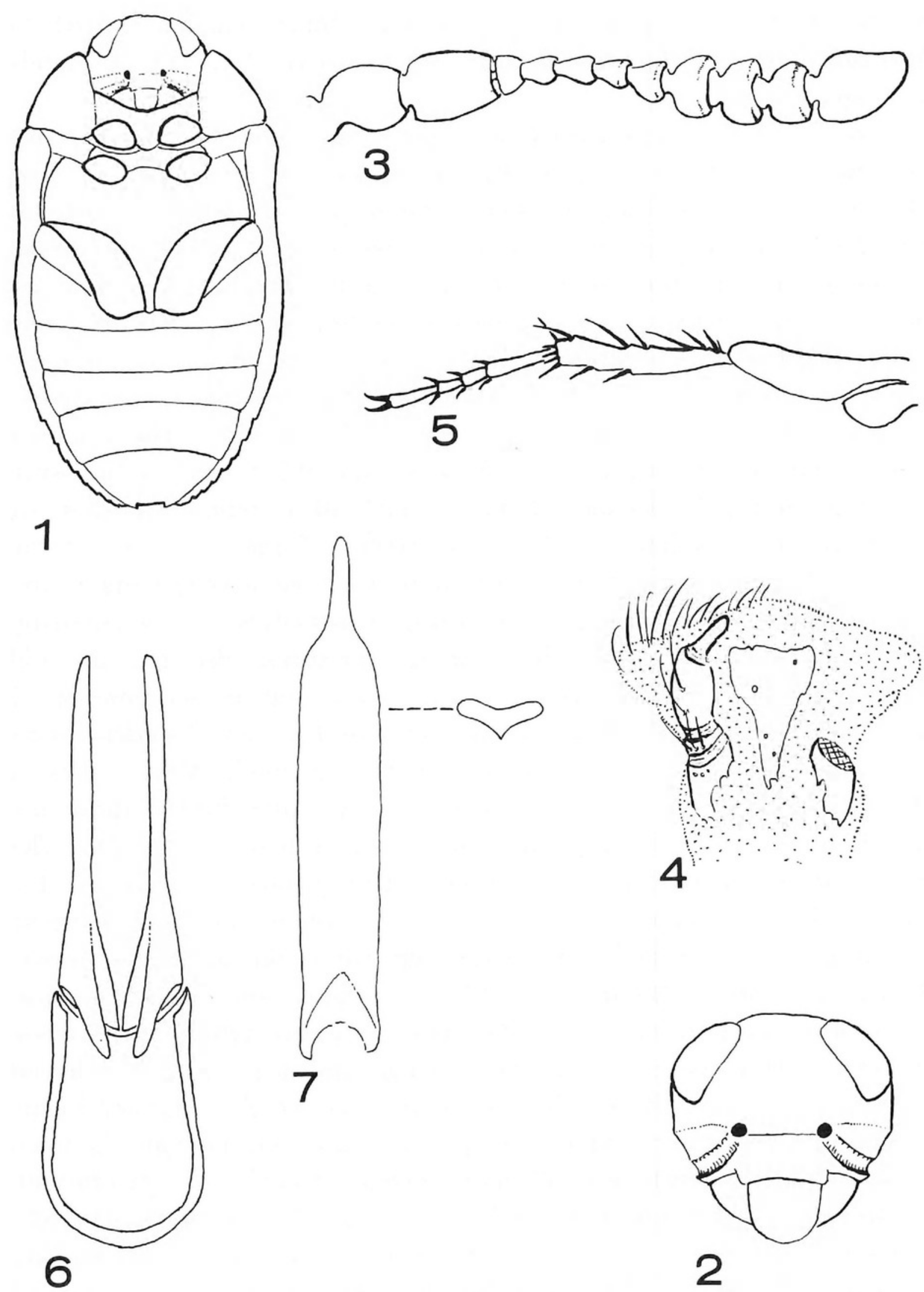
is an intermediate genus, but it is much more closely related to *Martinius* than to *Acontosceles*. In other words, *Acontosceles* stands well apart.

This new genus, described below under the name *Mexico*, has five outstanding characteristics. First, the antenna is very odd. At first glance the general shape of the antenna seems similar to that of *Pseudeucinetus*, but the number of articles appears to be 10 instead of the normal 11 because the second and third articles seem to be one. However, what appears to be a mere line or constriction on the apical third of this seemingly single article is actually a division or joint, and the morphology becomes obvious when the two are separated. The second article is large, the third small (Fig. 3). The apex of the second is concave, and the base of the third has an opposing concavity and a slender medial stalk; that stalk is actually the base of the third and fits into a hole in the center of the concavity of the second. I wonder about the function of such an arrangement; why should there be opposing, close-fitting concavities on neighboring antennal segments? One other genus, *Martinius*, also has an odd antenna, but that oddity is not in its shape but in its number of articles—it has only seven. Both *Acontosceles* and *Pseudeucinetus* have normal antennae of eleven articles. Second, *Mexico* has a sharply margined, deep, bare antennal groove immediately above the mandible, just wide enough to contain the antenna (Fig. 2). The groove does not exist in other genera. This groove is located in the broad, shallow, setose depression that is present in other genera; I had previously called that broad depression the antennal groove. Third, the eyes of *Mexico* are widely separated, very nearly vertical in position, and suboval (Fig. 2). However, this genus is not alone in having distinctive eyes; the eyes of each genus are differently shaped and arranged. The eyes of *Mexico* are the most widely separated in the subfamily, and their shape and position are intermediate between those of *Acontosceles* and *Pseudeucinetus*. Fourth, the prosternum of *Mexico*, the longest in the subfamily (Fig. 1), is one and a half times as long as the prosternum of *Pseudeucinetus* and twice as long as that of *Martinius*. Fifth, the metasternum is long (Fig. 1), almost as long as that of *Acontosceles*; this structure is very short in *Pseudeucinetus* and *Martinius*. Also, the metacoxae of *Mexico* are moderately oblique, of moderate size, and have moderately large plates. In *Acontosceles* the metacoxae are only slightly oblique, are relatively small, and have small plates; in *Pseudeucinetus* and *Martinius* they are very oblique, are very large, and have very large plates. The

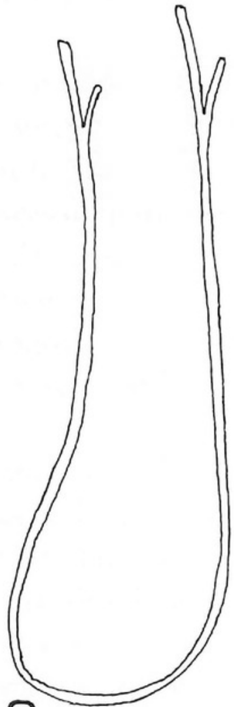


FIGS. 1–7. *Mexico litoralis*, new species. FIG. 1. Beetle, ventral view. FIG. 2. Head, anterior view. FIG. 3. Antenna. FIG. 4. Labium, aboral view. FIG. 5. Hind leg, anterior view. FIG. 6. Male parameres and pars basalis, dorsal view. FIG. 7. Male penis, dorsal view; outline of cross section at right.

length of the metasternum is inversely proportional to the size of the metacoxae in all four genera.

The majority of comparisons made in the generic description of *Mexico* indicates a close relationship to *Pseudeucinetus* and *Martinius*. However, I feel that the five characteristics discussed in the preceding paragraph indicate that *Mexico* is intermediate between *Acontosceles* on the one hand and *Pseudeucinetus* and *Martinius* on the other. That relationship, surely only a conjecture, might be expressed in a linear manner as follows, with the number of hyphens being directly proportional to distance of relationship: *Acontosceles----Mexico---Pseudeucinetus-Martinius*

Each time I look critically at members of this subfamily some different facet of functional morphology catches my eye. In my first paper (1959) I commented on several structures and their functions; in my second (1966) I discussed the functional significance of position of setae on the metatarsi. Now I am able to report on the morphology of the closure of the cavity formed by the elytra and abdomen. Closure is effected by three structures: a lateral seal, a lateral clasp, and an apical clasp. First, a lateral seal is formed by a dorsally projecting, continuous, longitudinal, thin, sclerotized plate or flange on each side of the dorsum of the abdominal segments (Fig. 10). This plate is actually a dorsal projection of all the combined sternites, and the lightly sclerotized tergites are continuous with the plate. The plate fits tightly against the underside of the lateral edge of the elytra when the latter are at rest. Second, a lateral clasp (Fig. 11) is formed by a very small, thin, dorsal projection on the lateral edge of the metacoxa. That projection fits into a very small, very narrow and short slit on the lower edge of the elytral pseudopleuron. Third, an apical clasp is formed in two different ways in the subfamily. The clasp is similar in *Pseudeucinetus*, *Martinius*, and *Mexico* (Fig. 12). The last visible abdominal sternite has a notch on each side of the midline of the posterior border and a slightly expanded process at the apex of that notch. The elytral apex has a truncate process, and the lateral surface of that process is concave. When the combined elytra are closed against the abdomen, the processes of the elytral apices fit between the processes of the abdominal sternite; the medial surface of each abdominal process fits snugly into the concavity of the lateral surface of the elytral process. However, the apical clasp in *Acontosceles* is different (Fig. 13). The apex of the elytron is slightly projected, but the projection is not parallel sided nor is it truncated. Proximad to the apex of the elytron the



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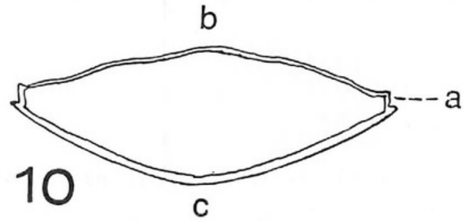

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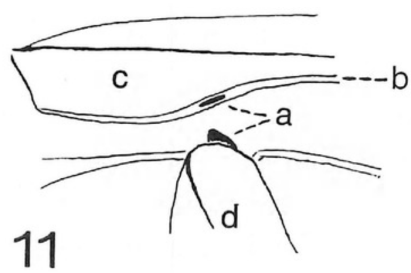

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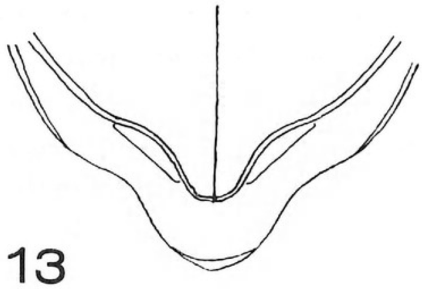

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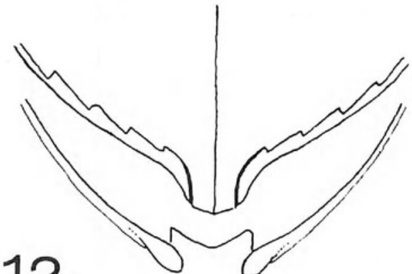

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FIG. 8–12. *Mexico litoralis*, new species. FIG. 8. Male sternite 9, dorsolateral view. FIG. 9. Male tergite 9, dorsolateral view. FIG. 10. Abdomen in region of 2nd visible sternite, diagrammatic cross section; a-lateral plate, b-dorsal surface, c-ventral surface. FIG. 11. Lateral area of left elytron and abdomen, showing lateral clasp opened; a-lateral clasp, b-elytral epipleuron, c-elytral pseudopleuron, d-metacoxa. FIG. 12. Apex of elytra and abdomen, showing apical clasp opened. FIG. 13. *Acontosceles hydroporoides* Champion. Apex of elytra and abdomen, showing apical clasp opened.

lateral border is incurved and from that incurved section a small vertical flange projects downward. The posterior border of the last visible abdominal sternite does not have notches or processes, but it is slightly rolled upward or recurved on its lateral thirds. When the combined elytra are closed against the abdomen, the recurved border of the sternite presses against or grips the flanges of the elytra.

Each of these three structures has a distinct function in the common cause of closure. The lateral seal forms a tight seal, keeping water from the subelytral cavity. The lateral clasp aligns the borders of the elytra and abdomen, preventing lateral movement of the elytra. The apical clasp functions as a locking mechanism and as a seal in the area where movement of the apical abdominal sternite must be possible. All three structures serve to maintain the integrity of the subelytral cavity.

KEY TO THE GENERA OF THAUMASTODINAE

1. Tarsal formula 4-5-5. Eye acutely angulate ventrally. Antenna inserted very near eye .... *Acontosceles* Champion
   Tarsal formula 4-4-4. Eye evenly arcuate or broadly angulate ventrally. Antenna inserted near mandible and distant from eye 2
2. Antenna with 7 articles .... *Martinius* Spilman
   Antenna with 11 articles or apparently with 10 articles 3
3. Antenna with articles 2 and 3 seemingly united, with continuous border (Fig. 3). Elytra with lateral border serrate posteriorly .... *Mexico* Spilman, new genus
   Antenna with 11 obvious articles, all articles distinct. Elytra with lateral border entire posteriorly .... *Pseudeucinetus* Heller

The four genera in the Thaumastodinae are compared in each character in the following description of the new genus. If the character mentioned is identical or similar to that same character in *Acontosceles*, an "(A)" is placed after the character. A "(P)" indicates similarity or identity to *Pseudeucinetus*, and an "(M)" indicates *Martinius*. If the character is unique or greatest in *Mexico*, the exclamation mark "(!)" is used.

Mexico Spilman, new genus

Head (Fig. 2) with face weakly convex in lateral aspect (PM); epistomal suture present (PM). Eyes (Fig. 2) subovate, dorsolateral, widely separated (!). Antennal groove (Fig. 2) broad, margined dorsally, with shiny, deep, acutely margined groove in ventral third of broad groove (!). Antenna (Fig. 3) inserted near mandible (PM); short, with 11 articles (PA); middle segments submoniliform (PM); with club of four articles (!); 2nd article large, 3rd small, 2nd and 3rd almost fused and together appearing as one (!). Labrum with lateral borders evenly arcuate (PM). Mandible with apical slender part not offset from lateral border of main body of mandible (!); lacinia mobile longer, its apex at level of apex of mandible proper (!); without elevation at base of lacinia mobile (!). Maxilla slender, with galea simple apically (PM). Labium (Fig. 4) with postmentum as wide as long (PM); ligula with broad, blunt lateral projections (!); 2nd palpal article longer (PM) and much broader than 3rd (!). Pronotum evenly convex (PM). Prosternum (Fig. 1) relatively long anterior to procoxal cavities, longest prosternum in tribe (!). Mesosternum (Fig. 1) on same level as prosternal process (PM), with distinctly bordered depression for reception of prosternal process (M), linear in area anterior to each mesocoxa (PM). Metasternum (Fig. 1) evenly convex, short anterior to metacoxae, slightly expanded laterally, posterior borders moderately converging medially, becoming triangular between coxae (in all respects intermediate between A and PM). Metepisternum (Fig. 1) very narrow, widest anteriorly, becoming linear posteriorly (PM). Hind tibia (Fig. 5) with many heavy spurs (PM). Tarsal formula 4-4-4 (PM). Foreleg not exhibiting sexual dimorphism (A). Metacoxa (Fig. 1) oblique, large, its length equal to distance between it and mesocoxa (A). Elytra with lateral border posteriorly serrate (M); apex with truncate process (PM) (Fig. 12). Abdomen (Fig. 1) with first visible sternite very long laterally and very short medially where large hind coxae encroach (PM); with border of ultimate visible sternite bidentate (PM) (Fig. 12). Metendosternite with stalk not bulbous anteriorly (PM); vertical plate not thickened on dorsal border (PM); anterior tendons not visible (PM). Male with aedeagus (Fig. 6) with tegmen ventral to penis when retracted within abdomen (M); with pars basalis symmetrical, not sclerotized dorsally, forming trough for penis (M); with parameres obviously longer than basal piece (!) and not acuminate apically (PM); sternite nine (Fig. 7) symmetrical (M); sternite eight (Fig. 8) small, modified V-shaped (PM).

TYPE-SPECIES: *Mexico litoralis* Spilman, new species.

The generic name *Mexico* should be considered to be in the third declension: *Mexico, Mexiconis.* The name would be similar to *Dido* and *Leo*; it is masculine.

Mexico litoralis Spilman, new species

Dorsal surface covered with dense, fine, setigerous punctures. Setae on dorsal surface of head similar to those on pronotum and elytra except directed anteriorly; setae on anterior surface of head strongly arched and directed ventrally. Setae on pronotum and elytra of three kinds. First kind very dense, short, fine, appressed, and brown, and covering most of surface. Second kind very dense, short, broad, appressed, and silvery or white, and forming irregular bands or spots on elytra; bands or spots obscured when lighted from certain directions. Third kind evenly dispersed among other kinds, dense, longer, fine, recurvate, and brown. Ventral surface covered with very dense, fine, setigerous punctures; setae whitish yellow, posteriorly directed, appressed, and fine. Ultimate visible sternite with four rows of very long, coarse, brown, curved setae, each row with four or five setae; setae not very obvious because of length of very dense finer setae. Antenna clothed with long whitish setae; much longer setae sparsely distributed and especially noticeable on apex of last article. Legs with dense whitish setae. Tarsi with pair of course setae on apex of each article except distal article. Sexual dimorphism not visible.

Eyes with overall surfaces continuous with surfaces of head; dorsal separation of eyes equal to 0.8 length of eye; anterior borders widely divergent ventrally in anterior view and almost straight, posterior borders strongly curved; dorsally and ventrally evenly arcuate. Antenna attaining middle point of procoxa; with club of 4 articles; article 1 large, subglobular, article 2 long, 3 short, 3 to 7 becoming gradually broader, 8 to 10 broad, submoniliform, 11 elongate. Pronotum with anterior border moderately incurved; anterior angles only moderately projecting; lateral borders evenly arcuate; posterior border sinuate on lateral thirds and with broad, posteriorly projecting, truncate lobe on middle third. Elytra parallel-sided in anterior half, evenly arcuate in posterior half, together forming semicircle at apex. Surface transversely evenly convex and longitudinally weakly convex; pseudopleural carina, or angulation of dorsal surface with pseudopleuron, visible throughout its length in dorsal view, forming lateral border of elytra; pseudopleural carina with approximately 10 small serrations on posterior half; apex of each elytron with small truncated projection which lies medial to apical projections on ultimate sternite of abdomen; pseudopleuron wide anteriorly, gradually narrowing posteriorly, visible throughout its length.

Length: 1.7–2.0 mm; width, 0.9–1.1 mm.

Holotype, USNM No. 71706, Allotype, and 13 Paratypes, TENACATITA BAY, JALISCO, MEXICO, 19°16′45″N., 104°48′30″W., W. G. Evans, 4 November 1966. Evans in a letter to me said, ". . . they hopped like flea beetles. I found the beetles, aggregated in groups of 6 to 12, in crevices of high tide-zone and splash-zone rocks on the protected south end of Tenacatita Bay. These rocks were scattered irregularly on a shingle beach. Collembola, as yet unidentified, were also found on the surface of these rocks as well as in crevices, but algae were not present."

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