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Two new species of the aquatic beetle genus *Macrelmis* Motschulsky from Venezuela (Coleoptera: Elmidae: Elminae)

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Abstract: Two new species collected in northwestern Venezuela, *Macrelmis milleri* and *M. hayekae*, are described and illustrated by line drawings and scanning electron micrographs. Both species are assigned to the new species group *Macrelmis milleri*, and characters of the new species group are described. A key to the species of the group is given.

Key words: Coleoptera, Elmidae, Elminae, *Macrelmis milleri*, *Macrelmis hayekae*, new species, new species group

The genus *Macrelmis* Motschulsky (1859) is known only from the Western Hemisphere, is primarily neotropical, and previously included 38 described species, most of which were described in the synonymous genus *Elsianus* Sharp (1882). The validity, parameters, and redescription of the genus and the placing of *Elsianus* Sharp (1882) as a synonym of *Macrelmis* were detailed by Brown (1984). The known distribution of the genus is from southern Texas, New Mexico, and Arizona south to Bolivia, Brazil, and Peru. An additional 21 undescribed species have been recognized from Mexico and Central America and will be included in a report of a study of the elmids from that area. Although most South American and Central American species of the genus have been collected at lower elevations such as the Amazon Basin, the specimens of *M. milleri*, new species, were collected in the Andes at an elevation of about 1225 meters.

The genus *Macrelmis* is easily distinguished from all other described neotropical elmid genera by the presence of an accessory stria between the sutural and second stria on the basal fifth or sixth of each elytron (Figures 1, 7). In addition, Hinton (1946) and Brown (1984) reported that members of *Macrelmis* have one longitudinal cleaning fringe of golden, hair-like setae on each protibia, two similar fringes on each mesotibia, and one or two fringes on each metatibia. The two species described below are placed as members of *Macrelmis* because they have the distinguishing elytral accessory stria (somewhat obscured in *M. hayekae*) and cleaning fringes on each tibia. However, the species of the *M. milleri* group have a cleaning fringe formula of 2-2-1 instead of 1-2-1 or 1-2-2 as described for other members of the genus.

Macrelmis milleri, new species (Figures 1-23)

Diagnosis: *Macrelmis milleri* may be recognized by the following: evenly convex pronotal discal area; moderately convex scutellum; apical half of last abdominal sternum convex; apex of male protibiae without tufts of golden, hair-like setae; tibial cleaning fringe formula, 2-2-1; subapices of parameres, in dorsal view, only slightly expanded (Figure 22); parameres, viewed laterally, without subapical notch (Figure 23).

Holotype ♂: Body Form and Size: Rectangular, robust (Figures 1, 2). Length, 4.15 mm; greatest width, 1.84 mm.

Head: Retractable, mouthparts may be hidden. Surface granulate (Figure 8), area between granules microreticulate; sparsely punctate; with fine, sparse setae. Frontoclypeal suture distinctly, broadly emarginate. Clypeus broad (Figure 6); granulate and microreticulate as rest of head. Labrum short, subtruncate apically; shiny and smooth except for fine, sparse seta-bearing punctures along base (Figure 6). Antennal segments 5-10 with cluster of stout setae apicoventrally; ultimate segment encircled with numerous stout setae on apical fourth (Figure 9). Mandible with 3 acute apical teeth and a large membranous prosthema; medial edge of prosthema spinose (Figure 10). Maxilla as illustrated (Figure 11). Labium (Figure 16). Maxillary palpus (Figures 11, 13-15) and labial palpus (Figures 17, 18) each with sensilla on apical segment.

Thorax: Pronotum as for genus and as follows: discal area evenly convex, microreticulate, and finely, densely punctate; discal punctures separated by puncture diameter; cuticular surface coarsely granulate along inner margins of sublateral cari-

nae to outermost margins (Figure 8). Pronotal sublateral carinae high, wide, incurved at midlength then becoming higher and narrow on posterior half. Elytra about $2\frac{1}{2}$ times longer than length of pronotum; greatest width, at apical two-thirds, slightly wider than width across humeri; lateral margins finely crenate; apices deeply incised laterally and each apex extended, subparallel, and rounded (Figures 1, 7). Each elytron with 9 punctate striae and a short accessory stria on basal fifth between sutural stria and stria 2; with 3 sublateral carinae: one on interval 3, one low carina on interval 5, and one on interval 7; carina on interval 3 widest at base and again at apical $3/4$; carina on interval 5 moderately carinate from base to apex where it is most distinct for a short distance before becoming effaced; carina on interval 7 distinctly carinate from humerus to near apex but most distinct at humerus and apically before becoming effaced (Figure 7). Hind wing as illustrated (Figure 12). Scutellum (Figure 8) moderately convex, subovate; moderately arcuate basally and arcuate laterally; surface finely, densely punctate except coarsely and sparsely so laterally. Prosternum with low, rounded granules medially (Figure 16); sides in front of procoxal cavities with peg-like granules and lanceolate plastron setae (Figures 19–21). Prosternal process broad, apex obtuse; surface rugose (Figures 3, 4). Hypomera with peg-like granules and plastron setae as on sides of pronotum (Figures 19–21); with a row of small, elongate, dorsoventrally oriented granules on upper edge (Figures 19–20). Mesosternum with sides rugose (Figure 4). Metasternum with discrimen extending almost to anterior eighth; posterior two-thirds of disc deeply and broadly concave; discal concavity with coarse, dense, granules; sides with plastron setae and smaller and more widely separated granules than those in concavity (Figure 4). Profemur, mesofemur, and metafemur granulate, with plastron setae.

Abdomen: Visible sternum 1 concave conjointly with metasternal cavity; deeply and broadly concave between metacoxae; surface of concavity coarsely and densely granulate like that of metasternal concavity (Figure 5). Surface of sides of visible sternum 1 and entire surface of visible sternum 2–5 granulate, with plastron setae as on sides of metasternum except granules become progressively smaller from sternum 1 to sternum 5; apical third of sternum 5 without plastron setae. Sternum 4 with small, lateral, tooth-like process on apical half recurved to clasp epipleuron. Sternum 5 with api-

cal half convex; with large, lateral tooth-like process recurved to clasp epipleuron.

Genitalia: As illustrated (Figures 22, 23).

Female: Unknown.

Variations: None noticed on the four specimens available.

Type Data: Holotype ♂: Venezuela: Merida, Las Cruces, 9 July 1986, R.S. Miller; deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Paratypes: Same data as holotype, 3 ♂♂; one deposited in the Museum of Natural History, London; one deposited in the collection of the Instituto de Zoología Agrícola, Facultad de Agronomía, Universidad Central de Venezuela at Maracay; and one in the collection of R.S. Miller.

Etymology: I am pleased to name this species for Richard Miller, a colleague, coleopterist, collector and donor of the type specimens of this species and other beetles to the National Museum of Natural History, Smithsonian Institution.

Habitat: Unknown; specimens were collected at a blacklight at an altitude estimated at about 1225 meters.

Macrelmis hayekae, new species

(Figures 24, 25)

Diagnosis: *Macrelmis hayekae* may be recognized by the following: apical half of pronotum in high relief, high relief continued posteriorly in a V-shape; scutellum distinctly protuberant; apical half of last abdominal sternum with moderately deep, broad, medial concavity; apex of protibia with 2 tufts of long, golden, hair-like setae; tibial cleaning fringe formula, 2-2-1; subapices of parameres, in dorsal view, distinctly expanded (Figure 24); parameres, viewed laterally, with subapical notch (Figure 25).

Holotype ♂: Body Form and Size: Rectangular, robust (similar to *M. milleri*). Length, 4.55 mm; greatest width, 1.90 mm.

Head: Retractable, mouthparts may be hidden. Surface granulate, area between granules microreticulate; sparsely punctate; with fine, sparse setae. Frontoclypeal suture deep and broadly emarginate. Clypeus broad; granulate and microreticulate as rest of head. Labrum short, subtruncate apically; shiny and smooth except for fine, sparse, seta-bearing punctures.

Thorax: Discal area of pronotum with apical half in high relief, high relief continued posteriorly in a V-shape. Surface of pronotal area in high relief

microreticulate and finely, densely punctate anteriorly; becoming coarser posteriorly; punctures separated by puncture diameter; with a shallow, longitudinal, medial groove on posterior two-thirds; groove with a few coarse punctures posteriorly. Pronotal surface between sublateral carinae and outermost margins coarsely granulate. Pronotal sublateral carinae distinct, widest anteriorly, indistinctly incurved at midlength and becoming higher and narrower on posterior half. Elytra about $2\frac{1}{2}$ times longer than length of pronotum; greatest width, at apical $2/3$, slightly wider than width across humeri; lateral margins finely crenate; apices deeply incised laterally and each apex extended, subparallel, and rounded. Each elytron with 10 punctate striae and a short accessory stria on basal fifth between sutural stria and stria 2; with 3 sublateral carinae: one on interval 3, one on interval 5, and one on interval 8; carina on interval 3 not as high apically; interval 5 moderately carinate from base to apex where it is most distinct for a short distance before becoming effaced adjacent to elytral margin; carina on interval 8 distinctly carinate from humerus to apex but most distinct at humerus and apically before becoming effaced. Scutellum distinctly protuberant, subovate; moderately arcuate basally and extremely arcuate laterally; surface finely microreticulate medially and coarsely punctate laterally. Prosternum depressed apicomediaally; with low, rounded granules medially; sides in front of procoxal cavities with peg-like granules and lanceolate plastron setae. Prosternal process broad, apex obtuse; deeply grooved medially; surface rugose. Hypomera with peg-like granules and plastron setae as on sides of pronotum; with a row of small, elongate, dorsoventrally oriented granules on upper edge. Mesosternum deeply concave between mesocoxae; sides rugose. Metasternum with discrimen extending almost to anterior half but discrimen obscured by rugosity; disc with posterior $2/3$ deeply and broadly concave; discal concavity with coarse, dense, granules; sides with plastron setae and smaller, more widely separated granules than those in concavity. Profemur, mesofemur, and metafemur granulate, with plastron setae. Profemur distinctly more swollen than other femora. Protibia with 2 elongate cleaning fringes of long, golden, hair-like setae and 2 apical tufts of long, golden, hair-like setae. Mesotibia with 2 dense, elongate cleaning fringes of long, golden, hair-like setae. Metatibia with 1 small, elongate cleaning fringe of golden, hair-like setae on inner surface.

Abdomen: Visible sternum 1 concave conjointly with metasternal cavity; deeply and broadly concave between metacoxae; surface of concavity coarsely and densely granulate like that of metasternal concavity; sides of concavity subcarinate. Surface of sides of visible sternum 1 and entire surface of visible sternum 2–5 granulate, with plastron setae as on sides of metasternum except granules become progressively smaller from sternum 1 to sternum 5. Sternum 4 with small, lateral, tooth-like process on apical half recurved to clasp epipleuron. Sternum 5 with moderately deep, broad medial concavity and large, lateral, tooth-like process recurved to clasp epipleuron.

Genitalia: As illustrated (Figures 24, 25).

Female: Unknown.

Type Data: Holotype ♂: Venezuela: [Aragua]: Colonia Tovar [$10^{\circ}25'N$ $67^{\circ}17'W$], 25 July 1971, H. E. Hinton; deposited in The Natural History Museum, London, England.

Paratype: Same data as holotype, 1 ♂; deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Etymology: In appreciation for her kindness and extensive help with many loans, I am pleased to name this species for Christine von Hayek, former curator of the family Elmidae and various other beetle families at The Museum of Natural History, London.

Habitat: Unknown; specimens were collected at a blacklight.

Discussion

The two species described above have the stable and distinctive accessory stria on the elytral base between the sutural and second striae (Figure 7) and the typical metathoracic wing venation of *Macrelmis* (Figure 12) as described by Hinton (1940). However, they differ from all other members of the genus that I have examined by the following characters. 1) Absence of "short, sparse or dense, usually recumbent hairs" (Hinton, 1940) on the dorsal surface (Figures 7, 8); 2) the presence of a Y-shaped penial sclerite attached to the median lobe of the aedeagus (Figures 22, 24); 3) presence of a row of vertical, elongate granules on the upper margin of the hypomeron (Figure 20); 4) tibial cleaning fringe formula of 2-2-1 instead of 1-2-1 or 1-2-2 (Hinton, 1940; Brown, 1984); and 5) presence on each elytron of distinct or indistinct sublateral carinae on intervals 3, 5, and 7 (Figure 7).

Because of these differences, and principally the apomorphic Y-shaped penial sclerite attached

to the median lobe of the aedeagus, I believe these two species constitute a monophyletic group of species.

Although the genus *Macrelmis* (*Elsianus auctorum*) and the 38 included species have never been completely revised, the following four regional or species group keys are available and, when used together, facilitate a review of most of the described species of the genus: Hinton's (1940) key to 7 Mexican species, (1945) key to 5 species in the *granigera* species group, and (1946) key to 14 species reported from Brazil. Brown (1976) provides a key to the three North American species of the genus.

I regard the sister species *M. milleri* and *M. hayekae* as distinctive enough to be set apart as a new subgenus or, possibly, a new genus. However, without larvae and/or a revision of the genus I choose to place them as a species group within the genus *Macrelmis*.

Although other species groups will be designated when *Macrelmis* is revised, the following key will distinguish the two species groups now recognized in the genus and will distinguish the two new species described in this article from each other and all other described species of the genus.

Key to species in the *Macrelmis milleri* group

1. Pronotum with prominent, basal, round or obovate, medial gibbosity *granigera* groups
— Pronotum without baso-medial gibbosity 2
2. Dorsal surface with short, sparse or dense, usually recumbent setae. Elytra without sublateral carinae except *Macrelmis granosus* (Grouvelle) with intervals 3, 5, 7, and 9 carinate. Aedeagus without Y-shaped penial sclerite attached to median lobe. Tibial cleaning fringe formula 1-2-1 or 1-2-2 *Macrelmis* spp.
— Dorsal surface without short, sparse or dense setae. Elytra each with carinae present on intervals 3, 5, and 7. Aedeagus with Y-shaped penial sclerite attached to median lobe. Cleaning fringe formula 2-2-1 3 (*milleri* group)
3. Pronotal disc evenly convex. Scutellum moderately convex. Protibia (males) without apical tufts of long, golden, hair-like setae. Last abdominal sternum of males convex apicomediaally. Viewed dorsally, subapices of parameres only slightly expanded (Figure 22); viewed laterally, parameres without notch (Figure 23)
..... *milleri*, new species

- Pronotal disc not evenly convex; apical half in high relief and continued posteriorly in a V-shape; with shallow, medial, longitudinal groove on basal half. Scutellum highly protuberant. Protibia with 2 conspicuous apical tufts of long, golden, hair-like setae (males). Last abdominal sternum broadly concave anteromedially (males). Subapices of parameres, viewed dorsally, broadly expanded (Figure 24). Parameres notched, viewed laterally (Figure 25)
..... *hayekae*, new species

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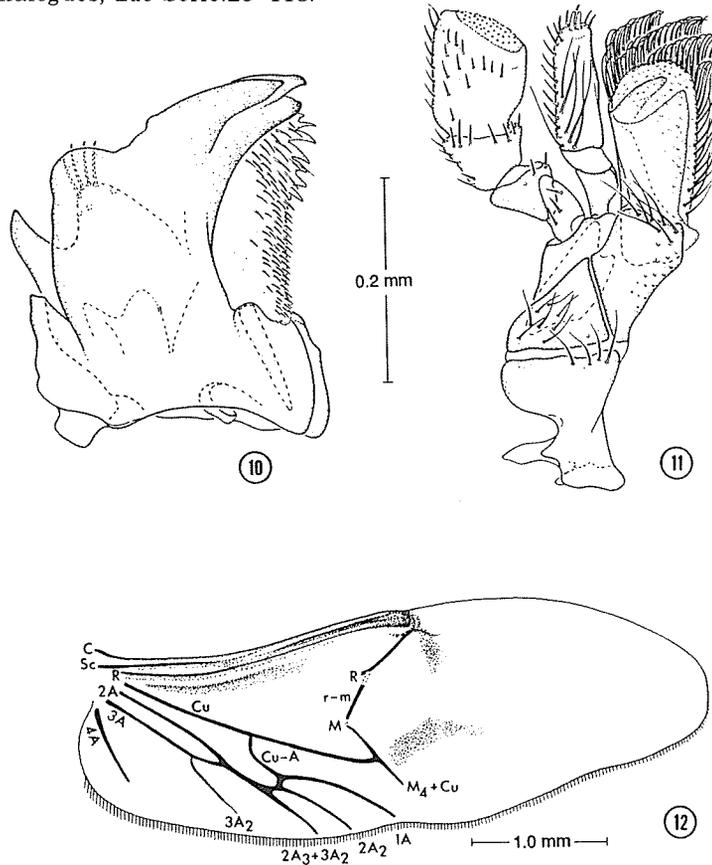
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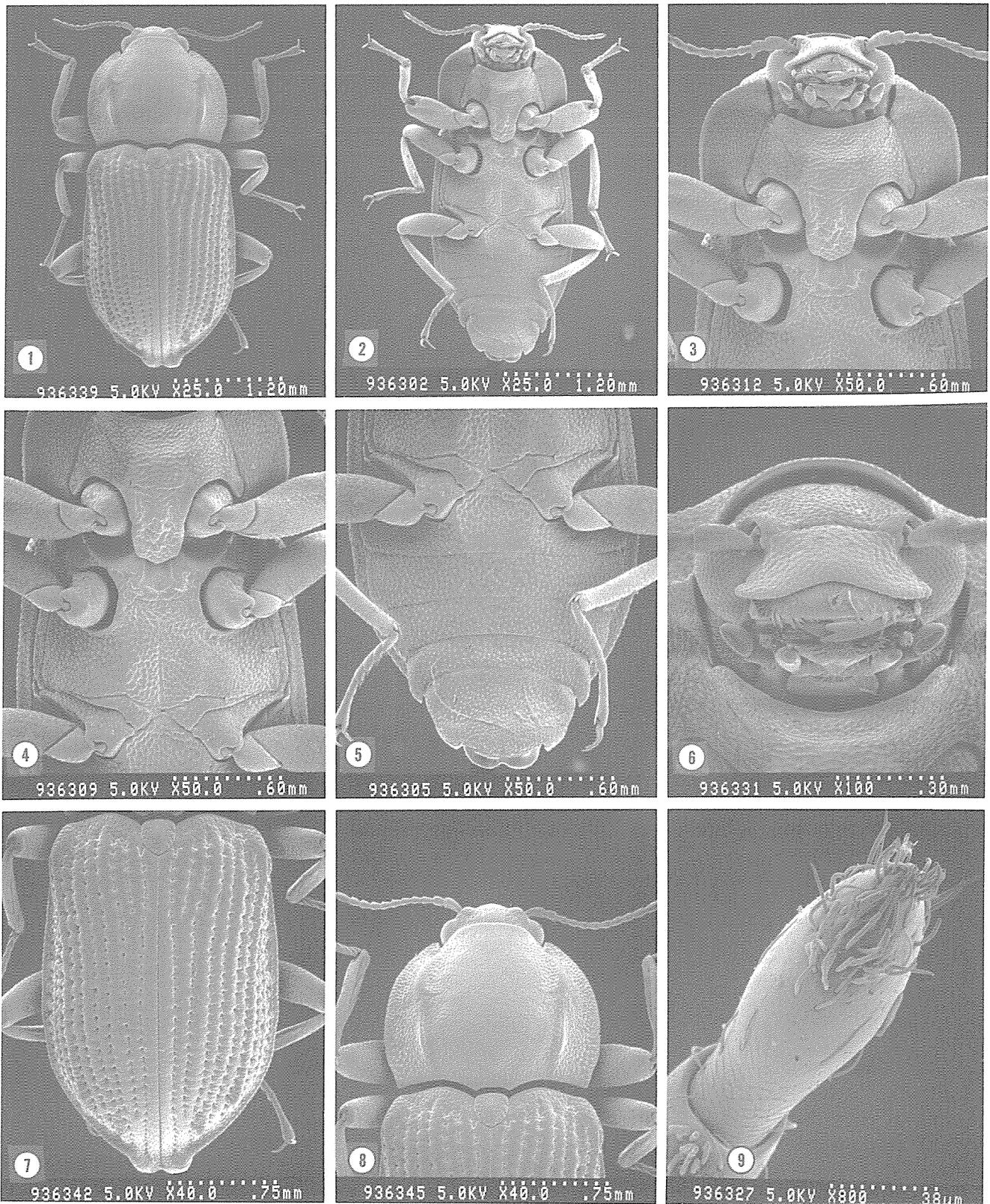
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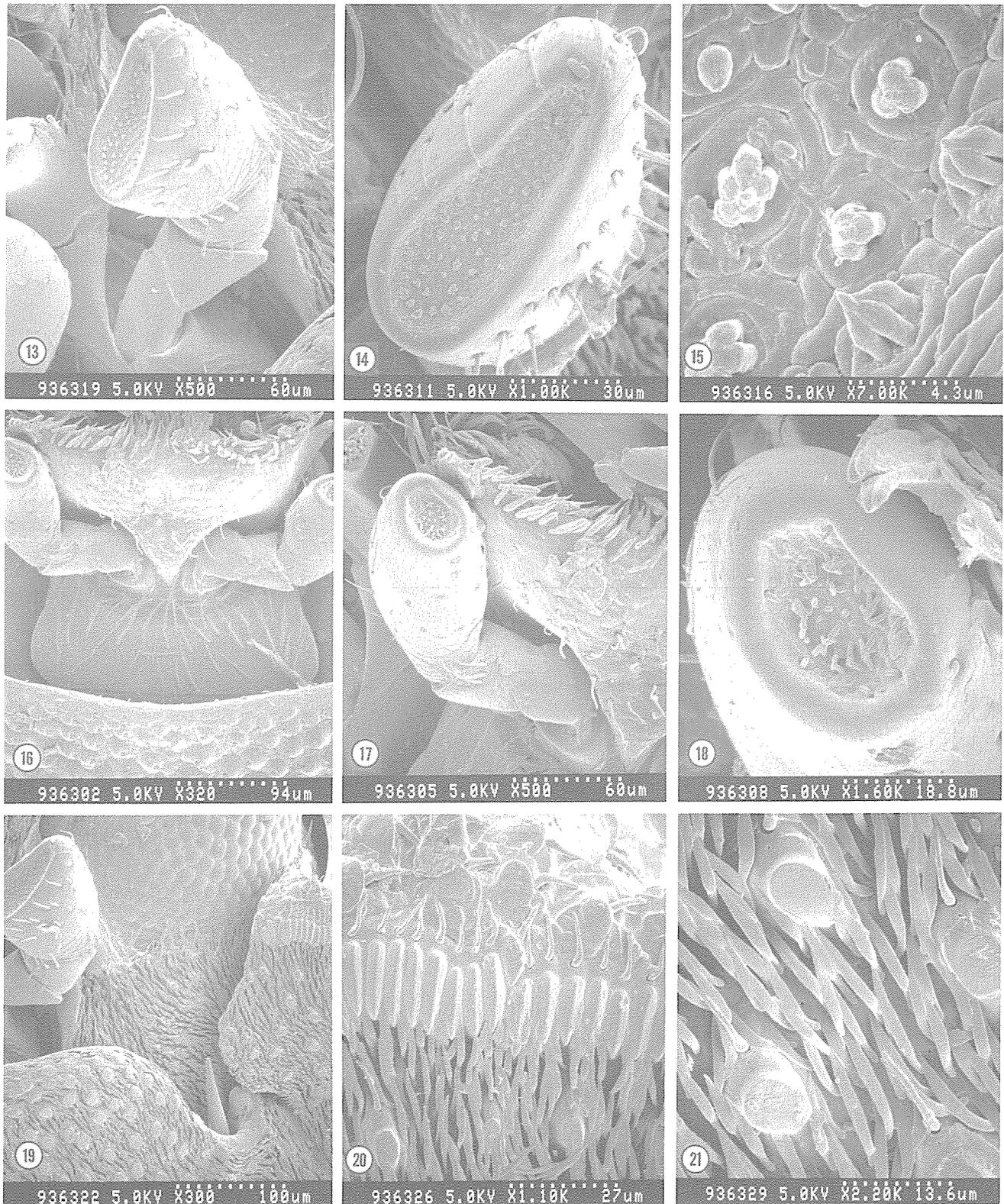
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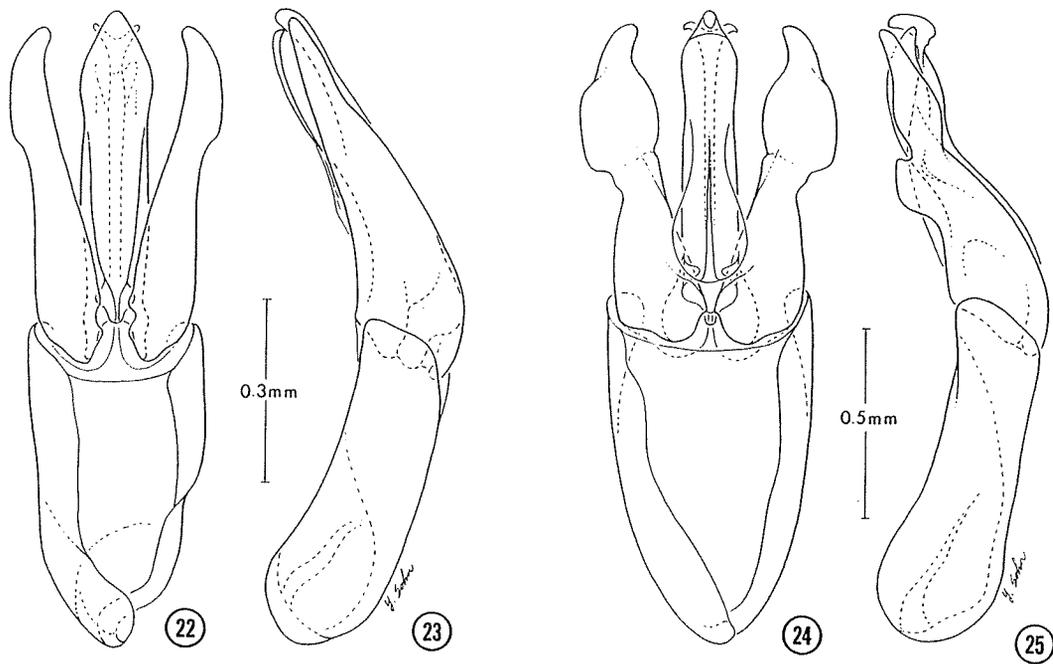
Figures 10-12: *Macrelmis milleri*, new species: 10, mandible; 11, maxilla; 12, wing.



Figures 1-9: *Macrelmis milleri*, new species: 1, habitus, dorsal view, X25; 2, habitus, ventral view, X25; 3, head and thorax, ventral view, X50; 4, Prosternum, mesosternum, and metasternum X50; 5, abdomen, X50; 6, mouthparts, X100; 7, elytron with accessory stria, X40; 8, head, pronotum and scutellum, X55; 9, antenna, apical segment, X800.



Figures 13-21: *Macrelmis milleri*, new species: 13, maxillary palpus, X500; 14, maxillary palpus, apical segment, X1,000; 15, maxillary palpus, sensilla, X7,000; 16, labium, X320; 17, labial palpus, X500; 18, labial palpus, sensilla, X1,600; 19, base of head, apex of hypomeron and prosternum, X300; 20, hypomeron, marginal sculpture and plastron setae, X1,100; 21, hypomeron, granules and plastron setae, X2,200.



Figures 22-25. Figs. 22 & 23: *Macrelmis milleri*, new species: 22, aedeagus, ventral view; 23, aedeagus, lateral view. Figs. 24 & 25: *Macrelmis hayekae*, new species: 24, aedeagus, ventral view; 25, aedeagus, lateral view.