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Four new species of *Acoma* Casey, with a key to species in the genus (Coleoptera: Scarabaeidae: Melolonthinae)

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(Coleoptera: Scarabaeidae: Melolonthinae)

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Four new species of *Acoma* Casey, with a key to species in the genus (Coleoptera: Scarabaeidae: Melolonthinae)

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Abstract. *Acoma howdenorum*, *Acoma westcotti*, *Acoma quadrilaminata*, and *Acoma cimarron* (Coleoptera: Scarabaeidae: Melolonthinae), all **new species**, are described from Yuma County, Arizona, USA, and Baja California Sur, Baja California (Norte), and Sonora, Mexico, respectively. Habitus of the four new species is illustrated, and an updated key to the described species in the genus is provided. Distribution and variation of *Acoma glabrata* Cazier are also discussed.

Introduction

It has been about 50 years since *Acoma* Casey (Coleoptera: Scarabaeidae: Melolonthinae) was last reviewed by Howden (1958, 1962). The genus ranges from western Texas to California in the USA, and Chihuahua, Sonora, and the entire length of the Baja California peninsula in Mexico. Three new species with three-segmented antennal clubs and one species with four-segmented antennal clubs are here described, bringing the total known species in the genus to 30.

Presumably females of all *Acoma* species are flightless, as has been suspected by past authors, and *Acoma* species are often restricted to isolated sand dune areas. Because of this, interpopulation gene flow is presumably restricted, and *Acoma* tend to vary geographically within presumptive species more than most other scarabs in which both sexes can fly. Apparently, only a single female specimen has ever been collected (of *A. knulli* Howden (CMNC), dug from soil near Rodeo, New Mexico); it is larger than males collected at the site, has short antennal clubs, and indeed has short (non-functional) flight wings. Larvae are still unknown for the genus, and its tribal affinities remain uncertain.

Because there is no current key that includes species described after Howden (1958), I here provide a provisional key amalgamated and modified from the partial keys of Cazier (1953) and Howden (1958), and the notes of Howden (1962). Many *Acoma* species are difficult to identify without comparative material, and the reader is directed to the above works for more information. Setal vestiture and presence of clypeal emargination are used at several places in the key; but worn individuals may not key out properly because those characters can be lost or modified through wear. With additional study, some difficult to differentiate species pairs (e.g. *A. brunnea* and *A. knulli*) may turn out to be synonymous. Also, specimens of possibly undescribed taxa have been seen in various collections, mostly from Mexican localities, and most of these will key to described species.

Materials

Codens used for collection depositories cited are:

- ASUT — Arizona State University, Tempe, AZ, USA.
- BCRC — B. C. Ratcliffe personal collection, Lincoln, NE, USA
- BDGC — B. D. Gill personal collection, Ottawa, Canada
- CMNC — (H. F. Howden personal collection transferred to) Canadian Museum of Nature, Ottawa, Canada
- CSCA — California State Collection of Arthropods, Sacramento, CA, USA
- EMEC — Essig Museum of Entomology, University of California, Berkeley, CA, USA
- FSCA — Florida State Collection of Arthropods, Gainesville, FL, USA
- GNGC — G. Nogueira personal collection, Guadalajara, Jalisco, Mexico
- IEXA — Instituto de Ecología, Xalapa, Veracruz, Mexico
- MJPC — M. J. Paulsen personal collection, Lincoln, Nebraska, USA
- MXAL — M. A. Morón personal collection, Xalapa, Veracruz, Mexico
- NAUF — Northern Arizona University, Flagstaff, AZ, USA

PHSC — P. H. Sullivan personal collection, Sierra Vista, AZ, USA
RACC — R. A. Cunningham personal collection, Chino, CA, USA
RLWE — R. L. Westcott personal collection, Salem, OR, USA
UAIC — University of Arizona, Tucson, AZ USA
UCRC — University of California, Riverside, CA, USA
UNAM — Universidad Nacional Autónoma de México, México, Distrito Federal, Mexico
UNSM — University of Nebraska State Museum, Lincoln, NE, USA
USNM — National Museum of Natural History (Smithsonian), Washington, DC, USA
WBWC — W. B. Warner personal collection, Chandler, AZ, USA

***Acoma westcotti* new species**

Figures 2-5

Type Material. Holotype (UNAM): “MEX, Baja Calif. Sur, 10 km SE Mulegé, dunes, 18-VI-1993, Westcott & Equihua.”

Paratypes (22 males): same as holotype (3); “Mex: Baja Calif. Sur, 5.7 mi. SE Mulege, vii-7-1979, Andrews, Hardy, & Giuliani; collected at blacklight” (12); same except “cereal bowl pit trap” (2); “Mexico: Baja California Sur, 6 km S. Mulege, 18 November 1981, W.E. Steiner” (2); “Baja California, 4 mi. S Mulege, 18-ix-1991, Robert Gordon” (3).

Paratypes are deposited at CASC, CSCA, FSAC, CMNC, RLWE, USNM, WBWC.

Diagnosis. Castaneous; shiny, head and pronotum unusually smooth for genus, glabrous except for margins, elytral disc hairy; antennae 9-segmented with 3-segmented club, club segments slightly shorter than length of other segments combined; anterior tibia distinctly bidentate.

Description. Holotype male, length: 5.8 mm, width: 2.7 mm.

BODY medium brown, elongate, moderately convex. HEAD including clypeus unusually smooth and shiny for genus, sparsely finely punctulate, punctures mostly separated by 3-5 times their own diameters, more dense on either side of subtriangular mostly impunctate area extending from base of head to half way to frontoclypeal junction; supraorbital areas narrowly subcarinately overhanging eyes, this narrow shelf becoming obsolete at base of ocular canthus. Clypeus subsemicircular, apex slightly flattened in dorsal view, free margins strongly reflexed, reflection weakly emarginate at clypeal apex. Ocular canthus short, about one-sixth of eye width, densely setose, setae twice or more as long as canthus. PRONOTUM slightly less than half as long as elytron; disc glabrous, moderately convex, finely sparsely punctate similar to head; posterior and lateral margins with bead fine, anterior marginal bead wide and flat, the margin rather strongly concave from angle to angle; posterior margin very weakly convex; posterior angles rounded, lateral margins parallel in posterior two-thirds, narrowing in anterior one-third; anterior angles drawn anteriorly, very narrowly rounded at apices; anterior marginal setae about one-third pronotal length, lateral marginal setae nearly one-half length of pronotum, posterior marginal setae about one-third or less as long as anterior marginal setae. SCUTELLUM small, parabolic, about one-third as wide as elytron, rather densely setigerously punctulate in basal half. ELYTRON slightly less than three times as long as pronotum, surface shagreened, subrugosely punctate, punctures sparse on disc, more dense on declivity, setigerous; striae evident on disc, obsolescent basally, laterally, and in apical fourth. PYGIDIUM parabolic, moderately punctate, punctures shallow, setigerous (Fig. 5). LEGS: Anterior tibia bidentate, emargination between middle and apical teeth deep, middle tooth strong, arising basal to insertion of tibial spur (Fig. 4). GENITALIA: paramera with apex weakly deflexed, ventrobasal emargination moderate.

Variation. Length: 4.7 – 5.9 mm, width: 1.9 – 2.8 mm. Clypeal shape varies from semicircular to subtrapezoidal, with the apical emargination varying from obsolete to subdistinct; minor variation in surface sculpture; color varies from honey brown to dark brown.

Etymology. I am pleased to name this new species for Rick Westcott, Salem, Oregon, expert on the Buprestidae, who has a great talent for collecting rare Scarabaeoidea, and who collected part of the type series.

Remarks. *Acoma westcotti* apparently occupies an isolated position within the genus based on the distinctive pronotal and tibial shapes. It is easily recognized by the strongly bidentate anterior tibia (Fig. 4) and smooth head (Fig. 2 and 3), both characters being very unusual for the genus. (The head of *Acoma glabrata* Cazier, a species with a relatively smooth head compared to most *Acoma*, is shown in Fig. 1 for comparison.) The anterior tibial shape is very similar to that of the unrelated but sympatric *Chaunocolus cornutus* Saylor, and may represent a parallelism.

***Acoma howdenorum* new species**

Figures 6, 7

Type Material. Holotype male (FSCA): "Ariz: Yuma Co., Mohawk Dunes, ca. 1 mi. S. I-8; v-14-1988; U.V. light; W.B.Warner."

Paratypes, (193 males) with data: same as holotype (33); "USA. AZ: Yuma Co., 10 km E. Tacna, Mohawk Dunes, 23 vii.1992, H. & A. Howden" (6); same except: "10 mi. E of Tacna; 32°41'N, 113°47'; vii.23.1992; UV, W.Warner" (11); same except: "32°41'45"N, 113°47'22", June 4, 2010; UV; W.B.Warner" (143). (All paratype locality data refer to the same location.)

Paratypes are deposited at ASUT, BCRC, BDGC, CSCA, EMEC, FSCA, CMNC, MJPC, NAUF, PHSC, RACC, RLWE, UAIC, UCRC, UNAM, UNSM, USNM, WBWC.

Diagnosis. Pale testaceous, pronotum and elytra subtransparent (when fresh) and glabrous except for marginal fimbriae and scattered long hairs at elytral base; clypeal disc nearly impunctate; antenna 9-segmented, with 3-segmented club; anterior tibia tridentate.

Description. Holotype male, length: 5.7 mm, width: 2.5 mm, widest at about middle of elytra.

BODY light testaceous, integument translucent to subtransparent, shiny on head, slightly sericeous on pronotum and elytra. HEAD with front and clypeal base scabrously, reticulately punctate; clypeus subhemihexagonal, margins moderately reflexed, more strongly so apically, disc sparsely, shallowly, finely punctate, punctures separated by about 2 to 6 times their own diameters; antenna 9-segmented, club 3-segmented, segment immediately proximal to club anteriorly prolonged into short lamina. PRONOTUM glabrous except for marginal bead, length about 0.4 times elytral length, widest at about middle; anterior margin weakly bisinuate; posterior margin convex, lateral margins subparallel in about basal half, in apical half straight and converging to slightly obtuse anterior angles which are not drawn forward next to eyes; posterior angles rounded; disk weakly, but moderately punctate, punctures mostly separated by 2 to 4 times their own widths, longitudinal midline very slightly impressed and impunctate. SCUTELLUM lobiform, with apex evenly arcuate. ELYTRON glabrous, weakly striate, striae obsolescent basally, weakly contiguously punctate on disc; intervals more coarsely and distinctly punctate than pronotal disc, but punctures similarly separated. PYGIDIUM with apex broadly arcuate, disc shallowly subcontiguously punctate, punctures setigerous. LEGS: Anterior tibia narrow, gracile, tridentate, basal tooth weak; metatibia rather narrow, widest corbel diameter distinctly less than half pygidial length, posterior tarsal claws about 1/3 length of segment from which they arise. GENITALIA: paramera only weakly and arcuately deflexed in apical third, ventrobasal emargination shallow, moderately long.

Variation. Length: 4.2 – 6.0 mm, width: 1.8 – 2.9 mm. Clypeal shape varies occasionally to subsemicircular, and occasional paratypes have the apical clypeal margin vaguely concave. A few paratypes had one antenna 8-segmented because of fusion in the funicular segments.

Etymology. I take pleasure in naming this species for Henry and Anne Howden, both in recognition of their many contributions to coleopterology and for their help in collecting part of the type series.

Remarks. This species was treated as “variation” within *Acoma glabrata* Cazier by Cazier (1953), who listed four specimens from Welton and Dome, Arizona; but he purposely excluded them from the paratype series. Howden (1958) followed that lead, quoting Cazier’s (1953) comments on variation. *Acoma howdenorum* is indeed similar to *A. glabrata*; however, *A. howdenorum* is separated both geographically and phenotypically from that species. It can immediately be differentiated from *A. glabrata* by its 9-segmented antennae, generally smaller size, less robust tarsi, more gracile tarsi and anterior tibia, differently shaped pronotum and clypeus, more rounded scutellar apex, and thinner integument. *Acoma glabrata* has 10-segmented antennae (Fig. 8, 9), although occasional specimens may have one antenna with one or more segments partially to completely fused. In all specimens examined (more than 100), however, at least one of the antennae is 10-segmented. *Acoma glabrata* ranges from the type locality at San Felipe, northward into the Algodones Dunes in SE California. It also occurs in dunes of the Gran Desierto de Altar in northwest Sonora, with its northern terminus in the Yuma Desert in extreme SW Arizona west of the Tinajas Altas and Gila mountain ranges. *Acoma howdenorum* occurs only to the east of those two mountain ranges in the Mohawk Dune field just west of the Mohawk Mountains, and associated small dunes in the Mohawk Valley near Welton and Dome, where it is sympatric with the southwestern form of *Acoma arizonica* Brown. Apparently *A. howdenorum* does not occur on the east side of the Mohawk Mountains as concurrent collecting on a dune field just south of Dateland, AZ, only produced *A. arizonica*.

Both *A. glabrata* and *A. howdenorum* appear to be restricted to deep eolian sand dunes. Specimens of *A. glabrata* from the USA tend to be rather uniform in size (mostly 6-7 mm long), whereas specimens from the type locality vary widely in size, with some specimens much larger than those from the USA. The Arizona specimens of *A. glabrata* from south of Yuma differ slightly from specimens collected on the Algodones Dunes (across the Colorado River) as well, but do have 10 segmented antennae and the other differences from *A. howdenorum* noted above. *Acoma glabrata*’s type locality dunes are remote from the Sonoran and US localities, and further study may indicate that the three populations (type locality, Algodones Dunes, Gran Desierto) represent separate species or subspecies. A specimen from the Algodones Dunes in California is shown in Figures 1, 8, and 9.

***Acoma quadrilaminata* new species**

Figures 10-13

Type Material. Holotype male (UNAM): “MEX: Baja Calif. Norte, 3 mi. N Las Arrastras, VII-7-1973, Fisher & Westcott.”

Paratypes, (5 males) with data same as holotype.

Paratypes are deposited at WBWC, RLWE, CASC.

Diagnosis. Medium brown, vestiture light colored and contrasting with cuticle color, pronotum glabrous except for marginal fimbriae; elytral disc hairy; clypeal disc nearly impunctate; antenna 9-segmented, with 4-segmented club, all club lamellae of equal size; anterior tibia tridentate; paramera as in Figure 12.

Description. Holotype male, length: 6.9 mm, width: 3.1 mm, widest at about middle of elytra.

BODY medium brown, shiny, hairs lighter colored and contrasting with ground color. HEAD with front and clypeal base scabrously, subreticulately punctate-rugose, weakly convex, more noticeably so on frontoclypeal transition; clypeus broadly parabolic, apically weakly emarginate, obtusely subdentate at each lateral terminus of emargination, margins moderately reflexed, only little more strongly so apically, disc concave, deeply punctate, punctures mostly separated by less than their own diameters; antenna 9-segmented, club four segmented, segment 5 (basal to club) unusually elongate, in form of flattened cylinder and about as long as segments 2-4 combined. PRONOTUM glabrous except for marginal bead, length about 0.4 times elytral length, widest at about middle; lateral margins straight in posterior half, converging in anterior half, slightly sinuating before anterior pronotal angles which are slightly acute and drawn forward next to eyes; disc glabrous, moderately densely and distinctly punctate, punctures mostly separated by about 1 to 2 times their own widths, interpunctural integument weakly shagreened with micro-punctures, midline impunctate and weakly impressed. SCUTELLUM subtriangular, apex broadly rounded. ELYTRON with disc setigerous, setal length about 1/4 to nearly 1/2 of elytron width; stria channels

somewhat irregular but distinct, strial punctures obsolescent, intervals very irregularly uniseriately punctate, punctures distinct, mostly separated by about 2-4 times their own diameters, about half as wide as intervals. PYGIDIUM longer than broad, subscutelliform, apex arcuate, disc shagreened, shallowly subcontiguously punctate, punctures setigerous. LEGS: Anterior tibia moderately robust, tridentate, basal tooth about half as large as strong middle tooth; metatibia with widest corbel diameter little less than half pygidial length, posterior tarsal claws over 1/3 length of segment from which they arise. GENITALIA: paramera as in Fig. 12, with apex only weakly deflexed, ventrobasal emargination shallow, moderately long.

Variation. Length: 6.5 – 8.3 mm, width: 3.0 – 4.0 mm. Clypeal form varies moderately in punctuation, depth of discal concavity, breadth and strength of apical emargination, but shape (lateral margins weakly convex) is similar. Medial mesotibial fringe of denticles varies from 7-12 (usually 9). In one specimen the anterior pronotal angles are nearly right. One paratype has the left antenna deformed, with 3-segmented, shortened club.

Etymology. This species is named for its 4-segmented antennal clubs.

Remarks. This species keys to *A dilemma* Saylor in Cazier (1953). Saylor (1948) diagnosed that species on the combination of the 4-segmented antennal clubs and hairy elytra; however, the basal club segment in specimens of *A. dilemma* is narrower than and slightly less than half as long as the more apical segments. In *A. quadrilaminata*, all antennal club segments are of equal size.

***Acoma cimarron* new species**

Figures 24-27

Type Material. Holotype male (UNAM), labeled: “MEXICO: Sonora: Rancho San Huberto, 2.6 mi. SW. Hwy. 29, Near El Cimarron, 29°22’01”N, 112°04’34”W; elev. 574 ft.; 3-AUG-2009; G. Nogueira & R. Cunningham; at UV (BL, BLB) and Hg vapor lights set in Sonoran desert scrub.”

Paratypes, (16 males): same as holotype (15); “Mexico: Sonora; 15 mi. S. Hermosillo; 16-IX-1980; Robert Gordon.”

Paratypes are deposited in GNGC, IEXA, MXAL, RACC, USNM, WBWC.

Diagnosis. Reddish brown, pronotum glabrous except for marginal fimbriae; elytral disc glabrous; frontoclypeal area strongly reticulately sculptured; antenna 9-segmented, with 3-segmented club; anterior tibia tridentate; metatibia with medial carina strongly flared; paramera as in Figure 27.

Description. Holotype male, length: 8.1 mm, width: 3.5 mm, widest at about middle of elytra.

BODY reddish brown, interpunctural surfaces shiny and micropunctate, hairs lighter colored and contrasting with ground color. HEAD with front and clypeal base scabrously, subreticulately punctate-rugose, flattened; clypeus broadly rounded, apical margin more or less arcuate, distinctly reflexed, disc concave, deeply punctate, punctures mostly separated by 1-3 times their own diameters; antenna 9-segmented, club 3-segmented, not quite twice as long as non-club segments together. PRONOTUM glabrous except for marginal bead, length about 0.45 elytral length, widest at about middle; lateral margins slightly diverging to middle, anterior pronotal angles very obtuse, not distinctly drawn forward next to eyes; disc glabrous, moderately densely and distinctly punctate, punctures subcontiguous to mostly separated by about 2-4 times their own widths, midline impunctate and weakly impressed. SCUTELLUM lobiform, with apex broadly rounded, disc densely minutely punctate. ELYTRON with disc glabrous, setae arising only from epipleuron and on base, but not posterior to scutellar apex; strial channels somewhat irregular but distinct, strial punctures distinct, intervals very irregularly uniseriately punctate, punctures distinct, mostly separated by about 1-3 times their own diameters, intervals weakly rugulose. PYGIDIUM longer than broad, subscutelliform, apex arcuate, shagreened and broadly weakly reflexed, disc shiny, midline narrowly mostly impunctate, otherwise distinctly subcontiguously punctate, punctures setigerous. LEGS: Protibia moderately robust, tridentate, apex of basal tooth at about middle; metatibia flaring from base to medial carina which juts shelf-like over abruptly narrower distal section

which again flares to apex, with widest corbel diameter slightly more than half pygidial length, posterior tarsal claws over 1/3 length of segment from which they arise. GENITALIA: paramera (Fig. 27) with apices moderately deflexed and ventrobasal emargination comparatively short and distinct.

Variation. Length: 5.9 – 8.5 mm, width: 2.6 – 3.8 mm. Clypeal form varies moderately in shape and length/width proportions, with apex broadly rounded to more or less truncate, but lateral margins are weakly convex in all specimens seen. Body color varies from medium reddish brown to nearly piceous. The protibial basal tooth is submedian in some paratypes, and length of teeth varies because of wear. The metatibia is allometrically shortened with the medial ridge more strongly flaring in proportion to increasing body size. The paratype from 15 miles south of Hermosillo is darker than the others, and has the metatibia even more strongly shortened, but otherwise is similar to paratopotypes.

Etymology. This specific epithet (a noun in apposition) is named for the vicinity of the type locality, as well as for the Mexican big horned sheep (*Ovis canadensis mexicana* Merriam), the “borrego cimarron” characteristic of the area.

Remarks. Both known localities, although about 122 km (76 miles) apart, are on washes that drain to Bahía de Kino; the species is expected to occur along other washes in that drainage.

The combination of 9-segmented antennae with 3-segmented club, glabrous elytral disc, “coffee-colored” body, rounded clypeus, strongly protruding medial metatibial carina, and mainland Mexican distribution make this species easily identifiable. Specimens of *A. cimarron* imperfectly key to *A. glabrata* in Howden (1958), but specimens of *A. glabrata* are very different in color and proportions, have 10-segmented antennae, longer clypeus, tarsi, and antennal club, broader metatibia, and are restricted to deep sand dunes of the Gran Desierto de Altar region of northwestern Sonora, the Algodones dunes in eastern California, and nearby dunes in northeastern Baja California. Except for having 9-segmented antennae, all these differences also apply to *A. howdenorum*. Additionally, males of *A. cimarron* have a much more deeply, coarsely sculptured head and wider, more rounded clypeus than males of *A. glabrata* or *A. howdenorum*.

Key to the Described Species of *Acoma* (Males)

- | | | |
|-------|---|--------------------------------------|
| 1. | Antennal club composed of 3 segments | 12 |
| — | Antennal club composed of more than 3 segments; proximal segment of club may be short but at least 1/3 as long as other club segments | 2 |
| 2(1). | Antennal club composed of 7 segments (Fig. 16, 17) | <i>A. sexfoliata</i> Saylor |
| — | Antennal club composed of fewer than 7 segments | 3 |
| 3(2). | Antennal club composed of 4 segments; elytral disc glabrous or setigerous | 4 |
| — | Antennal club composed of more than 4 segments; elytral disc setigerous | 8 |
| 4(3). | Elytral disc glabrous | 5 |
| — | Elytral disc hairy | 7 |
| 5(4). | Sonora (Ciudad Obregon area), dark reddish brown | <i>A. gibsoni</i> Howden |
| — | Baja California peninsula; color various | 6 |
| 6(5). | Body color pale testaceous; NE Baja California area | <i>A. stathami</i> Cazier |
| — | Body color dark brown; W Cape area, Baja California Sur | <i>A. cazieri</i> Saylor |
| 7(4). | Basal club lamella narrower and only about half as long as the other lamellae; vicinity of El Refugio, Baja California Sur | <i>A. dilemma</i> Saylor |
| — | All club lamellae about same length and width (Fig. 11); vicinity of Las Arrastras, Baja California (Norte) | <i>A. quadrilaminata</i> new species |

- 8(3). Antennal club composed of 5 segments of equal length (Fig. 22); body usually relatively elongate, narrow 9
 — Proximal antennal club lamella distinctly shorter and often narrower than other lamellae (Fig. 14, 15); form robust 11
- 9(8). Baja California peninsula *A. leechi* Cazier
 — Mainland Sonora species 10
- 10(9). Color light (tan); clypeus emarginate apically; Desemboque area *A. mimica* Howden
 — Color dark reddish brown; clypeus semicircular to rounded-truncate; Hermosillo area *A. evansi* Howden
- 11(8). Clypeal suture tumid medially; anterior pronotal angles not or feebly produced; size small (5.5-6.5 mm) *A. rossi* Saylor
 — Clypeal suture flat medially; anterior pronotal angles usually strongly produced anteriorly (Fig. 14, 15); size large (6.5-11.0 mm) *A. robusta* Van Dyke
- 12(1). Elytral disc with at least some short or long hairs 15
 — Elytral disc glabrous; only marginal setae present 13
- 13(12). Antenna 10-segmented (Fig. 9); clypeus often bidentate (Fig. 1, 8); dunes of the Gran Desierto in NE Sonora and NW Baja California, SE California and extreme SW Arizona *A. glabrata* Cazier
 — Antenna 9-segmented (Fig. 7, 26); clypeus truncate (Fig. 6, 7) or rounded (Fig. 26) 14
- 14(13). Clypeus more or less pentagonal; color translucent, pale testaceous; metatibia with medial transverse carina relatively weak (Fig. 6); Mohawk dune system east of Gila and Tinajas Altas Mountains, Arizona *A. howdenorum* new species
 — Clypeal rounded, with lateral margins convexly arcuate (Fig. 26); metatibia with medial carina strongly protruding, shelf-like (Fig. 25); color dark reddish brown, elytra not translucent (Fig. 24); Sonora, vicinity of Hermosillo *A. cimarron* new species
- 15(12). Anterior tibia distinctly bidentate (Fig. 4); head and pronotum appearing very smooth, anterior pronotal angles acute, drawn forward (Fig. 2); Baja California Sur (vicinity of Mulege) *A. westcotti* new species
 — Anterior tibia tridentate (e.g. Fig. 6, 14-16, 22, 23, 26); head and pronotum distinctly sculptured, often strongly so (e.g. Fig. 1, 10, 13, 14-16, 20-23, 26); anterior pronotal angles various..... 16
- 16(15). Anterior lateral margins of pronotum straight or arcuate; anterior pronotal angles usually obtuse or nearly so, not noticeably drawn forward near eyes (as in Fig. 1, 6, 8, 10, 26) 20
 — Anterior lateral margins of pronotum slightly sinuate; anterior pronotal angles acute and slightly anteriorly extended near eyes (as in Fig. 2, 14-16, 22) 17
- 17(16). Clypeal margin apically rounded, truncate, or at most slightly emarginate (as in Fig. 2, 6, 21) 18
 — Clypeal margin usually distinctly emarginate medially, often bidentate (as in Fig. 1); Loreto to San Ignacio, Baja California *A. confusa* Van Dyke
- 18(17). Sonora, Mexico; sinuation of lateral pronotal margin before anterior angle generally obsolescent to obsolete; antennal club only slightly longer than funicle *A. martini* Howden
 — Baja California Sur; sinuation of pronotal margin usually more or less distinct; antennal club length various 19

- 19(18). Clypeus deeply cupuliform, free margin strongly reflexed; antennal club length only slightly longer than funicle; pronotum usually with discal setae; body length usually over 5 mm; Venancio to Santiago ***A. incognita* Howden**
- Clypeus with free margin only weakly reflexed; antennal club about 1.5 times as long as funicle; pronotal disc glabrous; body length usually under 5 mm; west of La Paz ***A. parva* Howden**
- 20(16). Hairs on elytral disc conspicuous, at least some as long or longer than the width of elytral intervals; color tan to dark brown **22**
- Hairs on elytral disc shorter and inconspicuous even when fresh, most no longer than width of a discal elytral interval; color light tan to tan **21**
- 21(20). Clypeus distinctly emarginate, bidentate when fresh; labrum very small, scarcely elevated above ventral surface of clypeus (length usually 1/6th or less of clypeopleural length (underside of adjacent clypeus) at middle, narrowest ventral interocular distance distinctly less than half of maximum ventral eye width (Fig. 18); generally distributed in Sonoran Desert of Arizona (expected in northwest Sonora) ***A. arizonica* Brown**
- Clypeus rounded or truncate; labrum larger, tumid, its length usually 1/5th to 1/4th medial clypeopleural length, narrowest ventral interocular distance more than half of maximum ventral eye width (Fig. 19); mostly Sonoran Desert of Pinal and eastern Pima Counties in Arizona ***A. mixta* Howden**
- 22(20). Frontoclypeal transition scarcely tumid, frons rather evenly finely rugulose and granulate, with 2 vague tubercles in front of the posterior glabrous area; a pronounced ridge present above each eye; Durango, Mexico (*parva* may also key here except for range) ***A. granulifrons* Howden**
- Frontoclypeal transition strongly tumid or frons irregularly, usually coarsely sculptured, or both; found north or west of Durango **23**
- 23(22). Not occurring in Baja California; frons deeply, irregularly sculptured or conspicuously tumid near clypeus or both; median transverse band of spines on mesothoracic tibiae usually numbering 9 or less **24**
- Vicinity of Mesquital, Baja California Sur; frons finely, irregularly sculptured, evenly convex to nearly flat; median transverse band of spines on mesothoracic tibia usually numbering 10 or more ***A. ochlera* Howden**
- 24(23). Pronotum with at least 1 to few discal hairs; Chihuahua **25**
- Pronotal disc completely glabrous (hairs on margin only); distribution various but not recorded to date from Chihuahua **26**
- 25(24). Length usually over 5 mm; color reddish-brown; usually more than 8 setae on pronotal disc; near the Big Bend of the Rio Grande River (Ojinaga) ***A. seticollis* Howden**
- Size smaller, length usually 5 mm or less; color dark brown; usually only 2-8 setae on pronotal disc (Fig. 20); inland Chihuahua, far from Big Bend ***A. minuta* Cazier**
- 26(24). Clypeus usually distinctly emarginate, more or less bidentate **27**
- Clypeus usually more or less rounded to weakly emarginate apically, not distinctly bidentate ... **28**
- 27(26). Frontoclypeal transition distinctly tumid (best viewed from about 45° posterior view), the tumosity extending into about the basomedial third of clypeus; western New Mexico and Arizona ***A. knulli* Howden**
- Frontoclypeal transition at most weakly tumid, not or only slightly extending onto more or less evenly cupuliform clypeus (Fig. 23); dunes in El Paso, Texas, area ***A. brunnea* Casey**

- 28(26). Big Bend area of Texas; clypeus nearly parabolic, only vaguely flattened or weakly emarginate (if at all) apically ***A. conjuncta* Howden**
— Central Arizona to SE New Mexico; clypeus subrhomboidal to subpentagonal, apical margin weakly to distinctly sinuate on each side of medial weak to subdistinct emargination **29**
- 29(28). Frons deeply reticulate (Fig. 21); color brown; size small, ranging between 4.5 and 5.7 mm; Dona Ana County, New Mexico ***A. diminiata* Howden**
— Frons shallowly reticulate; color tan; size moderate, usually larger, ranging between 5.8 and 6.6 mm; vicinity of Casa Grande, Arizona ***A. rufula* Howden**

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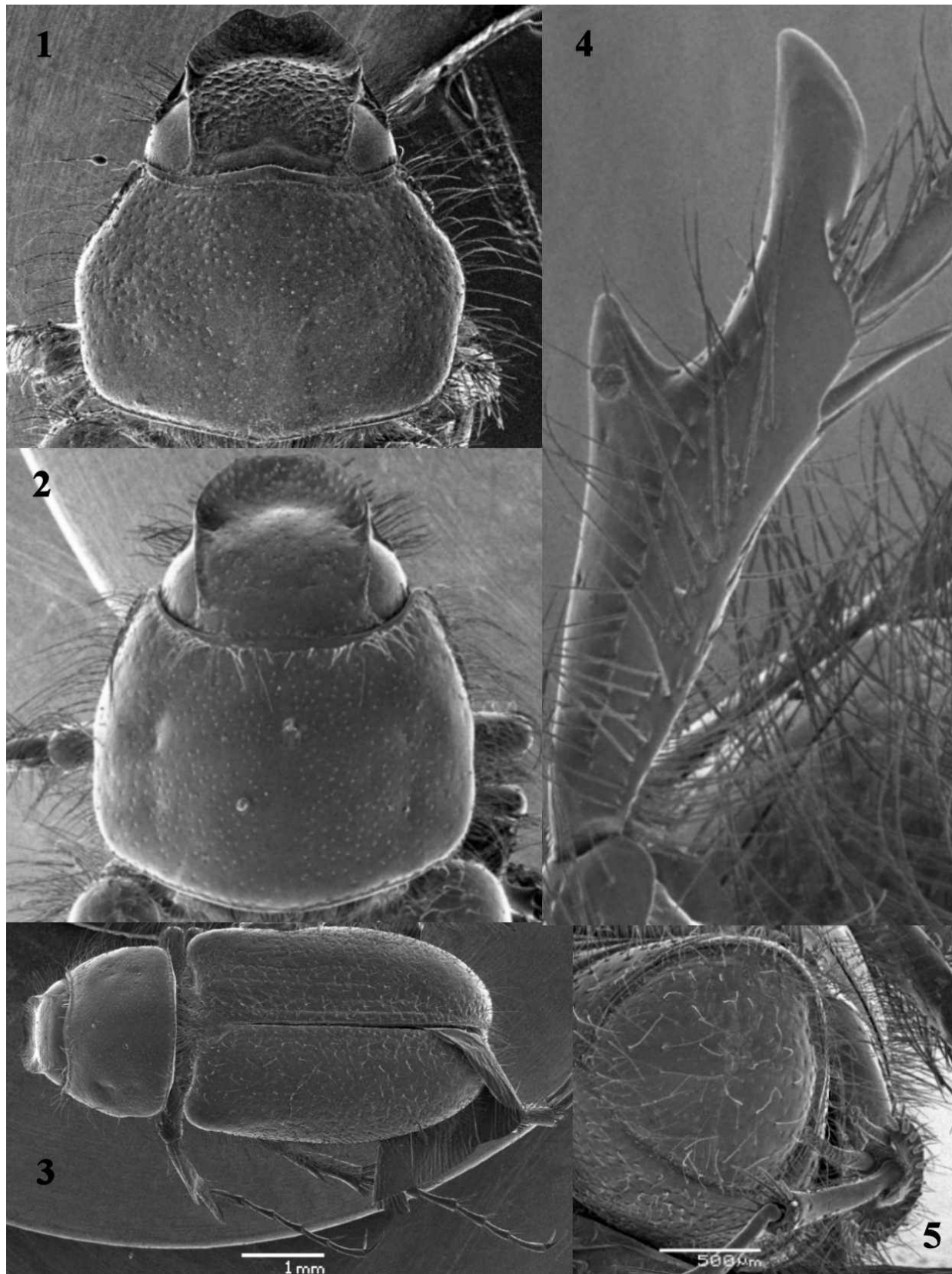


Figure 1-5. *Acoma* spp. 1) *Acoma glabrata* Cazier, head and pronotum. 2-5) *Acoma westcottii* Warner: 2) Head and pronotum, 3) Dorsal habitus. 4) Left anterior tibia. 5) Pygidium.



Figure 6-9. *Acoma* spp. **6-7)** *Acoma howdenorum* Warner: **6)** Dorsal habitus. **7)** Antenna. **8-9)** *Acoma glabrata* Cazier (specimen from Algodones Dunes): **8)** Dorsal habitus. **9)** Antenna.



Figure 10-13. *Acoma quadrilaminata* Warner: 10) Dorsal habitus. 11) Antenna. 12) Paramera. 13) Dorsolateral view of head and pronotum.



Figure 14-17. *Acoma* spp. 14-15) *Acoma robusta* Van Dyke: 14) Head and pronotum. 15) Antenna. 16-17) *Acoma sexfoliata* Saylor: 16) head and pronotum. 17) Antenna.

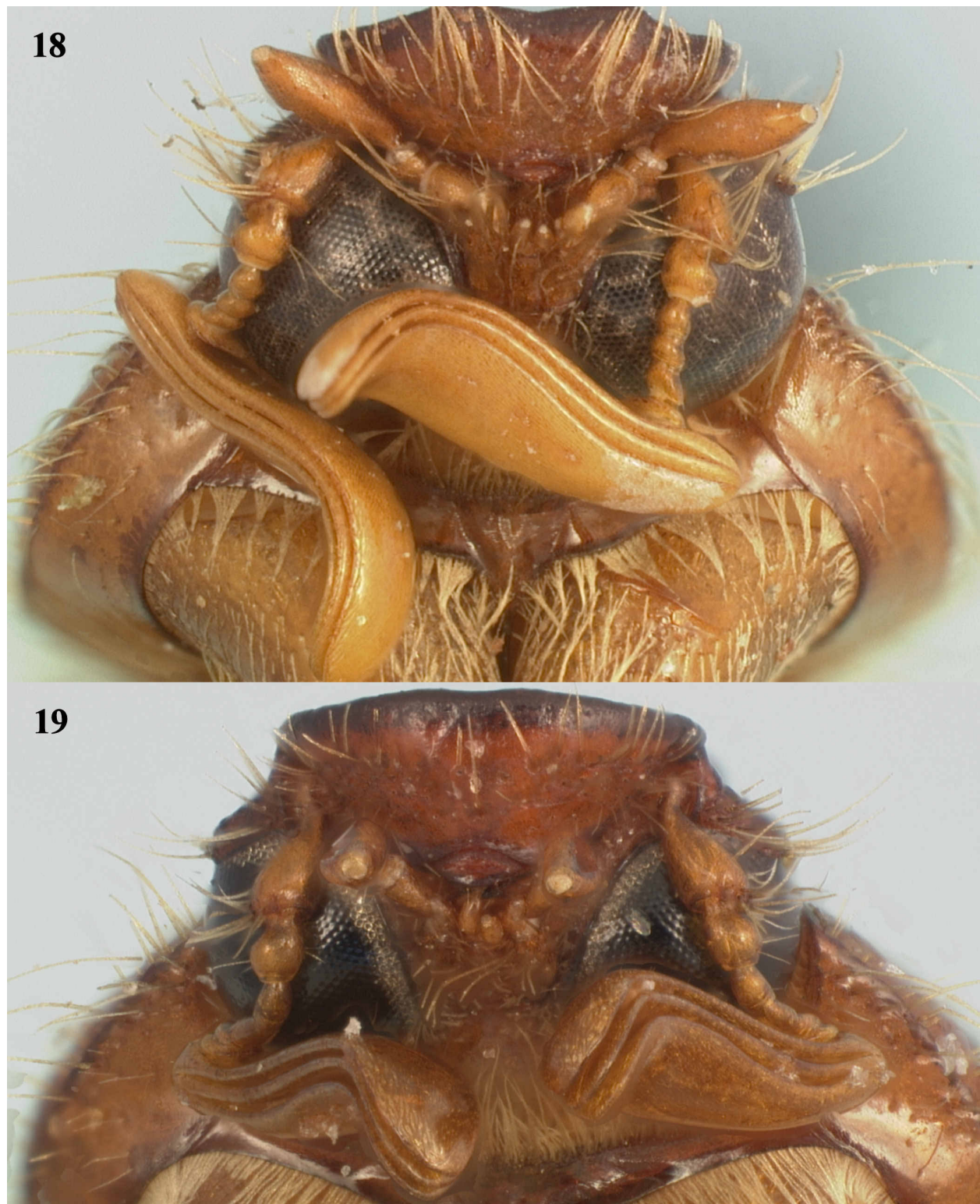


Figure 18-19. Ventral views of head showing mouthparts: **18)** *Acoma arizonica* Brown. **19)** *Acoma mixta* Howden.

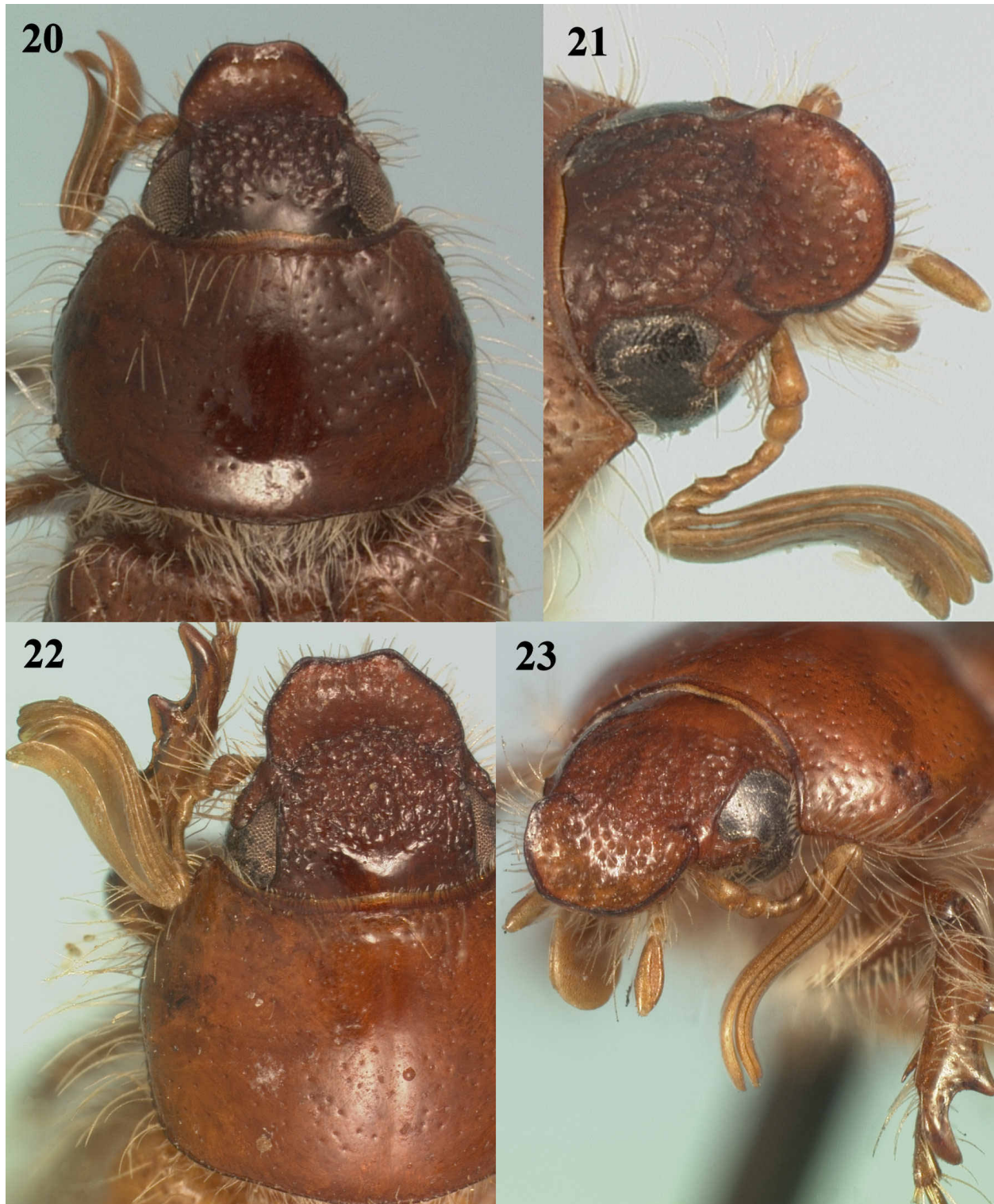


Figure 20-23. Heads and antennae: **20)** *Acoma minuta* Cazier, paratype. **21)** *Acoma diminiata* Howden, topotype. **22)** *Acoma mimica* Howden, paratype. **23)** *Acoma brunnea* Casey.



Figure 24-25. *Acoma cimarron* Warner, holotype: **24)** Dorsal habitus. **25)** Metatibia.



Figure 26-27. *Acoma cimarron* Warner: 26) Head. 27) Paramera.

