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ZOOTAXA 124: 1-24 (2002)
www.mapress.com/zootaxa/
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ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

124

A new genus of flea beetles from the Greater Antilles (Coleoptera: Chrysomelidae)

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Abstract

The new genus *Normaltica* and two new species (*N. obrieni* from Puerto Rico and *N. iviei* from the Dominican Republic) are described and illustrated. A key and illustrations of these taxa are provided. Morphological consequences of wing reduction are discussed. Variability of *N. obrieni* is illustrated and discussed.

Key words: Chrysomelidae, new genus, new species, Greater Antilles

Introduction

Compared to the other regional faunas of the New World, the flea beetles of the West Indies including the Greater Antilles, are relatively well studied. Extensive collecting and publications of the first half of the 20th century reported many unusual and endemic flea beetle taxa (Blake 1928, 1931, 1934, 1937, 1938, 1944, 1947, 1960, 1964). However, recent collecting efforts in Puerto Rico and earlier in the Dominican Republic revealed unique flea beetles with several features previously unknown among flea beetle genera of the New World. The most conspicuous of these features is clavate antennae. So far, the only other known flea beetles with clavate antennae (*Clavicornaltica* Scherer) are from southern Asia, but the tendency towards clavate antennae is apparent in some other flea beetle genera, particularly in those living in leaf litter or moss in the montane areas of Asia. For example, the apical antennomeres of *Benedictus* Scherer and *Paraminota* Scherer are notably shorter and wider than in most flea beetles. This is particularly evident in antennomere 8, which is shorter in the two aforementioned genera as well as in *Paraminotella* Döberl and Konstantinov. Although a biological meaning for this tendency is not clear, it seems reasonable that more robust antennae are less prone to damage when beetles move in such a dense substrate as leaf litter and moss. Since these beetles clearly belong to

Accepted: 11 December 2002; published: 20 December 2002

distant lineages, the tendency towards clavate antennae is probably due to their common environment.

Flea beetles with clavate antennae from Puerto Rico and the Dominican Republic represent a new genus and two new species which are described below. Dissecting techniques and terminology for most internal and external structures of these beetles follow Konstantinov (1998, 2002). Terminology for wings follows Kukalová-Peck and Lawrence (1993), and terminology for the thoracic structures follows Konstantinov and Lopatin (1987), Konstantinov and Vandenberg (1996), and Korotyaev et al. (2000). The beetles are deposited in the following collections: National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM); West Indian Beetle Fauna Project Collection, Montana State University, Bozeman Montana (WIBF); and Canadian Museum of Nature, Ottawa, Canada (CMCN).

Normaltica new genus (Figs. 1-77)

Description. Body of medium size, length 1.94-2.59 mm, oval, relatively convex in lateral view. Color black, brown or dark brown, with or without metallic luster, appendages paler. Eight apical antennomeres vary in color.

Head (Figs. 1-4) nearly hypognathous, flat in lateral view. Frons and vertex form nearly straight or slightly convex line (Fig. 4) in lateral view. Vertex smooth. Supraorbital pore single, well developed, protruding dorsally, surrounded by shallow grove nearly equally deep all around pore. Antennal callus variously developed, if developed nearly trapezoidal, 1.45 times as wide as long. Midfrontal sulcus poorly developed. Suprafrontal sulcus well developed. Supraorbital and orbital sulci well developed, deep. Supracallinal sulci variable. Subgenal suture well developed along base of mandible. Orbit wide, 1.7 times as wide as transverse diameter of eye. Interantennal space 0.8 times as wide as transverse diameter of eye and 1.54 times as wide as transverse diameter of antennal socket. Frontal ridge wide. Anterofrontal ridges variable in height, poorly developed, not separated from frontal ridge. Labrum (Figs. 12, 13) with six setiferous pores and two sensilla medially. Apical margin with seven short sensilla on each side. Torma relatively short. Mandible (Figs. 7, 8) with four denticles. Labium with three palpomeres per palpus, second palpomere longest. Maxilla with galea slightly wider than lacinia (Figs. 16, 17). Sensilla patch of last maxillary palpomere longer than wide, consisting of four imbedded sensilla (Fig. 18). Antenna clavate (Figs. 9-11), club with six antennomeres.

Pronotum (Figs. 19-24) 1.67 to 1.95 times wider than long, without impressions, side weakly rounded and relatively widely explanated. Lateral sides not parallel to each other, converging gradually at apical two-thirds. Anterolateral callosity unusually long, with pore situated nearly in middle of lateral margin. Posterolateral callosity not protruding. Anterior coxal cavity open. Intercoxal prosternal process wide, in middle from 1.40 to 1.76 times as

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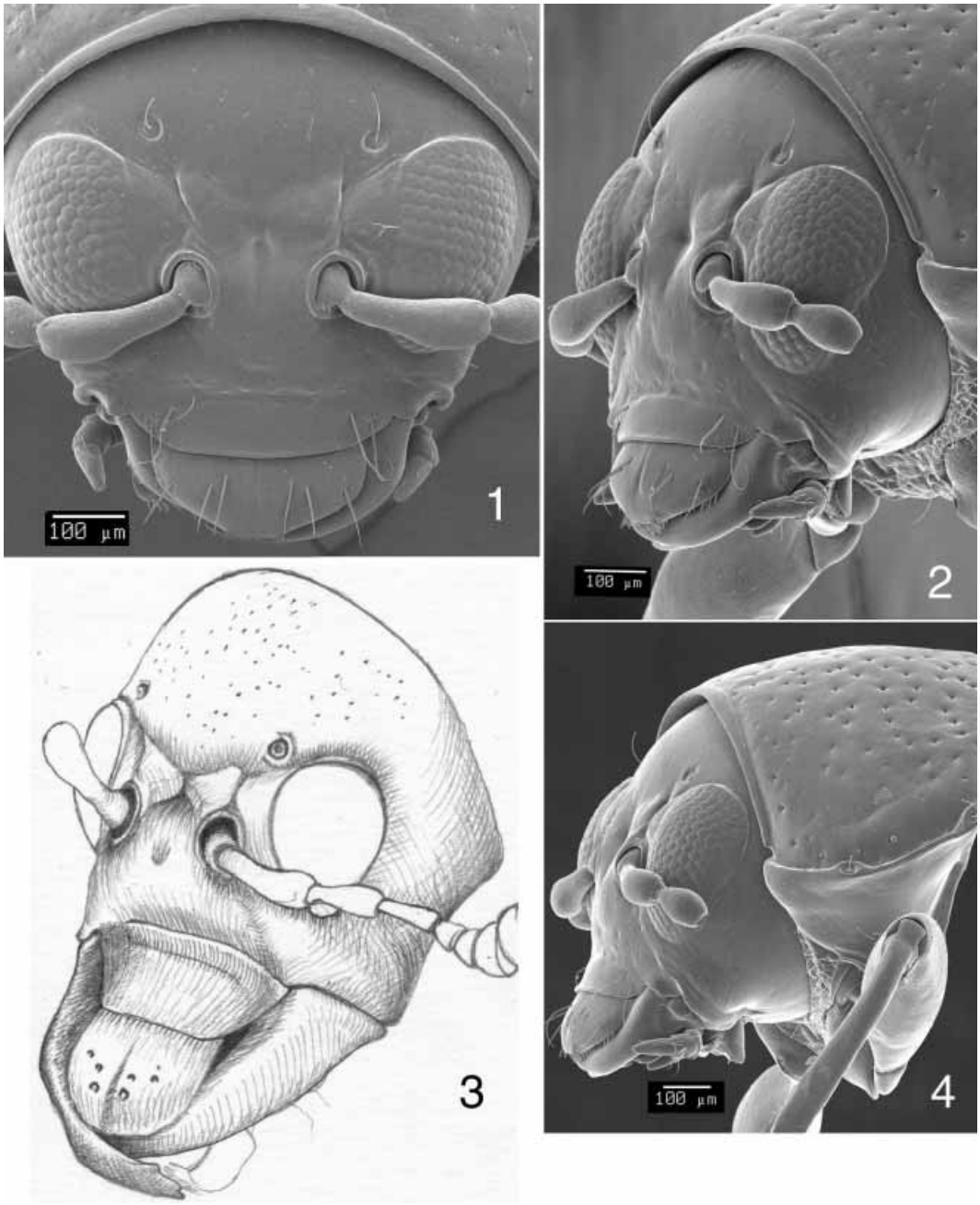
wide as long, nearly parallel sided or narrowing apically with apex slightly concave, not projecting beyond coxa. Distance between proximal margin of prosternum to coxal cavity 0.23 times as long as distance from proximal margin of prosternum to end of intercoxal prosternal process (Fig. 24). Proendosternites relatively short, facing each other, slightly rounded on top (Fig. 20).



FIGURES 1—4. Head of *Normaltica obrieni*. 1, 2, 4, female. 3, male.

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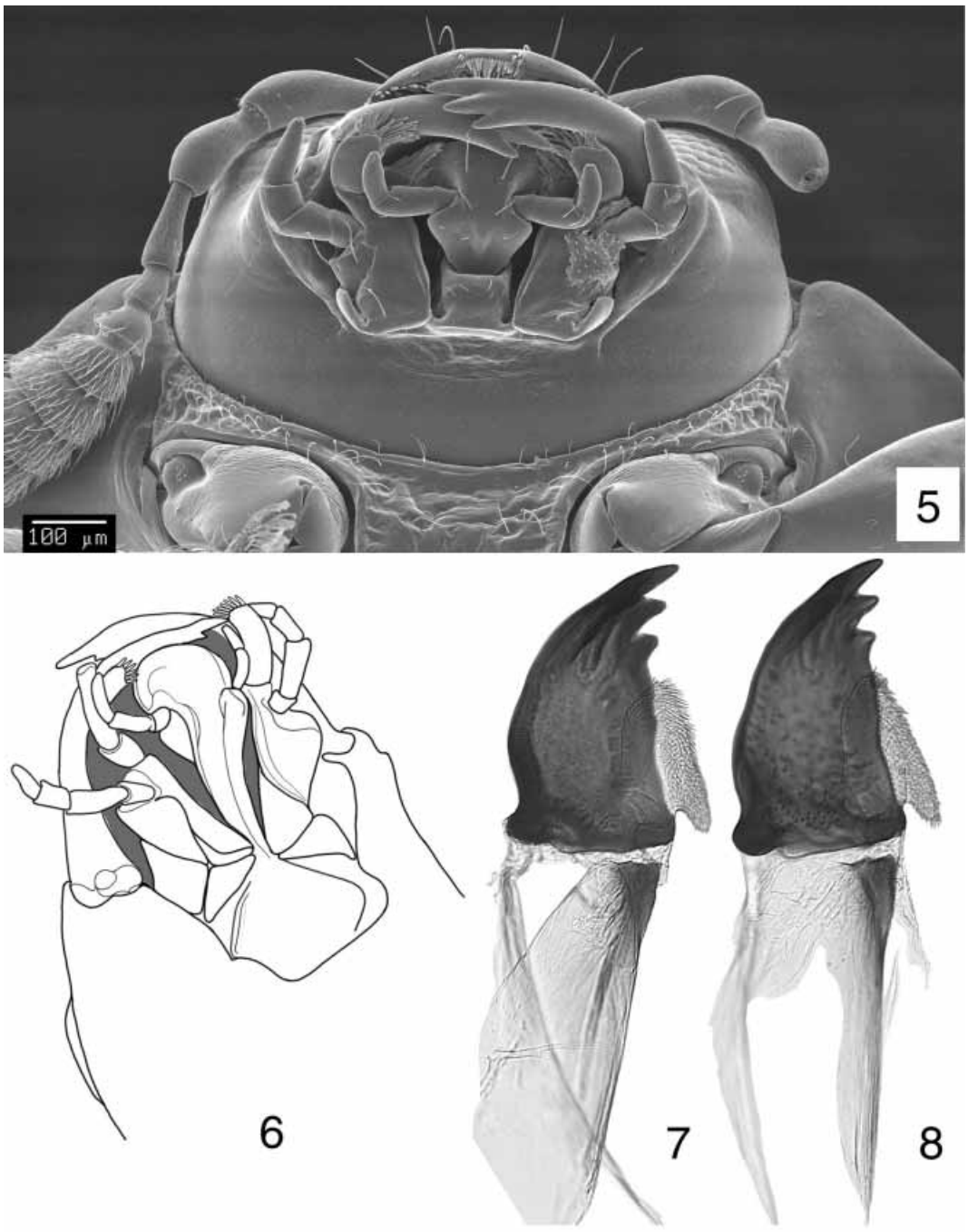

FIGURES 5—8. Details of *Normaltica*. 5, 6, *Normaltica obrieni*. 5, female. 6, male. 7, 8, *Normaltica iviei* mandibles.

Mesonotum weakly developed, membranous with postmedial projection attached to lateral side of metanotum and prealar projection attached to mesepisternum (Fig. 29).

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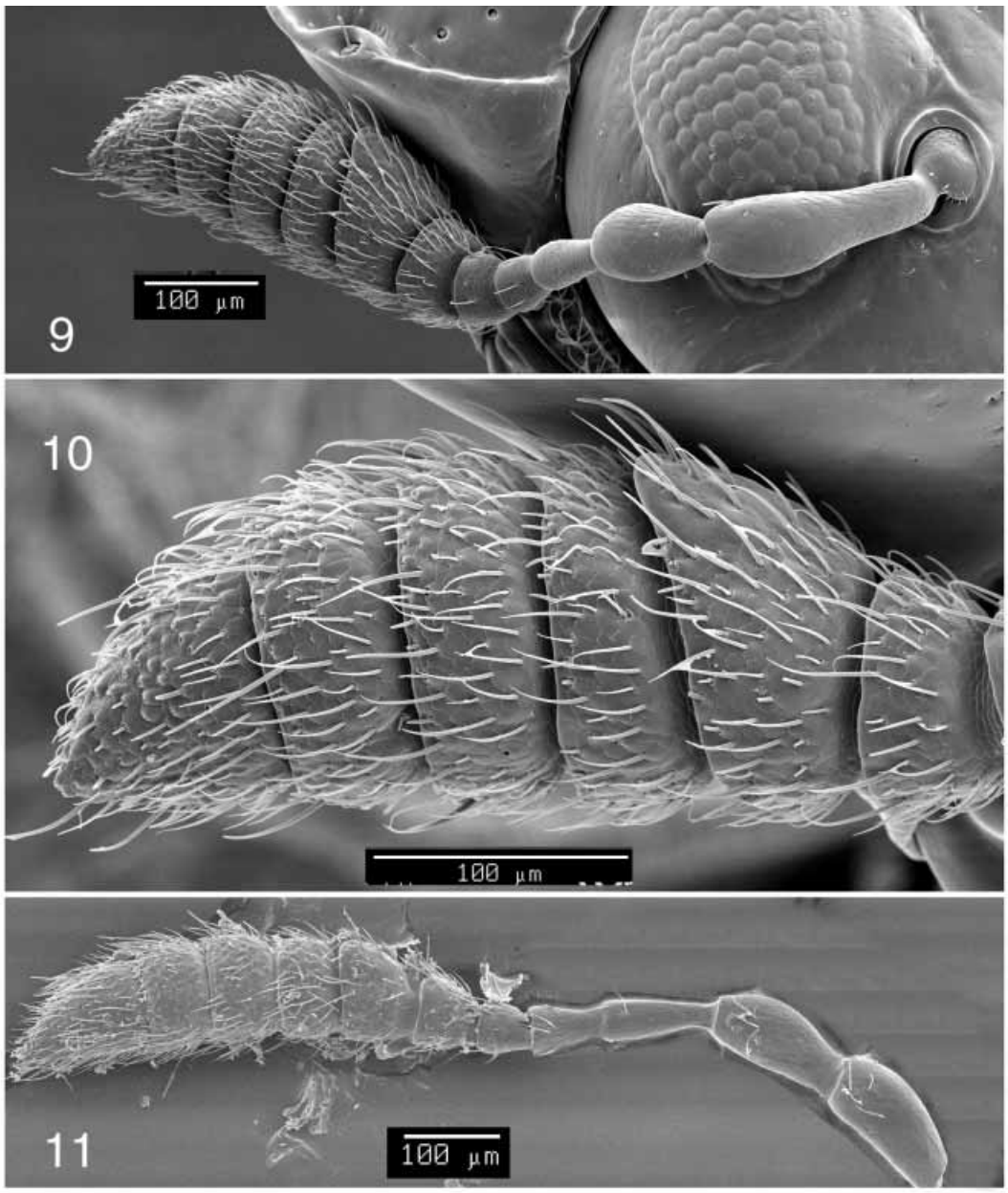
Mesoscutellum flat, broadly triangular. Longitudinal diameter of mesocoxal cavity 2.28 times as long as mesosternum above mesocoxal cavity. Mesepimeron and mesepisternum forming outer side of mesocoxal cavity. Mesosternal intercoxal process nearly as wide as prosternal intercoxal process, slightly concave on top. Mesendosternite wide at base, narrowing apically, not connecting with mesepisternomeral ridge (Fig. 25).



FIGURES 9—11. Antennae of *Normaltica*. 9, 10, *Normaltica obrieni*. 11, *Normaltica iviei*.

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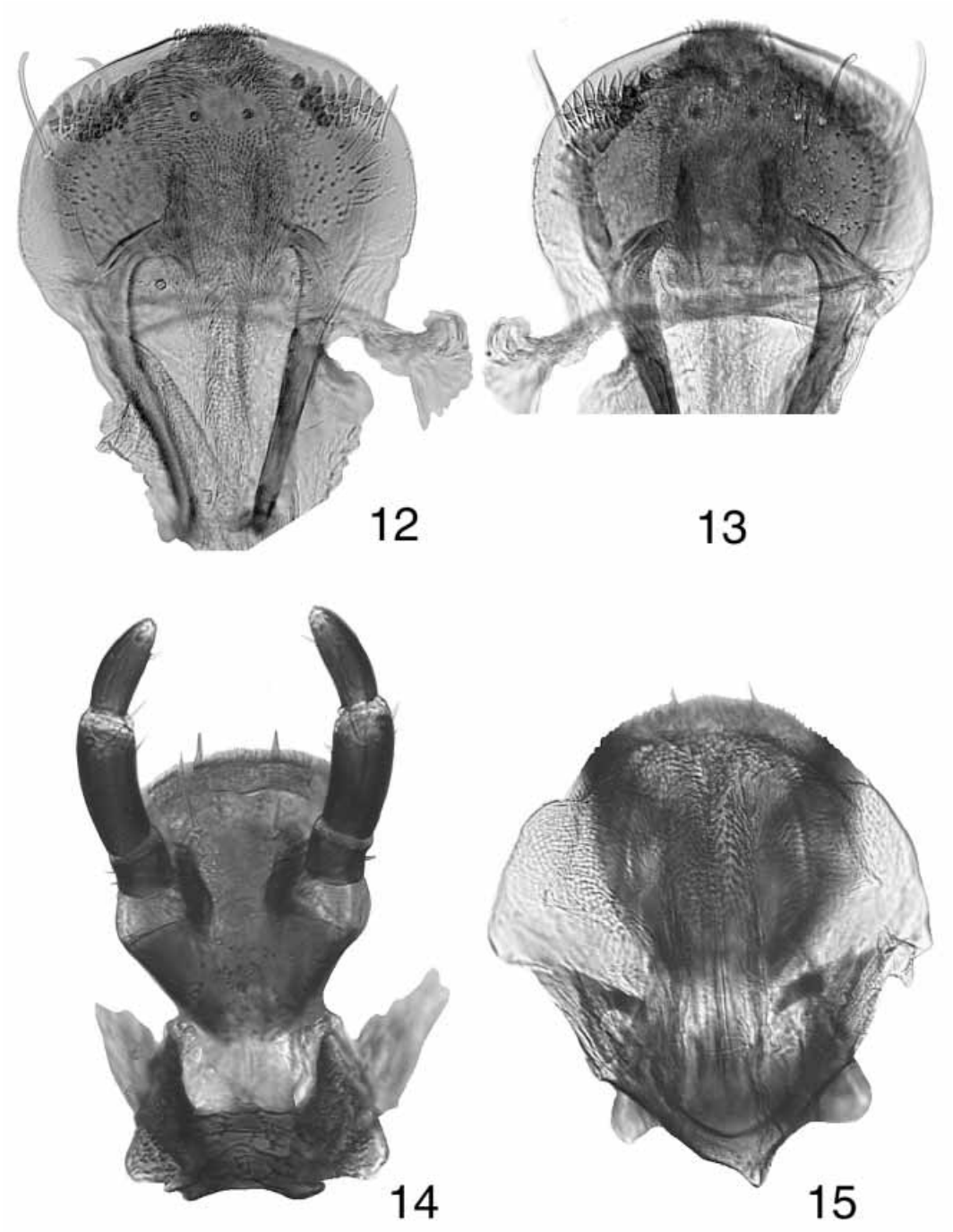

FIGURES 12 —15. Mouth parts of *Normaltica iviei*. 12, 13, labrum. 14, 15, labium.12, 14, ventral side. 13, 15, dorsal side.

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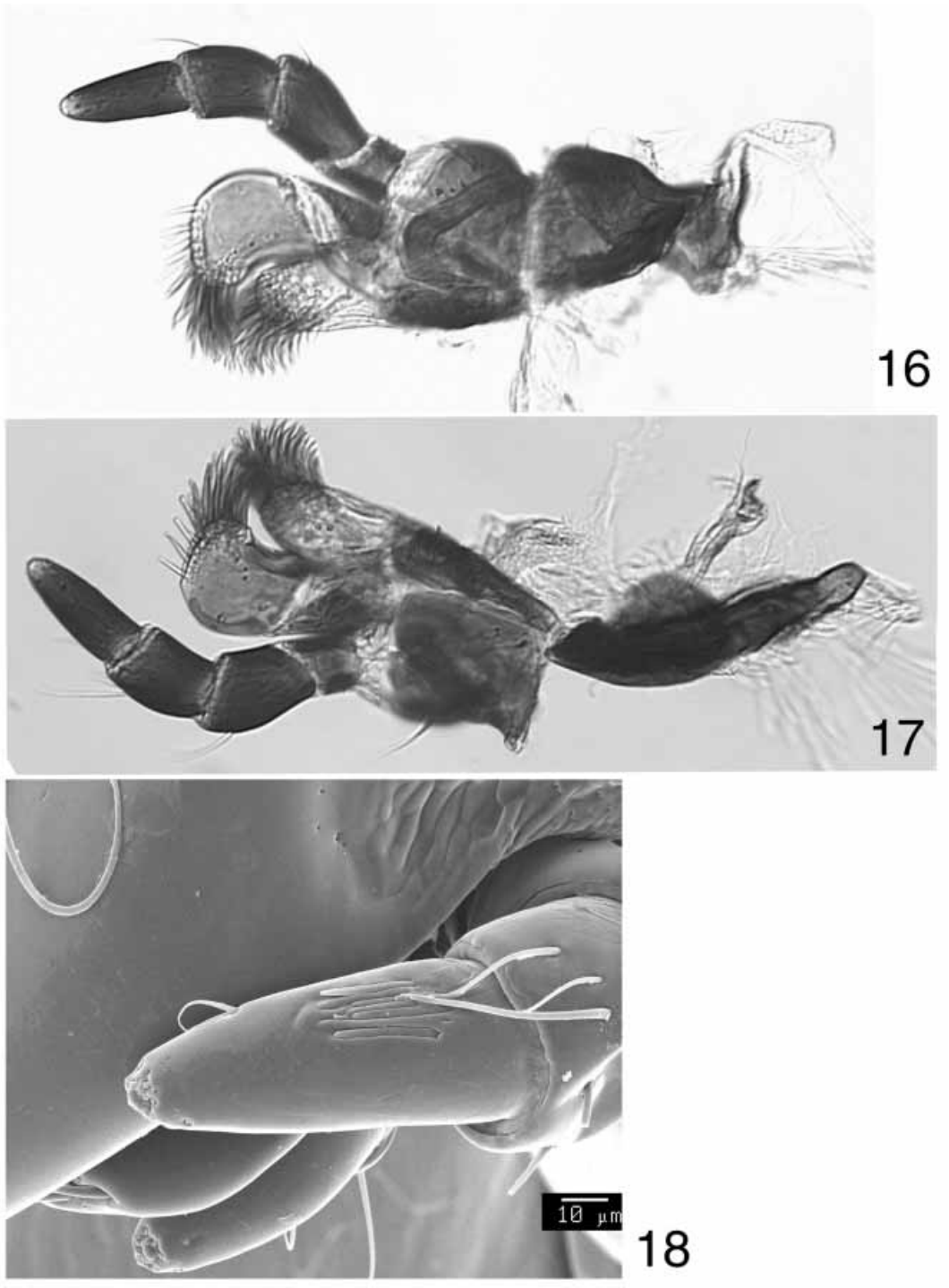

FIGURES 16—18. Maxillae of *Normaltica*. 16, 17, *Normaltica iviei*. 18, apical maxillary palpomere of *Normaltica obrieni*.

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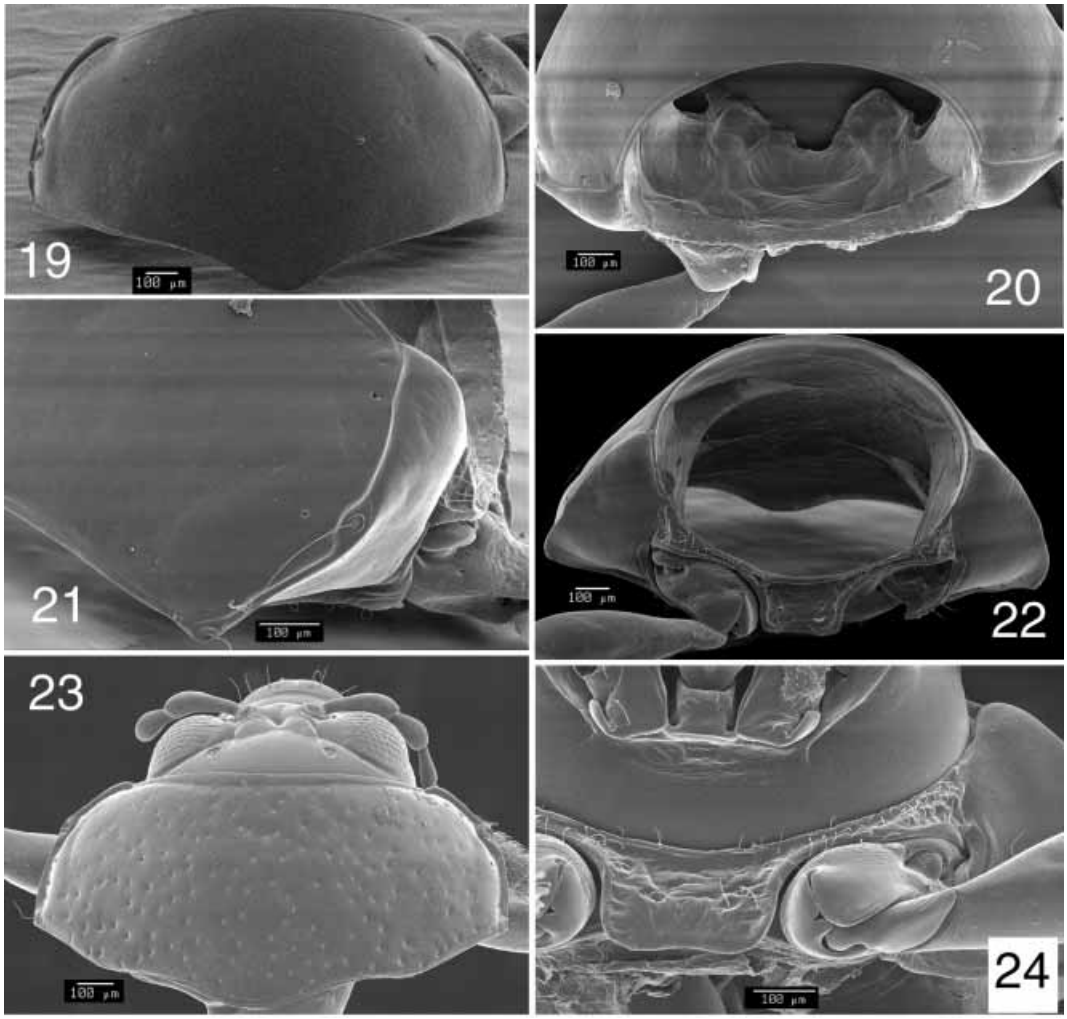

FIGURES 19—24. Prothorax of *Normaltica*. 19—22, *Normaltica iviei*. 23, 24, *Normaltica obrieni*.

Metanotum fully developed in *N. obrieni* and simplified in *N. iviei*, allocrista situated nearly in middle of notum. Metasternum longer than mesosternum in *N. obrieni* and shorter than mesosternum in *N. iviei*. Metendosternite with stalk nearly as wide as long (Fig. 28). *Normaltica obrieni* with robust arms and full set of ridges; *N. iviei* with arms long and thin, stalk lacking most ridges (Fig. 25).

Elytron (Figs. 31-42, 57, 58) with maximum width near mid length. Humeral callus well to poorly developed. Elytral apex narrowly rounded, surrounded by distinct border. Epipleura nearly horizontal, reaching almost to sutural margin of elytron. Lateral margin of elytron delimiting epipleura dorsolaterally, continuing along apical margin of elytron. Elytral lock mechanism asymmetrical near base and symmetrical apically (Figs. 30-33).

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Lock of left elytron with longitudinal groove dorsally, bordered by ridge ventrally. Right elytron with ridge dorsally and groove ventrally, so ridge of right elytron locks with groove of left elytron at base. Further apically, ridge of right elytron migrating ventrally, gradually opening groove slightly narrower but otherwise nearly identical to one of left elytron. Elytron with two sensilla patches (Figs. 34-40) near middle, basal patch larger than medial patch. Sensilla on periphery of basal patch sharktooth-shaped, facing toward middle of patch and away from patch on posterior side of it; medial patch lacks shark-tooth-shaped sensilla. Sensilla medial to sharktooth sensilla wide arrowhead-shaped, in basal patch facing toward middle, in medial patch facing away from middle. Sensilla occupying centers of all patches stump-shaped, facing middle of patch in basal patch and laterally in medial patch. Elytral apex with sensilla stripes along apex and suture (Figs. 41, 42).

Wings greatly variable. In *N. obrieni,* wings with full set of veins including two sclerites between radial cell and RP-mp2. In *N. iviei,* wing of full length but very narrow with apical part lacking veins and surrounded by long setae. Basal part with only radial and median bars (Figs. 53, 54).

Pro- and mesotibiae without apical spine. First protarsomere in male wider than in female. Metafemur robust, with two small humps on anterior and posterior margins (Figs. 43, 50). Metatibia (Figs. 43-52) slightly curved in dorsal and lateral views, nearly cylindrical, apical 1/6 slightly flattened, without callosity in lateral view. Apical spur shorter than tarsal claw. Metatibia 5 times as long as first metatarsomere. Latter triangular, ventral side flat, covered with long and thin setae of same shape as on dorsal side. Second metatarsomere smaller than first and third, triangular with setae similar to those of first. Third metatarsomere entire. Setae on ventral side of third metatarsomere, abruptly widening at apex, with few microtrichia (Figs. 44-48). Claw appendiculate (Figs. 47, 48).

Abdomen with five distinct sternites (Figs. 60, 66, 72). Apical sternite as long as three preceding sternites together, without appendages basally. Apical tergite of female nearly triangular, unevenly covered with long setae, with lightly sclerotized area in middle (Figs. 61, 67, 73).

Spermatheca (Figs. 62, 69, 75) with receptacle variable in length. Pump with long vertical part. Duct without abrupt border with receptacle, without coils. Sclerotized part between duct and gland long. Tignum (Figs. 65, 70, 76) straight, widening anteriorly, with two sclerotized hook shaped structures posteriorly. Vaginal palpus (Figs. 64, 71, 77) robust, wide posteriorly, abruptly narrowing anteriorly.

Median lobe of aedeagus (Figs. 55, 56) relatively robust, simple in shape, slightly convex in lateral view, without any sculpture ventrally, without membranous window.

Type species. *Normaltica obrieni* sp. nov.

Etymology. This genus is named after Norman Woodley, who collected male and female of the type species of the genus. The name is feminine.

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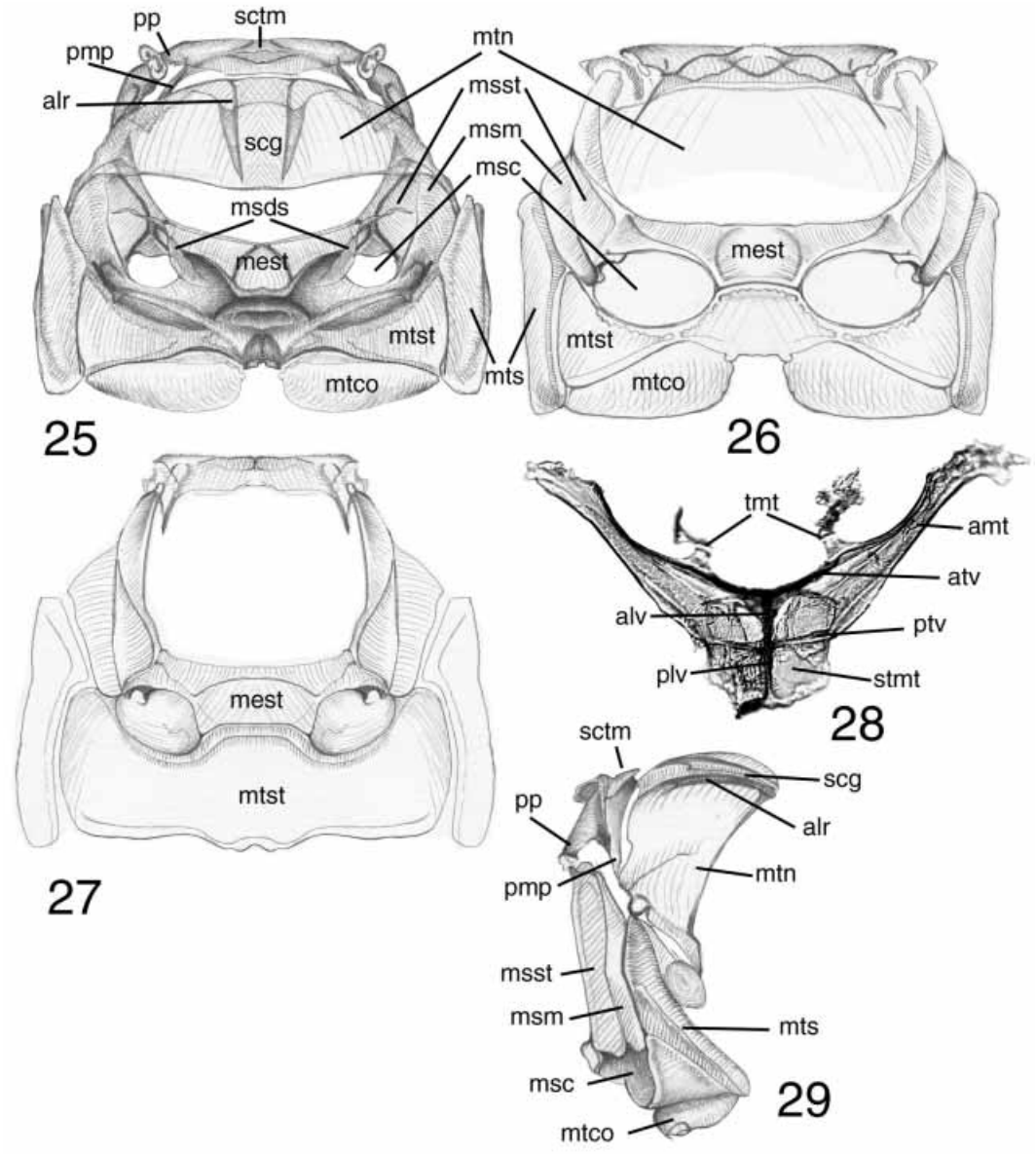

FIGURES 25—29. Thoracic structures of *Normaltica*. 25, 26, 29, *Normaltica iviei*. 27, 28, *Normaltica obrieni*. 25, meso-and metathorax, view of internal structures. 26, 27, ventral view of meso- and metasterna. 28, metendosternite. 29, lateral view of meso-and metathorax. Abbreviations:
alr = allocrista, alv = anterior part of longitudinal ventral process, amt = furcal arm, atv = anterior part of transverse ventral process, mest = mesosternum, msc = mesocoxal cavity, msds = mesendosternite, msm = mesepimeron, msst = mesepisternum, mtn = metanotum, mts = metepisternum, mtco = metacoxa, mtst = metasternum, plv = posterior part of longitudinal ventral process, pmp = postmedial projection, pp = prealar projection, ptv = posterior part of transverse ventral process, scg = scutellar groove, sctm = mesoscutellum, stmt = furcal stalk, tmt = tendons of meso- metafurcal muscles.

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Discussion. *Normaltica* can be easily separated from all New World flea beetles based on the clavate antennae. *Normaltica* is the only known flea beetle genus one species of which species possesses a particular kind of sexual dimorphism in which the male has a greatly enlarged head and long labrum and mandibles. This kind of sexual dimorphism is known in some other leaf beetles, for example Clytrini (*Labidostomis* Germar, *Coptocephala* Lacordaire, etc.), but not in other flea beetles. Males of *Chaloenus* Westwood have the facial part of their head longer, but their mouthparts seem no longer than those of females.

Based on the lack of the impressions on the pronotum and the dilation on the posterior part of the pronotum, *Normaltica* keys together with *Pseudodibolia* Jacoby in Scherer's (1983) key to Neotropical flea beetle genera. Besides having clavate antennae, *Normaltica* can be easily distinguished from that genus based on the lack of a denticle on the hind tibia, having six setiferous pores on the labrum, and having strongly developed supraantennal and supraorbital sulci. *Normaltica* is also similar to *Monotalla* Bechyne. This genus was synonymized by Scherer (1983) with *Pseudodibolia*, but later removed from synonymy (Savini and Furth 2001). *Normaltica* can be separated from *Monotalla* by its 11 segmented antennae (they are 10 segmented in *Monotalla*), lack of the prebasal transverse impression on the pronotum, tiny metatibial spur, and the lack of denticles on the dorsal side of the metatibia.

The two species of *Normaltica* provide an opportunity to understand some of the consequences of wing reduction in flea beetles. Comparison of the fully winged specimens of *N. obrieni* with specimens of *N. iviei* with significantly reduced wings indicates noticeable differences in thoracic structures, particularly in the meso- and metathorax (Figs. 25, 29). In *N. iviei*, the meso- and metanota have lost most of the ridges, leaving only allocrypta on the metanotum. Although the length of the mesosternum in *N. obrieni* and *N. iviei* is essentially the same, the length of the metasternum in *N. iviei* is significantly shorter (Figs. 26, 27). Among internal structures, the metendosternite in *N. iviei* (Fig. 25) is also much simplified; it lacks most of the ridges and its stalk is much shorter than in *N. obrieni* (Fig. 28).

Normaltica obrieni **new species**

(Figs. 1-6, 9, 10, 18, 23, 24, 27, 28, 30-42, 47, 49-53, 56, 58, 66-77)

Description. Body of medium size, length 2.00-2.59 mm, oval, relatively convex in lateral view. Color black, with metallic luster and paler appendages. Eight apical antennomeres white.

Antennal callus (Figs. 1-4) relatively well developed, nearly trapezoidal, 1.45 times as wide as long. Supracallinal sulci relatively well developed. Vertex with tiny well developed punctures. Anterofrontal ridge relatively high. Dorsal side of antennomere seven 2.43 times longer than dorsal side of antennomere eight (Figs. 9, 10).

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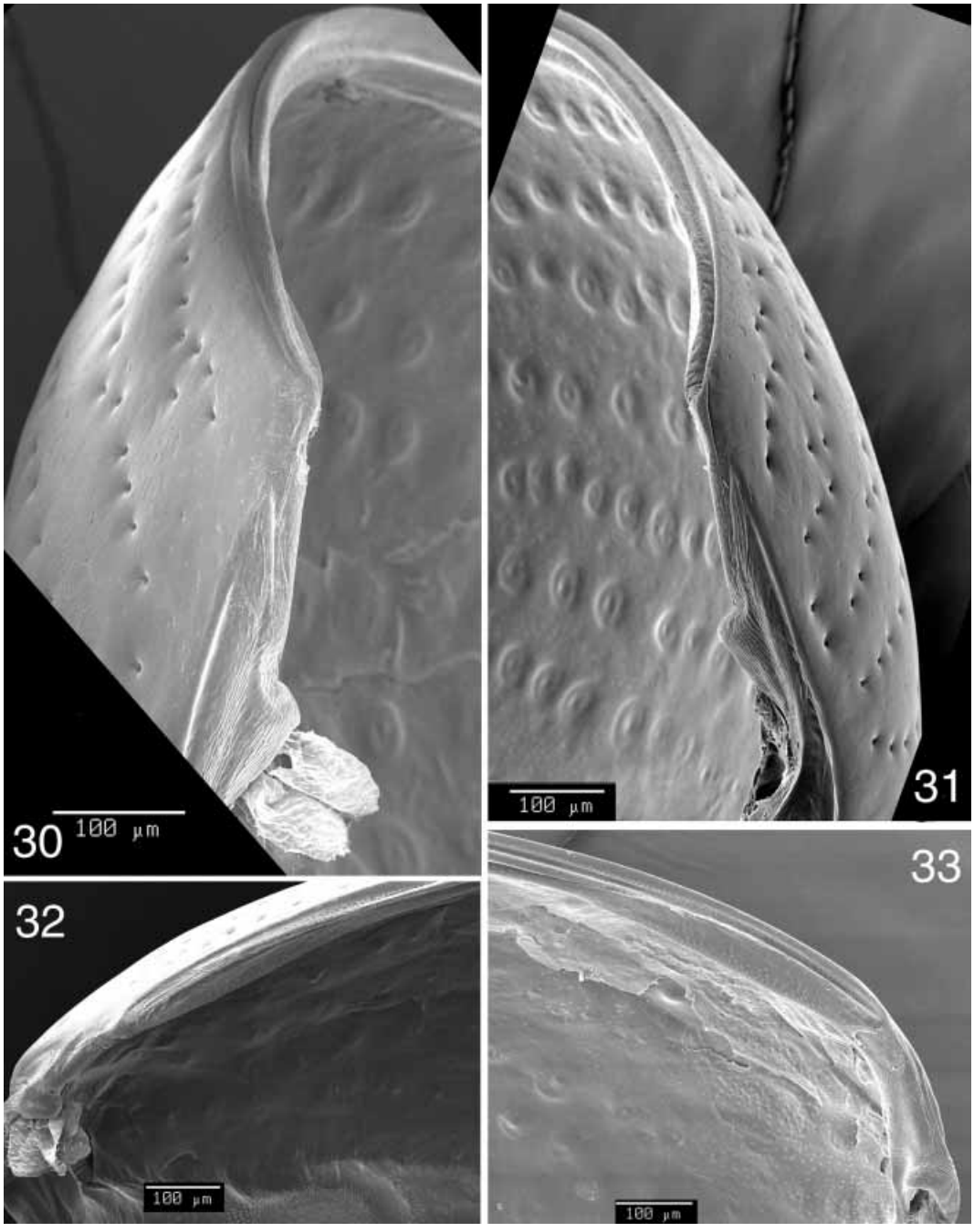
Pronotum (Fig. 23) 1.95 times wider than long, without impressions. Anterolateral callosity slightly angulate at setiferous pore. Basal dilation widely rounded. Punctures relatively large, deep, sparse.



FIGURES 30—33. Suture region of elytron of *Normaltica obrieni*.

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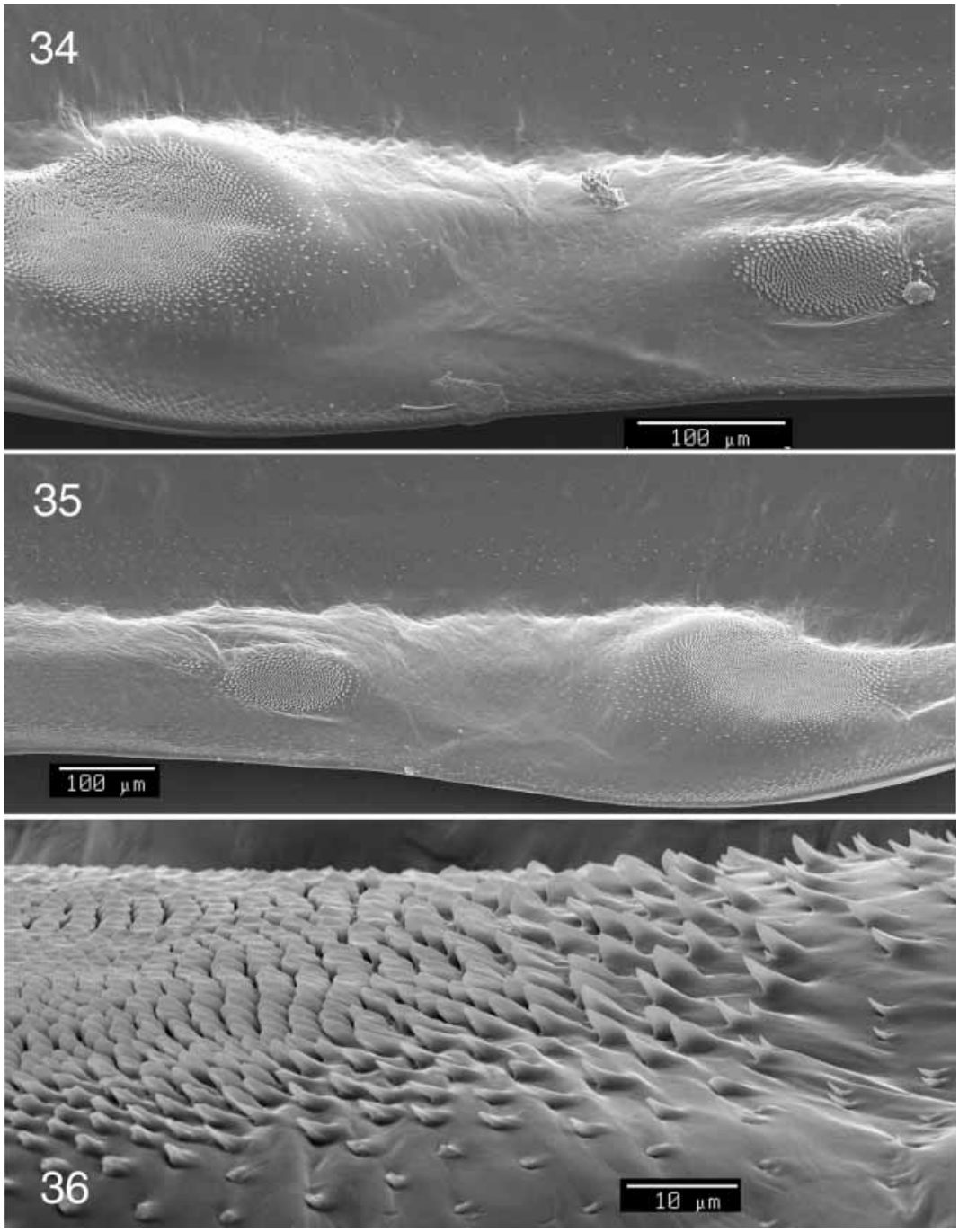
Elytron (Figs. 31-42, 58) with well developed humeral callus and maximum width near mid length. Punctures relatively large, deep, arranged in striae. Wing well developed with full set of veins including two sclerites between radial cell and RP-mp2 (Fig. 53).



FIGURES 34—36. Internal surface of elytra of *Normaltica obrieni*. 34, right elytron. 35, left elytron. 36, anterior part of basal patch.

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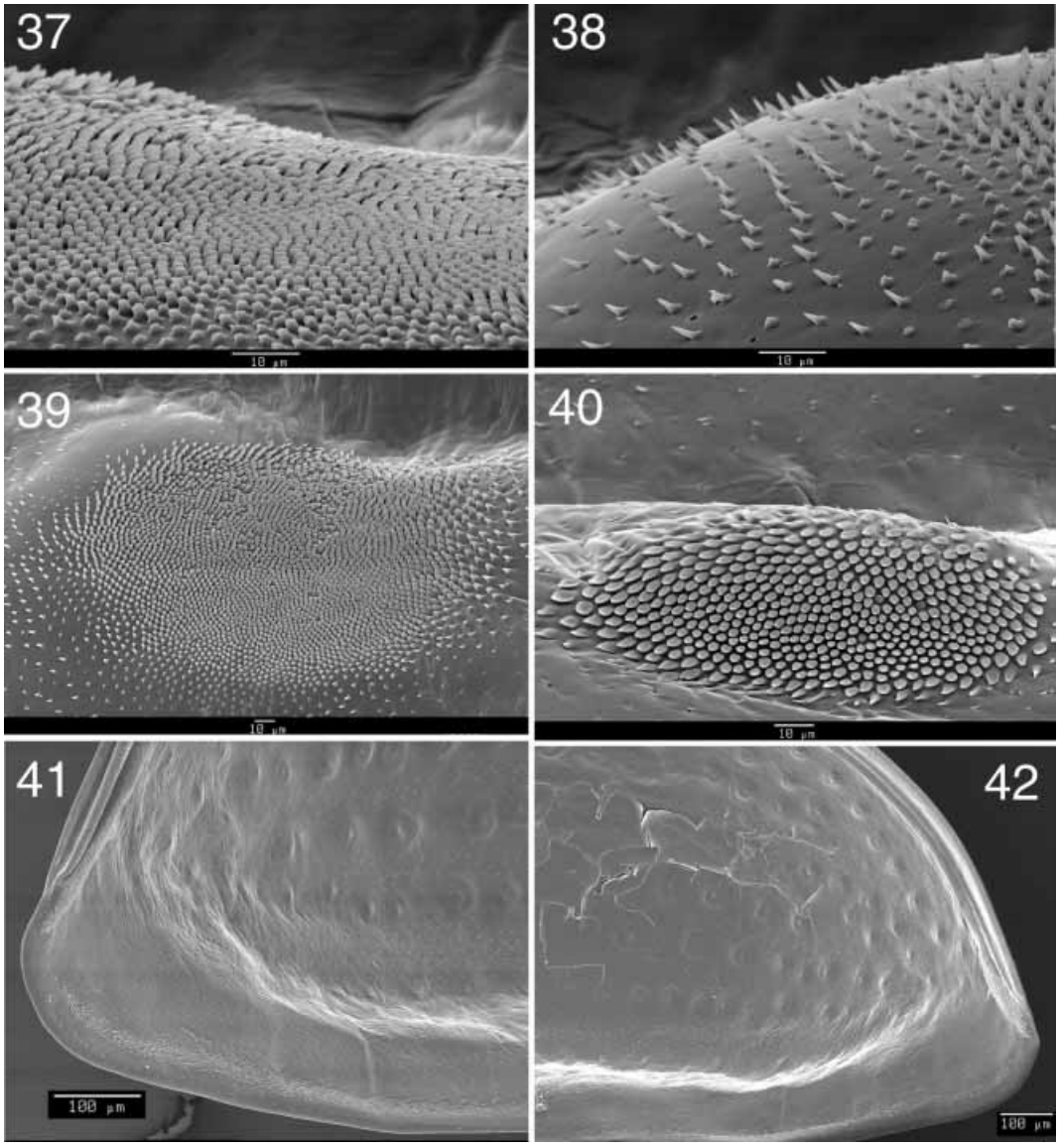
Spermatheca (Figs. 69, 75) with receptacle 0.6 to 0.8 times as long as horizontal part of pump. Internal side of receptacle as convex as external side. Base of duct facing same direction as receptacle. Tignum (Figs. 70, 76) robust, as wide anteriorly as posteriorly. Vaginal palpus (Figs. 71, 77) robust.

Median lobe of aedeagus (Figs. 56) parallel sided, weakly convex in lateral view.

Etymology. This species is named after C. W. O'Brien who collected the second known female. The species name is a noun in apposition.



FIGURES 37—42. Elytral sensilla patches of *Normaltica obrieni*. 37, middle part of basal patch. 38, posterior part of basal patch. 39, basal patch. 40, apical patch. 41, 42, apices of elytra. 41. left elytron. 42, right elytron.

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Variability. Males of this species have greatly enlarged mouthparts in addition to the head being much wider apically than in females. All three aedeagi are slightly different in the minute details of the shape of the apex (the apex is slightly thicker in the specimen from Mt. Britton trail, in lateral view the apex is abruptly bent ventrally in the specimen from El Yunque Hwy). However, the main characters of the median lobe are the same in all three males of this species. Also, the male from El Yunque is the smallest one. It has interstriae of the elytra more convex compare to other males. The spermathecae of the females collected at El Toro and Luguillo have a sharp border between the pump and receptacle, but this border is very smooth in the specimen collected at Guilarte Forest. The tignum of the El Toro specimen is less robust, and the distance between the apex and deviation is 2.72 times longer that from the deviation to the base, whereas this ratio is 1.44 in the specimens from Guilarte Forest.

Discussion. This species can be easily distinguished from *N. iviei* with the key following the descriptions. Despite the variability in female genitalia between the specimens from El Toro, Luquillo and Gullarte Forest, I consider them conspecific.

Type material. Holotype ♂. Labels: 1) Puerto Rico: Caribbean National Forest, El Toro trail, 650-800 meters, 18°16'55'' N, 65°51'10'' W, 26 June 2002, N. E. Woodley; 2) Holotype *Normaltica obrieni* sp. nov. des. A. Konstantinov, 2002 (USNM). Paratype ♀, with same labels as holotype (USNM). Paratype ♀. Labels: 1) Puerto Rico, Gullarte [Guilarte] For. Res. Hwy. 131&158, July 23, 1979, C. W. O'Brien; 2) Paratype *Normaltica obrieni* sp. nov. des. A. Konstantinov, 2002 (USNM). Paratypes ♂, ♀. Labels: 1) Puerto Rico, Carib. N. F. Mt. Britton Trail, July 19, 1979, C. W. O'Brien; 2) Paratype *Normaltica obrieni* sp. nov. des. A. Konstantinov, 2002 (♀ USNM, ♂ WIBF). Paratype ♂. with the same labels as previous except. El Yunque Hwy, (191) K9H9, GB Marshall (USNM). Paratype ♂. Labels: 1) Mt. Britton, Loguillo [Luquillo] Forest, P. R. 8.VII.1969, H. & A. Howden; 2) Paratype *Normaltica obrieni* sp. nov. des. A. Konstantinov, 2002 (CMCN). Paratype ♀. Labels: 1) Luquillo Forest, East Peak, P. R. 15.VII.1969, H. & A. Howden; 2) Paratype *Normaltica obrieni* sp. nov. des. A. Konstantinov, 2002 (CMCN).

Normaltica iviei new species

(Figs. 7, 8, 11-17, 19-22, 25, 26, 29, 43, 44, 45, 46, 48, 54, 55, 57, 59-65)

Description. Body of medium size, length 1.94-2.32 mm, oval, relatively convex in lateral view. Color brown, without metallic luster, appendages paler. Eight apical antennomeres brown, darker than basal antennomeres.

Antennal calli poorly developed, their borders unclear so their shape and dimensions can not be determined. Supracallinal sulci absent. Supraantennal sulcus deep with acute borders. Vertex without small punctures. Anterofrontal ridge relatively low. Dorsal side of antennomere seven with peg-like structure, 1.1 times longer than dorsal side of antennomere eight.

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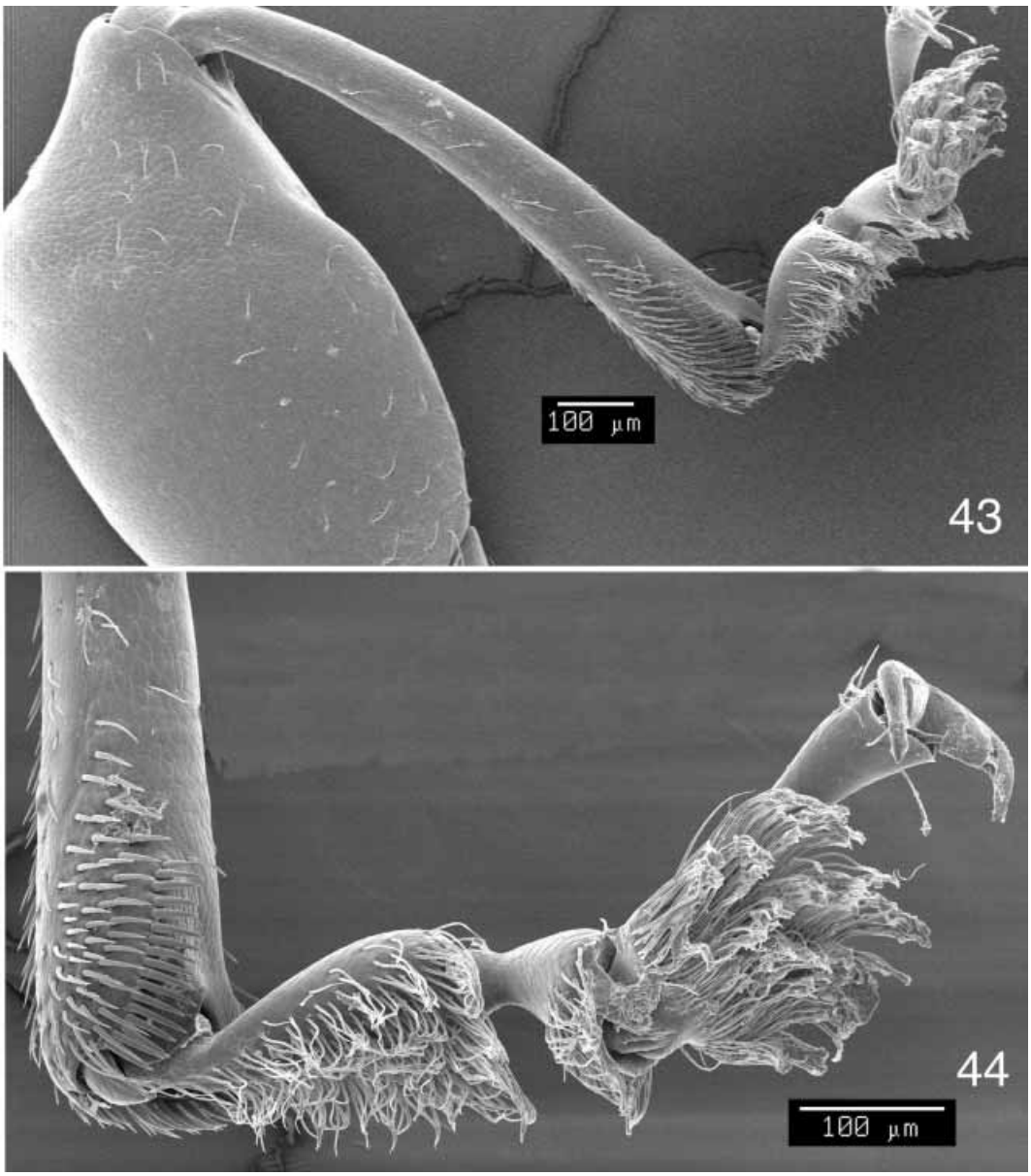
Pronotum (Fig. 19) 1.67 times wider than long, without impressions. Anterolateral callosity not angulate at setiferous pore. Basal dilation narrowly rounded. Punctures tiny, sparse.

Elytron (Fig. 57) without humeral calli. Punctures tiny, ill developed, arranged in striae. Wing reduced in size with reduced set of veins, without two sclerites between radial cell and RP-mp2 (Fig. 54), apical part of wing surrounded by long setae.



FIGURES 43—44. Legs of *Normaltica iviei*. 43, overview of hind leg. 44, metatarsi and tip of metatibia.

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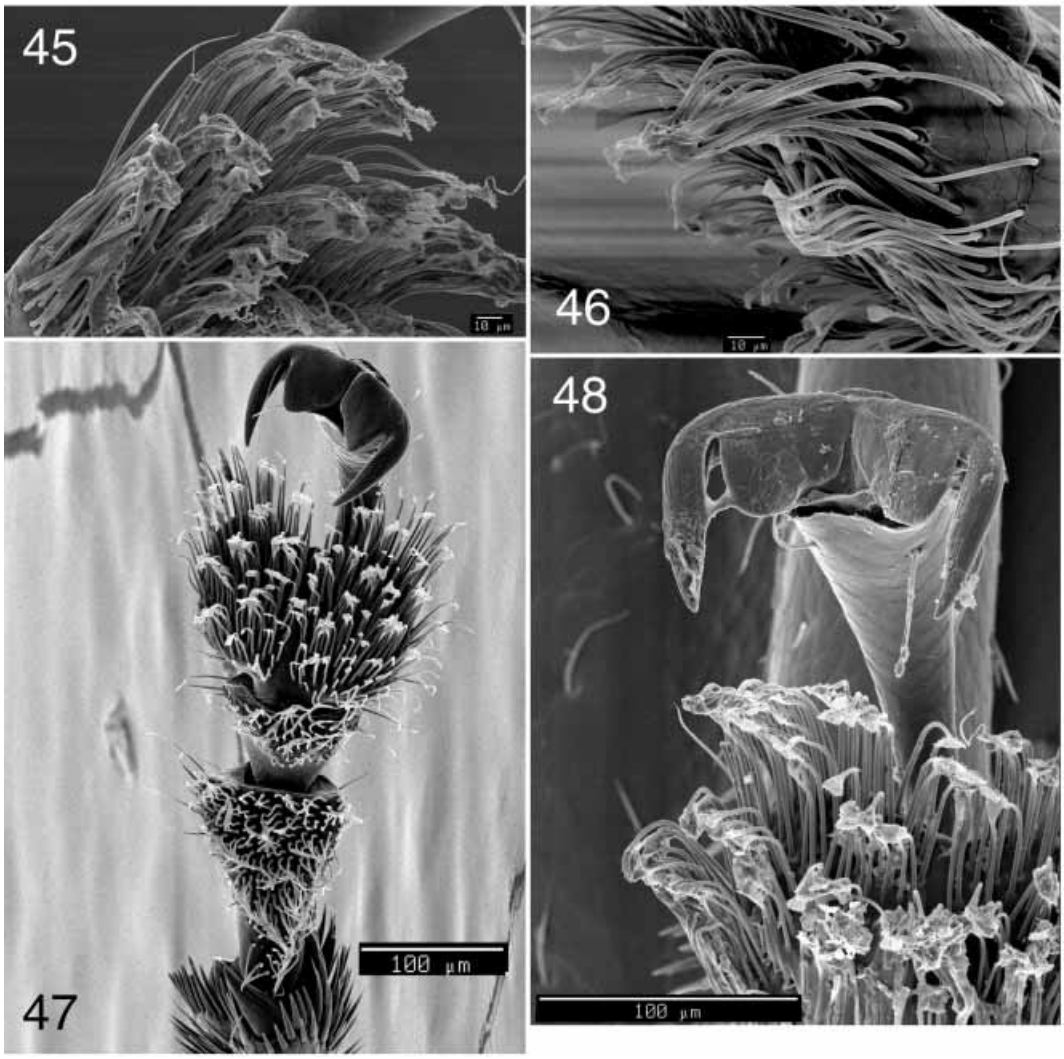
Spermatheca (Fig. 62) with receptacle 1.67 times as long as horizontal part of pump. Internal side of receptacle convex, external side concave. Base of duct faces away from direction of receptacle. Tignum (Fig. 65) less robust anteriorly, wider posteriorly. Vaginal palpus (Fig. 64) less robust.

Median lobe (Figs. 55) wider at apex than near middle, convex in lateral view.

Etymology. This species is named after Mike Ivie who brought the specimens to my attention. The species name is a noun in apposition.

Variability. Males of this species have no significant differences from females in external structures, including the mouthparts and head. The first tarsomere of the male is slightly wider than in the female, a character common to most flea beetles



FIGURES 45—48. Ventral side of apical metarsomeres and claw of *Normaltica*. 45, 46, 48, *Normaltica iviei*. 47, *Normaltica obrieni*.

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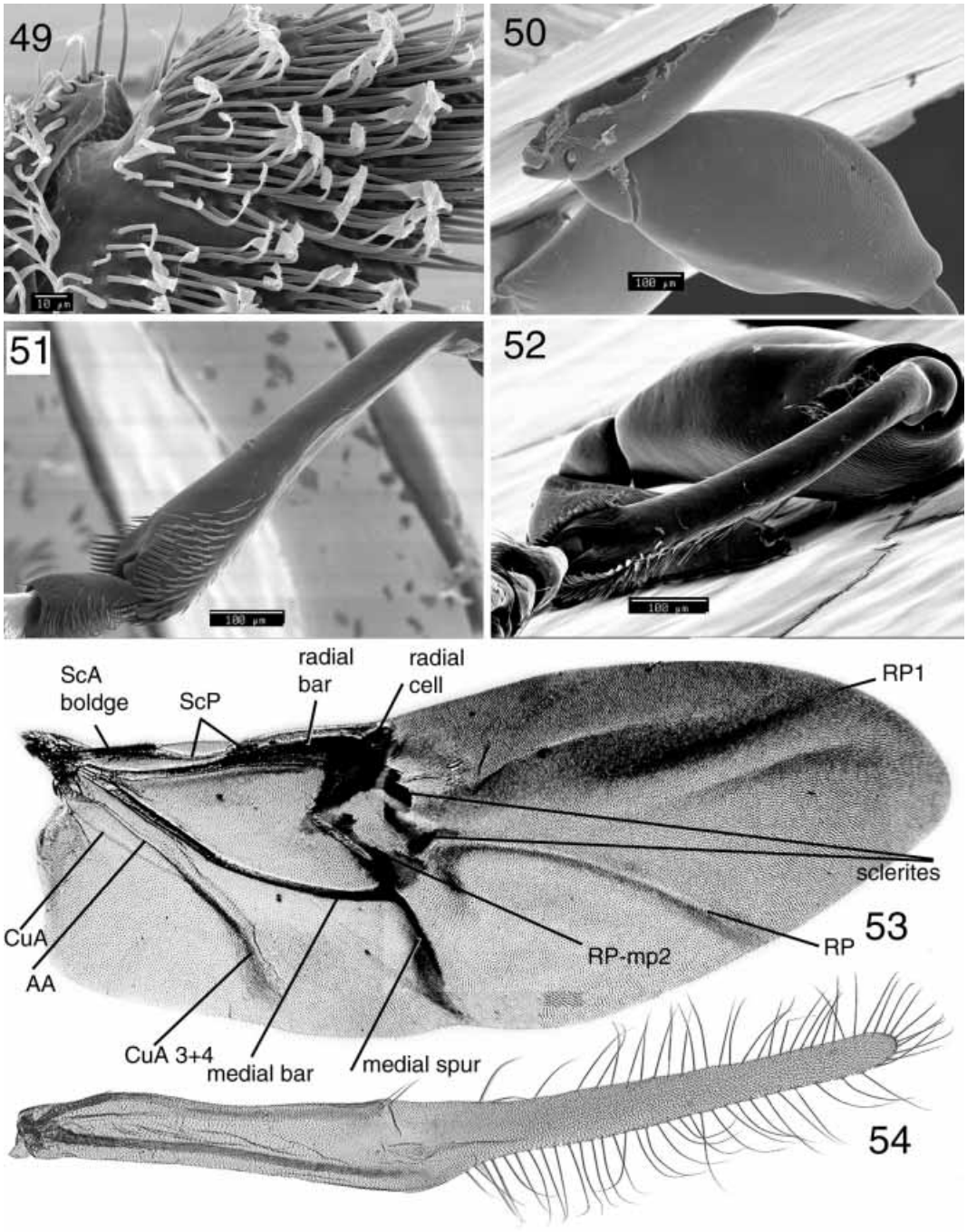

FIGURES 49—54. Details of *Normaltica*. 49—52, leg of *Normaltica obrieni*. 53, 54 wings. 53, *Normaltica obrieni*. 54, *Normaltica iviei*.

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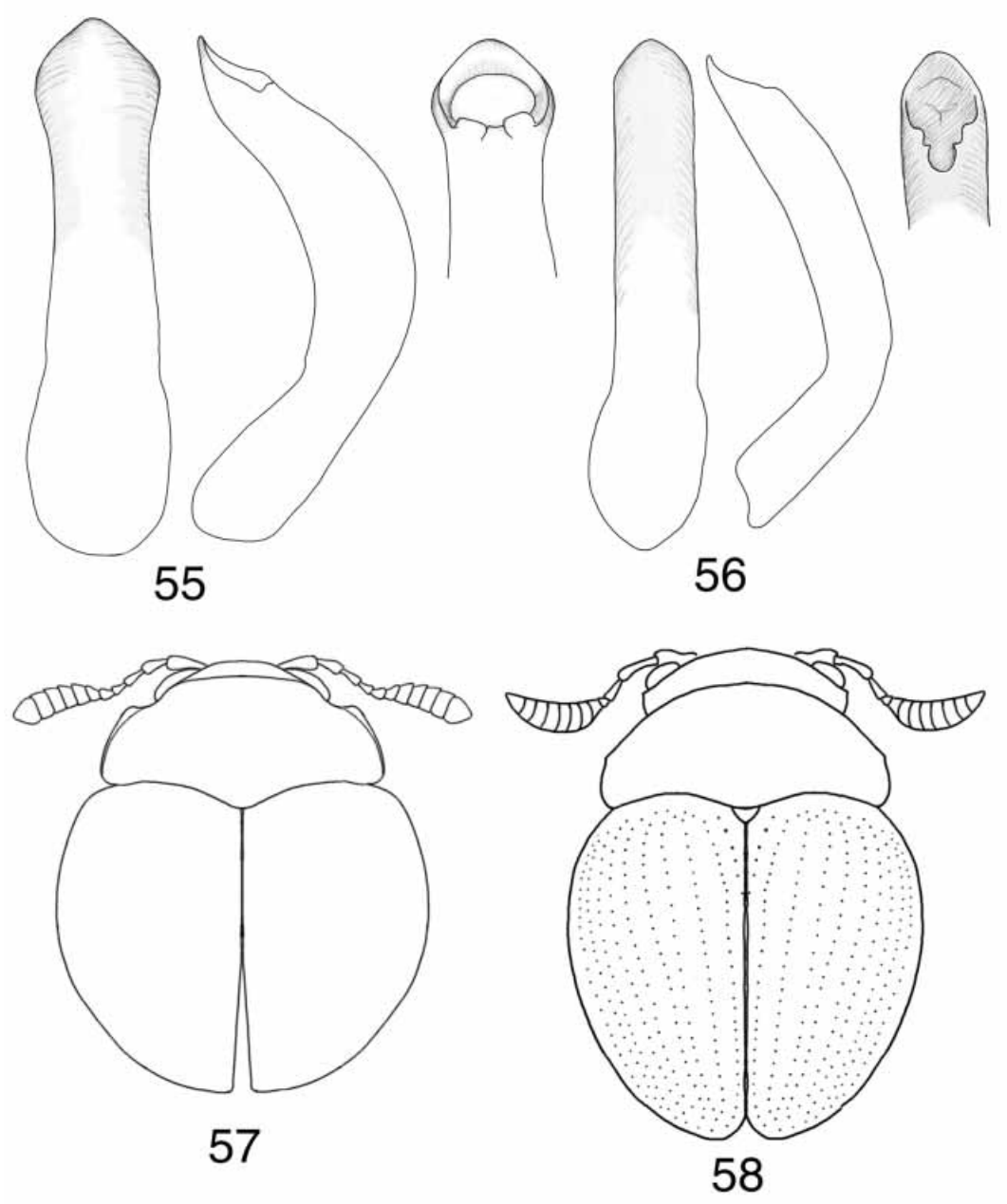

FIGURES 55—58. Details of *Normaltica*. 55, 56, male genitalia. 57, 58, habiti. 55, 57, *Normaltica iviei*. 56, 58, *Normaltica obrieni*.

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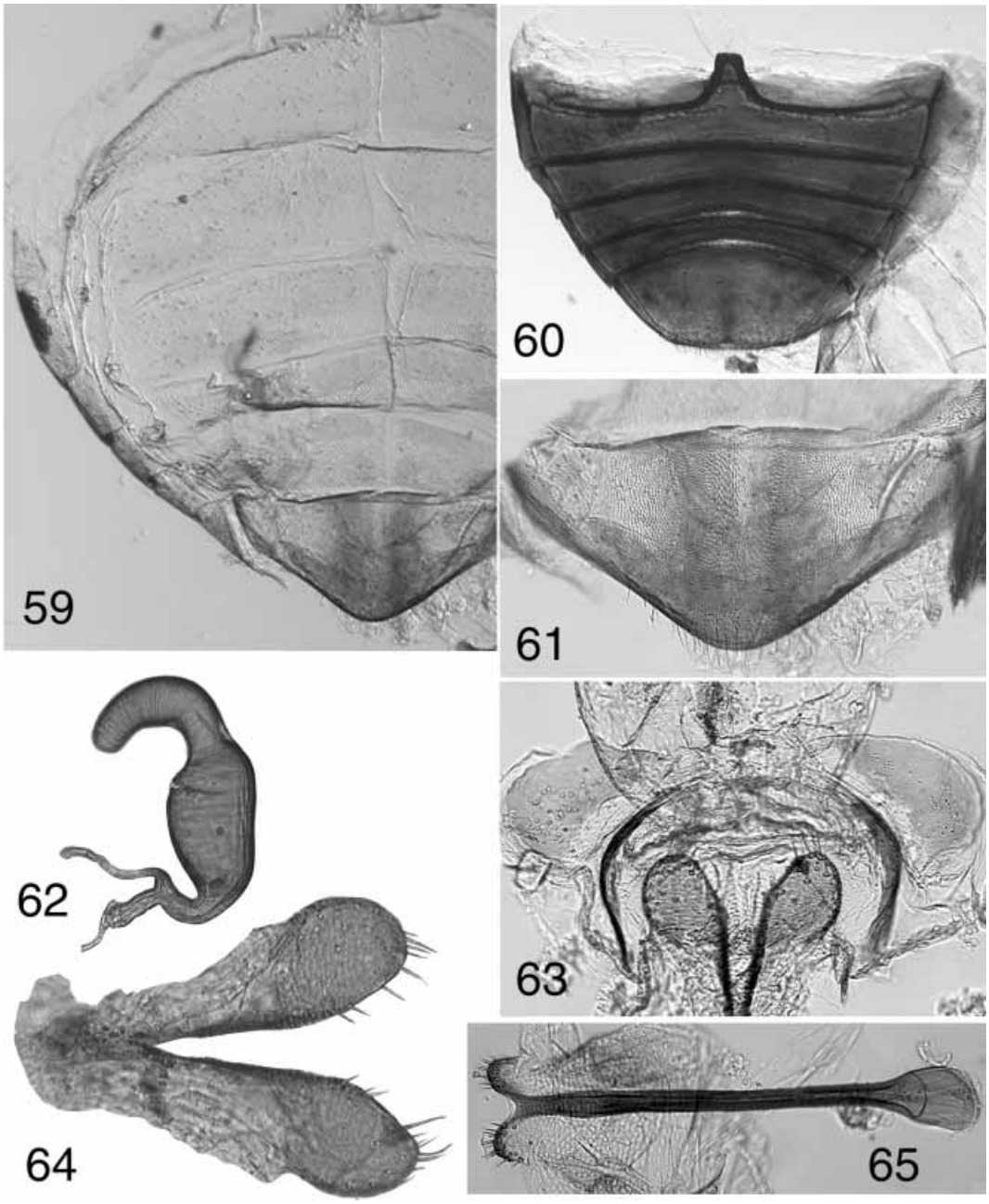

FIGURES 59—65. Abdomen and female genitalia of *Normaltica iviei.* 59—61, 63, abdomen and its details. 62, spermatheca. 64, vaginal palpi. 65, tignum.

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Discussion. *Normaltica iviei* can be easily distinguished from *N. obrieni* with the following key.

Type material. Holotype ♂. Labels: 1) Dominican Republic, LaVega, 53 km SE Constanza, August 9, 1979, L. B. O'Brien; 2) Holotype *Normaltica iviei* sp. nov. des. A. Konstantinov, 2002 (USNM). Paratype 3♀, with same labels as holotype (2 USNM, 1 WIBF).

Key to *Normaltica* species

1 Eight apical antennomeres white, lighter than basal antennomeres. Dorsal side of antennomere seven without peg-like structure, 2.43 times longer than dorsal side of antennomere eight. Basal dilation of pronotum broadly rounded. Humeral calli well developed. Median lobe (Fig. 56) at apex as wide as near middle, weakly convex in lateral view. Spermathecal (Figs. 69, 75) receptacle 0.6 to 0.8 times as long as horizontal part of pump. External side of receptacle convex. Base of duct facing same direction as receptacle ..... *Normaltica obrieni* new species

— Eight apical antennomeres brown, darker than basal antennomeres. Dorsal side of antennomere seven with peg-like structure, 1.1 times longer than dorsal side of antennomere eight. Basal dilation of pronotum narrowly rounded. Humeral calli poorly developed. Median lobe (Figs. 55) wider at apex than near middle, convex in lateral view. Spermathecal (Fig. 62) receptacle 1.67 times as long as horizontal part of pump. External side of receptacle concave. Base of duct facing away from direction of receptacle *Normaltica iviei* new species

Acknowledgments

I am very grateful to N. E. Woodley, S. W. Lingafelter (Systematic Entomology Laboratory, Washington D.C.), C. W. and L. B. O'Brien (Florida A&M University, Tallahassee, FL) and H. and A. Howden (Canadian Museum of Nature, Ottawa, Canada) for the wonderful flea beetle collecting in Puerto Rico and the Dominican Republic. I am also grateful to M. A. Ivie (Montana State University, Bozeman, MT) for bringing these unusual flea beetles to my attention. E. G. Riley (Department of Entomology, Texas A&M University) and D. G. Furth (Department of Systematic Biology, Smithsonian Institution) provided additional specimens of *N. obrieni*. S. Whittaker and S. Braden (SEM Laboratory, National Museum of Natural History, Smithsonian Institution) assisted with scanning electron microscopy. D. Perez (Department of Systematic Biology, Smithsonian Institution) consulted on spelling of geographic names. I am thankful to C. L. Staines (Department of Systematic Biology, Smithsonian Institution), E. E. Grissell and A. L. Norrbom (Systematic Entomology Laboratory, Washington D.C.) for reviewing this manuscript and providing valuable suggestions.

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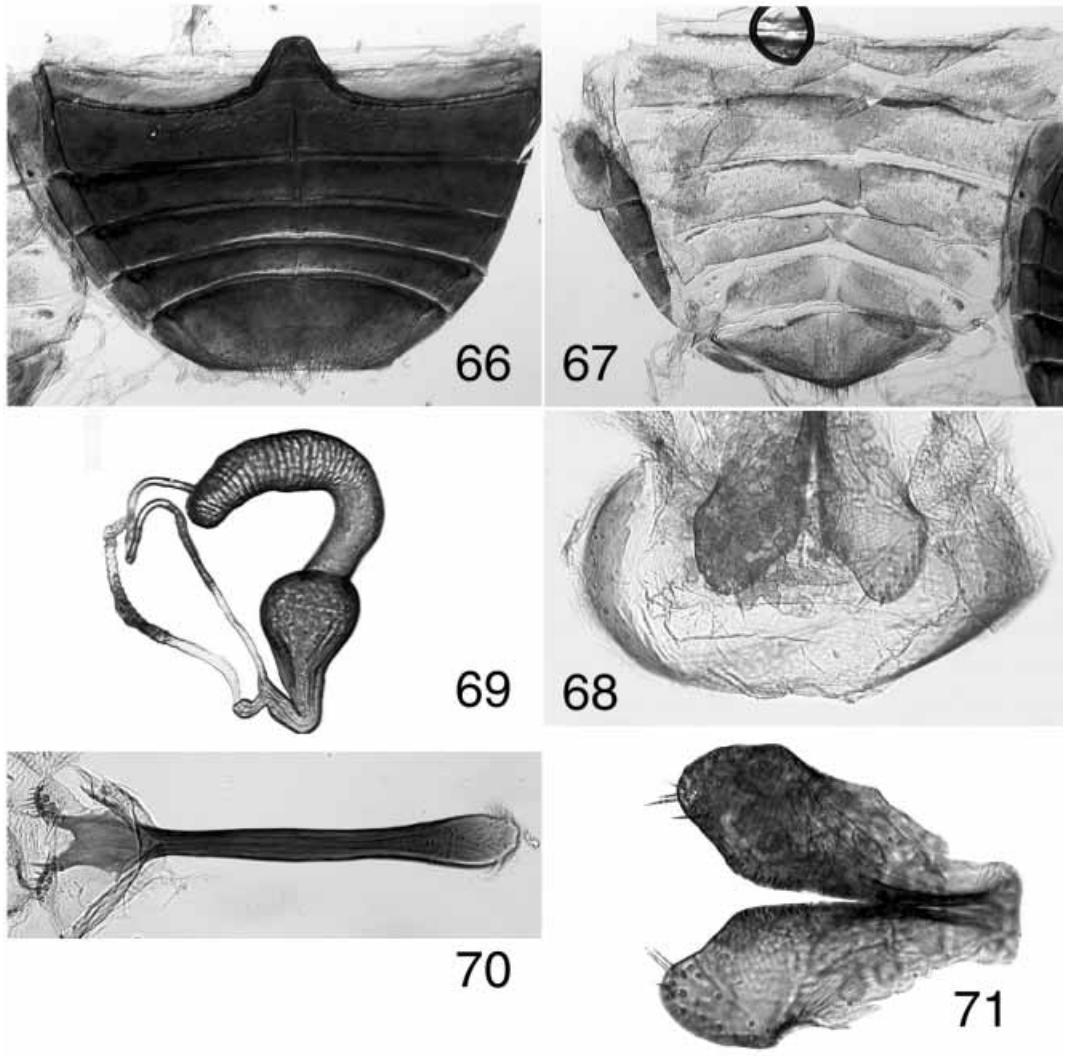

FIGURES 66—71. Abdomen and female genitalia of *Normaltica obrieni*, El Toro. 66—68, abdomen and its details. 69, spermatheca. 70, tignum. 71, vaginal palpi.

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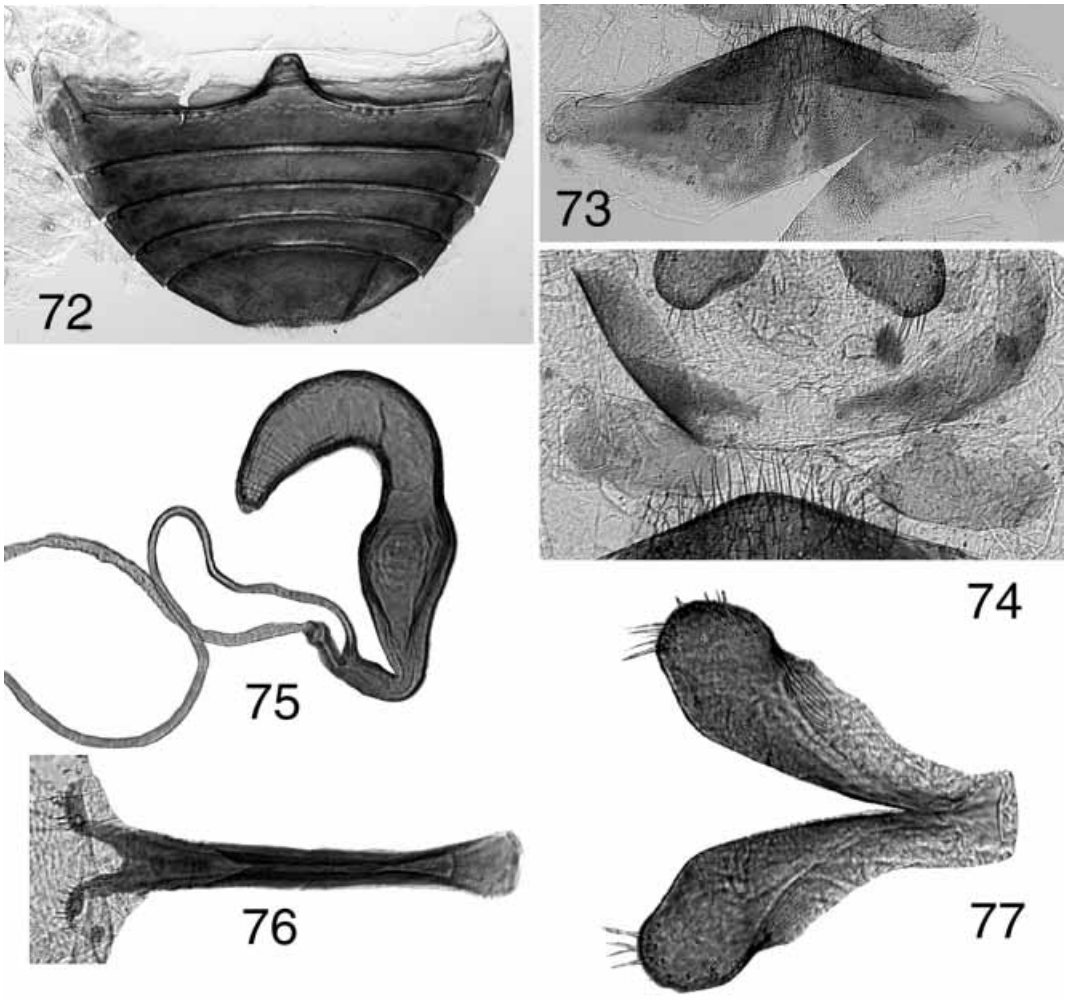

FIGURES 72—77. Abdomen and female genitalia of *Normaltica obrieni*, Gullarte Forest. 72—74, abdomen and its details. 75, spermatheca. 76, tignum. 77, vaginal palpi.

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