

INSECTA MUNDI

A Journal of World Insect Systematics

0525

Myrmeconycha new genus: the first myrmecophilous flea beetle
(Coleoptera: Chrysomelidae: Galerucinae: Alticini)

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Date of Issue: February 7, 2017

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Insecta Mundi 0525: 1–13

ZooBank Registered: urn:lsid:zoobank.org:pub:0A7153B4-AB40-4EA4-BE32-201036DBC414

Published in 2017 by

Center for Systematic Entomology, Inc.
P. O. Box 141874
Gainesville, FL 32614-1874 USA
<http://centerforsystematicentomology.org/>

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Layout Editor for this article: Eugenio H. Nearn

Myrmeconycha new genus: the first myrmecophilous flea beetle
(Coleoptera: Chrysomelidae: Galerucinae: Alticini)

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Abstract. The first myrmecophilous flea beetle genus (*Myrmeconycha* Konstantinov and Tishechkin, **new genus**) with four new species (*M. erwini* Konstantinov and Tishechkin, **new species** – Ecuador, *M. gordonii* Konstantinov and Tishechkin, **new species** – Brazil, *M. pakaluki* Konstantinov and Tishechkin, **new species** – Panama, and *M. pheidole* Konstantinov and Tishechkin, **new species** – Costa Rica) is described and illustrated. It is compared with flea beetles of the subtribe Disonychina (Coleoptera: Chrysomelidae: Galerucinae: Alticini) and may be easily differentiated based on the external and internal features, which include the waxy surface of the head and pronotum, reticulated surface of the pronotum, and four longitudinal ridges on each elytron.

Key Words. Flea beetles, new genera, new species, myrmecophily, Neotropics, *Pheidole* sp.

Introduction

While sorting leaf beetles (Coleoptera: Chrysomelidae) from the T. L. Erwin Ecuadorian lowland rainforest canopy fogging material (Erwin et al. 2005), one of the authors (AKT) came across an odd flea beetle specimen (Galerucinae: Alticini). At first glance, it was clear that the specimen, possessing a set of unusual alticine characters, most notably, a network of prominent interconnecting pronotal costae and longitudinal elytral ridges, represented an unusual and undescribed taxon. Further searches for similar beetles in the existing collections produced a few more specimens of this genus representing multiple species that originated from the lowlands of Central America and the Amazon Basin. Most specimens were collected from forest canopies, and one series was collected in a nest of ants of the genus *Pheidole* Westwood. This fact and specific morphological features characteristic for myrmecophilous beetles (Tishechkin 2007; Parker 2016) suggest that the beetles in question are myrmecophilous.

Given the species diversity of Chrysomelidae and Alticini in particular [36,000 and 9,000 described species respectively (Konstantinov 2016)], myrmecophilous habits are disproportionately rare among Chrysomelidae (Parker 2016). Only two genera in Cryptocephalinae (Selman 1962), with characteristic morphological modifications in adults, have been reported as myrmecophilous for the entire family (Kistner 1982; Selman 1988; Parker 2016). Therefore, the beetles described in this paper are the third known case of myrmecophily in Chrysomelidae and the first one for the tribe Alticini in which the adults exhibit highly modified morphology. Rarity in collections, presence of numerous prominent dorsal ridges/costae (commonly present in many myrmecophilous beetles, often used as ‘handles’ by host ants) and a distinct layer of waxy substances over substantial parts of body surface, which might play a defensive role in a not highly integrated ant guest (Kistner 1982; Parker 2016), are suggestive of the myrmecophilous habits of these remarkable beetles. A single collecting record from an ant nest substantiates this hypothesis.

Below, we describe, diagnose, and illustrate this new genus and its constituent species and briefly discuss its peculiar morphology and potential relationships within Alticini.

Materials and Methods

Morphological observations were made with a Zeiss Discovery V20 microscope and digital images were taken with an AxioCam HRC digital camera attached to it. Female genitalia were dissected and mounted on slides with glycerin. Morphological terminology follows Konstantinov (1998). The head and prothorax of specimens of the new genus, *Myrmeconycha*, are often covered with a whitish waxy excretion that obstructs observation of the body surface, so the description of the head morphology is based on beetles with this waxy cover removed. Label data is verbatim with each label on a specimen indicated by a sequential number. The National Museum of Natural History, Washington DC, USA is hereafter referred to by the acronym USNM. The morphological characters found in all species are described in detail. Thus, the species descriptions are short, presenting only species-specific diagnostic characters.

Results

Myrmeconycha Konstantinov and Tishechkin, new genus

(Fig. 1 – 42)

Description. Body length 3.45 – 4.27 mm, width 1.72 – 2.18 mm. Body light ochre to light orange in color with or without a dark pronotum and head. In some species the middle antennomeres are lighter than rest. Head and prothorax often covered with whitish waxy secretion.

Head without midcranial and frontal sutures. Head surface uneven, covered with bumps and deep pits between them, which obscures observations of head sulci and sutures. Orbital and supraorbital sulci indistinguishable. Supracallinal sulcus thin and shallow. Supraantennal sulcus well developed. Midfrontal sulcus thin and shallow, but distinct. Suprafrontal sulcus well developed. Frontolateral sulcus well developed. Antennal callus long, trapezoidal, slightly entering interantennal space. Surface of antennal callus even, lacking bumps and depression of vertex surface, situated much above surface of vertex and orbit. Frontal ridge and vertex separated by antennal calli. Ratio of width of frontal ridge to width of antennal socket (including surrounding ridges) 0.58 – 0.67. Frontal ridge long, in lateral view almost straight. Area below antennal socket deeply concave. Orbit from normally wide to narrow, narrower than transverse diameter of antennal socket. Ratio of distance between eyes above antennal sockets to transverse diameter of eye in frontal view 3.06 – 3.15. Sides of head below eyes long, slightly converging ventrally. Labrum flat, with 2 or 3 pairs of long setae; anterior margin complete, without indentation on upper surface. Apical maxillary palpomere conical. Preapical maxillary palpomere wider than apical palpomere. Antennal sockets situated below middle of eye. Antenna filiform, with 11 antennomeres. Middle antennomeres slightly flattened dorsoventrally, with groups of pits apically. Antenna not reaching beyond middle of elytron.

Pronotum wider than long, widest at corners of anterolateral callosities, with nearly straight sides diverging anteriorly. Lateral margin covered with small denticles. Lateral margin not explanate. Anterolateral callosity relatively long, straight, slanted toward lateral margin. Pronotal disc with six cells separated from each other by tall ridges. Posterolateral callosity short, barely protruding beyond lateral margin. Pronotum covered with bumps and small ridges (but often concealed by wax). Base with short lobe in middle. Procoxal cavities open. Intercoxal prosternal process long, parallel-sided, extending beyond procoxae, lateral sides straight, posterior end rounded.

Scutellum long, wide at apex. Elytron with four sharp longitudinal ridges. Elytral punctation confluent. Elytra at base wider than base of pronotum. Humeral calli well developed. Basal calli present, separated from elytral disc. Epipleura slightly oblique outwardly, gradually narrowing from base to apex, reaching end of elytron side. Mesosternum short, with deep depression in middle. Metasternum short, with longitudinal ridge in middle, anteriorly without elevated projection and not projecting forward covering mesosternum.

Abdominal ventrite 1 free. Abdominal ventrites about equally long. First abdominal ventrite between coxae without longitudinal ridges, with apex acute. Last visible tergite without longitudinal groove in middle.

Pro- and mesotibiae slightly canaliculate dorsally. Pro- and mesotibial spurs absent. Metatibia slender, slightly curved in dorsal view. Metatibia in cross section at its middle more or less round. Dorsal surface flat. Bristles present on lateral and mesal sides of metatibiae. Metatarsomere 1 attached to metatibial apex. Apical spur of metatibia simple, situated at middle, directed medially. Metatarsomere 1 narrow in females, wider in males, with flat ventral surface, shorter than rest of metatarsomeres together. Claws appendiculate. Wings with full set of veins characteristic for flea beetles.

Median lobe of aedeagus in cross section somewhat flat, without impressions near apex on ventral surface, abruptly curved at apex in lateral view. Apex with a knob.

Spermatheca with oval receptacle, much smaller than pump. Pump and receptacle separated by distinct border. Gland attached to receptacle. Spermathecal duct not observed. Vaginal palpi membranous, short, poorly preserved on slides. Tignum long, with wide and relatively long explanation anteriorly, posterior sclerotization narrow.

Etymology. The genus is named for its myrmecophilous habits and relationships with flea beetles of the subtribe *Disonychina*. The name is feminine.

Type species. *Myrmeconycha pheidole* Konstantinov and Tishechkin.

Remarks. External features of *Myrmeconycha* are substantially modified presumably due to its myrmecophilous habits. However, main features of the frontal and anterofrontal ridges; long, flat dorsally and slightly curved in dorsal view metatibia; proportions of the tarsi; short, poorly sclerotized and barely visible vaginal palpi; and spermatheca with an oval receptacle and a relatively long pump suggest that it is mostly similar to *Disonychina* flea beetles (Duckett 1999). We have compared *Myrmeconycha* to 15 out of 21 *disonychina* genera. Among them, *Myrmeconycha* is more similar to *Disonychina sensu stricto*, which contains only six genera. *Myrmeconycha* can be easily distinguished from them based on the following characters: head and pronotum covered by wax; head surface uneven, covered with bumps with deep grooves in between; pronotum widest at corners of anterolateral callosities, with nearly straight sides diverging anteriorly; lateral margin of pronotum covered with small denticles, not explanate; pronotal disc with six cells separated from each other by tall ridges; and elytron with four sharp longitudinal ridges including sutural.

As in the genus *Nicaltica* (Konstantinov et al. 2009), the meso- and metasternites of *Myrmeconycha* are as short as in most flightless flea beetles, so we very much doubt that the flight muscles are significantly developed. Although *Myrmeconycha* beetles have wings (Fig. 39), they probably cannot fly, as in the case of some Neotropical cicindelinae (Carabidae: Cicindelinae; Zerm and Adis 2002).

***Myrmeconycha erwini* Konstantinov and Tishechkin, new species**

(Fig. 1 – 11)

Description. Body length 3.81 – 4.09 mm, width 2.00 – 2.18 mm. Color light ochre, except pronotum, head and antennae dark grayish brown. Head and pronotum covered with waxy secretion. Front and middle legs and metatibia dark brown. Metafemora light ochre with apices dark brown.

Head with impressions lateral to antennal calli shallow. Anterofrontal ridge much longer than width of frontal ridge. Proportions of female antennomeres 1 – 6 as follows: 17:7:11:12:12:11.

Pronotum with basal central cell without ridge in middle, much smaller than basal lateral and central cells. Anterior wall of basal central cell shorter than lateral walls. Anterolateral setiferous pore situated on a sharp appendage. Pronotal punctures small, barely visible through wax.

Third (humeral) elytral ridge bent abruptly. Proportions of mesotarsomeres in female as follows: 17:12:13 (including setae):22. Proportions of metatarsomeres in female as follows: 32:17:15 (including setae):24.

Tignum with anterior end gradually rounded.

Etymology. This species is named after Terry Erwin who collected the only known specimens of this species.

Material examined. Holotype, female. 1) Ecuador: Depto. Orellana. Res. Ethnica Waorani, 1 km S Onkone Gare Camp. Trans. Ent. 0°39'10"S 76°26'W 220m, 8 February 1995, T.L. Erwin et al. collectors. 2) Insecticidal fogging of mostly bare green leaves, some with covering of lichenous or bryophitic plants in terra firme forest. Project MAXUS Lot 953 Trans. 9 Sta. 4.; 3) Holotype *Myrmeconycha erwini* sp. nov. Konstantinov and Tishechkin 2016 (USNM). Paratype, female. Same labels as holotype (USNM).

***Myrmeconycha gordonii* Konstantinov and Tishechkin, new species**

(Fig. 12 – 19)

Description. Body length 3.94 mm, width 1.89 mm. Color light ochre, except pronotum and head dark brown. Antennae dark brown except last three antennomeres light ochre or yellowish. Head and pronotum covered with waxy secretion.

Head with impressions lateral to antennal calli deep. Anterofrontal ridge slightly longer than width of frontal ridge. Proportions of female antennomeres 1 – 6 as follows: 16:7:11:12:10:10.

Pronotum with basal central cell with short ridge in middle, much smaller than basal lateral and central cells. Anterior wall of basal central cell shorter than lateral walls. Anterolateral setiferous pore situated on a sharp appendage. Pronotal punctures small, barely visible through wax.

Third (humeral) elytral ridge bent gradually. Proportions of mesotarsomeres in female as follows: 20:15:15 (including setae):22. Proportions of metatarsomeres in female as follows: 33:18:17 (including setae):22.

Sclerotized part of spermathecal pump shorter than membranous part.

Etymology. This species is named after Robert Gordon, a friend and fellow coleopterist at the USNM between 1993 and 1998.

Material examined. Holotype, female. 1) Brazil: Amazonas 18.1 km e Campinas field sta. km 60 n Manaus 22 Feb 1979, 02°30'S 060°15'W. 2) Terra firme forest canopy fogged with Pyrethrum Sample #2. 3) Montgomery, Erwin, Schimmel, Krischik, Date, Bacon colls.; 4) Holotype *Myrmeconycha gordonii* sp. nov. Konstantinov and Tishechkin 2016 (USNM).

***Myrmeconycha pakaluki* Konstantinov and Tishechkin, new species**

(Fig. 20 – 31)

Description. Body length 3.45 – 3.72 mm, width 1.72 – 1.81 mm. Color light ochre, except apex of antennomere 4 and antennomeres 5 to 7 dark. Head and pronotum covered with waxy secretion.

Head with impressions lateral to antennal calli shallow. Anterofrontal ridge much longer than width of frontal ridge, forming Y-shaped structure together. Proportions of male antennomeres 1 – 6 as follows: 15:7:12:11:11:10.

Pronotum with basal central cell without ridge in middle, much smaller than basal lateral and central cells. Anterior wall of basal central cell absent. Anterolateral setiferous pore situated on a rounded appendage. Pronotal punctures small, barely visible through wax.

Third (humeral) elytral ridge bent gradually. Proportions of mesotarsomeres in male as follows: 22:14:15 (including setae):25. Proportions of metatarsomeres in male as follows: 28:17:15 (including setae):23.

Aedeagus gradually narrowing towards apex, with small knob apically. Apex sharply bent ventrally in lateral view. Sclerotized part of spermathecal pump shorter than membranous part.

Etymology. This species is named after the late Jim Pakaluk, a friend and fellow coleopterist at the USNM between 1993 and 1998.

Material examined. Holotype, male. 1) Panama: Canal Area, Barro Colorado N.M. Gigante Peninsula 22 Jun' 92 Fog.#10 Coll. John E. Tobin; 2) Holotype *Myrmeconycha pakaluki* sp. nov. Konstantinov and Tishechkin 2016 (USNM). Paratype, male. Same data labels as holotype (USNM).

***Myrmeconycha pheidole* Konstantinov and Tishechkin, new species**

(Fig. 32 – 42)

Description. Body length 3.90 – 4.27 mm, width 1.82 – 2.00 mm. Entire body, including antennae and legs, ochre to light orange.

Head with impressions lateral to antennal calli deep. Anterofrontal ridge much wider than width of frontal ridge, not forming T-shaped structure together. Proportions of male antennomeres 1 – 6 as follows: 16:9:13:13:12:13.

Pronotum with basal central cell without ridge in middle, much smaller than basal lateral and central cells. Anterior wall of basal central cell absent. Anterolateral setiferous pore situated on a rounded appendage. Pronotal punctures small, barely visible through wax. Specimen without wax with long grooves along sides of anterior central cell.

Third (humeral) elytral ridge bent gradually. Proportions of mesotarsomeres in male as follows: 27:17:18 (including setae):27. Proportions of metatarsomeres in male as follows: 29:18:17 (including setae):28.

Aedeagus more or less parallel-sided, abruptly narrowing before apex, with small knob apically. Apex sharply bent ventrally in lateral view. Sclerotized part of spermathecal pump longer than membranous part.

Etymology. This species is named after the name of the ant genus, *Pheidole*, with which the beetles were collected.

Material examined. Holotype, male. 1) Turrialba, Costa Rica, Sept. 8.1966. 2) assoc. with *Pheidole* sp. 3) Robin Andrews Collector 67; 4) Holotype *Myrmeconycha pheidole* sp. nov. Konstantinov and Tishechkin 2016 (USNM). Paratype, female. Same data as the holotype (USNM).

Key to species of *Myrmeconycha*

- | | | |
|-------|---|--------------------|
| 1. | Pronotum darker than elytra | 2 |
| — | Pronotum concolorous with elytra | 3 |
| 2(1). | Three apical antennomeres light ochre or yellow in color, others dark brown. Front and middle legs yellow. Third (humeral) elytral ridge bent gradually | <i>M. gordonii</i> |
| — | Three apical antennomeres dark brown, concolorous with rest of antennae. Front and middle legs dark brown. Third (humeral) elytral ridge bent abruptly | <i>M. erwini</i> |
| 3(1). | Antennomeres four to seven much darker in color than rest of antenna. Anterofrontal ridge much longer than width of frontal ridge, forming Y-shaped structure together. Aedeagus gradually narrowing towards apex. Sclerotized part of spermathecal pump shorter than membranous part | <i>M. pakaluki</i> |
| — | Antennomeres four to seven similar in color to rest of antenna. Anterofrontal ridge slightly longer than width of frontal ridge, forming T-shaped structure together. Aedeagus more or less parallel-sided, abruptly narrowing before apex. Sclerotized part of spermathecal pump longer than membranous part | <i>M. pheidole</i> |

Acknowledgments

We thank T. Litwak (Systematic Entomology Laboratory, Washington DC) for the habitus illustration of *Myrmeconycha pakaluki* and C. Smith (Maryland) for taking and editing of all the photographic images.

We are grateful to C. Duckett for bringing some of these interesting beetles to our attention and initial discussion of their identity. We thank S. Lingafelter (APHIS, PPQ, Nogales, Arizona) and N.

Woodley (Hereford, Arizona) for reviewing an early version of this manuscript and making valuable suggestions.

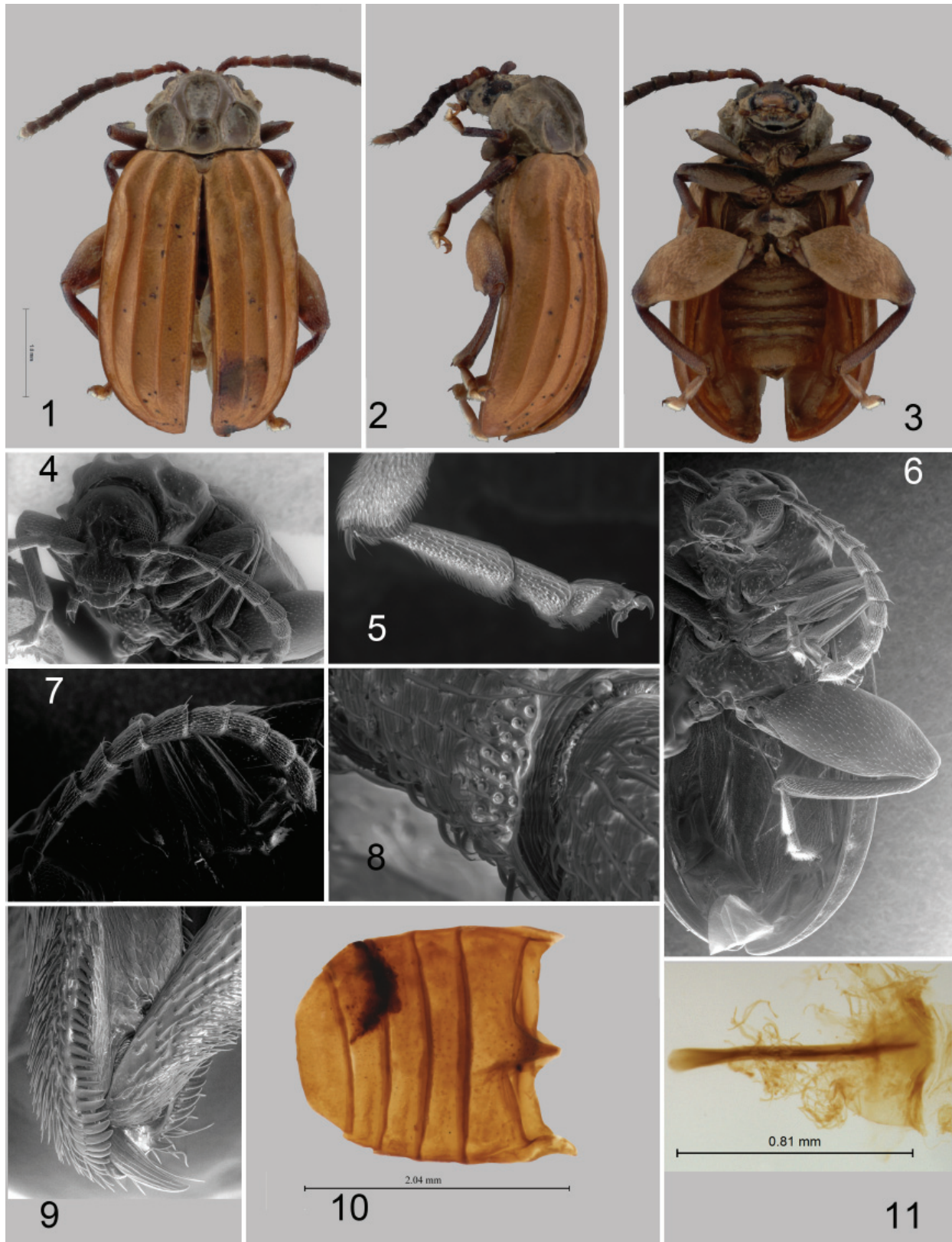
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Received December 7, 2016; Accepted January 13, 2017.

Review Editor Michael L. Ferro.



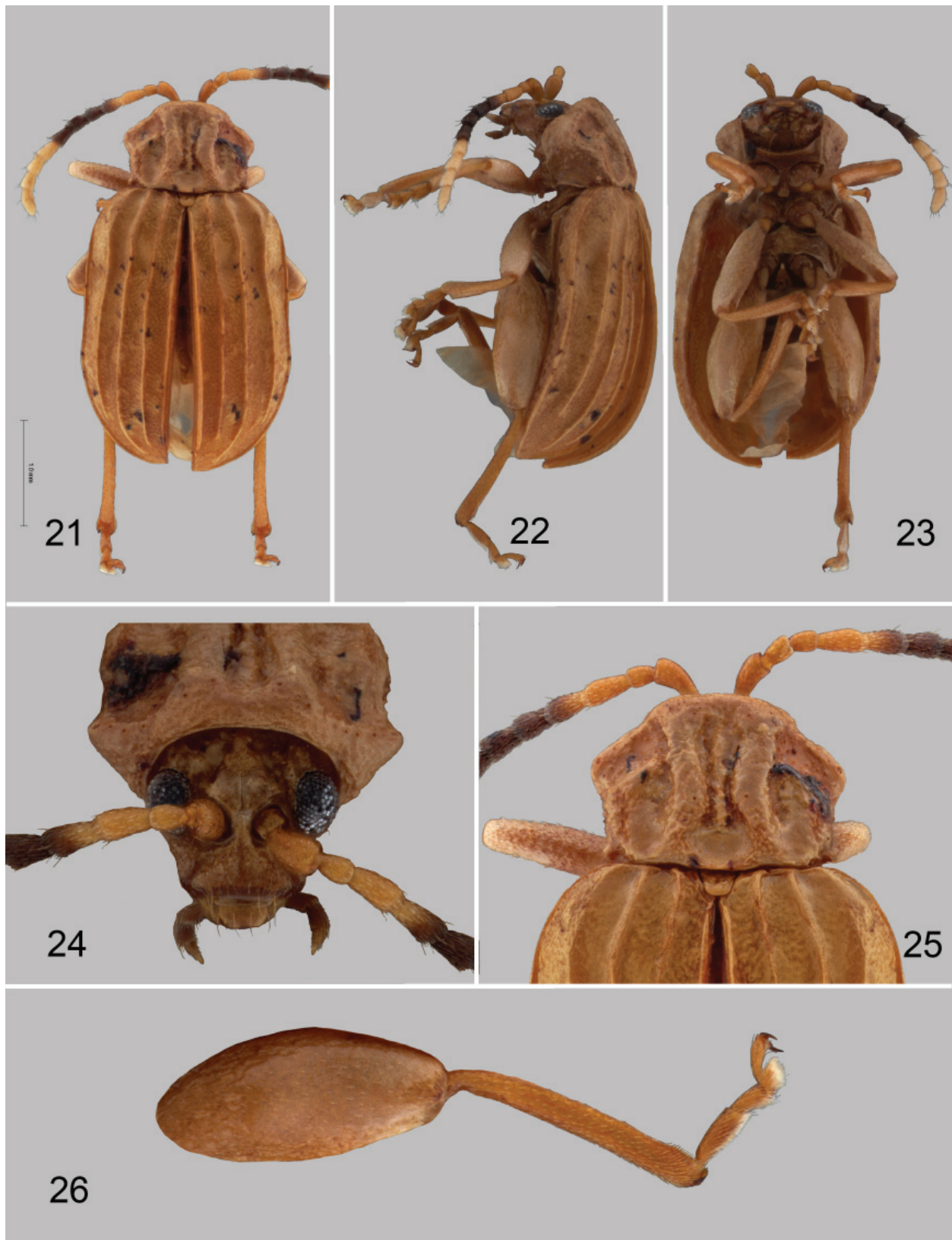
Figures 1–11. *Myrmeconycha erwini*. 1, 2, 3) Habitus, dorsal, lateral and ventral views. 4) Head, frontal view. 5) Hind tarsus, lateral view. 6) Ventral view. 7) Antenna. 8) Apex of 8th antennomere. 9) Hind tarsus dorsolateral view. 10) Female abdomen. 11) Tignum.



Figures 12–19. *Myrmeconycha gordonii*. 12, 13, 14) Habitus, dorsal, lateral and ventral views. 15) Head, frontal view. 16) Pronotum. 17) Hind leg. 18) Female abdomen. 19) Spermatheca.



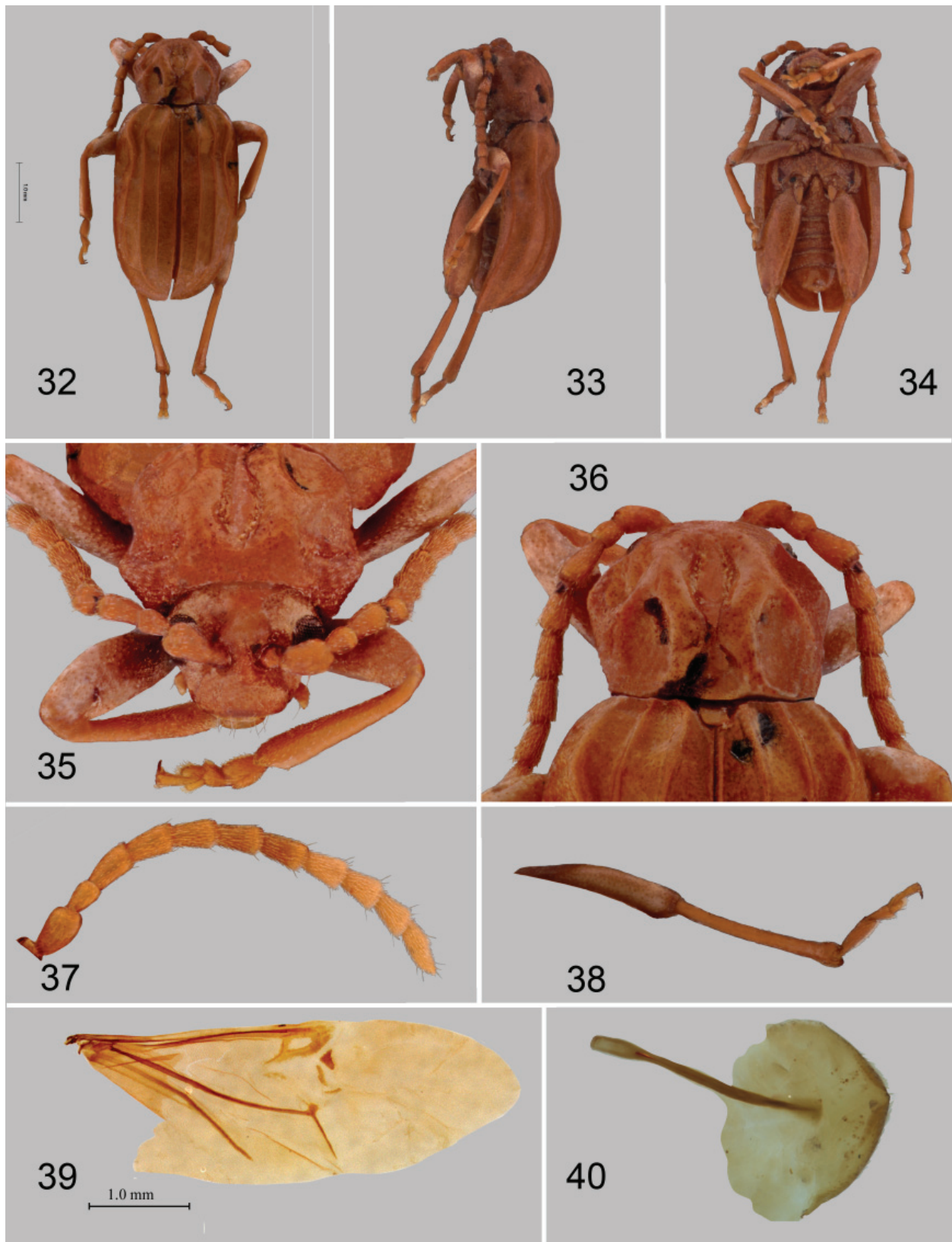
Figure 20. *Myrmeconycha pakaluki*, dorsal habitus.



Figures 21–26. *Myrmeconycha pakaluki*. 21, 22, 23) Habitus, dorsal, lateral and ventral views. 24) Head, frontal view. 25) Pronotum. 26) Hind leg.



Figures 27–31. *Myrmeconycha pakaluki*. **27)** Head, frontal view. **28)** 6th and 7th antennomeres. **29)** Clypeus and labrum. **30)** Aedeagus, ventral and lateral views. **31)** First metatarsomere articulation.



Figures 32–40. *Myrmeconycha pheidole*. **32, 33, 34)** Habitus, dorsal, lateral and ventral views. **35)** Head, frontal view. **36)** Pronotum. **37)** Antenna. **38)** Hind leg. **39)** Hind wing. **40)** Tignum.



Figures 41–42. *Myrmeconycha pheidole*. 41) Aedeagus, ventral and lateral views. 42) Spermatheca.

