

First record of the genus *Alisalia* Casey from Canada, description of two new species, and a key to all Nearctic species of the genus (Coleoptera, Staphylinidae, Aleocharinae)

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Abstract

The genus *Alisalia* Casey is reported from Canada for the first time. Three species were discovered in New Brunswick, one previously described from North Carolina, *Alisalia testacea* Casey, and two species new to science: *Alisalia minuta* Klimaszewski & Webster, **sp. n.**; and *Alisalia elongata* Klimaszewski & Webster, **sp. n.** Illustrations of the body and genitalia are presented for the species occurring in Canada and for the types of previously described species from North America. New data on habitat are presented. A key to Nearctic species is provided. The following new synonymies are proposed, names in brackets are valid: *Alisalia austiniana* Casey (= *A. parallela* Casey); and *A. minutissima* Casey (= *A. brevipennis* Casey). Lecto-types are designated for the following species: *Alisalia austiniana* Casey, *A. brevipennis* Casey, *A. testacea* Casey, and *A. bistriata* (Bernhauer).

Keywords

Alisalia, Aleocharinae, Canada, New Brunswick, new species, taxonomy

Introduction

The genus *Alisalia* was erected by Casey (1911) to embrace seven new Nearctic species ranging in distribution from Rhode Island and Pennsylvania in the north to Texas in the south, with one species described from Colorado. Bernhauer (1909) described the first *Alisalia* species from North America as *Atheta* (*Meotica*) *bistriata* Bernhauer, which was correctly considered by Casey (1911) and Seevers (1978) as *Alisalia*. Two of Casey's species are synonymized here leaving six valid species out of eight described by Casey (1911) and Bernhauer (1909). The total number of valid *Alisalia* species in the Nearctic region now stands at eight with the addition of the two new species from New Brunswick. The species of this genus are very small and externally similar to each other. The most reliable diagnostic features are those associated with the shape of the tubus of the median lobe of the aedeagus in lateral view, and include the shape and length of the subapical and apical portions of the tubus, and the degree of convexity of the median and basal portions of the tubus. The shape of the spermatheca is not reliable for species identification in this genus because this structure is very small, weakly sclerotized, and usually covered by multiple coils of a thin duct. The length of the elytra at the suture, the width of the antennal articles, the size of the eyes, and the width and length of the body are additional diagnostic characters. Females are best identifiable by association with the males. All Canadian species of this genus were discovered in New Brunswick and constitute the first generic and specific records for this country.

The objectives of this paper are to provide new records of the genus from Canada, describe the new species and their habitat, provide a key to the species occurring in Canada, and enhance the knowledge of biodiversity for our fauna.

Methods and conventions

Collection method.

Adults of *Alisalia* are hygrophilous and were collected on cobblestone beaches near river and lake margins, and on the margin of a large vernal pond. Adults were collected from under cobblestones, and sifted from moist leaf litter near water. Casey (1911) recorded some *Alisalia* species from “fungous earth”.

Specimen preparation and types.

Some 30 adult specimens of *Alisalia* were examined and most specimens were dissected. The genital structures were dehydrated in absolute alcohol and mounted in Canada balsam on celluloid microslides and pinned with the specimens from which they originated. The photographs were taken using an image processing system (Nikon SMZ 1500 stereoscopic microscope; Nikon Digital Camera DXM 1200F; and Adobe Photoshop software).

Terminology mainly follows that used by Seevers (1951) and Ashe (2001). The ventral part of the median lobe of the aedeagus is considered to be the part of the bul-

bus containing the foramen mediale, the entrance of the ductus ejaculatorius, and the adjacent venter of the tubus; the opposite side is referred to as the dorsal part.

All types of formerly described Nearctic *Alisalia* species have been studied and illustrated for the first time (Figs 23–38). *Alisalia minutissima* is considered here as the synonym of *A. brevipennis* based on similar size, body proportions and the similarly shaped median lobe of aedeagus in lateral view (Figs 25, 27, 36, 37). The median lobe of aedeagus of *A. minutissima* is slightly distorted but under different angles of observations proved to be almost identical to that of *A. brevipennis*. *Alisalia austiniana* is synonymized with *A. parallela* on the same principle as described above (Figs 26, 28, 33, 34). Lectotypes are designated for the following species because there was no original holotype designation: 1) *Alisalia austiniana* Casey (Figs 26, 34), label data: [Tex.; male; *austiniana* Csy.; Type USNM 38796; Casey bequest 1925; lectotype designation: Gusarov 1999 (unpublished), and Klimaszewski 2009; *Alisalia parallela* Casey: det. Gusarov 1999, and Klimaszewski 2009 (USNM) male]; 2) *A. brevipennis* Casey (Figs 27, 36), label data: [R.I.; *Alisalia brevipennis* Csy.; Type USNM 38795; Casey bequest 1925; lectotype designation: Gusarov 1999 (unpublished), and Klimaszewski 2009; *Alisalia brevipennis* Casey: det. Gusarov 1999 and Klimaszewski 2009 (USNM) male]; 3) *A. testacea* Casey (Figs 23, 31), label data: [N.C., male; *testacea*-7, paratype, 38798; Casey bequest 1925; lectotype designation: Gusarov 1999 (unpublished), and Klimaszewski 2009; *Alisalia testacea* Casey: det. Gusarov 1999 and Klimaszewski 2009 (USNM) male]; and 4) *Alisalia bistriata* (Bernhauer) (Figs 30, 38), label data: [Jeanette, Pa., H.G. Klages; *bistriata* Brh. Typus – Fenyess; Chicago NHMus. M. Bernhauer Collection (FMNH)].

Distribution. Distribution maps, created using ArcMap and ArcGIS, are presented for each species in New Brunswick, Canada. Each species is cited with current distribution in Canada and the United States using abbreviations for the states, provinces and territories. New provincial records are indicated in bold under Distribution. The following abbreviations are used in the text:

Acronyms of collections examined and referred to in this study are as follows:

AFC Atlantic Forestry Centre, Fredericton, New Brunswick, Canada

FMNH The Field Museum, Chicago, Illinois, U.S.A.

LFC Laurentian Forestry Centre, Quebec, Quebec, Canada

RWC Reginald Webster Collection, Charters Settlement, New Brunswick, Canada

NMNH Smithsonian Institution, Washington, D.C., U.S.A.

Results

Three species of *Alisalia* are newly reported from New Brunswick and Canada (see the checklist) bringing the total number of all aleocharine species known from the province to 178 (see recent account of New Brunswick species by Webster and Klimaszewski 2009). Two species of *Alisalia* are described as new to science, and one, *A. testacea*,

was previously described species from North Carolina. Collection and bionomic data for all these species are presented in the bionomic sections under each species description. Most adults were found under wet cobblestones near various water bodies, or in leaf litter on a vernal pond margin.

All *Alisalia* species are illustrated for the first time, including body images of the types and their genital structures, the median lobe in lateral view and, if applicable, the female spermatheca (Figs 23–38).

Species review

Tribe Oxypodini Thomson, 1859

Subtribe Meoticina Seevers, 1978

Genus *Alisalia* Casey, 1911

Figs 1–38

Alisalia Casey 1911: 219; Fenyes 1918: 21; Blackwelder 1952: 46; Seevers, 1978: 80; Moore and Legner 1975: 337; Ashe 2001: 305, 363. Type species: *Alisalia brevipennis* Casey, fixed by Fenyes (1918), by subsequent designation.

Description. Body minute and slender, length 1.0–1.9 mm, subparallel and dorso-ventrally flattened (Figs 1–4, 23–30); coloration yellowish rust-brown to brown, with head, elytra and part or entire abdomen darker than remainder of body and brown to dark brown; integument of forebody with approximately uniformly distributed microsetae and a few macrosetae on head, pronotum and base of elytra; isodiametric meshed microsculpture present, but scarcely visible; head with well-developed temporal region, tempora longer than diameter of eye; infraorbital carinae present and complete; gular suture subparallel and broadly separated; eyes small, finely faceted and broadly separated; labrum broadly oval; maxillary palpus with 4 articles, last one needle-shaped, about as long as 1/3 of penultimate article; labial palpus with 3 articles; right mandible bearing one small internal tooth, left mandible entire and does not bear teeth; ligula short, narrow and entire; antennae with three basal segments elongate, 3rd slightly shorter than 2nd, 4th segment small and quadrate to slightly transverse, 5th slightly broader than 6th, 4–10 segments transverse and incrassate (Figs 1–4, 23–30); pronotum transverse with visible hypomera from the side; mesocoxae contiguous; mesosternal process short, acute at tip and separated by long isthmus; metasternal process triangular and small; elytra more or less transverse, and as broad as pronotum or slightly broader (Figs 1–4, 23–30); abdomen subparallel with strongly impressed horizontal, broadly arcuate basal carinae; tarsal formula 4-4-4; tarsal claws falcate; spermatheca small and weakly sclerotized, covered by multiply coiled duct, capsule narrowly elongate and attached to elongate stem connected with coils of duct (Figs 9, 16, 35); median lobe of aedeagus variably shaped in lateral view, tubus bearing smaller or larger median swell; internal sac usually with two inconspicuous small structures; flagellum well developed, and



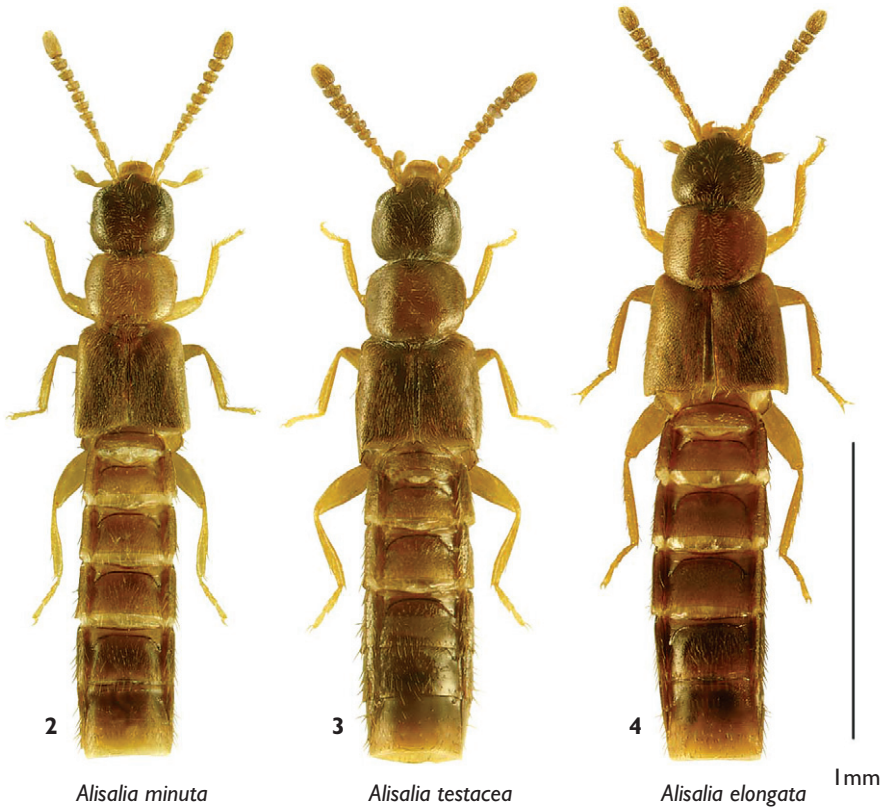
Figure 1. *Alisalia testacea* Casey, dorso-lateral view.

normally exerted beyond apex of internal sac (Figs 5, 12, 19, 31–34, 36–38); paramere with broad and short apical lobe bearing 3 macrosetae (Figs 6, 15, 22); male tergite 8 truncate apically (Figs 7, 13, 20); sternite 8 broadly rounded apically and often slightly pointed medially (Figs 8, 14, 21).

Alisalia (tarsal formula 4-4-4) is similar in general appearance to the genus *Meotica* Mulsant and Rey (tarsal formula 5-5-5) but may be readily distinguished by the tarsal formula, falcate tarsal claws and different genital features.

Bionomics. Adults of *Alisalia* in New Brunswick were collected on cobblestone beaches along lake and river margins, under cobblestones and rocks, on the margin of a large vernal pond in moist leaf litter, and at a light (one specimen).

Geographic distribution. Casey (1911) and Moore and Legner (1975) recorded 7 species of *Alisalia* in America north of Mexico. Seevers (1978) recorded 8 Nearctic species, and two additional species from Haiti, and Ashe (2001) confirmed 8 Nearctic species scattered from New England to California and mentioned one undescribed species from Mexico. Two additional new species are described from Canada and including the present new synonymy, there are now 8 valid species of *Alisalia* in the Nearctic region (same number as Ashe 2001, but different set of species).



Figures 2–4. *Alisalia* species in dorsal view (apical part of abdomen removed): **2** *A. minuta* Klimaszewski and Webster, sp. n. **3** *A. testacea* (Casey) **4** *A. elongata* Klimaszewski & Webster, sp. n.

Phylogenetic affiliation. *Alisalia* and allied genera (*Meotica* Mulsant & Rey, *Gyronycha* Casey, *Apimela* Mulsant & Rey, *Bamona* Sharp, and *Leptobamona* Casey) are currently considered to comprise the subtribe Meoticina Seevers of the tribe Oxypodini (Seevers 1978).

Checklist of *Alisalia* Casey species occurring in Canada with the United States records.

Conventions. Junior synonyms are indented. Countries and provinces in bold represent new records. Species follow alphabetical order.

Checklist of *Alisalia* species in Canada and U.S.A.

Genus *Alisalia* Casey, 1911

1. *Alisalia antennalis* Casey 1911: 223 (UNITED STATES: Texas).
2. *Alisalia bistriata* (Bernhauer 1909: 528) [*Atheta* (*Meotica*) *bistriata* Bernhauer] (UNITED STATES: Pennsylvania).

3. *Alisalia brevipennis* Casey 1911: 220 (UNITED STATES: Rhode Island).
Alisalia minutissima Casey 1911: 221 (UNITED STATES: North Carolina). **syn. n.**
4. *Alisalia delicata* Casey 1911: 222 (UNITED STATES: Colorado).
5. *Alisalia elongata* Klimaszewski & Webster, **sp. n.** (CANADA: New Brunswick).
6. *Alisalia minuta* Klimaszewski & Webster, **sp. n.** (CANADA: New Brunswick).
7. *Alisalia parallela* Casey 1911: (UNITED STATES: Texas).
Alisalia austiniana Casey 1911: 222 (UNITED STATES: Texas). **syn. n.**
8. *Alisalia testacea* Casey 1911: 221 (CANADA: New Brunswick; UNITED STATES: North Carolina).

Key to species of *Alisalia* recorded from Canada and the United States

(It should be noted that male genitalia offer the best diagnostic characteristics for species identification)

1. Elytra small, transverse and short, approximately as long as pronotum (elytra measured from anterior to posterior lateral angle) (Figs 27, 25); tubus of median lobe of aedeagus with almost straight ventral margin in lateral view (Fig. 36) ***Alisalia brevipennis* Casey**
- Elytra larger, quadrate to slightly transverse, longer than pronotum (Figs 1–4, 23, 24, 26, 28–30) **2**
- 2(1). Species distributed in eastern Canada and eastern United States **3**
- Species distributed in western United States within Rocky Mountains; body and median lobe of aedeagus as illustrated (Figs 24, 32) ***Alisalia delicata* Casey**
- 3(2). Body short, approximately 1 mm long (Fig. 30); tubus of the median lobe of the aedeagus straight for most of its length and with small basal swelling in lateral view (Fig. 38); known from Pennsylvania
..... ***Alisalia bistrata* (Bernhauer)**
- Body longer, distinctly more than 1 mm long (Figs 3, 4, 23, 24, 28, 29) ... **4**
- 4(3). Antennae robust (Figs 26, 28); tubus of median lobe of aedeagus long, with slightly sinuate ventral margin in lateral view (Figs 33, 34); known from Texas ***Alisalia parallela* Casey**
- Antennae less robust (Figs 1–4, 23, 29); tubus of median lobe of aedeagus differently shaped (Figs 5, 12, 16, 31) **5**
- 5(4). Body maximum width less than 0.2 mm (Fig. 2); head and elytra distinctly darker than pronotum; tubus of median lobe of aedeagus with straight and short subapical part and strongly convex medio-basal part (Fig. 5); spermatheca as illustrated (Fig. 9); known from New Brunswick
..... ***Alisalia minuta* Klimaszewski & Webster, sp. n.**
- Body maximum width at least 0.2 mm (Figs 3, 4, 23, 29); head and elytra not distinctly darker than pronotum; tubus of median lobe of aedeagus with elongate and slightly sinuate subapical part and with strongly convex medio-basal part (Figs 12, 16, 31) **6**

- 6(5). Elytra large and slightly broadening posteriad, distinctly broader than pronotum (Fig. 4); tubus of median lobe of aedeagus with elongate and slightly sinuate subapical part and with strongly convex medio-basal part (Fig. 19); known from New Brunswick
 *Alisalia elongata* Klimaszewski & Webster, sp. n.
- Elytra moderately large, subparallel and not distinctly broadening posteriad7
- 7(6). Species currently known only from North Carolina and New Brunswick; body and genital structures as illustrated (Figs 1, 3, 12, 16, 23, 31)
 *Alisalia testacea* Casey
- Species known from Texas; body and genital structures as illustrated (Figs 29, 35) *Alisalia antennalis* Casey

1. *Alisalia minuta* Klimaszewski & Webster, sp. n.

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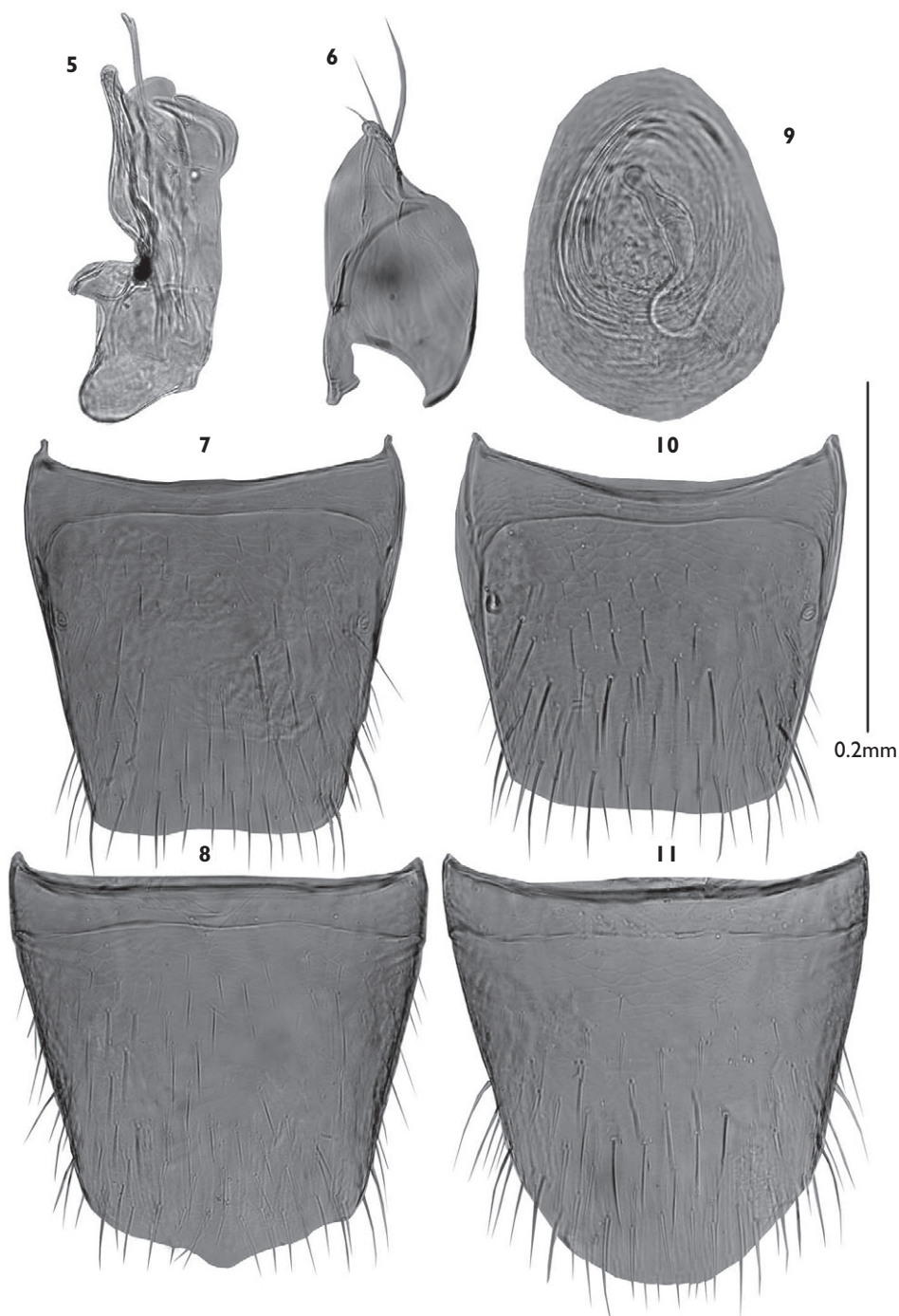
Figs 2, 5–11; Map 1

HOLOTYPE (male): CANADA, New Brunswick, Queens Co., Canning, Grande Lake, at Goat Island, 46.0110°N, 66.0133°W, 8.VIII.2007, R.P. Webster coll.; lake-shore, on cobblestone beach, under cobblestone in moist sand (LFC). **PARATYPES**: labelled as the holotype (LFC, RWC) 5 males, 16 females; New Brunswick, Carleton Co., Belleville, Meduxnekeag Valley Nature Preserve, 46.1944°N, 67.6832°W, 2.VI.2008, R.P. Webster coll., river margin under cobblestones in sand / gravel among scattered grasses (RWC) 2 males, 1 female; New Brunswick, York Co., 1.5 km N of Durham Bridge (at Nashwaak River), 46.1408°N, 66.6179°W, 15.VI.2008, R.P. Webster coll., river margin among cobblestones near outflow of brook (RWC) 1 male.

Etymology. The name of this species is the Latin adjective “minuta” meaning small, in reference to the small size of this species.

Description. *Alisalia minuta* may be distinguished from the other two *Alisalia* species recorded from Canada by its small and narrow bicoloured body (length 1.6–1.8 mm; maximum width 0.1 mm), slightly elongate elytra (Fig. 2), and the characteristic shape of the median lobe of aedeagus in lateral view (Fig. 5). For the differences between this and the other Nearctic species, see the key.

Body length 1.6–1.8 mm, narrowly subparallel; head, elytra and posterior part of abdomen dark brown, the remainder of the body light rust brown, legs and bases of antennae yellowish (Fig. 2); punctation on forebody fine and dense; microsculpture inconspicuous; pubescence of head directed obliquely lateroanterad, on pronotum laterad from midline of disc, on elytra obliquely or straight posteriad, and on abdomen approximately straight posteriad (Fig. 2); antennae moderately broad as illustrated (Fig. 2); pronotum slightly narrower than elytra, 1.1 times as wide as long; elytra slightly elongate, 1.1 times as long as wide; abdomen with sharply delimited horizontal basal depressions (Fig. 2). MALE: tergite 8 truncate apically and may bear shallow emargination (Fig. 7); sternite 8 broadly rounded apically, sometimes pointed medially (Fig. 8). Median lobe



Figures 5–11. *Alisalia minuta* Klimaszewski & Webster, sp. n.: **5** median lobe of aedeagus in lateral view **6** paramere **7** male tergite **8** male sternite **8** spermatheca **10** female tergite **8** **11** female sternite 8.

of aedeagus with moderately elongate and sinuate tubus, subapical part approximately straight and medio-basal part moderately convex, crista apicalis of bulbus moderately broad and slightly projecting ventrally (Fig. 5), flagellum slightly projecting externally, straight in shape (Fig. 5). Paramere as illustrated (Fig. 6). FEMALE. Tergite 8 truncate apically (Fig. 10); sternite 8 rounded apically (Fig. 11); spermatheca as illustrated (Fig. 9).

Bionomics.

Macrohabitat: lake and river margins. **Microhabitat:** under cobblestones embedded in moist sand with fine grass roots in areas with grasses within 40 cm of water. **Collecting period:** June and August. **Collecting method:** aspirating from under cobblestones.

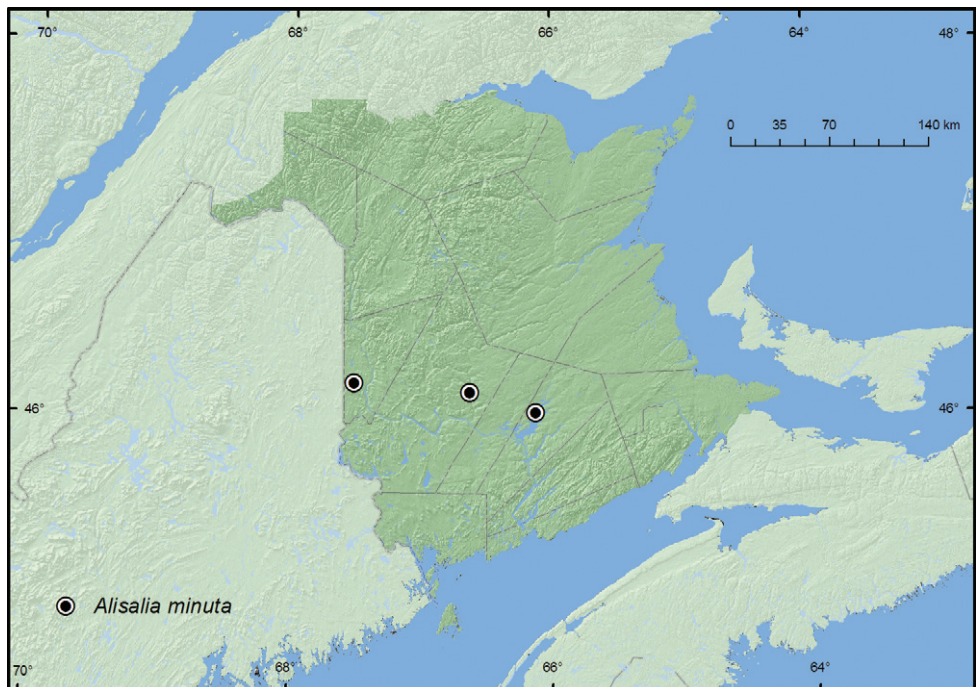
Distribution (Map 1). CANADA: New Brunswick.

2. *Alisalia testacea* Casey

Figs 1, 3, 12–18, Map 2

Alisalia testacea Casey 1911: 221; Moore and Legner 1975: 337.

LECTOTYPE (male): UNITED STATES: North Carolina; *testacea* – 7, Paratype USNM 38798; male; lectotypus, V.I. Gusarov 1999 [designation not published] (USNM). We designate this specimen as the lectotype of *A. testacea* in this paper.



Map I. Collection localities in New Brunswick, Canada of *Alisalia minuta*

MATERIAL EXAMINED: CANADA, New Brunswick: Carleton Co., Belleville, Meduxnekeag Valley Nature Preserve, 46.1889°N, 67.6764°W, 2.VI.2008, R.P. Webster, coll., river margin under cobblestone in grassy area (RWC) 1 female; same locality and date but 46.1944°N, 67.6832°W, 2.VI.2008, R.P. Webster, coll., river margin under cobblestones in sand / gravel among scattered grasses (RWC) 2 males, 1 female; York Co., Dumfries, Slagundy Dry Ponds, 45.8596°N, 67.1849°W, 8.VII.2006, R.P. Webster, coll., large vernal pond, pond margin in moist leaf litter (LFC, RWC) 2 males, 1 female; Charters Settlement, 45.8395°N, 66.7391°W, 11.VI.2007, R.P. Webster, coll., at mercury vapour light (RWC) 1 male.

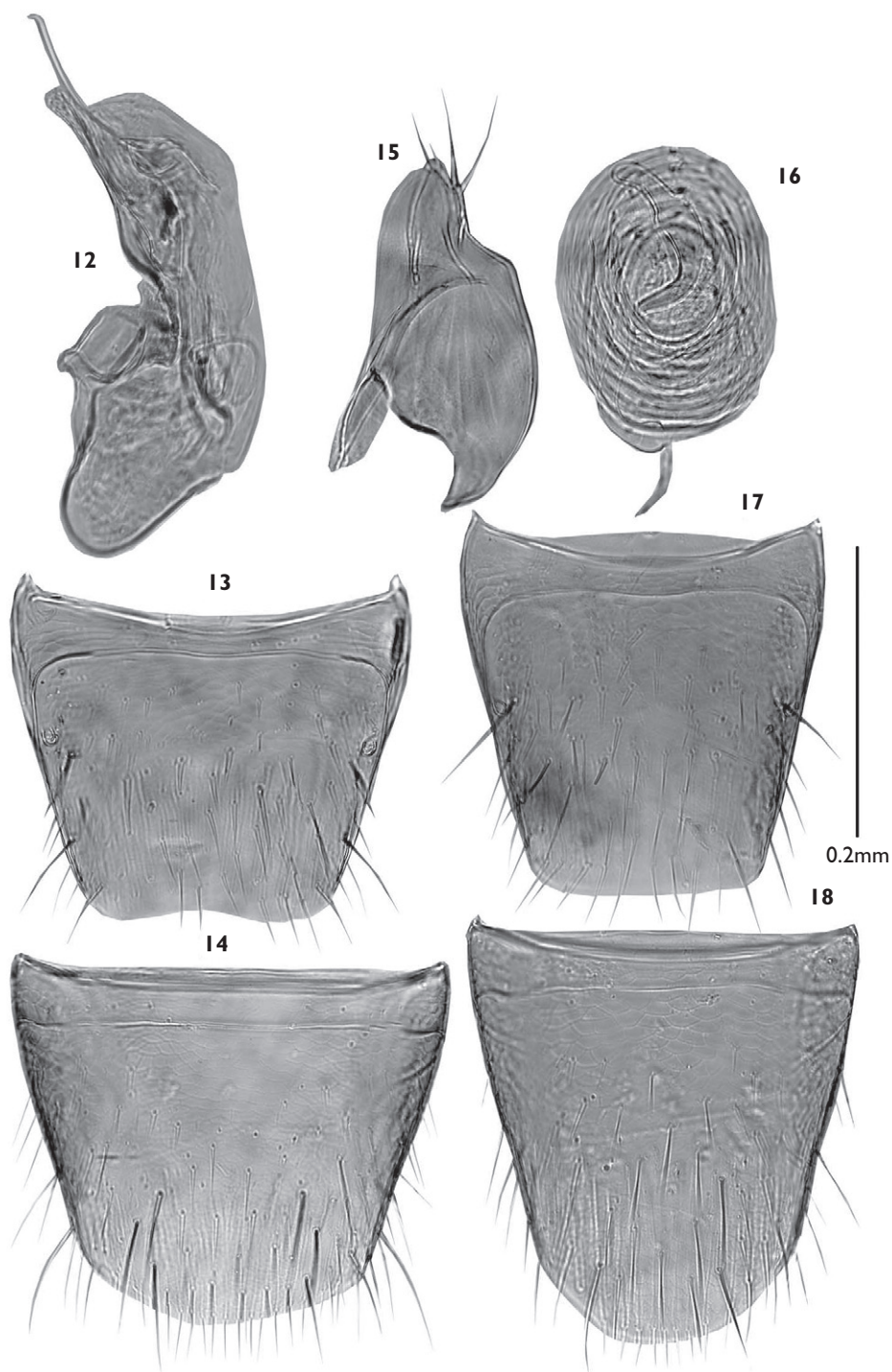
Description. *Alisalia testacea* may be distinguished from the other two *Alisalia* species recorded from Canada by its moderately larger and narrow approximately uniformly coloured body (length 1.7–1.8 mm; maximum width 0.1 mm), slightly elongate elytra (Figs 1, 3), and the characteristic shape of the median lobe of aedeagus in lateral view (Fig. 12). It has more transverse antennal articles than those of *A. minuta* (Fig. 3). For the differences between this and the other Nearctic species, see the key.

Body length 1.7–1.8 mm, narrowly subparallel; approximately uniformly dark or light brown, head, elytra and posterior part of abdomen may be slightly darker than the remainder of the body, legs and bases of antennae yellowish (Figs 1, 3); punctuation on forebody fine and dense; microsculpture inconspicuous; pubescence of head directed obliquely lateroanteriorad, on pronotum laterad from midline of disc, on elytra obliquely or straight posteriorad, and on abdomen approximately straight posteriorad (Figs 1, 3); antennae broad as illustrated (Fig. 3); pronotum slightly narrower than elytra, 1.1 times as wide as long; elytra quadrate or slightly transverse (Fig. 3); abdomen with sharply delimited horizontal basal depressions (Figs 1, 3). MALE: tergite 8 truncate apically and may bear shallow emargination (Fig. 13); sternite 8 broadly rounded apically (Fig. 14). Median lobe of aedeagus with moderately elongate and sinuate tubus, subapical part approximately straight and medio-basal part strongly convex, crista apicalis of bulbus moderately broad (Figs 12, 31), flagellum slightly projecting externally, straight in shape (Figs 12, 31). Paramere as illustrated (Fig. 15). FEMALE. Terminalia and spermatheca as illustrated (Figs 16–18).

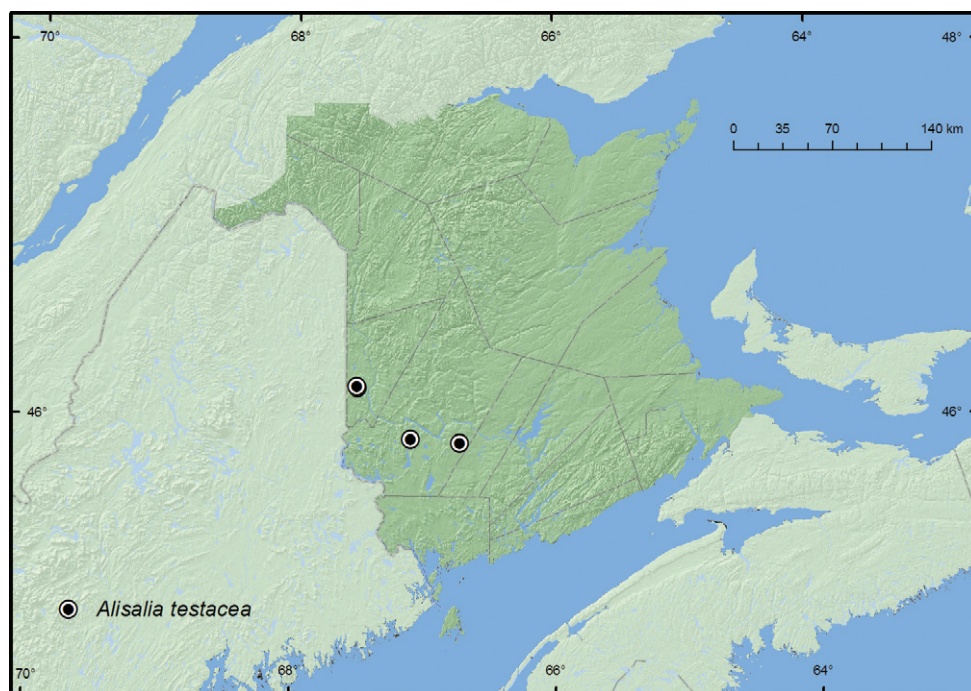
Bionomics.

Macrohabitat: river margin and margin of a large vernal pond. **Microhabitat:** Under cobblestones embedded in moist sand / clay or gravel mix with fine grass roots in areas with grasses within 40 cm of water. **Collecting period:** June and July. **Collecting method:** aspirating from under cobblestones and sifting leaf litter. One specimen collected at a light in mixed forest area.

Distribution (Map 2). CANADA: New Brunswick.



Figures 12–18. *Alisalia testacea* Casey: **12** median lobe of aedeagus in lateral view **13** male tergite 8 **14** male sternite 8 **15** paramere **16** spermatheca **17** female tergite 8 **18** female sternite 8.



Map 2. Collection localities in New Brunswick, Canada of *Alisalia testacea*

3. *Alisalia elongata* Klimaszewski & Webster, sp. n.

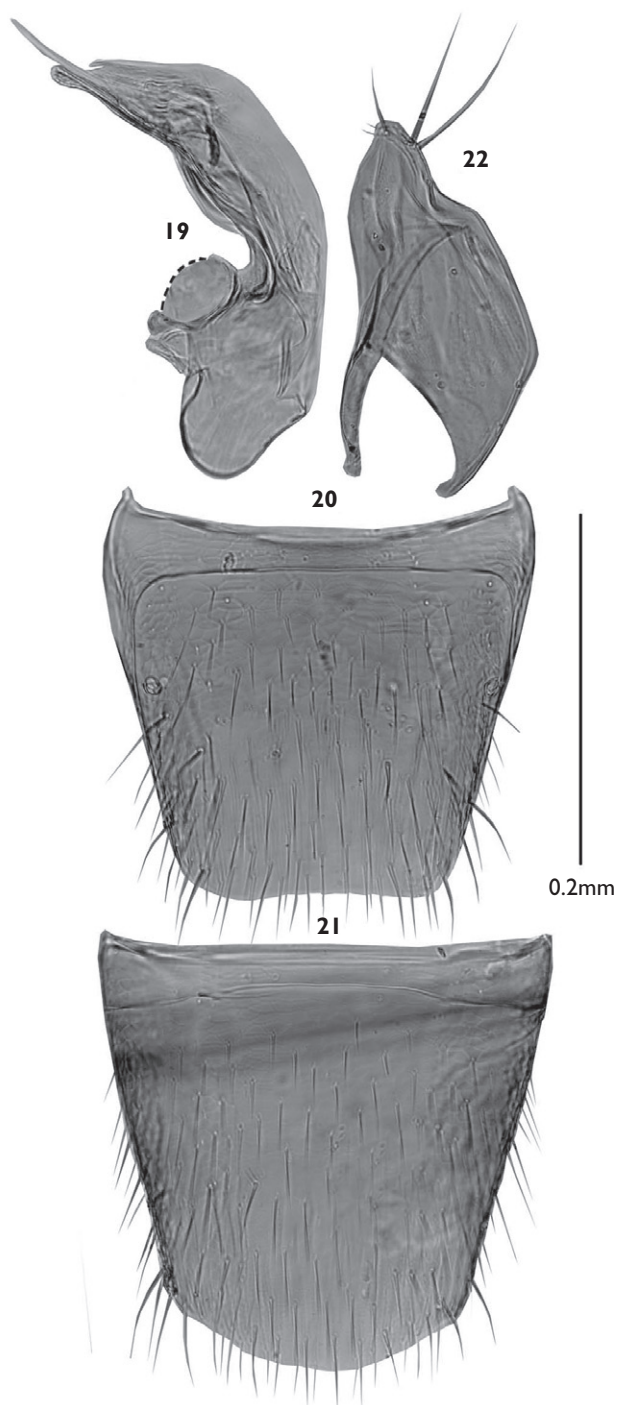
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Figs 4, 19–22, Map 3

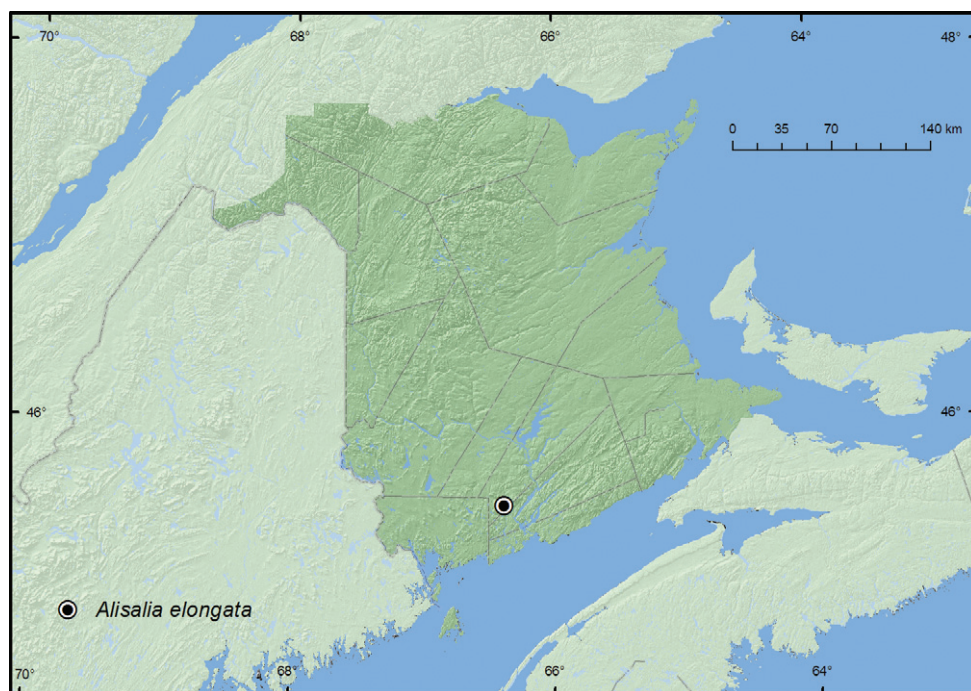
HOLOTYPE (male): CANADA, New Brunswick, Queens Co., Bayard, at Nerepis River, 45.4426°N, 66.3280°W, 30.V.2008, R.P. Webster, coll., river margin, under small rocks in gravel (LFC) 1 male. **PARATYPE**: labelled as the holotype (RWC) 1 male.

Etymology. The name of this species is the Latin adjective “elongata” meaning elongate, in reference to the elongate body shape of this species.

Description. *Alisalia elongata* may be distinguished from the other two *Alisalia* species recorded from Canada by the approximately uniformly coloured body (Fig. 4), the larger size (length 2.0 mm; maximum width 0.2 mm); strongly transverse pronotum and elytra (Fig. 4), and the characteristic shape of the median lobe of aedeagus in lateral view with an elongate subapical part (Fig. 19). It has fewer transverse antennal articles than for *A. testacea* and *A. minuta*. See the key for the differences between this and the other Nearctic species.



Figures 19–22. *Alisalia elongata* Klimaszewski & Webster, sp. n.: **19** median lobe of aedeagus in lateral view **20** male tergite 8 **21** male sternite 8 **22** paramere.



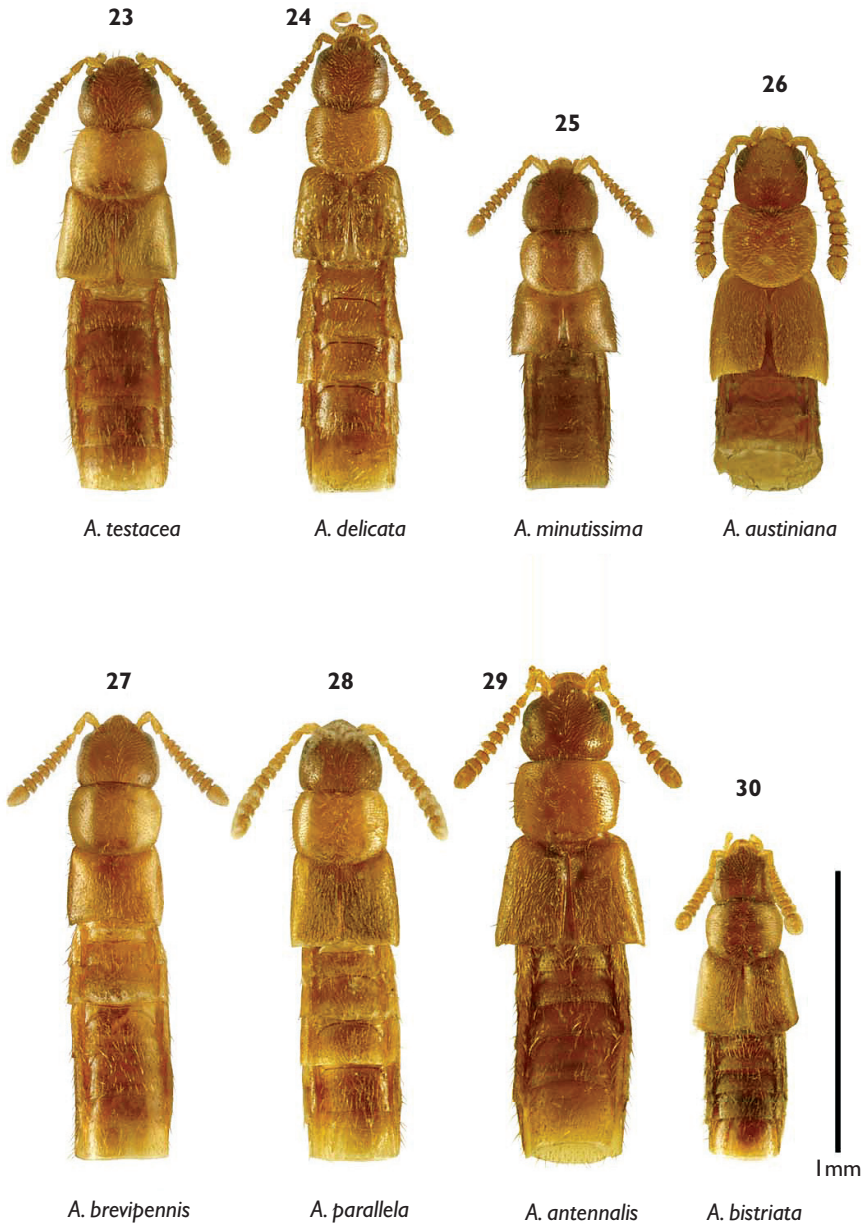
Map 3. Collection localities in New Brunswick, Canada of *Alisalia elongata*

Body length 2.0 mm, narrow but distinctly broader at elytra, and with abdomen slightly tapering posteriad; approximately uniformly dark reddish-brown, but head, elytra and posterior part of abdomen appearing slightly darker than the remainder of the body, legs and bases of antennae yellowish (Fig. 4); punctuation on forebody fine and dense; microsculpture inconspicuous; pubescence of head directed obliquely lateroanteriorad, on pronotum laterad from midline of disc, on elytra obliquely or straight posteriad, and on abdomen approximately straight posteriad (Fig. 4); antennae moderately broad as illustrated (Fig. 4); pronotum distinctly narrower than elytra, 2 times as wide as long; elytra slightly transverse; abdomen with sharply delimited horizontal basal depressions. MALE: tergite 8 truncate apically (Fig. 20); sternite 8 broadly rounded apically (Fig. 21). Median lobe of aedeagus with elongate and sinuate tubus, subapical part long and approximately straight, and medio-basal part strongly convex, crista apicalis of bulbus broad (Fig. 19), flagellum slightly projecting externally, straight in shape (Fig. 19). Paramere as illustrated (Fig. 22). FEMALE. Unknown.

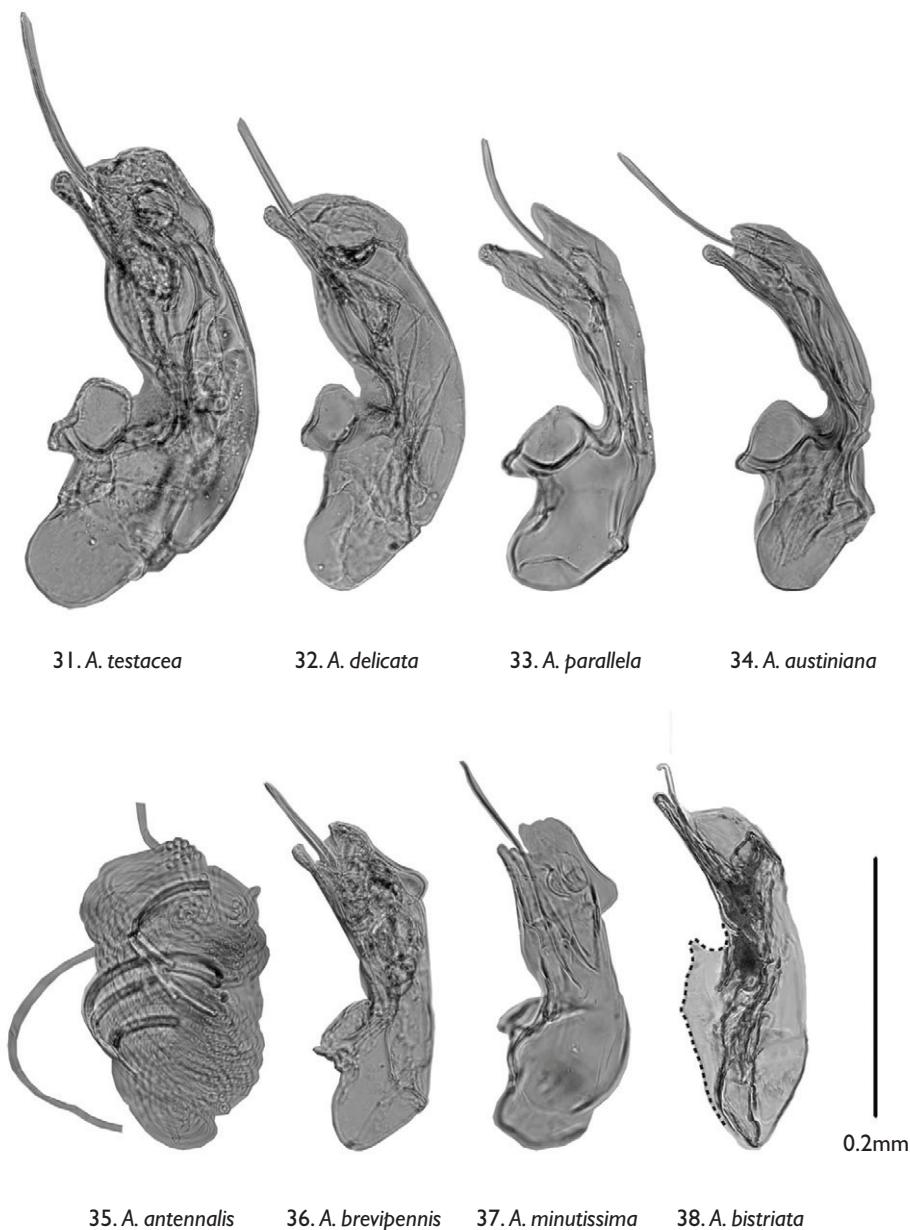
Bionomics.

Macrohabitat: river margin. **Microhabitat:** under small rocks in gravel. **Collecting period:** May. **Collecting method:** aspirating from under rocks and gravel.

Distribution (Map 3). CANADA: New Brunswick.



Figures 23–30. *Alisalia* species based on type specimens: **23** *A. testacea* Casey (lectotype) **24** *A. delicata* (holotype) **25** *A. minutissima* Casey (holotype) [= *A. brevipennis* Casey] **26** *A. austiniana* Casey (lectotype) [= *A. parallela* Casey] **27** *A. brevipennis* Casey (lectotype) **28** *A. parallela* Casey (holotype) **29** *A. antennalis* Casey (holotype) **30** *A. bistrinata* (Bernhauer) (lectotype).



Figures 31–38. Median lobe of aedeagus in lateral view and spermatheca based on type specimens: **31** *A. testacea* Casey (lectotype), median lobe **32** *A. delicata* (holotype), median lobe **33** *A. parallela* Casey (holotype), median lobe **34** *A. austiniana* Casey (lectotype) [= *A. parallela* Casey], median lobe **35** *A. antennalis* Casey (holotype), spermatheca **36** *A. brevipennis* Casey (lectotype), median lobe **37** *A. minutissima* Casey (holotype) [= *A. brevipennis* Casey], median lobe **38** *A. bistriata* (Bernhauer) (lectotype), median lobe.

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References

- Ashe JS (2001) Keys to the tribes and genera of Nearctic Aleocharinae. In: Arnett RH, Jr, Thomas MC (Eds) *American Beetles. 1. Archostemata, Myxophaga, Adephaga, Polyphaga: Staphyliniformia*. CRC Press, Boca Raton, Florida, 299–374.
- Bernhauer M (1909) Neue Aleocharini aus Nordamerika. 4. *Deutsche Entomologische Zeitschrift* (1909): 515–528.
- Blackwelder RE (1952) The generic names of the beetle family Staphylinidae with an essay on genotypy. *Bulletin of the United States National Museum* 200: I–IV, 1–483.
- Casey TL (1911) New American species of Aleocharinae and Myllaeninae. *Memoirs on the Coleoptera* 2. The New Era Printing Co., Lancaster, Pennsylvania, 1–183.
- Fenyés A (1918) *Coleoptera. Fam. Staphylinidae, subfam. Aleocharinae. Genera Insectorum* 173(a): 1–110.
- Moore I, Legner EF (1975) A catalogue of the Staphylinidae of America north of Mexico (Coleoptera). University of California, Division of Agricultural Science, Special Publication No. 3015: 1–514.
- Seevers CH (1951) A revision of the North American and European staphylinid beetles of the subtribe Gyrophaenae (Aleocharinae, Bolitocharini). *Fieldiana Zoology* 32(10): 659–762.
- Seevers CH (1978) A generic and tribal revision of the North American Aleocharinae (Coleoptera: Staphylinidae). *Fieldiana Zoology* 71: I–VI, 1–289.
- Thomson CG (1859) *Skandinavians Coleoptera, synoptiskt bearbetade*. Vol. 1. Berlingska Boktryckeriet, Lund.
- Webster RP, Klimaszewski J, Pelletier G, Savard K (2009) New Staphylinidae (Coleoptera) records with new collection data from New Brunswick, Canada. I. Aleocharinae. *ZooKeys* 22: 171–248.

The identity of *Parandra laevis* Latreille, 1804 and nomenclatural changes in the Parandrinae (Coleoptera, Cerambycidae)

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Abstract

Attelabus glaber (DeGeer, 1774) currently the type species of *Hesperandra* (*Zikandra*) Santos-Silva, 2003 is considered the type species of *Parandra* Latreille, 1802 (here validated). *Hesperandra* Arigony, 1977 and *Hesperandra* (*Zikandra*) become junior synonyms of *Parandra* Latreille, 1802, and *Gnathophorus* Kirby, 1837 is also confirmed as a synonym of this genus. *Birandra* Santos-Silva, 2002 is used to replace *Parandra* sensu lato. *Parandra laevis* Latreille, 1804 is placed as a synonym of *Attelabus glaber* DeGeer, 1774. New names are chosen to replace *Parandra laevis* Schönherr, 1817 (= sensu auctorum) (redescribed here) and the subgenus *Parandra* sensu Santos-Silva, 2002, respectively: *Birandra* (*Yvesandra*) *latreillei* and *Birandra* (*Yvesandra*). *Protospondylis* Linsley, 1942 is revalidated, excluded from Parandrinae, and placed incertae sedis in the Cerambycidae. An updated list of the reallocated species is given.

Keywords

Parandra, *Birandra*, *Hesperandra*, *Gnathophorus*, *Protospondylis*, nomen novum, synonymy

Introduction

The purpose of this paper is to resolve confusion regarding the identity of *Parandra laevis* Latreille, 1804 and to propose a new generic name for the species currently attributed to *Parandra* Latreille, 1804 (Monné 2006).

Parandra laevis Latreille, 1804 currently placed in *Parandra* (*Parandra*) (Monné 2006), is regarded as the type species of the genus *Parandra* Latreille, 1802 (Thomson 1864). Bousquet (2008) recognized the fact that *P. laevis* Latreille, 1804 was, under the current Code (ICZN 1999), a junior objective synonym of *Attelabus glaber* DeGeer, 1774. *Attelabus glaber* is the type species of *Parandra* Latreille, 1802, by monotypy and currently placed in *Hesperandra* (*Zikandra*) Santos-Silva, 2003 (Monné 2006). Thus any genera/subgenera which have the type species *A. glaber* become synonyms of *Parandra*. This also includes the mainly forgotten genus *Gnathophorus* Kirby, 1837 (Bousquet 2008).

Bousquet (op. cit.) correctly points out that the species *Parandra laevis* sensu auctorum is without valid synonyms (Monné 2006; Santos-Silva 2002) and thus a new name is needed. He also proposed that if it was deemed desirable to retain the species concept of *P. laevis* Latreille, 1804, to maintain current taxonomic stability, that it would be necessary to apply to the commission to suppress Olivier (1803) as the author of *Parandra* in favour of Latreille (1804). The problem with this suggestion is that Latreille's use of the name "*laevis*" in 1804 does not define or constitute a species separate from *Attelabus glaber* DeGeer, 1774 (see below) and as such cannot be used to validate the genus *Parandra* in Latreille (1804). It is therefore not an acceptable option. The subsequent validation, in this paper, of Latreille, 1802 as the author of the genus *Parandra* does not alter the need to propose a new generic name for the species currently placed in *Parandra* Latreille, 1804 (Monné 2006) as *Attelabus glaber* DeGeer (1774) is the only species given in the 1802 text. Thus *Hesperandra* Arigony, 1977 becomes a junior synonym of *Parandra* Latreille, 1802. *Parandra laevis* as a separate species concept, as proposed by Schönherr (1817) and Gyllenhal (1817), is retained and renamed accordingly.

Materials and methods

We examined specimens, males and females, of all species (including non American) in the same subgenus as *Parandra* (*Parandra*) *laevis* Latreille, 1804, specimens of *Hesperandra* (*Zikandra*) *glabra* (DeGeer, 1774) from various countries, and specimens of *Neandra brunnea* (Fabricius, 1798). These specimens belong to several museums and private collections, and were used to establish the identity of *Parandra laevis* Latreille (1802, 1804, 1806, 1807, 1818) and Olivier (1803) as it is understood today.

The acronyms used in the text correspond to the following institutions:

ICZN	International Commission on Zoological Nomenclature
MNCN	Museo Nacional de Ciencias Naturales, Madrid, Spain
MNHN	Muséum National d'Histoire Naturelle, Paris, France
MZSP	Museu de Zoologia, Universidade de São Paulo, São Paulo, Brazil
NRS	Naturhistoriska Riksmuseet, Stockholm, Sweden
NHM(UK)	(formally BM(NH)) The Natural History Museum, London, United Kingdom

The identity of *Parandra laevis* Latreille, 1804

The generic name *Parandra*, formally attributed to Latreille (1804), was subsequently attributed to Olivier (1803) (Bousquet 2008). However the concept of the genus *Parandra* was first proposed for the species *Attelabus glaber* DeGeer, 1774 by Latreille in 1802:160 (noted by Thomson, 1858, and Lameere, 1902). In the 1802 text Latreille used the vernacular name “Parandre; parandre”. As the name was not given a Latin form, this 1802 description of *Parandra* has been considered to be invalid according to ICZN Code, 1999:109. However the failure to give a Latin form for the name would appear to have been an error as all other genera mentioned in the Latreille (1802) text have the second expression of the name in Latin. According to Article 32.5.1 (ICZN Code 1999:39) “if there is clear evidence of an inadvertent error, such as a lapsus calami or a copyist’s or printer’s errors, it must be corrected”. In accordance with the format of the 1802 text the corrected spelling of the genus “Parandre; parandre” is “Parandre; *Parandra*”, and thus, the generic name *Parandra* becomes available from Latreille’s 1802 publication (Dr. Yves Bousquet is in agreement with this conclusion, pers. comm.).

It was common practice in the early 19th century for European authors, particularly in the dictionaries, to use both vernacular and Latin names when referring to or describing species, regarding these names as interchangeable in the texts. Latreille (1804:252), in his redescription of *Parandra*, used the vernacular name “La Parandre lisse”, in conjunction with the Latin name “*parandra laevis*” (as “lisse” was the vernacular name given by DeGeer (1774) for *Attelabus glaber*). The name “*laevis*” is clearly being used for *A. glaber* DeGeer, with the reference to the description and figure of that species in DeGeer (1774) being given in the text. Latreille (1804) clearly states that the genus is being erected for one species. The name “*laevis*” in this text is not being used as a replacement name in the sense we would understand it today, but under the ICZN (1999) it would be regarded as such. In 1806 Latreille published a figure that he believed to be the male of *A. glaber* DeGeer. The text relating to the plates was published in Latreille (1807). In this text he again uses both the vernacular name “Parandre lisse” in conjunction with the Latin name *Parandra laevis*. However in the legend to the plate only the name *Parandra laevis* is used.

In the 1807 text Latreille synonymises *Tenebrio brunneus* Fabricius, 1798 and *Tenebrio purpurascens* Herbst, 1799 (now *Neandra* Lameere, 1912) under “*Parandra laevis*”. It is therefore clear from the texts of Latreille (1802, 1804, 1807) and Olivier (1803) that Latreille believed that the genus *Parandra* contained only one species, the “Parandre lisse”, *Attelabus glaber* of DeGeer. It is not until Schönherr (1817) that the name *Parandra laevis* is used to indicate a species distinct from *Attelabus glaber* DeGeer. Gyllenhal (1817:145) in the appendix of Schönherr’s *Synonymian Insectorum* (Descriptions Novarum Specierum) states that he has seen DeGeer’s “type” (at that time, apparently, the male(s) type(s) was(were) already lost: “Exemplar unicum femininum”) of *Attelabus glaber* and that Latreille’s 1806 figure, “*Parandra laevis*”, represented a different species. He uses the name “*Parandra laevi*” (sic) for this species presumably be-

cause it is the name used in the figure legend of Latreille (1806) and that it was politic at that time to attribute the name of a species to the person who “discovered” it rather than the reviser. This is reflected in Schönherr’s (1817:334) main text where *Parandra glabra* is attributed to DeGeer, *Parandra laevis* to Latreille, and *Parandra brunnea* and *Parandra purpurea* listed as distinct species. Unfortunately, by using the same Latin name (*Parandra laevis*), that Latreille used for “Parandre lisse” (*A. glaber*), for the species represented in the 1806 figure which Schönherr / Gyllenhal believed to be distinct from *Attelabus glaber* DeGeer, Schönherr (op. cit.) created a junior homonym.

Latreille (1818: 523) acknowledges and accepts Schönherr’s (Gyllenhal’s) view that *Attelabus glabra* DeGeer, 1774 and the 1806 figure of “*Parandra laevis*” are different species. He comments on the distribution of the two species and morphological differences of the specimens he has in his possession from the Antilles and Brazil. He particularly notes that the mandibles of the male in *P. glabra* are strongly curved and bidentate at the apex with a small tooth on the inner edge whereas in “*laevis*” the inner edge in the male is bidentate and the apex simple or weakly forked (however it is not clear if he was referring to either the inner element of the apical trifurcation as a second inner tooth, the basal tooth if the mandibles were open or a minor male). He disagrees that *Parandra brunnea* is a good species.

The form of the mandibles would be the “key” for application of the Article 70.3 of the ICZN (1999), for selecting a new type species for *Parandra*. Unfortunately the description of Latreille (1802) is not precise enough to determine if he was describing the mandibles of *Parandra laevis* sensu auctorum, or the mandibles of *Attelabus glaber* DeGeer.

Latreille (1818) published a further figure of *Parandra laevis* in the plates of the Encyclopédie Méthodique with some differences from the 1806 figure, principally the position of the jaws (figure legend p. 19 spelt *Perandra* corrected to *Parandra* p. 39). The text relating to the plates was not published until 1825. In this volume the senior author is Latreille but the text on *Parandra* was written by LePeletier and Audinet-Serville. In the 1825 text “*Parandre glabre; Parandra glabra*” is attributed to Schönherr (1817) and “*Parandre lisse; Parandra laevis*” to Latreille (1807). Thus the connection between “*lisse*” = *glaber* of DeGeer = *laevis* was lost.

Gyllenhal in Schönherr (1817) distinguished *P. laevis* Latreille as a separate species from *P. glabra* (DeGeer) with reference to the Latreille 1806 figure and 1807 text, but there is no mention in Gyllenhal’s text of any actual specimens or that he had seen Latreille’s material. Research has failed to locate any specimens determined as *Parandra laevis* Latreille in the Gyllenhal collection although there is a major male specimen of *Parandra laevis* in the Schönherr collection from Haiti. Annotations in Schönherr’s personal copy of Synonymia Insectorum (1817) in the NRS indicates that he had this specimen in his lifetime (Julio Ferrer pers. comm.) and it probably represents his and Gyllenhal’s species concept of *Parandra laevis* Latreille 1806, 1807.

Post 1818 all subsequent authors when dealing with *Parandra* have regarded *Parandra glabra* (DeGeer) and *P. laevis* Latreille (1804, 1807) as separate, valid species. All failed to realize that prior to 1817 the name *Parandra laevis* as used by Latreille did not define or constitute a separate species from *Attelabus glaber* DeGeer.

We know that Dejean acquired the Latreille cerambycid collection after his death in 1833. In his 1837 catalogue Dejean attributes the female of *Parandra laevis* Latreille to another species *Parandra cayenensis* Dejean, now regarded as *Parandra punctatissima* Thomson, 1861 and placed in *Acutandra* Santos-Silva, 2002. Dejean did not use the name *Parandra glabra* (DeGeer) which may be why Kirby (1837:166) erected a new genus *Gnathophorus* for *Attelabus glaber* DeGeer, not realizing that it had already been placed in the genus *Parandra* by Latreille, 1802.

Westwood (1839:358), in a footnote, refers to *Attelabus glaber* DeGeer as the type species of *Parandra* and mentions that Kirby (op. cit.) proposes to call it *Gnathophorus* but fails to comment on the fact that this would make Kirby's name a junior synonym of *Parandra*.

The Dejean catalogues were very influential in their time and many subsequent synonyms and taxonomic problems can be attributed to them. Thomson (1867) validated many of Dejean's *Parandra* species names hence the large number of synonyms currently listed.

Chevrolat acquired the Dejean cerambycid collection after 1845. Chevrolat (1862:275) states that he has Latreille's "type" of *Parandra laevis*. The Chevrolat collection was divided and sold before his death with the cerambycids coming to the BM(NH) via J. Bowring in 1863. In the manuscript catalogue of the Chevrolat collection in the BM(NH), four specimens are listed as being determined as *Parandra laevis* Latreille (both sexes). Unfortunately none of the specimens bear Latreille's original determination labels having been relabelled by Dejean. Only one male is labelled as "*laevis*" Latr. from Latreille's collection. It bears an original handwritten locality label "St. Domingae" (Santo Domingo), the locality given by Thomson (1864:316) in his type species designation and by Lameere (1902:86). The other specimens that have been identified as coming from Latreille's collection (ex. Dejean collection), were given a variety of different names by Dejean, these are all now determined as *Neandra brunnea* (Fab.) confirming the fact that Latreille's 1807, 1818 concept of *Parandra laevis*, was a composite one. The *Parandra laevis* male from the Chevrolat (ex. Latreille collection) was labelled as "type", by C. O. Waterhouse, a former BM(NH) curator, with reference to Chevrolat (1862), shortly after it was acquired in 1863. It is thought that the BM(NH) red type label was probably added by K. G. Blair (former curator) ca. 1930s. Since 1863 this specimen would have been regarded as the "type" of *Parandra laevis* Latreille, 1804 by subsequent authors and maybe regarded as representing the species concept of *P. laevis* Latreille as it is accepted today.

As explained above, the name *Parandra laevis* as used by Latreille (1804, 1807) does not represent a species separate from *P. glabra* DeGeer, 1774. The first author to establish *Parandra laevis* as being a different species from *Parandra glabra* was Schönherr (1817).

The figure given by Latreille (1806), that Schönherr and Gyllenhal (1817) cited in their text as representing a second species to *Parandra glabra* and the subsequent 1818 figure of Latreille are too crude to be sure of the species they represent. We know from the Latreille 1807, 1818 texts that his species concept of "laevis" was a composite one. To resolve any confusion as to the identity of the species currently known as *Parandra laevis*, Latreille 1804 a new description, and name is provided (to resolve homonymy)

and a lectotype selected. It has been decided to designate the specimen labelled as the “type” of *Parandra laevis* Latreille from the Latreille collection cited by Chevrolat, 1862, now in the NHM(UK), as the lectotype of *Parandra laevis* Schönherr, 1817. It is not possible to determine, without doubt, which Latreille’s specimen is the holotype of *P. laevis* Schönherr, 1817, and the specimen figured by Latreille (1806), (ICZN 1999: Articles 73.1.4, 72.4.2, 75.1). Latreille 1818 states that the 1806 figure was drawn from a male from the Antilles. Selecting this specimen, which is from Santo Domingo and which has been cited in the past literature as the “type” of *Parandra laevis* Latreille, 1804 (see above), maintains the taxonomic stability and species concept of *Parandra laevis* Latreille, 1804 as it is known and accepted today (ICZN 1999: Article 60.3, 72.4.1).

Nomenclatural problems and solutions.

Attelabus glaber DeGeer, 1774 is the type species of *Parandra* Latreille, 1802 (by monotypy) and not *Parandra laevis* Latreille, 1804 (an unjustified emendation). Thus *Hesperandra* Arigony, 1977 (Monné 2006) becomes a junior synonym of *Parandra* Latreille, 1802 and all the species currently standing as *Parandra* (*Parandra*) Latreille, 1804 in Monné (op. cit.) now require a new generic name. The first available name is *Birandra* Santos-Silva, 2002 (Bousquet 2008) (see note on *Protospondylis* below). *Birandra* is currently a subgenus of *Parandra* Latreille (Monné op. cit.), thus the species currently standing as *Parandra* (*Birandra*) (Monné op. cit.) will become *Birandra* (*Birandra*) Santos-Silva, 2002. The species standing as *Parandra* (*Parandra*) Latreille (sensu Santos-Silva 2002) will become *Birandra* (*Yvesandra*) nom. n. Although the nomenclatural problems regarding *Parandra* and *P. laevis* were known to us before Bousquet (op. cit.) published his work, he was the first to point out these problems. Thus, we chose the name *Yvesandra* (feminine gender) to honor Yves Bousquet.

The subgenus *Hesperandra* (*Zikandra*) Santos-Silva, 2003 which has as its type species *Attelabus glaber* (DeGeer, 1774) is a junior objective synonym of *Parandra* Latreille, 1802 and *Parandra laevis* Latreille, 1804 is a junior objective synonym of *Parandra glabra* (DeGeer, 1774) (Bousquet 2008).

The name *Birandra* (*Yvesandra*) *latreillei* nom. n. is proposed for *Parandra laevis* Schönherr, 1817 (= *Parandra laevis* sensu auctorum, and not *Parandra laevis* Latreille, 1804, an unjustified emendation of *Attelabus glaber* DeGeer, 1774), thus *Parandra laevis* Schönherr, 1817 is the type species of *Birandra* (*Yvesandra*). *Birandra* (*Yvesandra*) *latreillei* is described below.

Birandra (*Yvesandra*) *latreillei* nom. n.

Figs 1–9

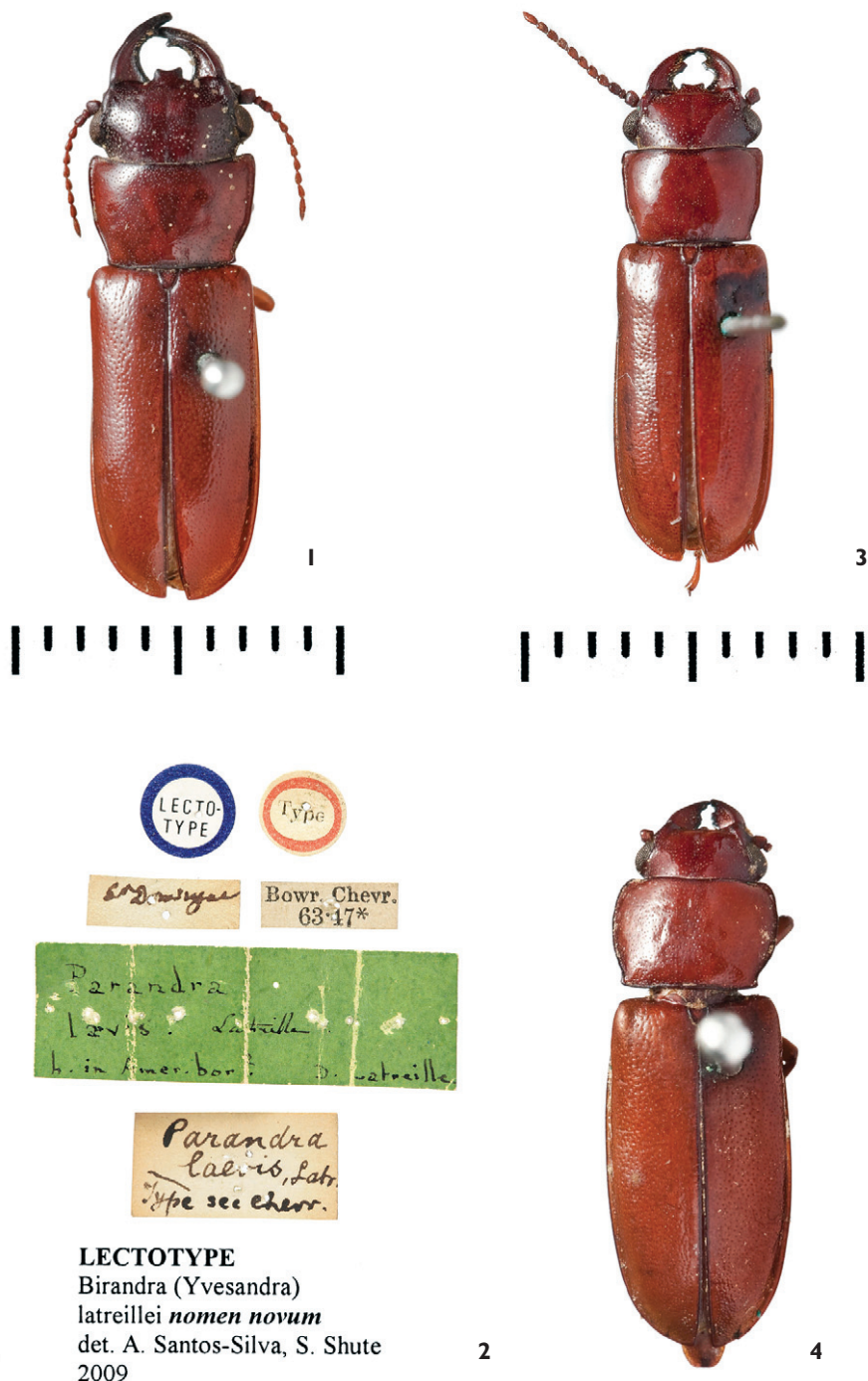
Parandra laevis Schönherr, 1817: 334; Monné, 2006 (cat.; part).

General colouration of integument a vitreous light chestnut to deep- reddish brown, head may be darker in colour than rest of dorsum, particularly in male; apices and

inner margins of mandibles, anterior margin of head, post ocular area, margins of pronotum, scutellum, elytral suture, episternum and anterior margins of femora normally dark to pitchy brown.

Male (Figs 1, 3). Width of head (Figs 5, 6) plus eyes equal to that of pronotum at anterior angles; length of mandible equal to that of head, finely and densely punctured, punctures slightly smaller than those on disc of head, becoming slightly coarser at apices; apices of mandible trifurcate; mandible in *major* male (Fig. 5) robust with a large tooth on inner edge just above the middle (see Santos-Silva 2002:36), size of sub-median tooth more or less equal to that of dorsal inner apical tooth which is in turn slightly shorter than terminal element but longer and broader than ventral apical tooth, ventral tooth (not visible when viewed dorsally) small and somewhat indistinct, apical teeth may be worn or broken; mandible in *minor* male (Fig. 6) less robust, sub-median inner tooth broadly flattened, width twice that of inner apical tooth, outer margin of sub-median tooth weakly emarginated; there is also a large basal tooth which is similar in size to sub-median tooth but this is only visible if the jaws are widely open; mandibular dorsal carina distinct, elevated from the base of mandible to just beyond sub-median inner tooth, inner edge of mandible with a fringe of long, pale, setae which project beyond margin and over sub-median tooth. Dorsal surface of the head (Figs 5, 6) more or less evenly convex with a weak median longitudinal sulcus, disc moderately and finely punctured, punctures irregular, size and distribution similar to that on disc of pronotum, becoming distinctly larger and coarser towards the ocular carina and occiput, post occipital area and genae coarsely and abundantly punctate, size of punctures at least three times that of largest on pronotum (maybe confluent in places), dense punctuation extending beneath head to gula which is medially impunctate; dorsal ocular carina distinct, moderately elevated, extending from mid level of eye to base of jaw, width more or less equal to the base of mandibular carina. Frons weakly depressed at sides, prior to anterior margin, resulting in a slight median, transverse ridge at level of anterior margin of antennal insertions. Clypeus weakly elevated medially with a strong median projection; projection at least three times wider than long; anterior margin weakly emarginated. Eye (Fig 8) very weakly emarginated; posterior ocular edge very distinct; length of eye twice that of median width, when viewed laterally; ventral ocular lobe only slightly broader than dorsal lobe. Sub-mentum with similar strong, dense punctuation, elevation of sub-mentum more or less equal to that of genae, delimited behind by a shallow transverse sulcus, punctures with a long pale seta which is at least five times the length of the puncture. Carina of ventral sensorial area of the antennomeres III-XI (Figs 8, 9) distinctly elevated, visible from the side; pilosity of the antennomeres III-XI pale, distinct, longest setae forming posterior fringe on segments, setal length almost equal to that of segment.

Pronotum (Figs 5, 6) transverse, somewhat flattened dorsally, maximum width at anterior angles, being slightly greater than that of elytra at humeri, anterior angles rounded not strongly projected; anterior margin very weakly concave; posterior margin weakly sinuate; lateral margins narrow but well defined, becoming gradually but distinctly concave after anterior third with minimum width just prior to posterior angles



Figures 1–4. *Birandra (Yvesandra) latreillei*: **1** *Parandra laevis* Schönherr, 1817, lectotype (major male), habitus **2** labels **3** minor male, ex. Chevrolat collection (ex. Dejean) (data not readable), habitus **4** female from Dominican Republic (Guaimati), habitus. Bar = 1 cm.

that are weakly projected; disc finely and irregularly punctuate, punctures finer than those on disc of head, becoming gradually larger towards margins, largest punctures not greater than those on anterior area of head. Elytron 3.8 times longer than broad, maximum width at humeri, becoming only slightly narrowed just prior to apex which is broadly rounded; surface adjacent to median suture finely punctate, punctures equal in size to smallest on disc of pronotum, distribution irregular, punctures on average 4–5 times their own width apart becoming slightly larger and denser sub-laterally below humeral third. Metepisternum distinctly and irregularly punctuate, punctures of similar size or slightly smaller than those on adjacent area of metasternum, becoming denser near anterior margin; punctures on metasternum large and distinct adjacent to metepisternum 2.3 times their own width apart, becoming distinctly finer towards metasternal suture. Apical ventrite of abdomen only slightly longer than preceeding segment, more distinctly punctured than rest of abdomen with long pale sub-erect setae. Femora minutely and indistinctly punctured throughout, setae minute and indistinct. Tibiae becoming strongly dilated towards apex, width at apical margin at least 4× that at base, punctures minute, as on femora, setae minute just extending beyond margins of punctures, ventral fringe short; protibiae somewhat flattened giving narrow, sharp dorsal edge. Metatarsomere V approximately as long as I–III combined.

Body length (including mandibles) 10.3–18.7 mm; prothorax: length 2.2–3.3 mm; anterior width, 3.0–4.8 mm; posterior width, 2.5–4.0 mm; elytral length, 6.2–11.5 mm.

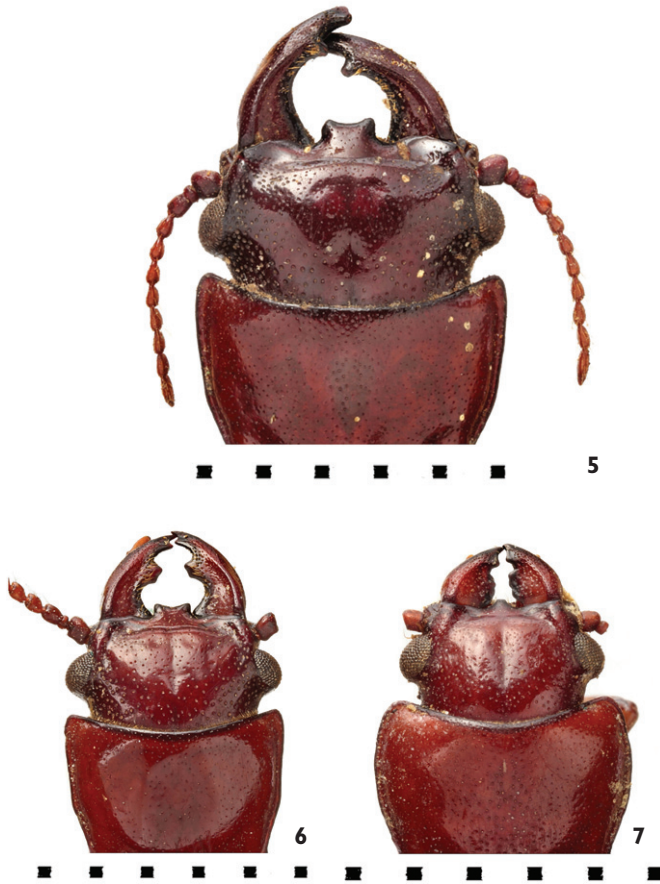
Female (Fig. 3). Head less robust, width plus eyes slightly narrower than that of pronotum at anterior angles. Eyes slightly broader and less pronounced than in male. Mandible (Fig. 7) subtriangular, length equal to two thirds that of head, more coarsely punctured than in male, punctures on dorsal surface irregular, largest equal in size to post ocular punctures; dorsal carina present but less well defined than in male; ventral apical tooth small (not visible dorsally); dorsal inner edge with small rounded preapical tooth, basal half with a broad flattened, weakly sinuate tooth which is slightly more pronounced on left mandible. Clypeal projection not broader than long, distinctly narrowing towards apex. Pronotum (Fig. 7) similar to male but with anterior two thirds slightly more rounded at sides prior to becoming narrowed and with anterior angles less pronounced. Apical ventrite of abdomen twice length of preceeding segment, punctuation slightly denser than in male and setae shorter.

Body length (including mandibles) 15.0–18.7 mm; prothorax: length 3.2–3.7 mm; anterior width, 4.1–4.6 mm; posterior width, 3.5–4.3 mm; humeral width, 4.1–5.1 mm; elytral length, 9.0–11.1 mm.

Lectotype.

As explained above, we have chosen the specimen from Latreille's collection, deposited at NHM(UK), as the Lectotype of *Birandra* (*Yvesandra*) *latreillei*. This specimen has the following labels (Fig. 2):

1. Purple (printed circular NHM label; added by us): Lectotype
2. printed red circular NHM type label
3. St. Domingae [San Domingo] (white h/w label)



Figures 5–7. *Birandra* (*Yvesandra*) *latreillei*, head and pronotum: **5** *Parandra laevis* Schönherr, 1817, lectotype (major male) **6** minor male, ex. Chevrolat collection (ex. Dejean) (data not readable) **7** female from Dominican Republic (Guaimati). Bar = 5 mm.

4. Bowring Chevrolat [18]63: 47* (BM(NH) registration for Chevrolat collection via J.C. Bowring 1863)
5. *Parandra laevis* Latreille, h.in Amer.bor. D[om]. Latreille (green Dejean h/w label)
6. *Parandra laevis* Latr., Type see Chevr. (white h/w C.O. Waterhouse det. label c. 1860s).
7. Lectotype *Birandra* (*Yvesandra*) *latreillei* nomen novem. A. Santos-Silva & S. Shute 2009

Material examined

DOMINICAN REPUBLIC: 1 ♀ Antilles, S.Dom [San Domingo], ex mus Laferte, Fry coll. 1903–100, *Parandra laevis* T. Arigony det. 1980 (NHM(UK); 2 ♂ St. Domgo [San



Figures 8–9. *Birandra* (*Yvesandra*) *latreillei*, lectotype of *Parandra laevis* Schönherr, 1817, antenna: **8** ventral view **9** ventral view, detail. Bar = 1 mm.

Domingo] [18]51–116 [purch. of Salle], compared with type C.J.G. [C. Gahan], *Parandra laevis* T. Arigony det. 1980 (NHM(UK); 3 ♂, 1 ♀ Dominican Republic, Guaimati, July, 1925, Pres. by Imp. Inst. Ent. Brit. Mus. 1930–336, *Parandra laevis* T. Arigony det. 1980 (NHM(UK); 2 ♂, La Vega: Constanza (“Paraje Los Flacos, Valle Nuevo”), IX.1962, E. Marcano col. (MZSP); 1 ♂, Hato Mayor: Parque Nacional los Haitises (3 km W Cueva de Arena; 19°04'N, 69°29'W), VII.7–9.1992, S. Davidson Col. (MZSP); 2 ♀, Monsenor Nouel: 8 miles W Jayaco, VIII.03.1967, J.C.Schaffner col. (MZSP).

HAITI: 1 ♂ 10816 [dark green handwritten label] ferruginea, Port au Pri[nce] Chr. [white h/w label] *Parandra laevis* Latr.? {large light green, black margined h/w label} *laevis* Latr. [ex Schonherr coll.] (NRS); 2 ♂ Antilles, Haiti [ex Fry coll. 1903–100] *Parandra laevis* E. Gilmour det. (NHM(UK).

JAMAICA: 1 ♂ Jamaica B.W.I, St. Andrew, Clydesdale, 27 Aug. 1950, R.P. Bengry, 5455 E 92+, *Parandra laevis* E. Gilmour det., *Parandra laevis*, *Parandra laevis* Latr. T. Arigony det. 1980 (NRS).

LOCALITY ? : 2 ♂ green Dejean labels, (not readable), Bowring Chevrolat [18]63:47* (NHM(UK)).

Comments. *Birandra* (*Yvesandra*) *latreillei* is similar to *B. (Y.) angulicollis* (Bates, 1879), *B. (Y.) pinchoni* (Villiers, 1979), and *B. (Y.) antioquensis* (Cardona-Duque et al., 2007) but differs, mainly, in the elytral punctures being finer and somewhat shallower. In *B. (Y.) angulicollis*, *B. (Y.) pinchoni* and *B. (Y.) antioquensis* the elytral punctures are conspicuously coarse and strong. In general, the pronotal punctures are also finer and shallower in *B. (Y.) latreillei* than in the other three species. Some differences pointed out by Bates (1879) and Lameere (1902), such as the form of anterior angles of the pronotum, are frequently variable intraspecifically and are not reliable when used alone.

Birandra (Y.) latreillei differs from *B. (Y.) cribrata* (Thomson, 1861) by the length of the sensorial area of antennomeres III–XI (antennomeres III–X, approximately two times longer than broad), and by the punctures of pronotum and elytra less deep and finer. In *B. (Y.) cribrata* the sensorial area of the antennomeres III–XI is distinctly narrow and elongate (antennomeres III–X, approximately three times longer than broad), and the punctures of pronotum and elytra are deeper and coarser. *B. (Y.) latreillei* can be separated from *B. (Y.) lata* (Bates, 1884) by the maximum width of the prothorax (width less than 1.5 times the length) and narrow lateral margins in both sexes. *Birandra (Y.) lata* has the prothorax distinctly transverse (width more than 1.5 times the length) with wide lateral margins in both sexes. Finally, *B. (Y.) tavakiliani* (Santos-Silva, 2002) does not have the sensorial area of antennomeres III–X divided by carina, whereas they are distinctly divided in *B. (Y.) latreillei*. (For figures and key to species see Santos-Silva 2002 and Cardona-Duque et al. 2007 (modified key).

Geographical distribution. Hispaniola, Jamaica. The occurrence of *Birandra (Y.) latreillei* in Cuba (Thomson 1861, Monné 2006) is doubtful and needs to be confirmed in the future. Zayas (1957, 1975) did not record “*Parandra laevis*” from Cuba. We believe, on examination of the type, that *Parandra cubaecola* sensu Zayas (op.cit.) is not the same species as that of Chevrolat (1862). It is possible that the specimens seen by Zayas are *B. (Y.) latreillei* (“*Parandra laevis*” sensu Thomson (op.cit.) from Cuba) or a new species. It has not been possible to find the specimen from Jamaica (J. Bowrey Coll.) examined by Waterhouse (1878), but a specimen from the NRS collection from Jamaica collected in 1950 has proved to be *B. (Y.) latreillei*.

Summary of the final position of the taxa of Parandriini involved

Parandra Latreille, 1802

Hesperandra Arigony, 1977: 163; Monné, 2006: 9. **syn. n.**

Gnathophorus Kirby, 1837: 166.

Hesperandra (*Zikandra*) Santos-Silva, 2003: 120; Monné, 2006: 12. **syn. n.**

Type-species: *Attelabus glaber* DeGeer, 1774 (monotypy).

Parandra (*Parandra*) Latreille, 1802

Included species:

Parandra (*Parandra*) *brasílica* Zikán, 1948;
Parandra (*Parandra*) *glaberrima* Zikán, 1948;
Parandra (*Parandra*) *glabra* (DeGeer, 1774)
Parandra laevis Latreille, 1804. **syn. n.**;
Parandra (*Parandra*) *humboldti* (Santos-Silva, 2003);
Parandra (*Parandra*) *minuscule* Zikán, 1948;
Parandra (*Parandra*) *monnei* (Santos-Silva, 2001);
Parandra (*Parandra*) *separanda* Zikán, 1948;
Parandra (*Parandra*) *solisi* (Santos-Silva, 2007);
Parandra (*Parandra*) *thomasi* (Santos-Silva, 2002);
Parandra (*Parandra*) *ubirajarai* (Santos-Silva, 2001).

Parandra (*Tavandra*) Santos-Silva, 2003

Hesperandra (*Tavandra*); Monné, 2006: 10.

Type-species: *Parandra longicollis* Thomson, 1861 (original designation).

Included species:

Parandra (*Tavandra*) *brachyderes* Lameere, 1902;
Parandra (*Tavandra*) *brevicollis* Lameere, 1902;
Parandra (*Tavandra*) *colombica* White, 1853;
Parandra (*Tavandra*) *guianensis* (Tavakilian, 2000);
Parandra (*Tavandra*) *lalanecassouorum* (Tavakilian, 2000);
Parandra (*Tavandra*) *longicollis* Thomson, 1861;
Parandra (*Tavandra*) *polita* Say, 1835;
Parandra (*Tavandra*) *scaritoides* Thomson, 1861;
Parandra (*Tavandra*) *solangeae* (Santos-Silva, 2003);
Parandra (*Tavandra*) *villei* Lameere, 1885.

Parandra (*Hesperandra*) Arigony, 1977

Hesperandra (*Hesperandra*); Monné, 2006: 9.

Type-species: *Parandra expectata* Lameere, 1902 (original designation).

Included species:

Parandra (*Hesperandra*) *conspicua* Tippmann, 1960;
Parandra (*Hesperandra*) *expectata* Lameere, 1902;
Parandra (*Hesperandra*) *imitatrix* (Santos-Silva, 2005);
Parandra (*Hesperandra*) *tucumana* Zikán, 1948.

Birandra Santos-Silva, 2002

Parandra (*Birandra*); Monné, 2006: 17.

Type-species: *Parandra punctata* White, 1853 (original designation).

Included species:

Birandra (*Birandra*) *lucanoides* (Thomson, 1861);
Birandra (*Birandra*) *mariahelenae* (Santos-Silva, 2002);
Birandra (*Birandra*) *punctata* (White, 1853);
Birandra (*Birandra*) *silvaini* (Tavakilian, 2000).

Birandra (*Yvesandra*) **nom. n.**

Parandra (*Parandra*); Monné, 2006: 16.

Type-species: *Parandra laevis* Schönherr, 1817.

Included species:

Birandra (*Yvesandra*) *antioquensis* Cardona-Duque et al. 2007

Birandra (*Yvesandra*) *angulicollis* (Bates, 1879);

Birandra (*Yvesandra*) *cribrata* (Thomson, 1861);

Birandra (*Yvesandra*) *cubaecola* (Chevrolat, 1862);

Birandra (*Yvesandra*) *lata* (Bates, 1884);

Birandra (*Yvesandra*) *latreillei* **nom. n.**

Parandra laevis Schönherr, 1817 (not Latreille, 1804)

Parandra laevis sensu auctorum (Monné 2006, part);

Birandra (*Yvesandra*) *pinchoni* Villiers, 1979;

Birandra (*Yvesandra*) *tavakiliani* (Santos-Silva, 2002).

Non American species provisionally allocated in *Birandra* (*Yvesandra*) (under study by Santos-Silva, Heffern and Matsuda):

Birandra (*Yvesandra*) *austrocaledonica* (Montrouzier, 1861);

Birandra (*Yvesandra*) *capicola* (Thomson, 1860);

Birandra (*Yvesandra*) *formosana* (Miwa & Mitono, 1939);

Birandra (*Yvesandra*) *frenchi* (Blackburn, 1895);

Birandra (*Yvesandra*) *gabonica* (Thomson, 1858);

Birandra (*Yvesandra*) *heterostyla* (Lameere, 1902);

Birandra (*Yvesandra*) *janus* (Bates, 1875);

Birandra (*Yvesandra*) *lanyuana* (Hayashi, 1981);

Birandra (*Yvesandra*) *moretto* (Adlbauer, 2004);

Birandra (*Yvesandra*) *passandroides* (Thomson, 1867);

Birandra (*Yvesandra*) *puncticeps* (Sharp, 1878);

Birandra (*Yvesandra*) *shibatai* (Hayashi, 1963);

Birandra (*Yvesandra*) *solomonensis* (Arigony, 1983);

Birandra (*Yvesandra*) *striatfrons* (Fairmaire, 1879).

Revalidation of *Protospondylis* Linsley, 1942

Vitali (2006) considered *Protospondylis* Linsley, 1942 to be synonymous with *Parandra* Latreille, 1804. However this was a tentative placement and we believe that it is not possible to affirm that *Protospondylis* is a true Parandrinae based on the figure of the fossil and the characters discussed by Vitali. Vitali states (p.24) that “The conservation of this fossil makes it difficult to use the key to genera provided by Santos-Silva (2002)” thus it is impossible to establish, without doubt, that *Protospondylis* is synonymous with *Parandra* sensu lato.

To solve this problem we are revalidating *Protospondylis* as a genus different from *Parandra* sensu lato, and place it incertae sedis in the Cerambycidae until its true taxonomic position can be resolved by the discovery of further specimens of *Protospondylis florissantensis* (Wickham, 1920).

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References

- Arigony THA (1977) Notas sobre Parandrinae (Coleoptera, Cerambycidae) V. Redescricao de *Parandra (Archandra) caspia* Ménétriers, 1832. *Revista Brasileira de Entomologia* 20: 159–164.
- Bates HW (1879) *Insecta. Coleoptera, Cerambycidae, Prionidae*. *Biologia Centrali-Americana*, London 5: 1–16, est. I–II.
- Bousquet Y (2008) Nomenclatural and bibliographic notes on Cerambycidae. *Coleopterists Bulletin* 61: 616–631.
- Cardona-Duque J, Santos-Silva A, Wolff, M (2007) A new species of Parandrinae from the Central Andes of Colombia (Coleoptera: Cerambycidae). *Zootaxa* 1661: 39–45
- Chevrolat LAA (1862) Coléoptères de l'Île de Cuba. Notes, synonymies et descriptions d'espèces nouvelles. Familles des Cérambycides et des Parandrides. *Annales de la Société Entomologique de France* (4)2: 245–280.
- Dejean PFMA (1837) *Catalogue de la collection de Coléoptères de M le Comte Dejean*. Ed. 3 Mequignon-Marvis Paris, xiv + 503pp.
- DeGeer C (1774) *Mémoires pour servir à l'histoire des insectes*. Stockholm, Imp. Pierre Hesselberg 4: xii + 456 pp., 19 pls.
- Gyllenhal L (1817) In: Schönherr CJ. Appendix ad C. J. Schönherr *Synonymiam Insectorum*. Descriptiones Novarum Specierum Insectorum. Scaris, Officina Lewerentziana 1(3): 1–266.
- ICZN (International Commission on Zoological Nomenclature) (1999) *International Code of Zoological Nomenclature*, London, xxx + 306 p.
- Kirby W (1837) *The Insects. Coleoptera*. In: Richardson J. *Fauna Boreali Americana; or the zoology of the northern parts of British America*. Norwich, Josiah Fletcher 4: xxxix + 335 pp.
- Lameere AA (1902) Révision des Prionides. Premier mémoire. – Parandrines. *Annales de la Société Entomologique de Belgique* 46: 59–111.
- Latreille PA (1802) *Histoire naturelle, générale et particuliere des Crustacés et des Insectes faisant suite aux Œuvres de Leclerc de Buffon, et partie d complet d'histoire naturelle rédigé par C.S. Sonnini...Principes elementaires. Familles Naturelles des Genres*. F. Dufart, Paris, 3: i–xii + 1–468.

- Latreille PA (1804) Histoire Naturelle, générale et particulière des Crustacés et des Insectes Insectes faisant suite aux Œuvres de Leclerc de Buffon, et partie d complet d'histoire naturelle rédigé par C.S. Sonnini... Principes elementaires. F. Dufart, Paris, 11: iv + 1–424.
- Latreille PA (1806) Genera Crustaceorum et Insectorum secundum ordinem naturalem in familias disposita, iconibus exemplisque plurimis explicata. Armand Koenig, Paris & Argentorat, 1: 1–302, 16 pl.
- Latreille PA (1807) Genera Crustaceorum et Insectorum secundum ordinem naturalem in familias disposita, iconibus exemplisque plurimis explicata. Armand Koenig, Paris & Argentorat, 3: 1–259.
- Latreille PA (1818) In: J. F. P. Deterville. Nouveau dictionnaire d'histoire naturelle appliquée aux arts, à l'agriculture, à l'économie rurale et domestique, à la médecine, etc. Deterville, Paris, 24: iv + 577 p.
- Latreille PA (1818) Tableau Encyclopédique et Méthodique des Trois Règnes de La Nature. Pt.24. Crustacés, Arachnides et Insectes. Paris. Mme.Veuve Agasse. 1–39, 397 pl.
- LePeletier de Saint-Fargeau ALM, Audinet-Serville JG (1825) In: Latreille PA. Encyclopédie méthodique: Entomologie, ou Histoire Naturelle des Crustacés, des Arachnides et des Insectes. Paris. Mme. Veuve Agasse, 10(1): 1–344.
- Monné MA (2006) Catalogue of the Cerambycidae (Coleoptera) of the Neotropical Region. Part III. Subfamilies Parandrinae, Prioninae, Anoplodermatinae, Aseminae, Spondyliinae, Lepturinae, Oxypeltinae, and addenda to the Cerambycinae and Lamiinae. Zootaxa 1212: 1–244.
- Olivier AG (1803) In: Deterville JFP. Nouveau dictionnaire d'histoire naturelle, appliquée aux arts, principalement à l'agriculture et à l'économie rurale et domestique: par une société de naturalistes et d'agriculteurs: avec des figures tirées des trois règnes de la nature. Deterville, Paris, 17: 1–574.
- Santos-Silva A (2002) Notas e descrições em Parandrina (Coleoptera, Cerambycidae, Parandrinae). Iheringia (Série Zoologia) 92: 29–52, 56 figs.
- Santos-Silva A (2003) Notas, descrições, sinónimas e revalidação em *Hesperandra* Arigony, 1977 (Coleoptera, Cerambycidae, Parandrinae). Revista Brasileira de Entomologia 47: 119–131.
- Schönherr CJ (1817) Synonymia insectorum, oder: Versuch einer Synonymie Aller bisher bekannten Insecten; nach Fabricii Systema Eleutheratorum &c. geordnet. Skara, Lewerentzischen Buchdrükerey, 1(3): xi + 506 p.
- Thomson J (1858) Voyage au Gabon. Histoire Naturelle des Insectes et des Arachnides recueillis pendant un voyage fait au Gabon en 1856 et en 1857 par M. Henry C. Deyrolle sous les auspices de MM. Le Comte de Mnischech et James Thomson. Archives Entomologiques, Paris 2: frontispice + 472 p., 14 pls.
- Thomson, J (1860–61) Essai d'une classification de la famille des cérambycides et matériaux pour servir à une monographie de cette famille. Paris. 396 pp. + 3 pls. [1860: pp. xvi + 128; 1861: pp. 129–396].
- Thomson J (1864) Systema cerambycidarum ou exposé de tous les genres compris dans la famille des cérambycides et familles limitrophes. Mémoires de la Société Royale des Sciences de Liège 19: 1–540.

- Thomson J (1867) Révision des Parandrides (insectes Coléoptères). Physis Recueil d'Histoire Naturelle (2)1: 106–118.
- Vitali F (2006) The real taxonomic position of *Spondylis florissantensis* Wickham, 1920 (Coleoptera, Cerambycidae). Entomapeiron (P.S.) 1: 13–28.
- Waterhouse CO (1878) Notice of a small collection of Coleoptera from Jamaica, with descriptions of new species from the West Indies. Transactions of the Entomological Society London IV: 303–311.
- Westwood JO (1839) An introduction to the modern Classification of insects: founded on the natural habits and corresponding organisation of the different families. Longman et al. (Ed), London, Vol. I, i-vi + 462 pp.

Rediscovery of *Clivina morio* Dejean with the description of *Leucocara*, a new subgenus of *Clivina* Latreille (Coleoptera, Carabidae, Clivinini)

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Abstract

Leucocara, a new subgenus of *Clivina* Latreille, is established for *C. americana* Dejean and its relatives, whose collective geographical range includes the Western Hemisphere Nearctic Region and the Eastern Hemisphere Palaearctic, Oriental, and Afrotropical Regions. Previously, these taxa were included in the subgenus *Reichardtula* Whitehead, 1977, a taxon now confined to the Eastern Hemisphere. Members of *Leucocara* differ from those of other Nearctic *Clivina* by the presence of a small, apically truncate preapical protuberance on the mesotibia with its seta inserted apically. *Clivina morio*, previously known only from the holotype, is reported here from Louisiana and Texas, confirming its presence on the North American continent; the species is also included in *Leucocara*. The following new synonymies are proposed: *C. dilutipennis* Putzeys, 1866, *C. insularis* Jacquelin du Val, 1857, *C. klugii* Putzeys, 1846, *C. sculptifrons* Putzeys, 1846 with *C. fasciata* Putzeys, 1846 and *C. morula* LeConte, 1857 with *C. americana* Dejean, 1831.

Keywords

new subgenus, *Clivina*, *Clivina morio*, new synonymies, North America

Introduction

Clivina morio was described in 1831 by Count Dejean from a single specimen reported from “Amérique septentrionale.” The species was transferred to the genus *Ardistomis*

Putzeys by Putzeys (1866: 205). Subsequently it was recorded from Lancaster County in Pennsylvania (Rathvon 1869: 524), Georgia (LeConte 1879: 32), the vicinity of New York city (Leng and Beutenmuller 1893: 135), Fort Myers in Florida (Leng 1915: 571), and Thomasville in Georgia (Fattig 1949: 15). Bousquet (2006) reviewed the Nearctic species of *Ardistomina* based on materials from 11 major North American collections, including the California Academy of Sciences, the Canadian National Collection of Insects, the Florida State Collection of Arthropods, the Museum of Comparative Zoology, and the National Museum of Natural History, and was unable to find a single specimen conspecific with the holotype of *C. morio*. This led him to believe the species may inhabit the Neotropical Region and that the region originally mentioned by Dejean was in error. Bousquet (2006) transferred the species back to the genus *Clivina* Latreille but did not provide a subgeneric placement for it.

In 2008, Igor S. Sokolov found two specimens in the Louisiana State Arthropod Collection that belong to *C. morio* and sent them to me for confirmation. This finding led me to investigate the systematic position of this species and its putative relatives in both the Western and Eastern Hemispheres.

The Western Hemisphere subgenera of *Clivina*

As discussed by Ball (2001), the Western Hemisphere species of *Clivina* Latreille belong to five subgenera: *Paraclivina* Kult, *Semiclivina* Kult, *Antroforceps* Barr, *Clivina s. str.*, and *Reichardtula* Whitehead. A list of the species, assigned to the respective subgenera, is included in Table 1. Members of *Paraclivina* are characterized in having the mandibular scrobe distinctly laterad, the lateral bead of pronotum without posteriolateral denticle and not extended to the basal edge but extended parallel anterior to it, and the elytral interval 3 with only two discal setigerous punctures. This taxon corresponds to groups 21 and 22 of Putzeys (1866) and is indigenous to the New World. It contains at least 33 species in the Nearctic and Neotropical Regions. According to Nichols' (1988) unpublished Ph.D. thesis, the names *C. dilutipennis* Putzeys, *C. insularis* Jacquelin du Val, *C. klugii* Putzeys, and *C. sculptifrons* Putzeys are junior synonyms of *C. fasciata* Putzeys [**new synonymy**].

The subgenus *Semiclivina* is characterized mainly by the presence of a narrow, sculptured band [deep longitudinal or submarginal furrow of Kult (1947: 31), submarginal ridge of Nichols (1988: 154), longitudinal carina of Ball (2001: 136)] extended more or less parallel to the lateral edge. This state is likely synapomorphic and suggests that the taxon is monophyletic. The group is indigenous to the Western Hemisphere and includes at least nine species (Table 1). Probably many other Middle American and South American species, placed by Putzeys (1866) in his group 24, belong to this subgenus.

Antroforceps Barr is indigenous to northeastern Mexico (Tamaulipas) and eastern United States. It includes three species (Table 1) and is recognized by the bidentiform lateral edge of pronotum posteriorly and bidentiform or crenulate humeri.

Table 1. List of Western Hemisphere *Clivina* with their subgeneric assignment

<i>Clivina</i> TAXA	SUBGENERA
<i>acuducta</i> Haldeman, 1843	<i>Leucocara</i>
<i>addita</i> Darlington, 1934	<i>Semiclivina</i>
<i>adstricta</i> Putzeys, 1866	<i>Semiclivina</i> ?
<i>amazonica</i> Putzeys, 1861	<i>Semiclivina</i> ?
<i>americana</i> Dejean, 1831	<i>Leucocara</i>
<i>antennaria</i> Putzeys, 1866	<i>Semiclivina</i> ?
<i>armata</i> Putzeys, 1846	<i>Semiclivina</i> ?
<i>batesi</i> Putzeys, 1866	<i>Semiclivina</i> ?
<i>bicolor</i> Putzeys, 1866	<i>Paraclivina</i>
<i>bidentata</i> Putzeys, 1846	<i>Semiclivina</i> ?
<i>bifoveata</i> Putzeys, 1861	?
<i>biguttata</i> Putzeys, 1866	<i>Paraclivina</i>
<i>bipustulata</i> Fabricius, 1801	<i>Paraclivina</i>
<i>bituberculata</i> Putzeys, 1866	<i>Paraclivina</i>
<i>bolivari</i> Barr, 1967	<i>Antroforceps</i>
<i>boliviensis</i> Putzeys, 1846	?
<i>brevicollis</i> Putzeys, 1866	<i>Paraclivina</i>
<i>breviuscula</i> Putzeys, 1866	<i>Paraclivina</i>
<i>brunnea</i> Putzeys, 1846	<i>Semiclivina</i> ?
<i>brunneipennis</i> Putzeys, 1846	<i>Paraclivina</i>
<i>burmeisteri</i> Putzeys, 1866	<i>Paraclivina</i>
<i>californica</i> Van Dyke, 1825	<i>Leucocara</i>
<i>carbonaria</i> Putzeys, 1866	<i>Semiclivina</i> ?
<i>collaris</i> Herbst, 1784	<i>Clivina</i>
<i>columbica</i> Putzeys, 1846	<i>Semiclivina</i> ?
<i>convexa</i> LeConte, 1857	<i>Paraclivina</i>
<i>cribricollis</i> Putzeys, 1861	?
<i>cruciata</i> Putzeys, 1866	<i>Paraclivina</i>
<i>cruralis</i> Putzeys, 1866	<i>Semiclivina</i> ?
<i>cubae</i> Darlington, 1834	<i>Semiclivina</i>
<i>dentifemorata</i> Putzeys, 1846	<i>Semiclivina</i> ?
<i>dentipes</i> Dejean, 1831	<i>Semiclivina</i>
<i>dissimilis</i> Putzeys, 1866	<i>Semiclivina</i> ?
<i>distigma</i> Putzeys, 1866	<i>Paraclivina</i>
<i>elongata</i> Chaudoir, 1843	<i>Semiclivina</i>
<i>erythrope</i> Putzeys, 1846	?
<i>fasciata</i> Putzeys, 1846	<i>Paraclivina</i>
<i>fassatii</i> Kult, 1947	<i>Paraclivina</i>
<i>ferrea</i> LeConte, 1857	<i>Paraclivina</i>
<i>fossifrons</i> Putzeys, 1866	<i>Paraclivina</i>
<i>fossor</i> Linné, 1761	<i>Clivina</i>

<i>Clivina</i> TAXA	SUBGENERA
<i>fuscicornis</i> Putzeys, 1846	<i>Paraclivina</i>
<i>fuscipes</i> Putzeys, 1846	<i>Paraclivina</i>
<i>hilaris</i> Putzeys, 1861	?
<i>impressifrons</i> LeConte, 1844	<i>Clivina</i>
<i>inaequalis</i> Putzeys, 1866	<i>Paraclivina</i>
<i>laeta</i> Putzeys, 1866	?
<i>laetipes</i> Putzeys, 1866	<i>Semiclivina</i> ?
<i>laticeps</i> Putzeys, 1846	<i>Semiclivina</i> ?
<i>latimana</i> Putzeys, 1846	<i>Semiclivina</i> ?
<i>latiuscula</i> Putzeys, 1866	<i>Paraclivina</i>
<i>lebasi</i> Putzeys, 1846	?
<i>limbipennis</i> Jacquelin du Val, 1857	<i>Clivina</i> ?
<i>longipennis</i> Putzeys, 1861	<i>Semiclivina</i> ?
<i>lucida</i> Putzeys, 1866	<i>Paraclivina</i>
<i>macularis</i> Putzeys, 1866	<i>Paraclivina</i>
<i>marginipennis</i> Putzeys, 1846	<i>Paraclivina</i>
<i>media</i> Putzeys, 1846	<i>Paraclivina</i>
<i>morio</i> Dejean, 1831	<i>Leucocara</i>
<i>myops</i> Bousquet, 1997	<i>Clivina</i>
<i>nitidula</i> Putzeys, 1866	<i>Semiclivina</i> ?
<i>oblita</i> Putzeys, 1866	<i>Semiclivina</i>
<i>obscuripennis</i> Putzeys, 1866	<i>Paraclivina</i>
<i>oregona</i> Fall, 1922	<i>Clivina</i>
<i>oxyomma</i> Putzeys, 1868	<i>Semiclivina</i>
<i>pallida</i> Say, 1825	<i>Clivina</i>
<i>pampicola</i> Putzeys, 1866	?
<i>parvidens</i> Putzeys, 1866	<i>Semiclivina</i> ?
<i>parvula</i> Putzeys, 1866	<i>Semiclivina</i> ?
<i>planicollis</i> LeConte, 1857	<i>Clivina</i>
<i>planulata</i> Putzeys, 1866	?
<i>platensis</i> Putzeys, 1866	<i>Semiclivina</i> ?
<i>postica</i> LeConte, 1848	<i>Paraclivina</i>
<i>pravei</i> Lutshnik, 1926	?
<i>punctifrons</i> Putzeys, 1866	?
<i>punctigera</i> LeConte, 1857	<i>Clivina</i>
<i>punctiventris</i> Putzeys, 1866	<i>Semiclivina</i> ?
<i>punctulata</i> LeConte, 1849	<i>Clivina</i>
<i>putzeysi</i> Csiki, 1927	<i>Semiclivina</i> ?
<i>quadrata</i> Putzeys, 1866	<i>Clivina</i> ?
<i>recurvidens</i> Putzeys, 1866	<i>Paraclivina</i>
<i>rubicunda</i> LeConte, 1857	<i>Antroforceps</i>
<i>rufa</i> LeConte, 1857	<i>Leucocara</i>

<i>Clivina</i> TAXA	SUBGENERA
<i>sasaji</i> Ball, 2001	<i>Antroforceps</i>
<i>spinipes</i> Putzeys, 1866	?
<i>stigmula</i> Putzeys, 1846	<i>Paraclivina</i>
<i>striatopunctata</i> Dejean, 1831	<i>Paraclivina</i>
<i>stygica</i> Putzeys, 1866	<i>Semiclivina</i> ?
<i>sulcipennis</i> Putzeys, 1846	<i>Paraclivina</i>
<i>taurina</i> Putzeys, 1866	?
<i>torrida</i> Putzeys, 1866	<i>Paraclivina</i>
<i>transversicollis</i> Putzeys, 1866	<i>Paraclivina</i>
<i>tridentata</i> Putzeys, 1866	<i>Semiclivina</i> ?
<i>tristis</i> Putzeys, 1846	<i>Paraclivina</i>
<i>tuberculata</i> Putzeys, 1846	<i>Paraclivina</i>
<i>urophthalma</i> Putzeys, 1861	<i>Semiclivina</i>
<i>urophthalmoides</i> Kult, 1947	<i>Semiclivina</i>
<i>vespertina</i> Putzeys, 1866	<i>Semiclivina</i>

The remaining two subgenera are inadequately characterized. Adults of the nominotypical taxon lack the paramedian sulci on abdominal sternum III as in members of *Paraclivina* but contrary to those of other Western Hemisphere taxa. As presently conceived, *Clivina s. str.* is worldwide, markedly speciose, and in my opinion possibly paraphyletic, if not polyphyletic. Nine species inhabiting the Western Hemisphere are currently assigned to this subgenus (Table 1).

The only distinctive or peculiar structural character state for *Reichardtula* is that the two setigerous punctures on each side of abdominal sternum VII (the so-called “last visible sternum”) are close to each other. The subgenus contains at least two distinct groups of species. One has the preapical protuberance on the mesotibia small, truncate at apex, its seta inserted apically (Fig. 2). The second group has that protuberance long, acuminate at apex, its seta inserted laterally (Fig. 3). In view of the current classification of the genus *Clivina*, I believe these two groups should each be given subgeneric rank. Because *Reichardtula* is a replacement name for *Eupalamus* Schmidt-Göbel, both have the same type species (ICZN 1999, Article 67.8) which is the Oriental *Clivina castanea* Westwood, 1837, a senior synonym of *Eupalamus clivinoides* Schmidt-Göbel the sole species originally associated with *Eupalamus*. That species, based on the description and keys to Indian species by Andrewes (1929: 353–355, 374–375), has “a spur above apex” of the mesotibia (e.g., with a relatively long protuberance) contrary to some species which are “without spur above apex” (e.g., with a small protuberance). Therefore, the species of the *americana* group (see Bousquet and Laroche 1993: 103) are those in need of a new subgenus.

Clivina morio has a small, truncate protuberance on the mesotibia and a close examination of the new material at hand shows that the species is externally markedly similar to this species of the *americana* group. Therefore the species is placed in this group which is given herein the subgeneric name *Leucocara* (see Table 2 for list of

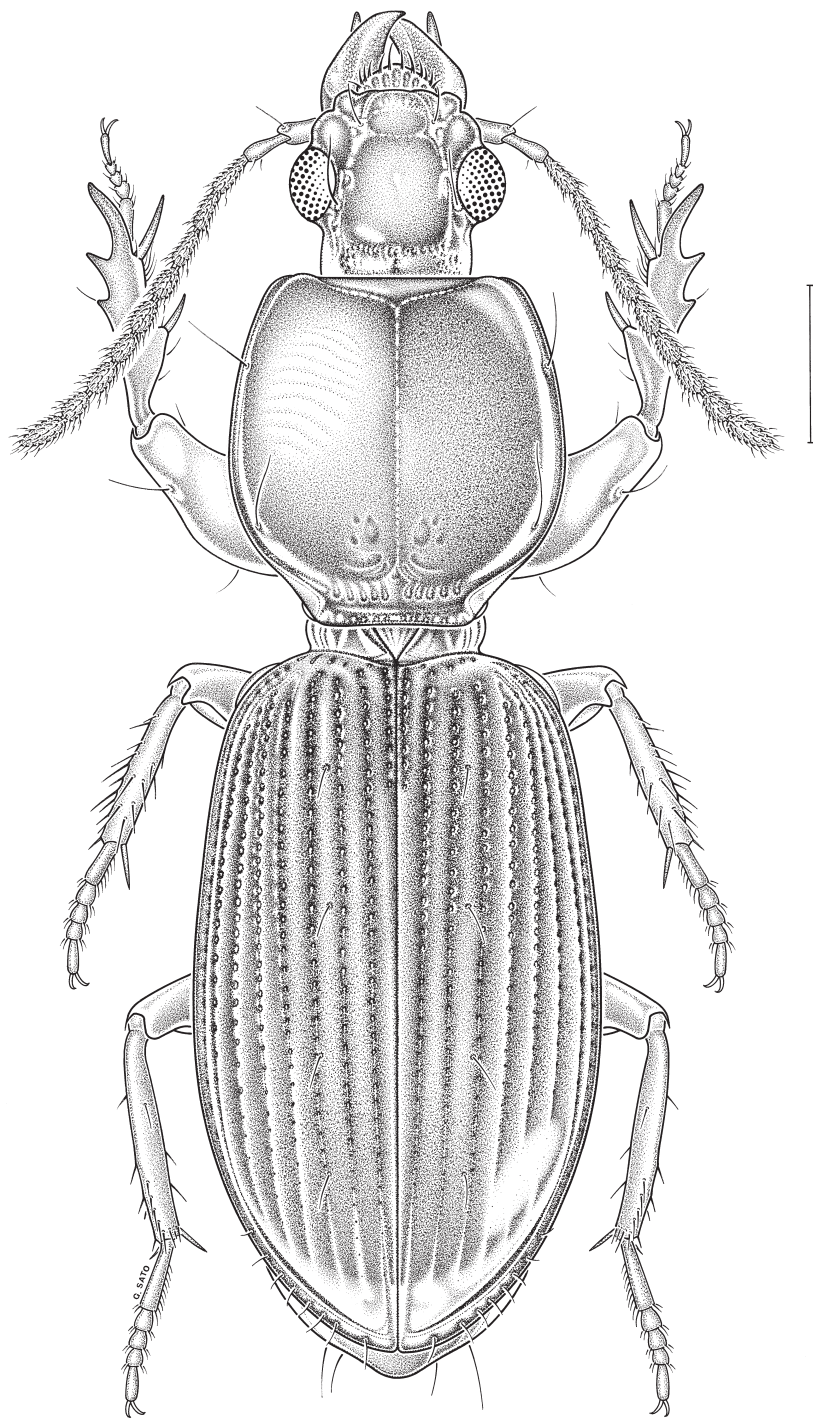


Figure 1. *Clivina (Leucocara) morio* Dejean, holotype, habitus (dorsal view). Scale bar = 1 mm

species names). This action, in effect, restricts the geographic range of subgenus *Reichardtula* to the Eastern Hemisphere.

Subgenus *Leucocara* Bousquet, subgen. n.

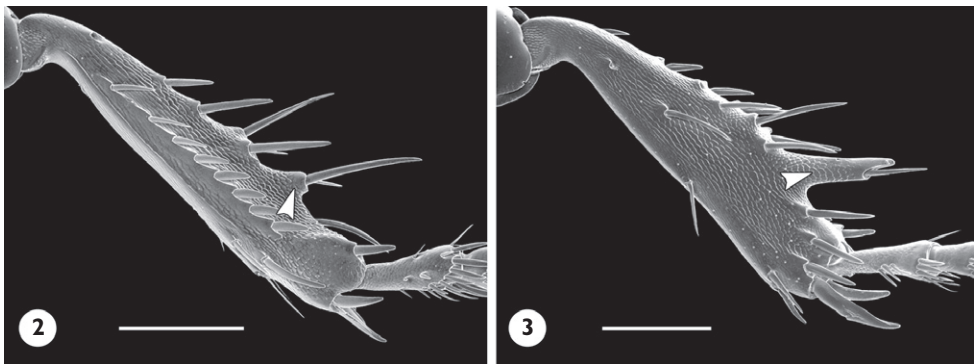
urn:lsid:zoobank.org:act:05AD95B8-1397-46E1-89C5-1A9CC5CD819F

Type species: *Clivina americana* Dejean, 1831 (here designated)

Etymology. From the Greek *leukos* (white) and *kara* (head). The name is proposed in memory of Donald Robert Whitehead [1938–1990] who had an interest in *Clivina* and the Clivinini in general. His family name has been used in the past to denote a scaritine genus (*Whiteheadiana* Perrault) and a curculionid genus (*Whiteheadia* Alonso-Zarazaga & Lyal).

Recognition. Members of this subgenus differ from those of other Nearctic *Clivina* by the presence of a small, apically truncate preapical protuberance on the mesotibia with its seta inserted apically.

Description. *Head.* Supraantennal lobes not prominent, distinctly posteriad anterior edge of clypeus. Lateral wings of clypeus isolated from median portion by extension of frontal impressions; median portion of clypeus coarsely beaded. Labrum with seven long setae. Mandible with scrobe depressed, not distinctly laterad, evident from dorsal aspect. Labial mentum with prominent U-shaped ridge; glossal sclerite acutely carinate medially, carina not sinuate; apex of glossal sclerite with one long seta medially; paramedian pit organs widely separate medially. *Prothorax.* Pronotum with lateral bead extended to basal edge; posteriolateral angle delimited, angulate; side without accessory dentiform projection posteriad posterior angle. Proepisternum without sculptured band. *Elytra.* Lateral gutter clearly extended inside humerus, humeral portion clearly delineated; umbilical setae not set up in ringed depressions. Interval 3 with three or four discal setae; second discal seta not adjoining stria 3 though close to it in some individuals, in most individuals rela-



Figures 2–3. Mesotibia. **2** *Clivina americana* (ventral view) **3** *Clivina fossor* (dorsal view). Scale bars = 0.2 mm

tively close to stria 2 or in middle of interval 3; interval 8 carinate toward apex and briefly toward base. Striae 4 and 5 joined at base. *Legs*. Profemur ventrally with a small dentiform projection toward apex. Mesotibia with preapical apophysis small, seta apicad (Fig. 2). *Abdomen*. Sternum III with coxal lines medially; sternum VII with preapical setae on each side proximate, distance between them less than that between medial setae.

Phylogenetic status. A small, truncate protuberance of the mesotibia (Fig. 2) is probably the plesiomorphic state among the Clivinini and does not support the idea that *Leucocara* is monophyletic. In fact, the genus *Clivina* is a large, inadequately defined complex and consequently the structural characters are difficult to polarize. Therefore, I am unable to offer any morphological evidence that *Leucocara* is natural. However, the species, at least those I have seen (see “Species included” section), are extremely similar to one another in external features and this is sufficient grounds for recognition of the group until it is subjected to phylogenetic analysis.

Geographical distribution. The known range of *Leucocara* includes the Western Hemisphere Nearctic Region, and the Eastern Hemisphere Palaearctic, Oriental, and Afrotropical Regions.

Species included. Names of species belonging to *Leucocara* are listed in Table 2. Taxonomic remarks about selected taxa are as follows.

The Western Hemisphere species

Based on Bousquet and Larochelle (1993: 103), the *americana* group contains five species in North America: *C. americana* Dejean, *C. analis* Putzeys, *C. californica* Van Dyke, *C. morula* LeConte, and *C. rufa* LeConte. However, in his unpublished thesis, Nichols (1988: 148) revalidated *C. acuducta* Haldeman (previously in synonymy with *C. americana*), synonymized *C. morula* with *C. americana* [**new synonymy**] and reinstated *C. analis* as a synonym of *C. americana*. This leaves the *americana* group with five valid North American species: *acuducta*, *americana*, *californica*, *morio*, and *rufa*. All these species, except *C. californica* which is known only from the type locality in Lake County, California, are found in the eastern part of the continent. The group, as far as known, as no representatives in the Neotropical Region.

Clivina morio was previously known from the holotype only (Bousquet 2006: 25). I have now seen three additional specimens. Two were collected at UV light in Louisiana, 4.2 mi. NE of Abita Springs, St. Tammany Parish, by V. Brou, one on May 30, 2001, the other one on June 2, 1988. These specimens are in the Louisiana State Arthropod collection, Baton Rouge. The third specimen is in the Canadian National Collection of Insects, Ottawa, and was collected at 12 mi. SW of Lufkin, Trinity Co., Texas on 22 April 1976 by A. Smetana. The species can be distinguished from the other eastern North American species of *Leucocara* by its size and shorter metepisternum. The four specimens studied of *C. morio* range between 7.0 and 8.5 mm in size while the largest specimen seen of the other species reach only 6.4 mm. The ratio length of

Table 2. List of species belonging or assumed to belong to *Leucocara*. Species marked with an asterix (*) have been studied.

Nearctic Region	
<i>C. acuducta</i> Haldeman, 1843*	eastern U.S.A.
<i>C. americana</i> Dejean, 1831*	eastern Canada and U.S.A.
<i>C. californica</i> Van Dyke, 1925	California
<i>C. morio</i> Dejean, 1831*	Louisiana and Texas
<i>C. rufa</i> LeConte, 1843*	eastern U.S.A.
Palearctic Region	
<i>C. kochi</i> Schatzmayr, 1936	Egypt
<i>C. laevifrons</i> Chaudoir, 1842*	widespread
<i>C. niponensis</i> Bates, 1873*	Japan & China (Hebei)
<i>C. sacra</i> Putzeys, 1875	Middle East
<i>C. subterranea</i> Decu, Nitzu & Juberthie, 1994	Romania
<i>C. tutancamon</i> Schatzmayr, 1936	Egypt, Eritrea
Oriental Region	
<i>C. baenningeri</i> Kult, 1951	Indonesia (Java, Sumatra), Philippines
<i>C. balfourbrownei</i> Kult, 1951	India
<i>C. birmanica</i> Kult, 1951	Myanmar
<i>C. championi</i> Kult, 1951	India (Kumaon)
<i>C. convexicollis</i> Putzeys, 1861	Indonesia (Java, Sulawesi)
<i>C. coomani</i> Kult, 1951	Vietnam
<i>C. fulvaster</i> Motschulsky, 1861	SE India, Sri Lanka
<i>C. hoberlandti</i> Kult, 1951	Indonesia (Sumatra)
<i>C. mordax marginicollis</i> Putzeys, 1866	Myanmar
<i>C. mordax mordax</i> Putzeys, 1861	Bengal, Myanmar
<i>C. obenbergeri</i> Kult, 1951*	India
<i>C. opacidermis</i> Baehr, 1989	Thailand
<i>C. pfefferi</i> Kult, 1951	India (Goa)
<i>C. placida</i> Putzeys, 1866	Indonesia (Sulawesi)
<i>C. saigonica drescheri</i> Kult, 1951	Borneo, Indonesia (Java, Sulawesi)
<i>C. saigonica saigonica</i> Kult, 1951	Vietnam
<i>C. semicarinata</i> Putzeys, 1877*	India
<i>C. stigmatica</i> Putzeys, 1866	Indonesia (Sulawesi)
<i>C. tranquebarica</i> Bonelli, 1813*	widespread
<i>C. zebe</i> Kult, 1951	Singapore, Indonesia, Borneo, Philippines
Afrotropical Region	
<i>C. allaeri</i> Kult, 1959	Zaire
<i>C. alluaudi</i> Kult, 1947	Madagascar
<i>C. angolana angolana</i> Kult, 1959	Angola, Zaire
<i>C. angolana zambesiana</i> Kult, 1959	Mozambique
<i>C. antoinei</i> Kult, 1959	Cameroon
<i>C. aucta aethiopica</i> Kult, 1959	Ethiopia
<i>C. aucta aucta</i> Erichson, 1843	southern Africa
<i>C. basilewskyi</i> Kult, 1959	Zaire
<i>C. caffra caffra</i> Putzeys, 1861	Mozambique

<i>C. caffra dainellii</i> Kult, 1959	Ethiopia
<i>C. caffra heyrovskyi</i> Kult, 1959	Zaire
<i>C. capensis</i> Kult, 1959	South Africa (Cape Province)
<i>C. collarti collarti</i> Burgeon, 1935	SW Zaire, E Congo
<i>C. collarti gabonensis</i> Kult, 1959	Gabon, Cameroon
<i>C. consobrina</i> Putzeys, 1866	western Africa
<i>C. damarina</i> Péringuey, 1896	Namibia
<i>C. decellei</i> Basilewsky, 1968	Ivory Coast
<i>C. dewaillyi</i> Kult, 1959	Mozambique, Zimbabwe, Tanzania, Somalia
<i>C. erythropyga</i> Putzeys, 1866	widespread
<i>C. femoralis</i> Putzeys, 1846	Senegal
<i>C. girardi</i> Kult, 1959	Angola
<i>C. heinemanni heinemanni</i> Kult, 1959	Tanzania
<i>C. heinemanni minor</i> Kult, 1959	Mozambique
<i>C. insignis</i> Kult, 1959	Zaire
<i>C. interstitialis</i> Kolbe, 1883	Angola, Zaire
<i>C. jeanneli</i> Kult, 1959	Kenya
<i>C. katangana</i> Kult, 1959	Zaire
<i>C. kawa</i> Basilewsky, 1948	Zaire
<i>C. lacustris</i> Putzeys, 1866	Tanzania, Botswana, South Africa
<i>C. lebisi</i> Kult, 1959	Ethiopia
<i>C. martii</i> Kult, 1959	Senegal
<i>C. maxima</i> Kult, 1959	Congo
<i>C. montei</i> Kult, 1959	east-central Africa
<i>C. muelleri</i> Kult, 1959	Zambia
<i>C. natalensis curticolis</i> Putzeys, 1873	Eritrea, Ethiopia
<i>C. natalensis natalensis</i> Putzeys, 1861*	widespread
<i>C. ngayensis</i> Burgeon, 1935	Zaire
<i>C. orientalis</i> Kult, 1959	Sudan, Tanzania
<i>C. palmeni palmeni</i> Kult, 1959	Zaire
<i>C. palmeni subsobrina</i> Kult, 1959	Congo
<i>C. perplexa congoensis</i> Kult, 1951	west-central Africa
<i>C. perplexa perplexa</i> Péringuey, 1896	southern Africa
<i>C. perplexa somalica</i> Müller, 1942	east-central Africa
<i>C. rugiceps</i> Klug, 1832	widespread
<i>C. schatzmayri</i> Kult, 1959	Sudan, Tanzania
<i>C. schoutedeni</i> Kult, 1959	central Africa
<i>C. sculptilis</i> Putzeys, 1866	Tanzania, South Africa (Natal)
<i>C. simplicifrons</i> Fairmaire, 1901	Madagascar
<i>C. sobrina</i> Dejean, 1831	Senegal
<i>C. straneoi</i> Kult, 1959	Zaire
<i>C. sudanensis</i> Kult, 1959	Sudan, Ivory Coast
<i>C. tanganyikana</i> Kult, 1959	Tanzania
<i>C. vosabloi</i> Kult, 1959	Zaire

metasternum, measured at the shortest distance between the meso- and metacoxa, and length of metacoxa measured in the same line as the metasternum is 0.9–1.0 in *C. morio* while it is 1.2–1.5 in the other eastern species. The stria punctures in *C. morio* are also larger, those on the anterior half of the elytra being larger than the depression around the anterior discal seta while in the other species the stria punctures are subequal or smaller than the depression around the anterior discal seta.

The Eastern Hemisphere taxa

Despite having seen but few species, there is little doubt that *Leucocara* is well represented in the Eastern Hemisphere. The *tranquebarica* group, of which I have seen three species only, includes 15 species (Kult 1951: 18–24) and the *natalensis* group, of which I have studied but one species, consists of 43 species in Africa (Kult 1959: 179–206). One Asian species, *C. zebi* Kult, reaches the Australian Region where it is found in New Guinea, New Britain, and Australia (Darlington 1962: 362). The three Afrotropical species of the *rugiceps* group probably also belong to *Leucocara*. According to Kult (1959: 176), adults of the *rugiceps* group have also a small mesotibial protuberance but contrary to those of the *natalensis*-group have only one pair of preapical setae (instead of two) on abdominal sternum VII. On the other hand, the species of the *attenuata* group of the Oriental region (five species), despite having a small mesotibial protuberance, have the preapical setae equidistant on abdominal sternum VII (Kult 1951: 18), no discal setae on interval 3 (Kult 1951: 18), the labrum with six setae (Andrewes 1929: 353), and the glossal sclerite with two apical setae (checked on *C. striata* Putzeys only). In my opinion, this group of species is probably not closely related to *Leucocara* and would need a new subgeneric name.

All remaining groups of species previously included in the subgenus *Reichardtula* have a long, apically acuminate mesotibial protuberance (Fig. 3). As now restricted, this subgenus is probably, in my opinion, more closely related to *Clivina s. str.* and *Semiclivina* than to *Leucocara*. The only known significant character state shared between *Reichardtula* and *Leucocara* is the condition of the preapical setae on each side of sternum VII being proximate. Even if this character is eventually proven to be synapomorphic for these taxa, the clear, unambiguous difference in the mesotibial protuberance would justify the recognition of two distinct subgenera, considering the current classification schema of the genus *Clivina*.

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References

- Andrewes HE (1929) Coleoptera. Carabidae. Vol. I. - Carabinae. The fauna of British India, including Ceylon and Burma. Taylor & Francis, London, xviii + 431 pp. + 9 pls.
- Ball GE (2001) The subgenera of *Clivina* Latreille in the Western Hemisphere, and a revision of subgenus *Antroforceps* Barr (new status), with notes about evolutionary aspects (Coleoptera: Carabidae: Clivinini). Special Publication of the Japan Coleopterological Society of Osaka 1: 129–156.
- Bousquet Y (2006) Review of the species of Ardistomina (Coleoptera: Carabidae; Clivinini) in America north of Mexico. Zootaxa 1308: 1–29.
- Bousquet Y, Larochelle A (1993) Catalogue of the Geadephaga (Coleoptera: Trachypachidae, Rhysodidae, Carabidae including Cicindelini) of America north of Mexico. Memoirs of the Entomological Society of Canada No. 167, 397 pp.
- Darlington PJ Jr (1962) The carabid beetles of New Guinea. Part I. Cicindelinae, Carabinae, Harpalinae through Pterostichini. Bulletin of the Museum of Comparative Zoology 126: 321–564 + 4 pls.
- Dejean PFMA (1831) Species général des Coléoptères, de la collection de M. le Comte Dejean. Tome cinquième. Méquignon-Marvis, Paris, 883 pp.
- Fattig PW (1949) The Carabidae or ground beetles of Georgia. Emory University Museum Bulletin 7: 1–62.
- ICZN [International Commission on Zoological Nomenclature] (1999) International Code of Zoological Nomenclature, fourth edition, adopted by the International Union of Biological Sciences. International Trust for Zoological Nomenclature, London, xxix + 306 pp.
- Kult K (1947) The 3rd study to the knowledge of tribus Clivinini (Col., Carab.). Časopis Československé Společnosti Entomologické [Acta Societatis Entomologicae Čechosloveniae] 44: 26–37.
- Kult K (1951) Revision of the genus *Clivina*, Latr., from the Oriental Region. (Col. Carabidae). Časopis Československé Společnosti Entomologické [Acta Societatis Entomologicae Čechosloveniae] 48: 16–32.
- Kult K (1959) Revision of the African species of the old genus *Clivina* Latr. (Col. Carabidae). Revue de Zoologie et de Botanique Africaines 60: 172–225.
- LeConte JL (1879) Synoptic tables: *Ardistomis*, Putz.; *Aspidoglossa*, Putz.; *Clivina*, Latr.; *Schizogenius*, Putz. Bulletin of the Brooklyn Entomological Society 2: 32–34.
- Leng CW (1915) List of the Carabidae of Florida. Bulletin of the American Museum of Natural History 34: 555–601.
- Leng CW, Beutenmuller W (1893) List of the Coleoptera of north eastern America, with special reference to the fauna of New York City and vicinity. Journal of the New York Entomological Society 1: 91–96, 134–146, 185–194.
- Nichols S (1988) Systematics and biogeography of West Indian Scaritinae (Coleoptera: Carabidae). PhD thesis, Ithaca, Cornell University, xiii + 393 pp.
- Putzeys JAAH (1866) Révision générale des clivinides. Annales de la Société Entomologique de Belgique 10: 3–242.
- Rathvon SS (1869) Entomology. In: Mombert JI. An authentic history of Lancaster County, in the state of Pennsylvania. J.E. Barr & Co., Lancaster, 521–574.

A new genus and species of Oxycarenidae (Hemiptera, Heteroptera, Lygaeoidea) from Argentina

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Abstract

The new genus *Notocoderus* and the new species *N. argentinus* are described from Buenos Aires Province, Argentina, based on two specimens taken in pitfall traps. Dorsal and lateral digital images of this new subbrachypterous oxycarenid and *Dycoderus picturatus* Uhler, known only from Arizona and Colorado in the United States, are provided and their relationships with each other and other oxycarenids are discussed. A lectotype for *D. picturatus* is designated.

Keywords

New World, lygaeoid, oxycarenid, *Notocoderus* gen. n., *argentinus* sp. n., distribution, *Dycoderus*, relationships

Introduction

The Oxycarenidae comprise a small family of Lygaeoidea, with 22 genera known worldwide (Slater 1964, Slater and O'Donnell 1995, Péricart 2001). They are characterized by ventral spiracles on abdominal segments III to VII, with only II dorsal; lack of lateral trichobothria on sterna III, IV, and V and a median trichobothrium

on segment V, three lateral trichobothria on sternum VI and two on sternum VII; a combination of lacking a hamus and the presence of intervannals on the hind wing; widely separated posterior coxae; absence of laterotergites; scent gland openings between terga IV to V and V to VI; and abdominal sternal sutures complete to margin (and fusion of sterna III, IV, and V is common). Henry (1997), who accorded the Oxycareninae family status, noted that the truncate female abdomen and the two transverse combs of glandular setae on abdominal segment VII in males are unique in the Pentatomomorpha.

Only five genera are recorded from the Western Hemisphere. *Anomaloptera* Amyot and Serville is represented by 17 New World species (Slater 1964), all of which, except one (Dellapé and Cheli 2007), previously were included in the synonymic genus *Crophius* Stål (Hoberlandt 1987). The monotypic genus *Dycoderus* Uhler was established to accommodate *D. picturatus* Uhler from the western United States (Uhler 1901), and *Neaplax* Slater, also represented by only one species, *N. mexicana* Slater, was described from Mexico (Slater 1974). The Palearctic genus *Oxycarenus* Fieber is represented by the introduced *Oxycarenus hyalinipennis* (Costa), a potential pest species now widely distributed in South America and the West Indies (Slater and Baranowski 1994). The species *Macroplox variegata* (Curtis 1835), described from northern Canada (Breddin 1902, Slater 1964), has not been recognized since its original description and almost certainly is not an oxycarenid.

In this paper, we describe the new genus *Notocoderus* and the new species *N. argentinus* from Argentina, based on a male and female collected in pitfall traps from southern Buenos Aires Province. *Dycoderus* (and its only included species *D. picturatus*) is redescribed and its relationship with *Notocoderus* is discussed. Dorsal and lateral digital images of both species are provided to help facilitate recognition.

Materials and methods

Color images of *D. picturatus* and *N. argentinus* were captured using an EntoVision Imaging Suite that included a JVC KY-75 3CCD digital camera mounted to a Leica M16 zoom lens via a Leica z-step microscope stand. Multiple focal planes were merged using Cartograph 5.6.0 (Microvision Instruments, France) software.

The following acronyms are used for specimen depositories cited in this paper: MLP (Museo de La Plata, La Plata, Argentina) and USNM (National Museum of Natural History, Smithsonian Institution, Washington, DC, USA).

Results

Notocoderus Henry & Dellapé, gen. n.

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Type species: *Notocoderus argentinus* sp. n.

Diagnosis. *Notocoderus* is distinguished by the coarsely punctate head, pronotum, and scutellum; the lack of ocelli; the bilobed pronotum with the lobes separated by a deep transverse impression, the strongly convex anterior lobe and much shorter, narrower posterior lobe bearing a tubercle at each posterolateral angle; the ostiolar auricle extended upward and outward into a stout, tuberclelike spout; and the swollen fore femur, armed below with a small spine on distal third.

Description. Total length 2.50 mm, width across hemelytra 0.80 mm. Head, pronotum and scutellum coarsely punctate; hemelytral punctures more sparse and shallow. Dorsal surface with scattered, erect, simple setae; setae longer and more dense on head and pronotum. Head globose; bucculae large and prominent, occupying nearly total length of ventral surface, ending posteriorly well past midlevel of eye, encompassing all of first rostral segment and basal half of second. Eyes small, ocelli absent. Pronotum strongly constricted, divided into two lobes separated by a distinct transverse impression; anterior lobe largest, strongly convex; posterior lobe shorter and narrower with a tubercle at each posterolateral angle. Hemelytron subbrachypterous, convex, wider than and overlapping abdomen by nearly half the width; corial margin narrowly explanate, with a row of coarse punctures along inner margin; membrane sclerotized, convex, without veins, lateral margins narrowly explanate; proportionate length of corium to length of membrane 1.78. Metathoracic scent gland auricle elongate, extending upward and outward, forming a tuberclelike spout; evaporative area covering about half of metapleuron. Metacoxae widely separated. Fore femora moderately incrassate, armed below with a small spine on distal third. Abdominal sterna III to VI fused, posterior margin of sternite VII in males with two transverse combs of glandular setae on either side of midline.

Etymology. The name *Notocoderus* is taken from the Greek “*notos*,” meaning south, and the suffix “*coderus*,” taken from the generic name *Dycoderus*, to reflect the overall similarity of this new southern hemisphere taxon with Uhler’s genus. The gender is masculine.

Discussion. *Notocoderus* clearly is most similar to the Nearctic genus *Dycoderus* in overall appearance, including the general shape of the head and pronotum and color pattern of the hemelytra. It can be distinguished from *Dycoderus* by the lack of ocelli; the more strongly convex anterior pronotal lobe, the more deeply constricted transverse impression, and shorter and narrower posterior lobe with a distinct tubercle (absent in *Dycoderus*) at each posterolateral angle; the longer, tuberculate metathoracic auricle (more distinctly visible from dorsal aspect than in *Dycoderus*); the much smaller subapical spine on the fore femur; and the narrower, more cylindrical abdomen.

Slater (1974) mentioned that there are two groups of Oxycarenidae, according to their general habitus. One includes those with somewhat broadened, ovoid, flattened bodies and tapering porrect heads, such as *Crophius* (now treated as a junior synonym of *Anomaloptera* [Hoberland 1987]; however, we note that this synonymy needs reevaluation), *Oxycarenus*, and *Dycoderus*, and a second composed of relatively slender species with rounded myrmecoid heads and frequently swollen, convex pronota, such as *Neaplax* and the Palearctic genera *Bethylimorphus* Lindberg and *Bycanistellus* Reuter. Although Slater's two groups are generally diagnostic, *Notocoderus* and *Dycoderus* are clearly more closely related to each other, based on the rounded (not porrect) heads and strongly bilobed pronota, than they are to either *Crophius* (or *Anomaloptera*) or *Oxycarenus*.

***Notocoderus argentinus* Henry & Dellapé, sp. n.**

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Figs 1–4, 7–12

Diagnosis. This species is best recognized by the small size, the strongly convex anterior pronotal lobe (Figs 1, 4), the narrow and shorter posterior lobe with a distinct tubercle at each humeral angle (Figs 2, 3), and the dull brown hemelytron (Fig. 1), with a white mark on the basal third and apex of the corium.

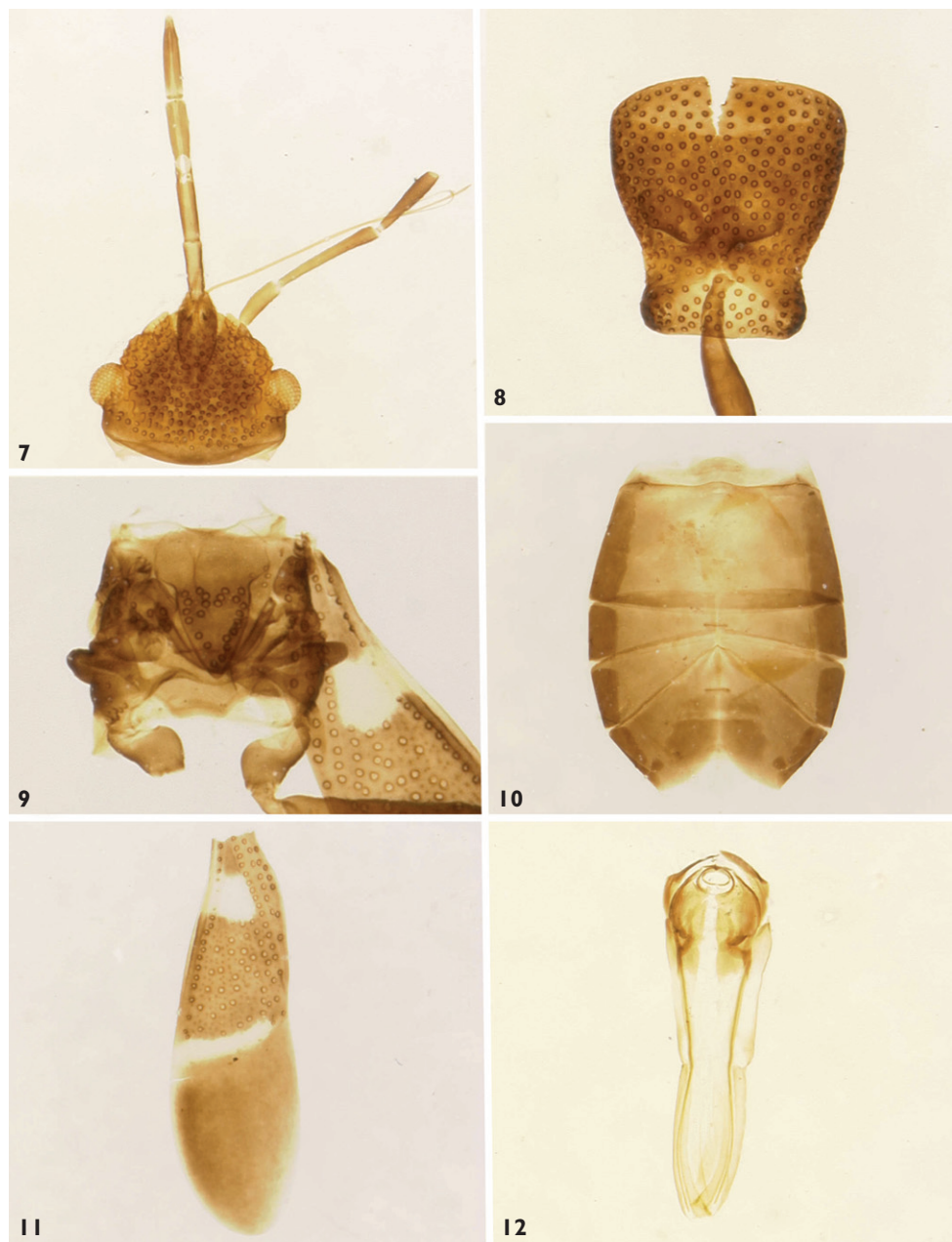
Description. Holotype male (Figs 1–4): Head, pronotum, scutellum, clavus, corium, pleura, sterna, abdomen, rostrum, antennae, and legs pale brown to brown. Antennal segments III and IV, and apex of II and rostral segment IV darker brown. Corium with a white subbasal macula and a narrow white band along posterior margin bordering membrane, whitish areas impunctate. Membrane fuscous with a narrow translucent margin.

Head, pronotum, and scutellum coarsely punctate. Head, pronotum, scutellum and narrowly explanate lateral margin of hemelytron and apex of corium shiny; remainder of corium and clavus dull. Antenna with short semierect setae, more abundant distally; segment I robust, segment IV fusiform. Anterior pronotal lobe globose, transverse impression separating lobe deep. Dorsum with numerous erect, pale setae, shorter and less abundant on hemelytra. Abdomen cylindrical.

Total length 2.50 mm, width across hemelytra 0.80 mm. Head length 0.40 mm, head width 0.61 mm, interocular space 0.42 mm. Labium extending to mesosternum, but not quite reaching mesocoxae; total length about 0.90 mm, length of segment I 0.19 mm, II 0.24 mm, III 0.24 mm, IV 0.18 mm. Antenna: Length of segments I 0.19 mm, II 0.35 mm, III 0.27 mm, and IV 0.42 mm. Pronotum: Length of anterior lobe 0.50 mm, length of posterior lobe 0.19 mm; anterior pronotal lobe 2.58 times longer than posterior pronotal lobe; width of anterior lobe 0.61 mm, width of transverse impression 0.45 mm, and width of posterior lobe 0.54 mm. Scutellum slightly longer than wide, depressed across middle, lacking a median carina. Membrane sclerotized,



Figures 1–6. 1–4 *Notocoderus argentinus*, holotype male 1 Dorsal aspect 2 Lateral aspect 3 Head and pronotum, lateral aspect (arrows indicate position of posterolateral pronotal tubercles) 4 Head and pronotum, dorsal aspect 5, 6 *Dycoderus picturatus* 5 Head and pronotum, lateral aspect (arrow indicates rounded posterolateral pronotal angle lacking a distinct tubercle) 6 Head and pronotum, dorsal aspect.



Figures 7–12. *Notocoderus argentinus*, paratype female (slide mounted) **7** Head **8** Pronotum **9** Thorax, including scutellum and ostiolar tuberculate tubercles **10** Abdomen **11** Hemelytron **12** Ovipositor.

without veins, exceeding apex of abdomen. Hemelytron length to apex of membrane 1.58 mm, length to apex of corium 0.99 mm.

Paratype female (slide mounted, Figs 7–12): Head, pronotum, and scutellum densely and deeply punctate; clavus and corium more sparsely punctate, except for im-

punctate white basal third and apex of corium. Hind wings apparently absent. Sterna II to IV fused; sterna V and VI with a pale sutural line medially. Laterotergites III and IV fused, suture lost. Terga membranous, tergite VI partially sclerotized medially; dorsal abdominal scent gland scar openings distinct between terga IV/V and V/VI.

Female: Head length 0.61 mm, width 0.72 mm, interocular space 0.48 mm. Labium: Length 1.01 mm, segment I 0.21 mm, II, 0.29 mm, III 0.22 mm, IV 0.29 mm. Antenna: Segment I length 0.18 mm, II 0.38 mm, III 0.26 mm, IV missing. Pronotum: Length 0.80 mm, width of anterior lobe 0.74 mm, width of transverse impression 0.46 mm, width of posterior lobe 0.50 mm; length of anterior lobe 0.56 mm, length of posterior lobe 0.24 mm. Hemelytron: Length to apex of corium 1.04 mm, length to apex of membrane 1.81 mm, width 0.50 mm (1.00 mm across hemelytra).

Etymology. The specific epithet *argentinus* is used to denote the country origin of this interesting new species.

Discussion. This species is distinct among the Oxycarenidae based on the shape of the bilobed pronotum (Figs 1, 4), with a well-developed tubercle at each posterolateral angle (Fig. 3), and the subbrachypterous hemelytra with four white maculae (Fig. 1), one on the basal third and apex of each corium.

The holotype and paratype were taken in pitfall traps set in two southern hilly areas of Buenos Aires Province, Sistema Serrano de Tandilia and Sistema Serrano de Ventania, respectively.

Type material. Holotype. Male. Argentina, Buenos Aires, Saavedra, Sierra Curamalal, 750 m, pitfall trap, H. Marrero coll. (MLP). Paratype female (slide mounted): Argentina, Buenos Aires, RN 226, Km 22.7, "El Abrojo" C1, 28-IX-2005, 3-II-2006, pitfall trap, J. L. Farina coll. (USNM).

Dycoderus Uhler

Dycoderus Uhler 1901: 507. Type species: *Dycoderus picturatus* Uhler, 1901. Monotypic.

Diagnosis. *Dycoderus* is distinguished by the coarsely punctate head, pronotum, and scutellum; the bilobed pronotum with lobes separated by a moderately shallow transverse impression, the weakly convex anterior lobe, and the shorter and slightly narrower posterior lobe; the brown hemelytron with the basal third and apex white; the moderately large ostiolar auricle extended up and outward into a tuberclelike spout; and the swollen fore femur, armed below with a large, stout spine on the distal third.

Description. Total length of subbrachypterous male 2.58 mm; length of macrop-terous male 3.14 mm; length of subbrachypterous female: 3.01 mm. Head, pronotum and scutellum coarsely punctate; hemelytral punctures finer and smaller. Dorsal surface with scattered, erect setae. Head globose; bucculae large and prominent occupying three fourths of the total length of ventral surface, extending posteriorly to about midlevel of eye, encompassing all of first rostral segment and basal half of second. Eyes small; ocelli tiny, reddish, set near inner margin of each eye. Pronotum bilobed, lobes separated by a

relatively shallow transverse impression, anterior lobe subquadrangular, weakly convex, slightly wider and about 1.7 times longer than posterior lobe. Scutellum subequalateral, with basal width slightly greater than length, basal half flattened, apex swollen above level of hemelytra. Hemelytron ranging from subbrachypterous (convex with a shell like membrane) to fully macropterous; corial margin narrowly explanate, with a row of shallow punctures along inner margin; membrane ranging from abbreviated, lacking veins, and extending only to apex of abdomen to fully developed with indistinct veins and extending beyond apex of abdomen by half its length. Proportionate length of corium to length of membrane 1.44. Ostiolar auricle elongate, extended upward and outward, forming a short, stout, tuberculate spout; evaporative area covering about half of metapleuron. Metacoxae widely separated. Fore femora moderately incrassate, armed below on distal third with a relatively large spine. Abdomen broad, abdominal sterna III to VI fused, posterior margin of sternites VII and VIII in males with two transverse combs of glandular setae on either side of median line.

Discussion. *Dycoderus* is similar to *Notocoderus*, but differs in the subequally wide pronotal lobes, with a more shallow transverse impression separating them, the lack of posterolateral tubercles on the posterior lobe, the shorter ostiolar tubercle (less visible from dorsal aspect), and the much larger white macula on the basal third of the corium.

Dycoderus picturatus Uhler

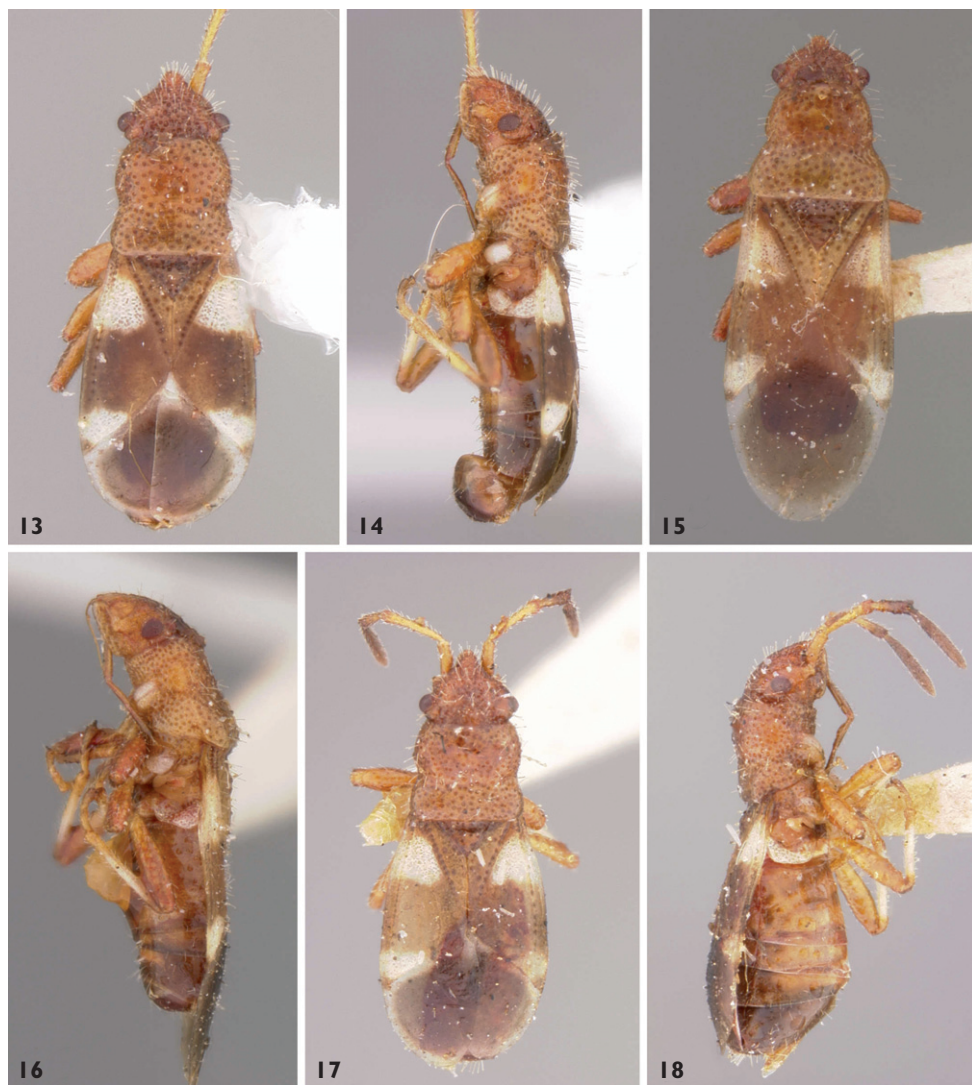
Figs 5, 6, 13–18

Dycoderus picturatus Uhler 1901: 508 (orig. descrip.); Slater 1964: 639 (cat.), 1974: 517 (note); Ashlock and A. Slater 1988: 209 (cat.).

Diagnosis. This species is best distinguished by the generic characters given above, especially the shape of the pronotum (Fig. 6) and the larger, white maculae (Figs 13, 15, 17) on the corium.

Description. Subbrachypterous lectotype male (Figs 13, 14): Overall coloration yellowish brown to almost reddish brown, with four white maculae on hemelytra. Dorsal surface of head, pronotum, scutellum, explanate costal margin, and wing membrane shiny; corium and clavus dull. Head reddish brown; eyes small, dark brown; ocelli tiny, indistinct, reddish. Labium yellowish brown, segment IV dark brown. Antenna yellowish brown, segment IV and apical half of III dark brown. Pronotum and scutellum reddish brown. Hemelytron largely brown to dark brown with basal third and apex white. Ventral surface brown to reddish brown, abdomen darker brown to fuscous laterally; acetabulae and posterior half of metapleuron white. Ostiolar evaporative area and auricle brown. Legs with femora brown to reddish brown; tibiae pale yellowish brown, slightly darker brown basally and distally.

Head deeply and densely punctate. Pronotum deeply but less densely punctate, posterolateral angles swollen but not tuberculate; scutellum deeply, but more sparsely punctate,



Figures 13–18. *Dycoderus picturatus* **13, 14** Subbrachypterous lectotype male **13** Dorsal aspect **14** Lateral aspect **15, 16** Macropterous male **15** Dorsal aspect **16** Lateral aspect **17, 18** Paralectotype female **17** Dorsal aspect **18** Lateral aspect.

depressed through middle, apex weakly swollen above level of hemelytra. Hemelytron impunctate except for a few fine punctures on white basal third of corium. Dorsum with scattered, erect, pale setae; setae more dense on head and pronotum than on hemelytron.

Total length 2.58 mm, width 0.99 mm. Head length 0.48 mm, width across eyes 0.62 mm; interocular width 0.42 mm, width between ocelli 0.32 mm. Labium: Total length 1.06 mm; segment I length 0.24 mm, II 0.26 mm, III 0.24 mm, IV 0.32 mm; extending to bases of middle coxae. Antenna: Segment I length 0.30 mm, II 0.45 mm, III 0.29 mm, IV 0.50 mm. Pronotum: Total length 0.69 mm, length of anterior lobe

0.43 mm, length of posterior lobe 0.25 mm, width of anterior lobe 0.66 mm, width of posterior lobe 0.70 mm, width of transverse impression 0.59 mm. Hemelytron length to apex of membrane 1.57 mm, length to apex of corium 1.20 mm.

Macropterous male (Figs 15, 16): Similar to subbrachypterous male but with wings fully developed and membrane extending well beyond apex of abdomen. Length 3.14 mm, width 1.07 mm. Head: Length 0.51 mm, width 0.62 mm, interocular width 0.40 mm; width between ocelli 0.32 mm. Labium: Total length 1.06 mm, length of segment I 0.27 mm, II 0.26 mm, III 0.21 mm, IV 0.32 mm, extending to bases of middle coxae. Antenna: Missing. Pronotum: Total length 0.77 mm, length of anterior lobe 0.42 mm, length of posterior lobe 0.35 mm, width of anterior lobe 0.69 mm, width of posterior lobe 0.91 mm, width of transverse impression 0.66 mm. Hemelytron length to apex of membrane 2.20 mm, length to apex of corium 1.40 mm.

Subbrachypterous paralectotype female (Figs 17, 18): Similar to subbrachypterous lectotype male in shape, size, and coloration. Length 3.01 mm, width 1.20 mm. Head: Length 0.45 mm, width across eyes 0.72 mm; interocular width 0.50 mm. Labium: Total length 1.10 mm, length of segment I 0.27 mm, II 0.32 mm, III 0.26 mm, IV 0.35 mm; extending to bases of middle coxae. Antenna: Length of segment I 0.26, II 0.40 mm, III 0.27 mm, IV 0.46 mm. Pronotum length 0.72 mm, length of anterior lobe 0.46 mm, width of anterior lobe 0.75 mm, length of posterior lobe 0.26 mm, width of posterior lobe 0.82 mm. Hemelytron length to apex of membrane 1.89 mm, length to apex of corium 1.33 mm.

Distribution. Reported and known only from Arizona and Colorado in the United States (Ashlock and A. Slater 1988).

Discussion. This species is most similar to *Notocoderus argentinus* in overall appearance, but can be distinguished by the presence of ocelli, the subequally wide pronotal lobes, the lack of a tubercle on each posterolateral angle of the posterior lobe, and the larger white maculae on the corium.

Type material examined. Lectotype. Male. (here designated to preserve nomenclatural stability): label 1, “Phoenix, Ariz, 5.97”; label 2, “Type”; label 3, “Remounted 1 Feb. 2008” (USNM). **Paralectotypes:** 1 female, same data as for lectotype (USNM); 1 female [head, pronotum, right hemelytron, and all legs missing], “Col.,” “*Dycoderus picturatus* Uhler” (in Uhler’s hand), “P. R. Uhler collection.,” “*Dycoderus picturatus* Uhl. Lectotype(?)”, Det. H. G. Barber” (USNM).

Other specimens examined. 1 female, West Cliff, Colo.[?City]; *Dycoderus picturatus* Uhler det. H. G. Barber (USNM); 1 male, Garland, Col., 22 – 6, Hubbard & Schwarz (USNM); 2 females, Custer Co., Col., Aug., T. D. A. Cockerell (USNM).

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References

- Ashlock PD, Slater A (1988) Family Lygaeidae Schilling, 1829 (= Infericornes Amyot and Serville, 1843; Myodochidae Kirkaldy, 1899; Geocoridae Kirkaldy, 1902). Pp. 167–245. In: Henry TJ, Froeschner RC (Eds) Heteroptera, or true bugs, of Canada and the continental United States. E. J. Brill, Leiden and New York, 958 pp.
- Breddin G (1902) Die Hemipteren und Siphunculaten des arktischen Gebietes. Fauna Arctica, Jena 2: 531–560.
- Curtis J (1835) Insects. Descriptions of the insects brought home by Commander James Clark Ross, R. N., F. R. S., & C. In: Ross JC (Ed.) Appendix to the narrative of a second voyage in search of a north-west passage and of a residence in arctic regions during the years 1829, 1830, 1831, 1832, 1833. A. W. Webster, London, lvii–lxxx.
- Dellapé PM, Cheli GH (2007) A new species of *Anomaloptera* Amyot & Serville from Patagonia (Hemiptera: Lygaeoidea: Oxycarenidae). Zootaxa 1528: 65–68.
- Henry TJ (1997) Phylogenetic analysis of family groups within the infraorder Pentatomomorpha (Hemiptera: Heteroptera), with emphasis on the Lygaeoidea. Annals of the Entomological Society of America 90(3): 275–301.
- Hoberlandt L (1987) Results of the Czechoslovak-Iranian Entomological Expeditions to Iran 1970, 1973 and 1977. Heteroptera, Lygaeidae, Oxycareninae. Acta Entomologica Musei Nationalis Pragae 42: 12–29.
- Péricart J (2001) Family Lygaeidae Schilling, 1829 – seed-bugs. In: Aukema B, Rieger C (Eds) Catalogue of the Heteroptera of the Palaearctic Region. Pentatomomorpha I. Volume 4. The Netherlands Entomological Society, Amsterdam, 35–220.
- Slater JA (1964) A catalogue of the Lygaeidae of the world. 2 volumes. University of Connecticut, Storrs. 1668 pp.
- Slater JA (1974) *Neaplax*, a new genus of Oxycareninae from the Western Hemisphere (Hemiptera: Lygaeidae). Journal of the Kansas Entomological Society 47(4): 517–522.
- Slater JA, Baranowski RM (1994) The occurrence of *Oxycarenus hyalinipennis* (Costa) (Hemiptera: Lygaeidae) in the West Indies and new Lygaeidae records for the Turks and Caicos Islands of Providenciales and North Caicos. Florida Entomologist 77: 495–497.
- Slater JA, O'Donnell JE (1995) A catalogue of the Lygaeidae of the world (1960–1994). New York Entomological Society, New York, 410 pp.
- Uhler PR (1901) Some new genera and species of North American Hemiptera. Proceedings of the Entomological Society of Washington 4: 507–515.

A new termite bug in Miocene amber from the Dominican Republic (Hemiptera, Termitaphididae)

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Abstract

A new species of the termite bug genus *Termitaradus* Myers (Aradoidea: Termitaphididae) is described and figured based on a single female preserved in Early Miocene (Burdigalian) amber from the Dominican Republic. *Termitaradus mitnicki* sp. n. differs from the only other termitaphidid in Dominican amber, *T. avitinquilinus* Grimaldi and Engel, in the integumental ornamentation, number of laminae and lobules, body proportions, and setation. This is the third species of fossil Termitaphididae discovered. A revised key to living and fossil termitaphidids is provided.

Keywords

Prosorrhyncha, Heteroptera, Pentatomomorpha, Aradoidea, inquiline, Tertiary, paleontology, West Indies

Introduction

The nests of highly eusocial insects are seething with a diversity of associated arthropods, all evolved to take advantage of the rich resources provided by these ubiquitous and ecologically impressive species. Among the more unusual of inquiline arthropods to evolve in conjunction with their eusocial hosts are those species of

the aradoid family Termitaphididae (Hemiptera: Heteroptera: Pentatomomorpha). Termitaphidids, as their name suggests, are obligate inquilines in the nests of termites, particularly those of the families Termitidae and Rhinotermitidae. Termitaphidids are typically small (2–4 mm in length, although some fossils can be as large as 5.5–7 mm), ovoid, and generally dorsoventrally compressed, with flattened lateral laminae extending from each segment. The family currently comprises two genera, *Termitaphis* Wasmann, a monotypic genus known from Colombia, and *Termitaradus* Myers, with eight living species in South and Central America, tropical Africa, Asia, and Australia. Although classified as a separate family, it is possible that termitaphidids are highly derived mezirine Aradidae, some of which have structures similar to Termitaphididae and several of which are termitophiles (Grimaldi and Engel, 2008). The most detailed accounts of termitaphidid biology are those of Myers (1924, 1932).

Two species of termitaphidids, both of the genus *Termitaradus* and known only from females, have been discovered in New World Tertiary ambers. *Termitaradus avitinquilinus* Grimaldi and Engel was described from Early Miocene Dominican amber and is generally similar to modern species in its overall proportions, but differs most notably in the number of laminar lobules as well as the structure of the flabella (Grimaldi and Engel 2008). *Termitaradus protera* Poinar and Doyen shares some similarities in lobule number with *T. avitinquilinus* by comparison to modern species, but is particularly noteworthy for its “gigantic” size (Poinar and Doyen 1992), which at 7.1 mm is nearly twice the length of previously described species. Hosts for these fossil species are unknown, although *T. avitinquilinus* is likely associated with *Mastotermes electrodominicana* Krishna and Grimaldi (Mastotermitidae) as two specimens were found in association with a worker of that species (Grimaldi and Engel 2008). This is noteworthy in that as far as has been documented modern termitaphidids are only associated with Neoisoptera (*sensu* Engel et al., 2009) of the families Rhinotermitidae (hosts for species of the genus *Termitaradus*) and Termitidae (hosts for the sole species of *Termitaphis*) (Wasmann 1902; Silvestri 1911, 1921; Mjöberg 1914; Morrison 1923; Myers 1924, 1932; Usinger 1942). Given how little termitaphidids have been studied there are likely a number of new species to be discovered and many elements of their biology remaining to be elucidated, perhaps including yet unsuspected host associations. Since the scant available information indicates an association between termitaphidids and Rhinotermitidae and Termitidae, and that these two termite families are so diverse in Dominican amber (Krishna and Grimaldi 2009), it is perhaps not surprising that a second species of termitaphidid has been discovered in this deposit (Fig. 1). Herein I provide a description of this new species as well as modified keys to the identification of living and fossil Termitaphididae.

Morphological terminology and format for the description generally follows that of Grimaldi and Engel (2008). Measurements were made using an ocular micrometer on an Olympus SZX-12 stereomicroscope.

Systematic Paleontology

Family Termitaphididae Myers, 1924

Genus *Termitaradus* Myers, 1924

Termitaradus mitnicki Engel, sp. n.

urn:lsid:zoobank.org:act:468CF2DC-81E4-40B3-911D-F52F3170D6CE

Figs 1–2

Holotype. ♀, KU-DR-023. Deposited in the Fossil Insect Collection, Division of Entomology, University of Kansas Natural History Museum, Lawrence, Kansas, USA.



Figure 1. *Termitaradus mitnicki* sp. n. (KU DR-023), photomicrograph of female holotype, dorsal aspect (length of specimen 5.8 mm).

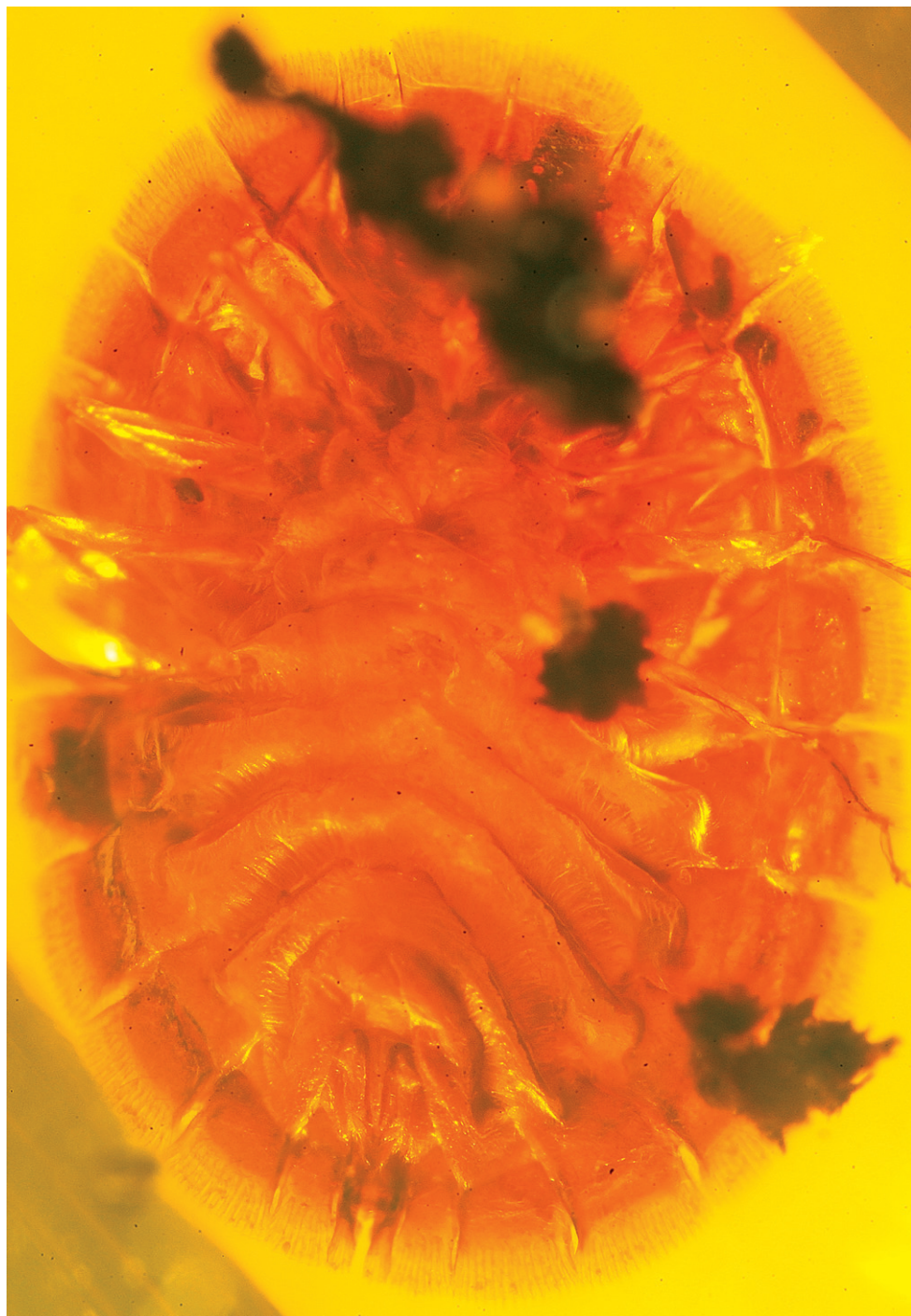


Figure 2. *Termitaradus mitnicki* sp. n. (KU DR-023), photomicrograph of female holotype, ventral aspect showing genitalia (length of specimen 5.8 mm).

Diagnosis. The new species is immediately distinctive for the network of dorsal, segmentally-arranged carinae (Fig. 1) and the absence of the small globular nodule-like setae of other species. The species is larger than most other termitaphidids (2–4 mm), approximating in size the anomalously large *T. protera* in Mexican amber (5.8 mm vs. 7 mm). Like the other two fossil species, *T. mitnicki* shares a greater number of lobules (4) on the terminal abdominal segment, whereas modern species have only 2–3. The number of lobules on most abdominal segments is greater than in any other species, living or fossil, of termitaphidid.

Description. *Female (adult):* Total length 5.8 mm, maximal width 4.0 mm (length/width ratio 1.45). Integument generally reddish brown, although paler on sterna and on dorsal carinae (Fig. 1), lobules largely reddish brown although slightly lighter than body of laminae, apices of lobules more weakly sclerotized, paler than remainder; marginal setae typically pale yellow brown although some cleared, faint (the latter owing to preservation); ventrally faintly imbricate except longitudinally wrinkled on sterna (Fig. 2), with mediolateral areas glabrous, without punctures; dorsally imbricate without punctures, with distinct and complex network of thick carinae arranged segmentally (Fig. 1), such carinae not extending onto laminae (Fig. 1), without setae. Antenna four-segmented, geniculate; first article elongate, length slightly longer than combined lengths of remaining articles combined; remaining articles short, cylindrical, apicalmost apparently slightly swollen (challenging to see in specimen). Labium three-segmented, basalmost segment much shorter than others; second longest, third approximately three-quarters length of second.

Legs with stout femora, greatest widths of femora 2.5–4× times width of tibiae; femora with widely scattered short setae on outer and inner surfaces; mesofemur ventrally with longitudinal row of 3–4 stiff, erect setae at about three-quarters length; metafemur with 4–5 long, fine, erect setae at about four-fifths length; tibiae with scattered short setae along lengths, particularly on outer surfaces, apically with patches of moderately dense, stiff setae; tarsi dimerous, basal tarsomere one-fourth to one-fifth length of apical tarsomere; pretarsal ungues (= claws) large, simple, without teeth; pulvilli present, slender, straplike, lengths nearly as long as that of pretarsal ungues.

Marginal setae of laminae generally subtriangular to lanceolate in form, apparently with serrate margins, none clavate. Thirteen marginal laminae present [two for head, first distinctly larger than, almost twice as large as, second and with narrow separation; three for thorax (one lobule per thoracic segment); and one each for the eight abdominal segments, seventh and eighth the smallest, seventh slightly less than one-half that of first, eighth about one-fifth that of first (Fig. 2)]. Laminae with lobules arranged as follows: 15 (head I), 5–6 (head II), 18 (prothorax), 16 (mesothorax), 12 (metathorax), 14 (abdominal I), 15–16 (abdominal II), 15–16 (abdominal III), 17–18 (abdominal IV), 15–16 (abdominal V), 14–15 (abdominal VI), 8 (abdominal VII), and 4 (abdominal VIII).

Male: Unknown.

Etymology. The specific epithet is a patronym honoring Mr. Tyler Mitnick, nephew of Keith Luzzi who generously located and donated this fine specimen for study.

Key to adult females of Termitaphididae

The following key is updated and modified from the one provided by Userger (1942).

1. Body egg-shaped, surrounded by a strongly incurved and upcurved, dorso-lateral, segmentally divided lamina, the edges of which are further divided into distinct, often quite distantly separated lobules, each with a long, fine almost smooth flagellum [Colombia; host: *Amitermes foreli* Wasmann (Termitidae: Termitinae)] ***Termitaphis circumvallata* Wasmann**
- Entire body strongly flattened above and below and surrounded by a flat, lateral, segmentally divided lamina, the margin of which is crenulate, forming short, non-separated lobules, each provided with a short, circular, clavate, or lanceolate flabellum with serrate edges [Tropicopolitan; Genus *Termitaradus* Myers; hosts, where known: Rhinotermitidae] **2**
2. Dorsal integument imbricate and granular, with scattered globular nodule-like setae; without raised pattern of carinae **3**
- Dorsal integument imbricate with network of raised, thick carinae forming distinctive network, such carinae not extending onto laminae (Fig. 1) [Dominican amber; host: unknown] ***T. mitnicki* sp. n.**
3. Flabella short and rounded, at most scarcely more than twice as long as broad **4**
- Flabella elongate, much more than twice as long as broad **8**
4. Eighth abdominal lobes each with two or three lobules; anterior abdominal segments with 7–10 lobules on each side; size small (2–3.5 mm in length) **5**
- Eighth abdominal lobes each with four lobules; anterior abdominal segments with at least 12 lobules on each side; size large, over 7 mm in total length [Mexican amber; host: unknown] ***T. protera* Poinar & Doyen**
5. Eighth abdominal lobes each with two lobules; anterior abdominal segments normally with seven or more lobules on each side **6**
- Eighth abdominal lobes each with three lobules on each side **7**
6. Flabella rounded; anterior abdominal segments with not more than seven lobules on each side [México; host: *Heterotermes tenuis* (Hagen) (Heterotermitinae)] ***T. mexicana* (Silvestri)**
- Flabella short, clavate; anterior abdominal segments with eight or more lobules on each side [India; host: *Coptotermes heimi* (Wasmann) (Coptotermitinae)] ***T. annandalei* (Silvestri)**
7. Flabella of second cephalic lobe half the size of other head and body flabella, but projecting conspicuously, ovate in form [Guyana; hosts: *Heterotermes crinitus* (Emerson) & *H. tenuis* (Hagen) (Heterotermitinae)] ***T. guianae* (Morrison)**
- Flabella of second cephalic lobe much smaller, minute, scarcely surpassing margins, perfectly circular in form [Jamaica; host: *Heterotermes convexinotatus* (Snyder) (Heterotermitinae)] ***T. jamaicensis* Myers**
8. Eighth abdominal lobes each with two or three lobules **9**

- Eighth abdominal lobes each with four lobules [Dominican amber; putative host: *Mastotermes electrodominicana* Krishna & Grimaldi (Mastotermitidae)] ***T. avitinquilinus* Grimaldi & Engel**
- 9. Eighth abdominal lobes each with two lobules **10**
- Eighth abdominal lobes each with three lobules **11**
- 10. Flabella long, narrow, clavate, with straight sides and squarely truncate tips, not echinate; anterior abdominal lobes each with eight or more lobules [Australia; host: *Coptotermes acinaciformis* (Froggatt) (Coptotermitinae)]
..... ***T. australiensis* (Mjöberg)**
- Flabella subcylindrical, rounded at apices or at most very obtusely pointed, echinate; anterior abdominal lobes each with seven lobules [Africa; host: *Schedorhinotermes putorius* (Sjöstedt) (Heterotermitinae)]
..... ***T. subafra* (Silvestri)**
- 11. Flabella lanceolate, very acute at apices [Panamá; hosts: *Heterotermes tenuis* (Hagen) & *H. convexinotatus* (Snyder) (Heterotermitinae)]
..... ***T. panamensis* Myers**
- Flabella moderately clavate, rounded at apices [Trinidad & Tobago; host: *Heterotermes tenuis* (Hagen) (Heterotermitinae)] ***T. trinidadensis* (Morrison)**

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References

- Engel MS, Grimaldi DA, Krishna K (2009) Termites (Isoptera): Their phylogeny, classification, and rise to ecological dominance. *American Museum Novitates* 3650: 1–27.
- Grimaldi DA, Engel MS (2008) A termite bug in Early Miocene amber of the Dominican Republic (Hemiptera: Termitaphididae). *American Museum Novitates* 3619: 1–10.
- Krishna K, Grimaldi DA (2009) Diverse Rhinotermitidae and Termitidae (Isoptera) in Dominican amber. *American Museum Novitates* 3640: 1–48.
- Mjöberg E (1914) Preliminary description of a new representative of the family Termitocoridae. *Silv. Entomologisk Tidskrift* 35: 98–99.
- Morrison H (1923) On three apparently new species of *Termitaphis* (Hem. Het.). *Zoologica* 3(20): 403–408.
- Myers JG (1924) On the systematic position of the family Termitaphididae (Hemiptera, Heteroptera), with a description of a new genus and species from Panama. *Psyche* 31(6): 259–278.

- Myers JG (1932) Observations on the family Termitaphididae (Hemiptera-Heteroptera) with the description of a new species from Jamaica. *Annals and Magazine of Natural History, Series 10*, 9: 366–372.
- Poinar GO, Jr, Doyen JT (1992) A fossil termite bug, *Termitaradus protera* sp. n. (Hemiptera: Termitaphididae), from Mexican amber. *Entomologica Scandinavica* 23(1): 89–93.
- Silvestri F (1911) Sulla posizione sistematica del genere *Termitaphis* Wasm. (Hemiptera), con descrizione di due specie nuove. *Bolletino del Laboratorio di Zoologia Generale ed Agraria, Portici* 5: 231–236.
- Silvestri F (1921) A new species of *Termitaphis* (Hemiptera-Heteroptera) from India. *Records of the Indian Museum* 22: 71–74.
- Usinger RL (1942) Revision of the Termitaphididae (Hemiptera). *Pan-Pacific Entomologist* 18(4): 155–159.
- Wasmann E (1902) Species novae insectorum termitophilorum ex America meridionali. *Tijdschrift voor Entomologie* 45: 75–107.

First report of the old world genus *Pelecystola* in North America, with description of a new species (Lepidoptera, Tineidae)

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Abstract

The tineid genus *Pelecystola*, which was previously represented by six widely scattered species known only from the Palearctic, Indomalayan, and Ethiopian regions, is reported for the first time from the western hemisphere. The new species, *Pelecystola nearctica*, has been found to occur rather commonly over much of eastern North America from Quebec, Canada, south in the United States to Florida and west to Arkansas. The genus *Pelecystola* is partially characterized by the development of a pedunculate pectinifer which arises from the extreme base of the male valva, a character also shared by the austral South American genus *Falsivalva*. Although the genus has sometimes been referred to the Scardiinae, the subfamily affinities of *Pelecystola* as well as the larval biology remain unresolved.

Keywords

Biogeography, *Falsivalva*, genital morphology, pectinifer, Scardiinae

Introduction

Prior to this report, the tineid genus *Pelecystola* was known only from the Palearctic, Indomalayan, and Ethiopian regions where six species occur widely scattered from Europe (*P. fraudulentella* Zeller), Africa (*P. decorata* Meyrick, *P. melanchares* (Meyrick), *P. polysticha* (Meyrick), and *P. tephritidis* (Meyrick)), eastward to India, Indonesia, and Japan, (*P. strigosa* (Moore) (= *P. hierophanta* (Meyrick), *P. maculella* (Matsumura)) (Robinson and Tuck 1996, Robinson 2008, Sakai 2002). Although *P. nearctica* is now relatively common and widespread over much of the eastern United States, the first recorded collection of this rather easily recognized moth dates back to only 1961 from Florida. Ten years later it was collected in Delaware. Because of its relatively recent history and its distribution along the Atlantic seaboard, *P. nearctica* was first suspected of being introduced from the Old World. Comparisons of the male genitalia of all six previously named species, however, have confirmed its status as previously unnamed. The larval biology of *Pelecystola* is unknown.

Pelecystola Meyrick

Pelecystola Meyrick, 1920: 103. Type species: *Pelecystola decorata* Meyrick, 1920.

Zularcha Meyrick, 1937: 75. Type species: *Zularcha melanochares* Meyrick, 1937.

Neurozestis Meyrick, 1938: 25. Type species: *Neurozestis polysticha* Meyrick, 1938.

Adult. Moderately large-sized tineid moths with forewing lengths 5.4–10 mm.

Head (Figs 2–3): Vestiture rough; vertex and frons densely covered with erect, piliform scales with acute apices. Antenna simple, ciliate, bipectinate in *P. strigosa* Moore, ~ 0.5–0.6× length of forewing; scape slightly flattened, smoothly scaled, with pecten consisting of 6–25 bristles; flagellum with a single row of moderately broad scales dorsally on each segment. Eye moderately developed; interocular index ~ 0.6; frons broad. Ocellus absent. Pilifer undeveloped. Mandible vestigial. Galea reduced, ~ 0.9–1.0× length of maxillary palpus. Maxillary palpus elongate, 5-segmented, with apical segment minute; length ratio of segments from base: 1.0: 0.9: 1.0: 3.75: 0.3–0.4. Labial palpus well developed; length ratio of segments from base: 1.0: 3.2: 1.7; vestiture relatively smooth dorsally, moderately rough ventrally with 2–8 dark, elongate bristles arising mostly laterally along segment 2.

Thorax: Forewing (Fig. 4) moderately slender, W/L ratio ~ 0.35, apex moderately rounded. Venation well preserved with most veins distinct. Forewing venation variable, usually with all 5 branches of R present and separate; Rs2 absent in *P. decorata*, Rs3 and 4 stalked in *P. decorata* and *P. strigosa*; accessory cell distinct, mostly closed; M1–3 all separate; CuA1–2 well preserved; CuP indistinct for most its length; A1 and 2 with basal fork, then fused nearly 2/3 their length; male retinaculum an elongate, basal, ventral fold, curled distally; female retinaculum consisting of a loose concentration of elongate hairs from ventral base of Sc. Hindwing W/L ratio ~ 0.4; M1–3 all separate; CuA1 and 2 well developed; 1A + 2A well preserved; 3A distinct; frenula a single stout bristle in male, 2

tightly appressed bristles in female. Legs with tibial spur pattern of 0–2–4; epiphysis well developed, more than half the length of foretibia; tibial spurs of unequal lengths.

Abdomen: Without specialized structures; S2 apodemes slender, nearly straight, elongate, $\sim 0.5\text{--}0.7\times$ length of S2. Male coremata and female corethrogynae absent.

Male genitalia: Uncus usually deeply bilobed, superficially bilobed in some African species. Gnathos absent. Vinculum and tegumen a relatively broad ring, with lateral fusion indistinct; saccus usually short, more elongate in *P. polysticha*. Valva deeply divided into two (cucullar and saccular) lobes; an elongate, slender stalk arising from extreme base of costal margin of valva which enlarges apically to form a spatulate tip bearing a pectinifer consisting of a single row of minute spines. Juxta absent. Aedoeagus usually a slender, moderate to elongate cylinder; cornuti absent.

Female genitalia: Ovipositor elongate, telescoping. Posterior apophysis $\sim 1.7\text{--}1.9\times$ length of anterior pair. Ventral pseudapophysis absent. Ostium bursae a sclerotized ring located near anterior margin of sternum 8. Ductus bursae slender, exceeding length of anterior apophysis, with lightly sclerotized antrum. Corpus bursae relatively large, $\sim 0.5\text{--}0.7\times$ the length of ductus bursae, mostly membranous, with a V-shaped signum consisting of a pair of slender arms converging and partially fused posteriorly.

Discussion. The generic and subfamily relationships of this aberrant genus are uncertain. Gozmány and Vári (1973) suggested that *Pelecystola* could be included within the Scardiinae based on superficial characters, a conclusion also followed by Sakai (2002). A specimen of the new species, *P. nearctica*, along with numerous other genera of Tineidae, have been sequenced for five nuclear genes as part of the Lepidoptera Tree of Life project, supported by the U.S. National Science Foundation. Results from these sequences have yet to be analyzed, but it is hoped that they might provide better resolution of the subfamily relationships of *Pelecystola*. As pointed out by Gozmány and Vári (1973) and others, *Pelecystola* is largely characterized by the peculiar pedunculate pectinifers arising on long stalks from the costal base of the male valvae. As discussed by S. and D. Davis (2009), few tineid genera are known to possess a pectinifer on the valva. Of those that do, the slightly more complex pectinifers of the South American genus *Falsivalva* resemble those of *Pelecystola* the most in arising on slender stalks from the extreme base of the valvae. However, the two genera share little else in common. The male genitalia of *Falsivalva* differ from that of *Pelecystola* and all other Tineidae in the extreme development of a greatly lengthened and almost completely divided tegumen (Davis and Davis 2009). In addition, the female genitalia of *Falsivalva* lack signa.

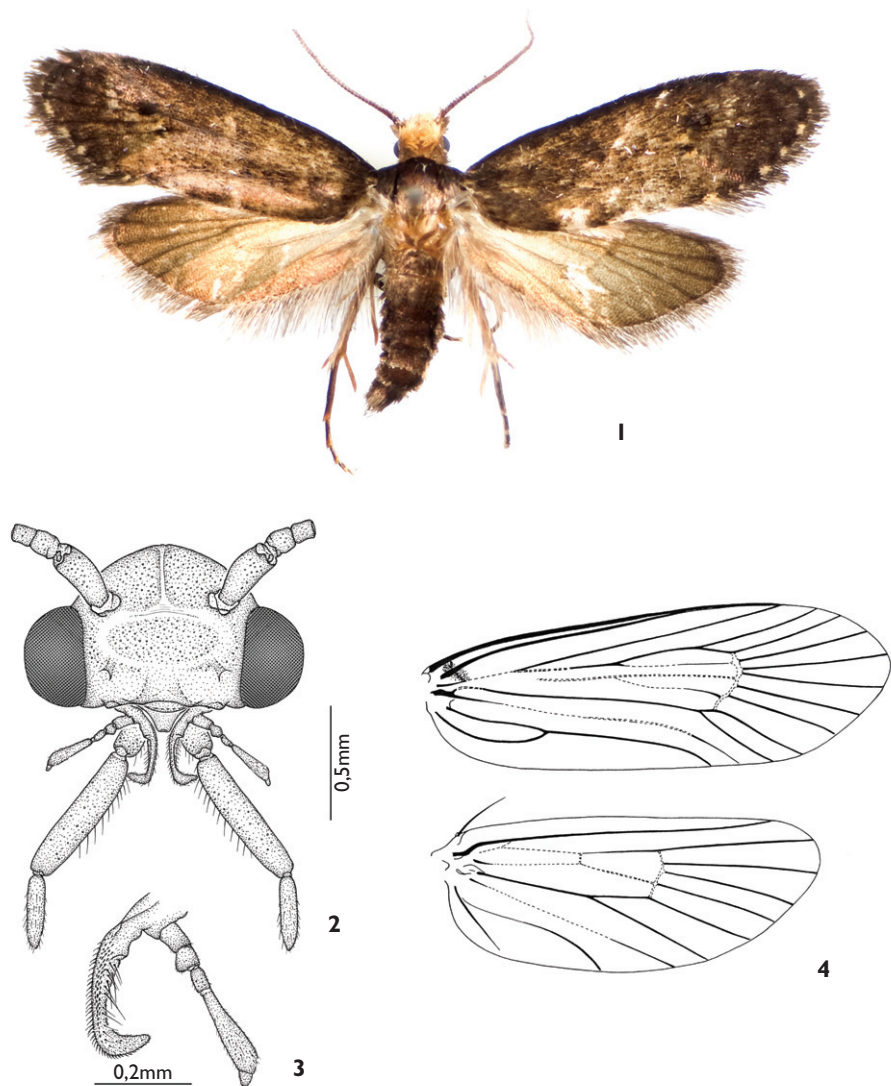
***Pelecystola nearctica* S. Davis & D. Davis, sp. n.**

urn:lsid:zoobank.org:act:618FD1B6-A400-4D52-A4C4-6D77EC524DB7

Figs 1–12

Adult (Fig. 1) – Forewing length: ♂, 5.4–6.2 mm; ♀, 7.0–8.5 mm.

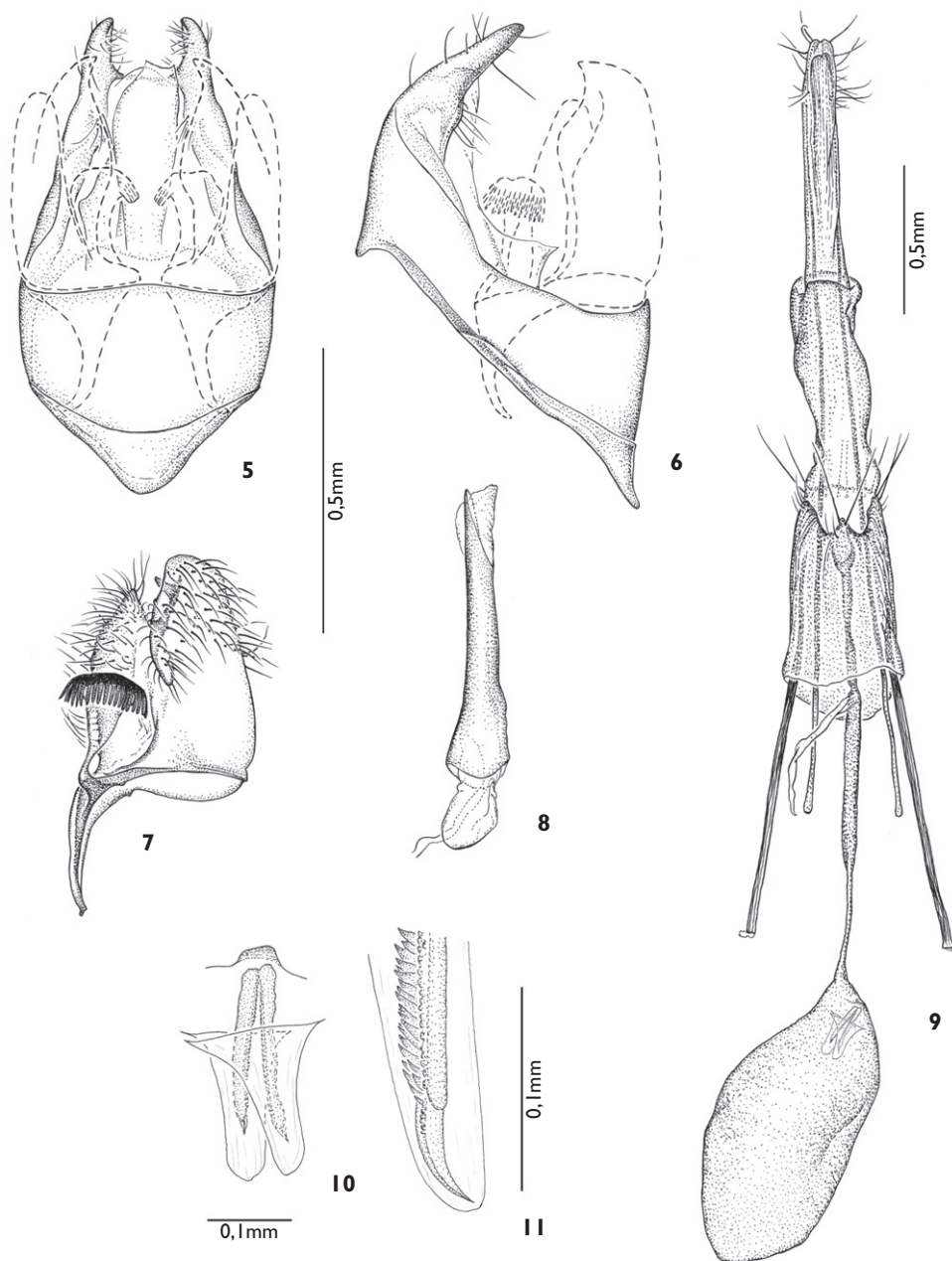
Head: Mostly cream, with caudal most scales of occiput fuscous. Antenna dark brown to fuscous dorsally and ventrally; scape cream ventrally. Maxillary palpus mostly



Figures 1–4. *Pelecystola nearctica* sp. n. **1** Holotype ♂, forewing length 7 mm. **2** Head, frontal view **3** Left maxilla **4** Wing venation.

cream basally, grayish-brown over segments 4–5. Labial palpus cream mesally, dark grayish brown laterally, with ~ 2–5 long, fuscous bristles arising dorsolaterally on segment 2.

Thorax: Pro- and mesonota fuscous; tegulae fuscous, sometimes with a few grayish white scales caudally; metanotum partially naked, light grayish-brown to brown; venter of thorax mostly white, suffused with gray. Forewing predominantly fuscous, lightly marked with several small cream spots as follows: a very small spot at basal 1/3 of Cu – CuP; 1–2 spots at apex of discal cell and 3–5 small spots scattered beyond apex of cell between bases of Rs1–4; a variable series of 6–9 small subterminal spots between



Figures 5–11. *Pelecystola nearctica* sp. n. **5–8** Male genitalia: **5** Genital capsule, ventral view **6** Lateral view of fig. 5 **7** Valva, mesal-lateral view **8** Aedoeagus **9–11** Female genitalia: **9** Ventral view (scale 0.5mm) **10** Detail of signum in fig. 9 **11** Detail of serrated edge of one of the paired arms of signum in fig. 10.

apices of Rs1 and CuA2; terminal fringe dark gray. Hindwing mostly dark grayish brown; fringe mostly light grayish brown, with dark brown basal band. Fore- and mid-legs mostly fuscous dorsally, light brown to cream ventrally; hindlegs dark brown to steely-gray dorsally, light brown to cream ventrally; coxae of mid- and hindlegs mostly white; apices of all tibiae and tarsomeres cream to light brown.

Abdomen: Fuscous to steely-gray dorsally and laterally; light brown to cream ventrally.

Male genitalia (Figs 5–8): Uncus deeply lobed, with lobes widely separated a distance slightly greater than length of lobes. Tegumen and vinculum forming a moderately broad, mostly fused ring; saccus moderately developed, broadly rounded. Valva divided approximately half its length to form subacute cucullar lobe and broader, more rounded saccular lobe; saccular lobe with a small subapical spine; a pedunculate pectinifer ~ half the length of valva arising on a slender stalk from costal margin at extreme base of valva; stalk gradually enlarging to a relatively broad apex bearing 18–20 reflexed spines. Aedeagus a slender tube ~0.6× length of genital capsule, with base slightly broader.

Female genitalia (Figs 9–11): Posterior apophysis elongate, ~1.8× length of anterior apophysis. Ductus bursae slender, densely covered internally with numerous, minute, short spinules; junction with ductus seminalis near caudal 1/3. Corpus bursae membranous except for V-shaped signum; forked arms of signum slender with minutely but coarsely serrated mesal edges (Fig. 11); arms loosely enclosed in a pair of membranous pockets (Fig. 10); walls of corpus bursae finely wrinkled.

Distribution (Fig. 12). This species occurs widely across eastern North America from Quebec, Canada to northern Florida, and west to Arkansas.

Holotype: ♂; USA: North Carolina: Buncombe Co: 4 km SW Black Mountain: 21–27 Jun 1986, W. E. Steiner, (USNM).

Paratypes (25 ♂, 27 ♀ total): CANADA: Quebec: Vercheres, 45.0683N, 73.0433W: 1 ♀, 20 Jun 2005, C. Chanta, CNCLEP00028697 (CNC). USA: ARKANSAS: Johnson Co: 8 mi N Clarksville, T10N R23W Sect. 2: 4 ♂ 10–12 May 1987, R.L. Brown, (MEM). Washington Co: Fayetteville: 1 ♀, 17–18 May 1975, H. N. Greenbaum, at blacklight, J. B. Heppner, wing slide 28587 (USNM); 1 ♂, 5–7 June 1975, H. N. Greenbaum, malaise trap, J. B. Heppner, slide 30242 (USNM); 1 ♀, 19–21 July 1975, H. N. Greenbaum, malaise trap, slide 20304 (USNM); 1 ♂, 19/22 June 1975, H. N. Greenbaum, malaise trap (FSCA); 1 ♀, 17–21 July 1975, H. N. Greenbaum, malaise trap (FSCA); 1 ♀, 1–5 July 1975, H. N. Greenbaum, malaise trap (FSCA). DELEWARE: Newark: 1 ♀, 25 August 1971, D. H. Funk (USNM); 1 ♀, GF [Glen Farms]: 4 Jun 1974, D. F. Bray, (USNM). FLORIDA: Escambia Co: Pensacola: 1 ♀, 15 May 1961, Shirley Hills (USNM). MARYLAND: Allegany Co: Green Ridge St. Forest: 1 ♀, 15 June 1992, J. Glaser (USNM). Charles Co: Myrtle Grove WMA: 1 ♀, 5 June 2001, J. Glaser (USNM). Dorchester Co: 3 miles E. Hurlock: 1 ♀, 10 Sept. 2004, J. Glaser (USNM). Montgomery Co: 4 mi southwest of Ashton, 39°06'30"N, 77°01'30"W: 1 ♂, 2 Jul 2007; 1 ♀, 24 Jul 2008, 1 ♀, 20 Aug 2009, G. Hevel (USNM); Laytonsville: Hoover Farm Woods: 1 ♂, 24 Jun 2000, D. R. Davis, DNA sample DRD-06-1340 (USNM). Plummers Island: 1 ♀, 17 July 1999, J. Brown, head slide 33978, (USNM). Prince Georges Co: 1 ♀, Ft. Washington Park: 1 July 2002, J. Glaser, (USNM); Pretty-

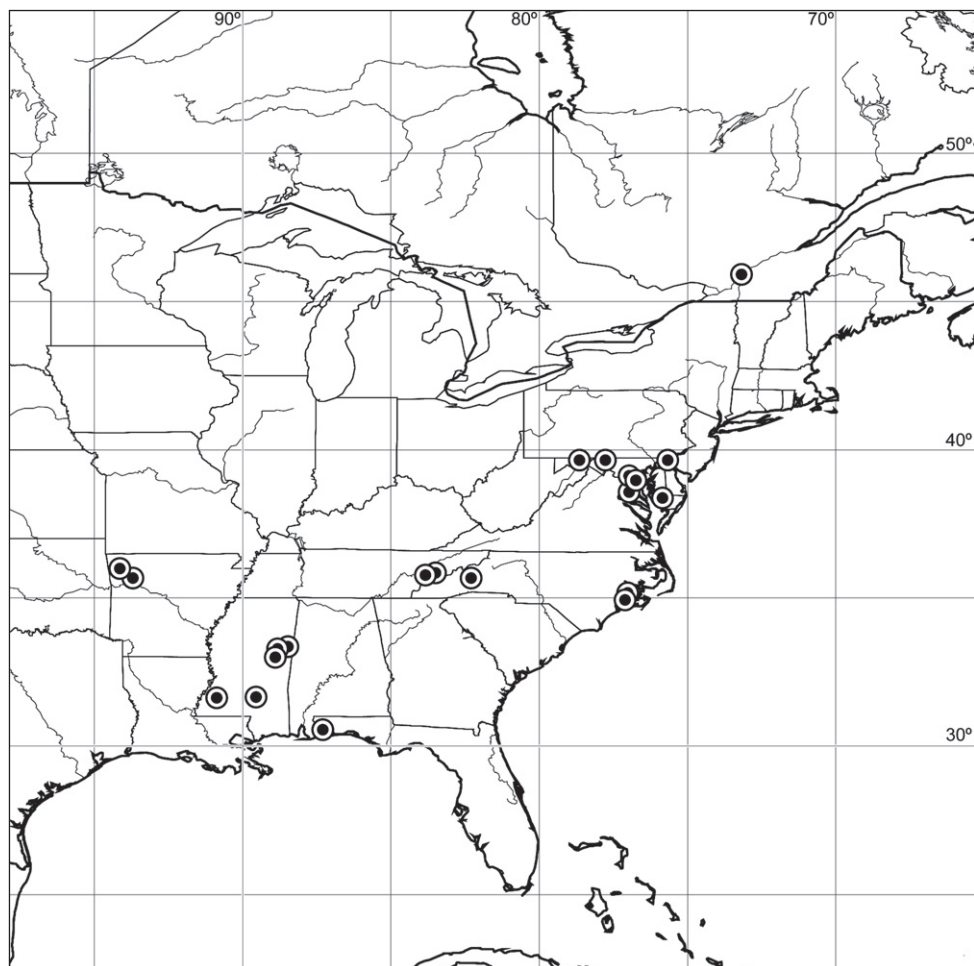


Figure 12. Distribution of *Pelecystola nearctica* sp. n.

boy Reservoir: 2 ♀, 13 August 1998, J. Glaser (USNM); Piscataway Nat. Park: 1 ♀, 30 August 2002, J. Glaser (USNM); 1 ♀, 13 July 2002, J. Glaser, slide 33095 (USNM); 1 ♀, 8 July 2002, J. Glaser (USNM); 1 ♀, 8 Sept. 2002, J. Glaser (USNM). Washington Co: 2 miles E. Smithsburg: 1 ♀, 3 July 1999, J. Glaser, (USNM). MISSISSIPPI: Franklin Co., Porter Creek, T5N R4E, Sec 8NW: 2 ♂, 8 Apr. 1992, J. MacGown & T. Schiefer (MEM). Lowndes Co: Crawford, T17N R16E, Sec. 34, Hickory Grove in Black Belt Prairie: 1 ♂, 20 May 1992, R.L. Brown (MEM). Oktibbeha Co: 5 mi SW Starkville: 1 ♀, 13 Sept. 1984, 1 ♂, 15 Sept. 1984, 1 ♀, 19 Sept. 1984, 2 ♂, 28 Apr. 1986, 1 ♂, 30 Apr. 1987, R.L. Brown (MEM). Winston Co: Tombigbee Natl. Forest, 33°10'20"N, 89°03'55"W: 1 ♂ 20 Apr. 1999, 1 ♀, 25 May 1999, R.L. Brown (MEM). NORTH CAROLINA: Buncombe Co: 4 km SE Black Mountain: 1 ♂, 21–27 June 1986, W. E. Steiner, (USNM); Craven Co: Croatan National Forest road 1111, Brier Ck. Site: 1 ♂, 30 Apr 1997, J. B. Sullivan, UV trap, (FSCA). Croatan National

Forest road 3046, Gum Branch Road: 1 ♂, 25 Apr 1996, J. B. Sullivan, UV trap, (FSCA). Croatan National Forest, Island Walk: 1 ♂, 30 Apr 1997, J. B. Sullivan, UV trap, hardwoods (FSCA). Croatan National Forest Road, 169 Little Deep Creek Road: 1 ♀, 22 April 1999, J. Bolling Sullivan, (USNM). Jones Co: Oak Grove Air Station: 1 ♂, 12 Apr 2002, J. B. Sullivan, UV trap, *Quercus*, *Vaccinium*, xeric and Trent River bottomland (FSCA). TENNESSEE: Cooke Co: GSMNP, Foothills Pkwy, 2nd pullout, 300m, 35°48'63"N, 83°14'05"W: 1 ♂, 22 August 2001, D., M., and S. Davis, UV trap, (USNM); Cocke Co: Great Smoky Mountains National Park, Albright Grove trailhead, 970m, 35°40'86"N, 83°16'77"W: 1 ♂, 24 Jun 2000, D. & M. Davis, UV trap (USNM). Blount Co: Great Smoky Mountains National Park, 200m SW Cades Cove, ATBI house, 35°36'N, 83°50'W, 515m: 1 ♂, 19–20 Aug. 2001, D., M. & S. Davis, UV trap, slide 32411 (USNM). Sevier Co: Gatlinburg, Cobbly Nob, Greenbrier Resort, 35°07'63"N, 83°03'55"W: 1 ♂, 20 May 2005, JF. Landry, P. Herbert, DNA-ATBI-3196 (CNC); Great Smoky Mountains National Park, University of Tennessee Field Station, 35.0739N, 83.0424W: 1 ♀, 21 May 2005, JF. Landry, P. Herbert, DNA-ATBI-3295 (CNC).

Flight Period. Adults have been collected from April 8 to September 19 in Mississippi, with most records over much of its broad range occurring from May through August.

Etymology. The specific name is derived from the Greek *neos* (new) and *arktos* (north) in reference to the nearctic distribution of the species.

Discussion. *Pelecystola nearctica* is most similar in general wing pattern to the European *P. fraudulentella* Zeller 1852, currently known from only the male holotype collected nearly 160 years ago in Slovenia and a recently discovered female from Sweden (Lindeborg and Bengtsson 2008). The two species can be easily distinguished by male genital morphology: the valva of *fraudentella* is distinct in possessing a more slender, greatly elongated saccular lobe which surpasses the apex of the cucullar lobe by nearly half its length, compared to being only slightly longer than the cucullar lobe in *nearctica* (Fig. 7).

The two bristles comprising the frenulum of female *P. nearctica* appear superficially to be fused as one. With slight pressure, however, these can be separated. Whether this peculiar condition of the frenulum is typical for all *Pelecystola* is not known.

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- BMNH** The Natural History Museum (formerly the British Museum (Natural History)), London, United Kingdom.
- CNC** Canadian National Collections of Insects, Arachnids and Nematodes, Agriculture and Agri- Food Canada, Ottawa, Canada.
- FSCA** Florida State Collection of Arthropods, Gainesville, Florida, USA.
- MEM** Mississippi State Entomological Museum, Mississippi State, Mississippi, USA.
- USNM** Collections of the former United States National Museum, now deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C., USA.

References

- Davis SR, Davis DR (2009) Neotropical Tineidae VIII: *Falsivalva*, a new genus of Tineidae from austral South America with extreme modification of the male postabdominal terga (Lepidoptera: Tineoidea). *Proceedings of the Entomological Society of Washington*, 111(2): 378–392.
- Gozmány LA, Vári L (1973) The Tineidae of the Ethiopian Region. *Transvaal Museum, Memoir* 18: i-vi, 1–238.
- Lindeborg M, Bengtsson BÅ (2008) On the remarkable find of *Pelecystola fraudulentella* (Zeller, 1852) in Sweden (Lepidoptera: Tineidae). [Om det sensationella fyndet av *Pelecystola fraudulentella* (Zeller 1852) (Lepidoptera: Tineidae)]. *Entomologisk Tidskrift* 129: 73–79.

- Meyrick E (1920) Voyage de Ch. Allauaud et R. Jeannel en Afrique Oriental, Resultats Scientifiques, Insectes Lépidoptères 2: 35–120.
- Meyrick E (1937) Exotic Microlepidoptera, 5 (pts. 3–5): 65–96.
- Meyrick E (1938) Tortricina and Tineina from the National Albert Park. Institut des Parcs Nationaux du Congo Belge 14: 3–28.
- Robinson GS (2008) Global taxonomic database of Tineidae (Lepidoptera) (v. 8.0). <http://www.nhm.ac.uk/entomology/tineidae/index.html>
- Robinson GS, Tuck KR (1996) A revisionary checklist of the Tineidae (Lepidoptera) of the Oriental Region. Occasional Papers on Systematic Entomology 9: 1–29.
- Sakai M (2002) Systematic study of the family Tineidae of Japan (Insecta: Lepidoptera). Unpublished PhD Thesis. Kyushu University, Japan.
- Zeller PC (1852) Die Schaben mit laugen Kiefertastern. *Linnaea Entomologica* 6: 81–197.