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Three additions to the false click beetle (Coleoptera: Elateroidea: Eucnemidae) fauna in the Nearctic region

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Abstract. Three species of false click beetles (Coleoptera: Eucnemidae) are added to the Nearctic fauna. One **new species**, *Isorhipis bicolor*, is described from a small series collected in Florida, U.S.A. Eighteen specimens collected from Georgia were identified as *Dyscharachthis amplicollis* (Fleutiaux), **new U.S.A. records** for a species previously taken from Japan and Southeast Asia. Examination of a series of eucnemids collected by Kyle Schnepp in Florida allowed me to revisit the *Deltometopus* fauna in eastern North America. Antennal structures present in a series of male specimens in the loan and past examined specimens are definitive enough to resurrect *Deltometopus ereptus* Bonvouloir, **status restored**, from synonymy with *Deltometopus amoenicornis* (Say). Species identification keys are provided for *Deltometopus* Bonvouloir and *Isorhipis* Boisduval and Lacordaire in the Nearctic region. Diagnostic differences are briefly noted for each of the three newly added species found in the United States. Images of three species and the related *D. amoenicornis* are provided.

Key words. *Isorhipis*, *Dyscharachthis*, *Deltometopus*, new species, new records, restored status, taxonomy, United States of America.

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Introduction

The Nearctic eucnemid fauna continues to grow as more new information and data are examined through identifying these beetles from various collections across the country, which includes global revisions currently underway for a number of groups. As scientific discernment takes place to ascertain the identities of these beetles, three species are added to the fauna while working with eucnemids for the Florida State Collection of Arthropods and the Carnegie Museum of Natural History. These three species along with forthcoming papers and revisions will continue to add to the faunal composition of the family. Since Muona (2000) revised the family in the Nearctic region, close to 30 species have been or will be added to the totals, including a number of undescribed species discovered during the revisions of several eucnemid groups. This research adds a new *Isorhipis* Boisduval and Lacordaire species, new U.S.A. records for an exotic species and resurrects a synonymized species from a widespread, common eucnemid species present in the Nearctic region north of Mexico, bringing the total close to 118 species.

In the early years of American entomology, Say (1823) described several species of Coleoptera ultimately belonging to Eucnemidae, including *Elater ruficornis*. Thirteen years later, Say (1836) added *Eucnemis obliqua* to the Nearctic fauna. LeConte (1852) transferred Say's *E. ruficornis* and *E. obliqua* into *Tharops* Laporte. Bonvouloir (1871) maintained these two species in *Tharops* and added a third species, *Tharops nubila* to the fauna. Sometime after Horn (1886) and before Fleutiaux (1921), *Tharops* was regarded as a junior synonym of *Isorhipis* Boisduval and Lacordaire and all species were transferred to that group. Muona (2000) added a fourth species, *Isorhipis occidentalis* from western North America to the Nearctic fauna. This study now adds a fifth species, *Isorhipis bicolor* **new species** to the region.

Several specimens of a recognizably different false click beetle collected in 2022 from Georgia caught my attention while conducting a short, initial examination of the loaned eucnemids received from the Carnegie

Museum of Natural History. On a hunch, I made contact with my colleague, Wataru Suzuki of Tokyo, Japan to gather some information in order to verify the identity of the eucnemid. Suzuki provided images of his specimens which has confirmed my suspicions when compared against these examined specimens collected from Georgia. Herein, I report the **first U.S.A. records** for *Dyscharachthis amplicollis* (Fleutiaux) collected in the southeastern United States. In 2023, 15 additional specimens have been collected from a number of sites around Savannah. *Dyscharachthis* Blackburn belongs in the tribe Dyscharachthini Muona within the subfamily Eucneminae Eschscholtz where it is placed between the tribes Dendrocharini Muona and Mesogenini Muona.

Say (1836) described nine species currently placed in Eucnemidae, including *Eucnemis amoenicornis*. Bonvouloir (1871) however, described a new genus, *Deltometopus* and transferred Say's *E. amoenicornis* to that group. He later synonymized *Eucnemis clypeatus* Say into *Deltometopus amoenicornis* (Say) after he determined the type of the former is a female of the later species. Bonvouloir (1871) added a second species, *Deltometopus ereptus* to the Nearctic region on the basis of antennal rami present beginning on the sixth segment versus the antennal rami beginning on the fifth segment found in *D. amoenicornis*. Horn (1886) however, synonymized *D. ereptus* into *D. amoenicornis* on the belief the ramus had been broken off on the fifth segment of the antenna. That belief was held through the revision of the eucnemid fauna in the Nearctic region by Muona (2000). The idea of the ramus being broken off on the fifth antennal segment asserted by Horn is being questioned. After examining a number of male specimens from Florida and Oklahoma in 2014 and 2023, I do not see any reason to maintain that notion. None of these specimens I observed showed any evidence of the ramus being broken off on the fifth segment. It is therefore, in my opinion, the belief held by Horn (1886) is unfounded and that the ramus is never present on the fifth antennal segment based on the examination of many male specimens showing external morphologies including antennal structures being consistent with the original description of *D. ereptus* in Bonvouloir (1871). The eucnemid species will be resurrected from synonymy with *D. amoenicornis* and established as a distinct species, *Deltometopus ereptus* Bonvouloir **status restored**.

Materials and Methods

Specimens were examined through a Wild M3C 6.4–40× zoom stereo binocular microscope with 20x oculars under a table lamp. Habitus and other structural images for all extant species were taken with a JVC KY-F75U digital camera attached to a Leica® Z16 APO dissecting microscope with apochromatic zoom objective and motor focus drive, using a Synchroscopy Auto-Montage® Pro System and software version 5.01.0005. Image stacks were processed using CombineZP®. All images were captured as TIFF files during the imaging process. Each image was modified through a paint program and Photoshop Elements 10® software and all were collated into plates. The size of each plate was modified to 300 dpi.

Adult measurements were taken using a ruler under magnification. Habitus length was measured from the apex of the head to the apex of the elytra. Habitus width was measured across the humeri, just below the base of the pronotum. Pronotal lengths were measured along the midsection from the apex to the base above the scutellar shield. Pronotal widths were measured across the base of the pronotum above the elytral humeri.

The study was based on the direct examination of 61 dry mounted and pinned specimens borrowed from a small number of collections as noted below including one additional Texas specimen from FMNH communicated to me by J. Muona through email:

ABSC Archbold Biological Station Collection; Venus, FL, USA
BYUC Brigham Young University Collection, Provo, UT, USA
CMNH Carnegie Museum of Natural History, Pittsburgh, PA, USA
FMNH Field Museum of Natural History, Chicago, IL, USA
FSCA Florida State Collection of Arthropods, Gainesville, FL, USA
GERP Global Eucnemid Research Project, UW Dept. of Entomology, Madison, WI, USA
KESC Kyle E. Schnepp Collection, Gainesville, FL, USA

Most label data are reported verbatim with text for each individual label placed inside quotation marks (“”). Line breaks on labels are denoted by a single slash (/). Breaks between labels are separated by a double slash (//). Observed metadata are placed between parentheses ( ) and/or brackets [ ] for some labels.

Systematics

Subfamily Melasinae Fleming, 1821

Diagnosis. Form oblong to elongate; antennae sexually dimorphic; antennal sensory pegs concentrated on apices and sides of individual antennomeres; mandibles short, stout; lateral pronotal sides either with a simple ridge or with divided, serrate ridges; hypomeron either simple, without antennal grooves or with notosternal antennal grooves; prothoracic tibiae with single apical spur; tarsomere IV either simple or bilobed; pretarsal claws simple; male prothoracic tarsomere I with or without basal or apical sex combs; male aedeagus either bulbous, wide and with an entire, free median lobe, or highly modified with an enlarged aedeagal flagellum; female sternite VIII partially sclerotized; bursa simple, divided; spermatheca reduced, sclerotized (Muona 1993; Otto 2016).

Tribe Melasini Fleming, 1821

Diagnosis. Form cylindrical; mandibles short, without ventral tooth; antennal flagellomeres I–VIII equal, either pectinate or flabellate; pronotum with simple lateral ridge; hypomeron without antennal grooves, nearly parallel-sided; prothoracic sternal peg high and strongly convex behind prothoracic coxae; male prothoracic tarsomere I without sex combs; last visible ventrite strongly produced; tergite VII usually keeled, exposed; aedeagus bulbous; median lobe entire, free and either with or without dorsal basal struts; bursa divided, simple; spermatheca divided, sclerotized (Muona 1993; Otto 2016).

Genus *Isorhipis* Boisduval and Lacordaire, 1835

(= *Tharops* Laporte, 1835; not Huber 1819)

Diversity and distribution. *Isorhipis* is a small genus consisting of 18 species distributed world-wide, with the majority of the species found in the Holarctic region with radiations into the tropics. Five species are present in the Nearctic region. Four species are present in the Neotropical region, including the Antilles. The remaining nine species, including two extinct Miocene species in Baltic amber, are present in the Palearctic region.

Diagnosis. Apical margin of frontoclypeal region fairly rounded and less than twice as wide as the base; antennal grooves absent; metathoracic coxal plate medially 3.0–6.0 times wider than laterally; last visible ventrite strongly produced, often exposed beyond elytral apices; tibiae rounded; tarsal claws simple; lateral surfaces of mesothoracic and metathoracic tibiae with setae only; pygidial keel on tergite VII variable; male aedeagus dorsoventrally compressed, without secondary lateral lobes; median lobe simple, usually pointed apically; lateral lobes simple, entire; aedeagal flagellum simple (Muona 1993, 2011).

Key to the species of *Isorhipis* in the Nearctic region (modified from Muona 2000)

1. Elytra at least partly yellowish brown or reddish orange, very rarely dark brown **2**
— Elytra black, body usually black, extremities and sometimes abdomen yellowish red . . . . . ***Isorhipis nubila* (Bonvouloir, 1871)**

2(1). Tergite VII with strong median keel; pronotal median groove usually restricted to basal half; elytra medially evenly yellowish brown or red, with sides and apical region dark **3**
— Tergite VII with poorly developed, low median keel; pronotum with sharp median groove extending usually from base to apical half; elytra with basal half yellowish brown, apical half dark, very rarely entirely dark brown . . . . . ***Isorhipis ruficornis* (Say, 1823)**

3(2). Elytra with well-marked, mostly punctate striae; eastern species **4**
— Elytral striae weak, without punctures; western species . . . . . ***Isorhipis occidentalis* Muona, 2000**

4(3). Femur infuscate red and black, with dark red tibiae and tarsi; elytra dark reddish orange and black . . . . . ***Isorhipis bicolor* Otto, new species**
— Femur, tibiae and tarsi unicolored dark brown; elytra variably dark orange and dark brown . . . . . ***Isorhipis obliqua* (Say, 1836)**

Isorhipis bicolor Otto, new species

Fig. 1–4

Diagnosis. Infuscate reddish black femur with reddish tibiae and tarsi along with the coloration of the elytra will distinguish the new species from *I. obiqua* and *I. nubila*. Well-developed pygidial keel on tergite VII will also distinguish *I. bicolor* from *I. ruficornis*. Well-developed, punctate elytral striae will further distinguish the new species from *I. occidentalis*.

Type material. Male holotype: "USA: Florida, Nassau Co. / Yulee, Agricultural Interdiction / Station, 16b (I95), 30.72689 / −81.66414, Lindgren funnel, EtOH / lure, 25.iv.14, Traya" // "**HOLOTYPE:** / *Isorhipis* / *bicolor* ♂ / Otto / Det. R.L. Otto / 2023" (red printed label). **Female allotype:** "Florida: Alachua Co. / San Felasco H.P.S.P. / 29.7172, −82.4594 / March 7–20, 2022 / Lindgren funnel trap / Kyle E. Schnepp" // "**ALLOTYPE:** / *Isorhipis* / *bicolor* ♀ / Otto / Det. R.L. Otto / 2023" (yellow printed label). Holotype and allotype are deposited in FSCA.

Paratypes. 5 ♀♀: **UNITED STATES of AMERICA: FLORIDA: Alachua County:** 1 ♀, "Florida: Alachua Co. / San Felasco H.P.S.P. / 29.7172, −82.4594 / March 7–20, 2022 / V-flight intercept trap / Kyle E. Schnepp" // "**PARATYPE:** / *Isorhipis* / *bicolor* ♀ / Otto / Det. R.L. Otto / 2023" (yellow printed label) (KESC); 2 ♀♀, "Florida: Alachua Co. / San Felasco H.P.S.P. / 29.7172, −82.4594 / April 3–10, 2022 / V-flight intercept trap / Kyle E. Schnepp" // "**PARATYPE:** / *Isorhipis* / *bicolor* ♀ / Otto / Det. R.L. Otto / 2023" (yellow printed label) (1, KESC; 1, CMNH); 1 ♀, "Florida: Alachua Co. / San Felasco H.P.S.P. / 29.7172, −82.4594 / April 18–30, 2022 / Lindgren funnel trap / Kyle E. Schnepp" // "**PARATYPE:** / *Isorhipis* / *bicolor* ♀ / Otto / Det. R.L. Otto / 2023" (yellow printed label) (KESC); 1 ♀, "Florida: Alachua Co. / San Felasco H.P.S.P. / 29.7172, −82.4594 / April 21–30, 2022 / V-flight intercept trap / Kyle E. Schnepp" // "**PARATYPE:** / *Isorhipis* / *bicolor* ♀ / Otto / Det. R.L. Otto / 2023" [yellow printed label] (GERP).

Description. Male holotype: Length, 7.0 mm. Width, 1.7 mm. Body oblong and elongate; uniformly black; basal ⅔ of the elytra infuscate reddish orange, apical ⅓ of elytra black; basal margin of the elytral humeri, scutellar shield and venter black; antennae infuscate reddish brown; femur infuscate red and black; tibiae and tarsi reddish; head, pronotum and elytra clothed with short, recumbent yellowish setae (Fig. 1). **Head:** Surface densely punctate, dullish, subspherical; frons convex, without median carina or fovea above frontoclypeal region; apical margin of frontoclypeal region rounded, less than 2 times wider than base; carinae present along the lateral edges of the frontoclypeal region; mandibles stout, bidentate, densely punctate. **Antenna:** Flabellate from flagellomeres II–VIII, attaining about ¼ the length of the body, never beyond pronotal hind angles; flagellomere I longer than II; flagellomeres II–IV each sub-equal, transverse; flagellomeres V–VI each sub-equal, quadrate; flagellomeres VII–VIII each sub-equal, longer than wide; rami elongate, arising near base of flagellomere II, arising near apices of flagellomeres III–VIII; flagellomere IX simple, ramous. **Pronotum:** Surface dullish, densely punctate; longer than wide, with short, divergent hind angles; lateral sides arcuate and slightly narrowing towards craniad; disc convex with pair of shallow lineal fovea and median depression at apical ½; short, basal carina present extending near center; base sinuous. **Scutellar Shield:** Slightly longer than wide, subtriangular, setose, punctate and distally rounded. **Elytra:** Distinctly striate; striae punctate; interstices elevated; surface shiny, basal ¾ closely punctate, transversely rugose at apical ¼; excretory grooves/punctures absent at elytral apices. **Abdomen:** Tergite VII exposed beyond elytra; pygidium strongly keeled. **Legs:** First tarsomere as long as the combined lengths of the remaining four on mesothoracic and metathoracic tarsi; tibiae rounded in cross section; metathoracic tarsomeres I–III simple; metathoracic tarsomere IV very short, slightly excavated; metathoracic tarsomere V elongate; pretarsal claws simple. **Venter** (Fig. 2): Closely punctate, with short, recumbent yellowish setae; abdomen transversely rugose; hypomeron simple, without antennal grooves; metathoracic episterna caudally wide; elytral epipleura punctate; metathoracic coxal plates medially 3.0–6.0 times wider than laterally.

Female allotype (Fig. 3–4): Length, 7.0 mm. Width, 1.7 mm. Antennae dark reddish brown, serriform, about ¼ the length of the body; flagellomere I longer than wide, longer than II; flagellomeres II–VIII transverse, each subsequent segment being more wider than long than the previous; flagellomere IX asymmetrical, slightly longer than VIII. Basal ½ of elytra dark reddish, apical ½ of elytra black. Prothoracic legs uniformly reddish brown. Mesothoracic and metathoracic femur bicolored black and infuscate reddish with tibiae and tarsi reddish.

Figures 1–4. *Isorhipis bicolor* **new species. 1)** Male holotype, dorsal habitus. **2)** Male holotype, ventral habitus. **3)** Female allotype, dorsal habitus. **4)** Female allotype, ventral habitus. (Scale: 1–4 = 1.0 mm)

Variations. Five female paratypes were examined. These five paratypes measured 4.5–7.0 mm long and 1.2–1.7 mm wide. Four out of the five female paratypes are shorter and narrower than both the holotype and allotype. One female paratype is as long as and as wide as the holotype. Reddish orange coloration on the elytra is more reduced in the females compared to the male holotype, that being about the basal ½ of the elytra compared to the basal ⅔ observed in the holotype. None of the female paratypes have any pronotal depressions as observed in the male holotype. Antennae and legs in all of the female paratypes are darker compared against the holotype.

Distribution. This new eucnemid species is known from a couple of localities in the state of Florida, U.S.A.

Biology. One specimen was taken from a Lindgren funnel trap baited with EtOH in Nassau County, Florida. Two specimens were taken from Lindgren funnel traps and four specimens were taken from a V-flight intercept trap in Alachua County, Florida. Larvae and pupae are unknown.

Etymology. The specific epithet is derived from the presence of its bicolored tibiae as well as its dark reddish-orange and black elytra.

Subfamily Eucneminae Eschscholtz, 1829

Diagnosis. Mandibles slender or stout, with or without ventral tooth; antennal flagellomeres VIII–IX increasingly serrate apically, tubular, sexually dimorphic; prothoracic tibiae with zero or one apical spur; lateral surfaces of mesothoracic and metathoracic tibiae flattened with sharp angles between lateral and caudal surfaces; male prothoracic tarsomere I with or without sex combs; tarsomere IV mostly simple; hypomeron with basally closed lateral antennal grooves; male aedeagus flattened; median lobe free, without dorsal basal struts; female eighth sternite partly sclerotized; bursa either bifurcate, divided or undivided; spermatheca sclerotized, divided (Muona 1993, 2000, 2011; Otto 2016).

Tribe Dyscharachthini Muona, 1993

Diagnosis. Form cuneiform to cylindrical; frons usually with median keel; tarsomere IV excavate-emarginate simple; male prothoracic tarsomere I without sex combs; tarsomeres without ventral lobes; antennal flagellomeres I–IX flattened, serrate; hypomeron without hairy excretory organs along antennal grooves; mesothoracic sternum with tarsal grooves; basal piece dorsally closed; median lobe free, with entire apex, without dorsal basal struts; fused basal portion of lateral lobes dorsally attached to basal piece; lateral lobes with basally placed tooth, transversely divided dorsally, apices turned dorsocaudad; bursa simple, divided; spermatheca sclerotized, divided and globular.

Genus *Dyscharachthis* Blackburn, 1900

(= *Galloisius* Fleutiaux, 1923)

Diversity and distribution. *Dyscharachthis* is a small sized genus consisting of approximately 20 species. One extant species and two extinct species from Baltic amber are present in the Palearctic region. Five species, including a number of undescribed species are present in the Neotropical region. One extinct species is known from Dominican amber in the Caribbean. The remaining 11 species are present in the Oriental and Australian/Oceanic regions, including an indeterminate number of undescribed species.

Diagnosis. Apical margin of frontoclypeal region evenly rounded and more or less than twice as wide as the base; basally closed, lateral antennal grooves present; metathoracic coxal plates medially 1.2–2.5 or 3.0–6.0 times wider than laterally; last visible ventrite either rounded or emarginate; tarsomere IV excavated, usually wider than V apically; tarsal claws simple; lateral surfaces of mesothoracic and metathoracic tibiae with setae only.

Dyscharachthis are often confused with species of *Idiotarsus* Bonvouloir. The presence of excretory grooves at the basolateral area of the hypomera are evident in species of *Idiotarsus*. These structures however, are not present in *Dyscharachthis*.

Dyscharachthis amplicollis (Fleutiaux, 1923)

Fig. 5–8

Galloisius amplicollis Fleutiaux 1923: 295

Differential diagnosis. Basally closed, lateral antennal grooves will readily distinguish this eucnemid apart from all primitive eucnemids, members of the subfamilies Melasinae and Macraulacinae. Presence of one apical spur on the prothoracic tibiae will further distinguish the species from members of the tribe Dendrocharini Muona. Absence of the excretory grooves on the basolateral area of the hypomeron will also distinguish *D. amplicollis* from *Idiotarsus errans* (Horn) and species of *Eucnemis* Ahrens. Form and coloration of the species' habitus will distinguish this eucnemid species from members of the tribes Proutianini Muona and Mesogenini Muona.

Specimens examined. Eighteen specimens were available for study: **UNITED STATES of AMERICA: GEORGIA: Chatham County:** "GEORGIA: Chatham Co. / 2.3 km WNW of Garden / City, 32.1235, –81.17599, 5m / 19 Apr–3 May 2022, LFT / E. Kennedy" (1, GERP); "GEORGIA: Chatham Co. / 3.4 km S of Garden City / 32.08385, –81.15543 / 7m, 14–28 June 2022 / E. Kennedy" // "Cross-vane panel trap / + Geranyl acetol + / Spruce Blend + EtOH" (1, CMNH); "GEORGIA: Chatham Co. / 2.3 km WNW Garden City / 32.12351, –81.17598, 5m / 1–16 Sept. 2022, LFT / E. Kennedy" (1, CMNH); "GEORGIA: Chatham Co. / 2.4 km WNW Garden City / 32.12402, –81.17636, 5m / 18 April–2 May 2023, LFT / T. Brackney" (4, CMNH); "GEORGIA: Chatham Co. / 5.2 km W Port Wentworth / 32.15330, –81.21786 / 24 April–8 May 2023" // "Cross-vane panel / trap + Megaplatypus / lure, Chris Barnes" (1, CMNH); "GEORGIA: Chatham Co. / 1.5 km W Port Wentworth / 32.15127, –81.17904 / 11 m, 25 April–9 May 2023" // "Cross-vane panel / trap + Megaplatypus / lure, Chris Barnes" (1, CMNH); "GEORGIA: Chatham Co. / 3.4 km S of Garden City / 32.08372, –81.15545 / 4 m, 2–17 May 2023 / Timothy Brackney, coll." // "Cross-vane panel trap / with Geranyl acetol + / Spruce Blend + EtOH" (3, CMNH); "GEORGIA: Chatham Co. / 3.3 km ESE Savannah / 32.07249, –81.06748 / 1 m, 2–17 May 2023, LFT / T. Brackney" (2, CMNH); "GEORGIA: Chatham Co. / 1.5 km W Port Wentworth / 32.15127, –81.17904 / 9–24 May 2023, LFT / C. Barnes" (1, CMNH); "GEORGIA: Chatham Co. / 3.4 km S of Garden City / 32.08372, –81.15545 / 4 m, 17–30 May 2023 / Timothy Brackney, coll." / "Cross-vane panel trap / with Geranyl acetol + / Spruce Blend + EtOH" (1, CMNH); "GEORGIA: Chatham Co. / 1.9 km ESE Garden City / 32.10783, –81.13543 / 4 m, 17–30 May 2023" // "Lindgren FT / T.

Figures 5–8. *Dyscharachthis amplicollis* (Fleutiaux). **5)** Dorsal habitus. **6)** Head, frontal view. **7)** Antenna. **8)** Ventral habitus. (Scale: 6, 7 = 0.5 mm; 5, 8 = 1.0 mm)

Brackney" (1, CMNH); "GEORGIA: Chatham Co. / 3.4 km S of Garden City / 32.08367, –81.15481 / 30 May–13 June 2023" // "Lindgren FT / T. Brackney" (1, CMNH).

Redescription. Length, 4.5–6.0 mm. Width, 1.0–2.0 mm. Body oblong, robust, cuneiform; uniformly dark brown; scape dark brown, pedicel and antennal flagellum dark reddish brown; legs dark reddish brown; head, pronotum and elytra clothed with short, recumbent yellowish setae (Fig. 5). **Head** (Fig. 6)**:** Subspherical, with delicate median carina present, extending down to frontoclypeal region where it splits and diverges along each lateral side of frontoclypeal region; interantennal carinae absent at base of frontoclypeal region; surfaces shiny, punctures somewhat shallow, evenly dispersed; apical margin of frontoclypeal region feebly rounded, more than 2 times wider than base; mandibles stout, bidentate, densely punctate. **Antennae** (Fig. 7)**:** Flagellomeres I–IX weakly serriform, about ⅓ of body length; flagellomere I longer than II; flagellomeres II–VIII quadrate, subequal; flagellomere IX 1.5 times longer than VIII; lateral carina present on antennal pedicel and each of the antennal flagellomeres I–VIII. **Pronotum:** Surfaces shiny; punctures shallow, evenly dispersed; slightly longer than wide, with enlarged, sharp hind angles; lateral sides parallel-sided at basal ⅔, apical ⅓ arcuate, narrowed craniad; disc convex; basal median groove variable, extremely shallow to absent; base sinuous. **Scutellar shield:** sub-triangular-shaped, slightly longer than wide, punctate with shallow median groove and distally rounded. **Elytra:** Striae largely absent except along elytral suture; interstices flattened; surfaces shiny; punctures deep and closely spaced near base, very shallow and widely spaced towards elytral apices. **Legs:** First tarsomere as long as the combined length of remaining four on mesothoracic and metathoracic tarsi; tibiae flattened in cross section; lateral surface of mesothoracic and metathoracic tibiae with setae only; metathoracic tarsomeres I–III simple; metathoracic tarsomere IV excavate-emarginate, as wide as III; metathoracic tarsomere V short; pretarsal claws simple. **Venter** (Fig. 8)**:** Punctures somewhat shallow, evenly dispersed; surface with recumbent yellowish setae; hypomeron with basally closed, lateral antennal grooves; metathoracic episterna parallel-sided; metathoracic coxal plates medially 2.5 times wider than laterally.

Distribution. This rarely collected eucnemid species has been taken from Japan (Amami-Oshima, Hokkaido, Honshu, Kyushu, Ogasawara (Chichi-Jima Island) and Shikoku), Laos, Singapore, Taiwan, Thailand, United States and Vietnam (Suzuki 2016; Suzuki and Makihara 2020; Otto, pers. obs.). In the United States, *D. amplicollis* has been recorded from a number of localities within a single county in Georgia.

Biology. Eleven specimens were taken from Lindgren funnel traps. Seven specimens were taken from baited cross-vane traps. Larvae and pupae remain unknown. Much of the biological information associated with this species comes from Japan through the published works of Wataru Suzuki and his colleagues. Suzuki and Tao (2019) noted *D. amplicollis* has been known to breed in the dead wood of Japanese Hackberry (*Celtis sinensis* var. *japonica* (Planchon) Nakai (Cannabaceae)). They surmised the species utilizes the exposed dead sapwood of a living tree as a possible source to breed. They collected a number of adults on a plane tree (*Plantanus* species (Plantanaceae)) along the roadside on a sunny day between the hours of 10:00 am to 1:00 pm with the temperatures ranging from 22.0° C to 30.5° C where they were observed crawling on the exposed sapwood in the middle of the day. They have noted the adults have been attracted to lights and found hiding beneath the bark of *C. sinensis* var. *japonica* and the zelkova tree (*Zelkova serrata* (Thunburg) Makino; Ulmaceae). Suzuki and Makihara (2020) noted a number of examined adults were taken from light traps on Chichi-Jima Island within the Ogasawara Islands.

Subfamily Macraulacinae Fleutiaux, 1922

Diagnosis. Form oblong, elongate or obtuse; antennal flagellomeres usually sexually dimorphic; mandibles either stout with a basal tooth or slender without teeth; simple lateral pronotal ridge present; hypomeron either simple, with basally closed lateral antennal grooves or with basally open lateral antennal grooves; legs slender; prothoracic tibiae with one apical spur; lateral surfaces of mesothoracic and metathoracic tibiae usually with transverse rows of spines; tarsomere IV often bilobed; tarsal claws either simple or basally toothed; prothoracic tarsomere I usually with basal sex combs in males; male aedeagus with dorsally open basal piece; median lobe simple, with solidly fused slender basal struts; fused to lateral lobes; lateral lobes entire, either notched or apically deeply and narrowly bifurcate; bursa either simple or divided; spermatheca tripartite, sclerotized, divided (Muona 1993; Otto 2016).

Tribe Macraulacini Fleutiaux, 1922

Diagnosis. Form oblong, elongate or obtuse; antennal flagellomeres usually sexually dimorphic; mandibles either stout with a basal tooth or slender without teeth; simple lateral pronotal ridge present; hypomeron either simple, with basally closed lateral antennal grooves or with basally open lateral antennal grooves; legs slender; prothoracic tibiae with one apical spur; lateral surfaces of mesothoracic and metathoracic tibiae usually with transverse rows of spines; tarsomere IV often bilobed; tarsal claws either simple or basally toothed; prothoracic tarsomere I usually with basal sex combs in males; male aedeagus with dorsally open basal piece; median lobe simple, with solidly fused slender basal struts, fused to lateral lobes; lateral lobes entire, either notched or apically deeply and narrowly bifurcate; bursa either simple or divided; spermatheca tripartite, sclerotized, divided (Muona 1993; Otto 2017).

Genus *Deltometopus* Bonvouloir, 1871

Diversity and distribution. *Deltometopus* is a small genus consisting of 12 described species distributed in the Neotropical and Nearctic regions. Nine described species are present in the Neotropical region. There are also an indeterminate number of undescribed species present in the Neotropical region. Several species are present in the Nearctic region with *Deltometopus amoenicornis* (Say) (Fig. 9–15) and *Deltometopus ereptus* Bonvouloir distributed in eastern North America and southern United States respectively along with *Deltometopus baranowskii* Muona present in Arizona, New Mexico and Utah.

Diagnosis. Apical margin of frontoclypeal region fairly evenly rounded and more than twice as wide as the base; well developed, apically widened, open lateral antennal grooves present; male prothoracic tarsomere I simple, without sex combs; metathoracic coxal plates medially 1.2–2.5 times wider than laterally; frons simple; last visible ventrite either rounded or acute; simple tarsal claws; lateral surfaces of mesothoracic and metathoracic tibiae either with setae only or with setae and irregularly placed spines; male aedeagus dorsoventrally compressed, with laterally attached secondary lateral lobes; median lobe simple, moderately and narrowly bifurcate apically; lateral lobes simple, entire; aedeagal flagellum simple (Muona 1993, 2011).

Key to the species of *Deltometopus* in the Nearctic region (modified from Muona (2000))

1. Antennae pectinate in males, serrate in females **2**
— Antennae deeply serrate in males, serrate in females ..... ***Deltometopus baranowskii* Muona, 2000**

2(1). Keels poorly-developed along lateral sides of the frontoclypeal region ..... ***Deltometopus amoenicornis* (Say, 1836)**
— Keels well-developed along lateral sides of the frontoclypeal region ..... ***Deltometopus ereptus* Bonvouloir, 1871**

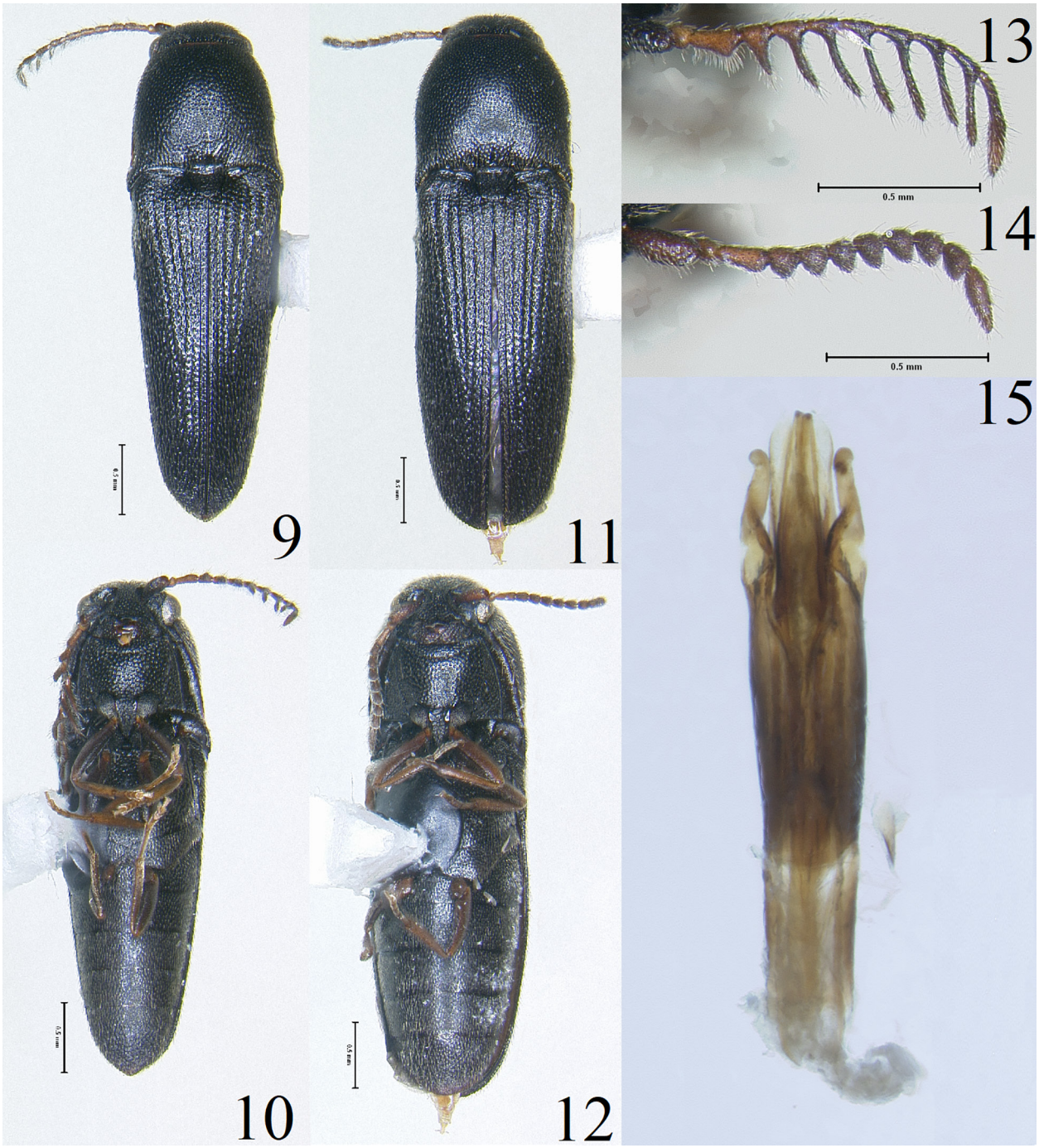
Deltometopus ereptus Bonvouloir, 1871, status restored

Fig. 16–22

Diagnosis. Well-developed keels present along the lateral sides of the frontoclypeal region will distinguish *D. ereptus* from *D. amoenicornis* and *D. baranowskii*.

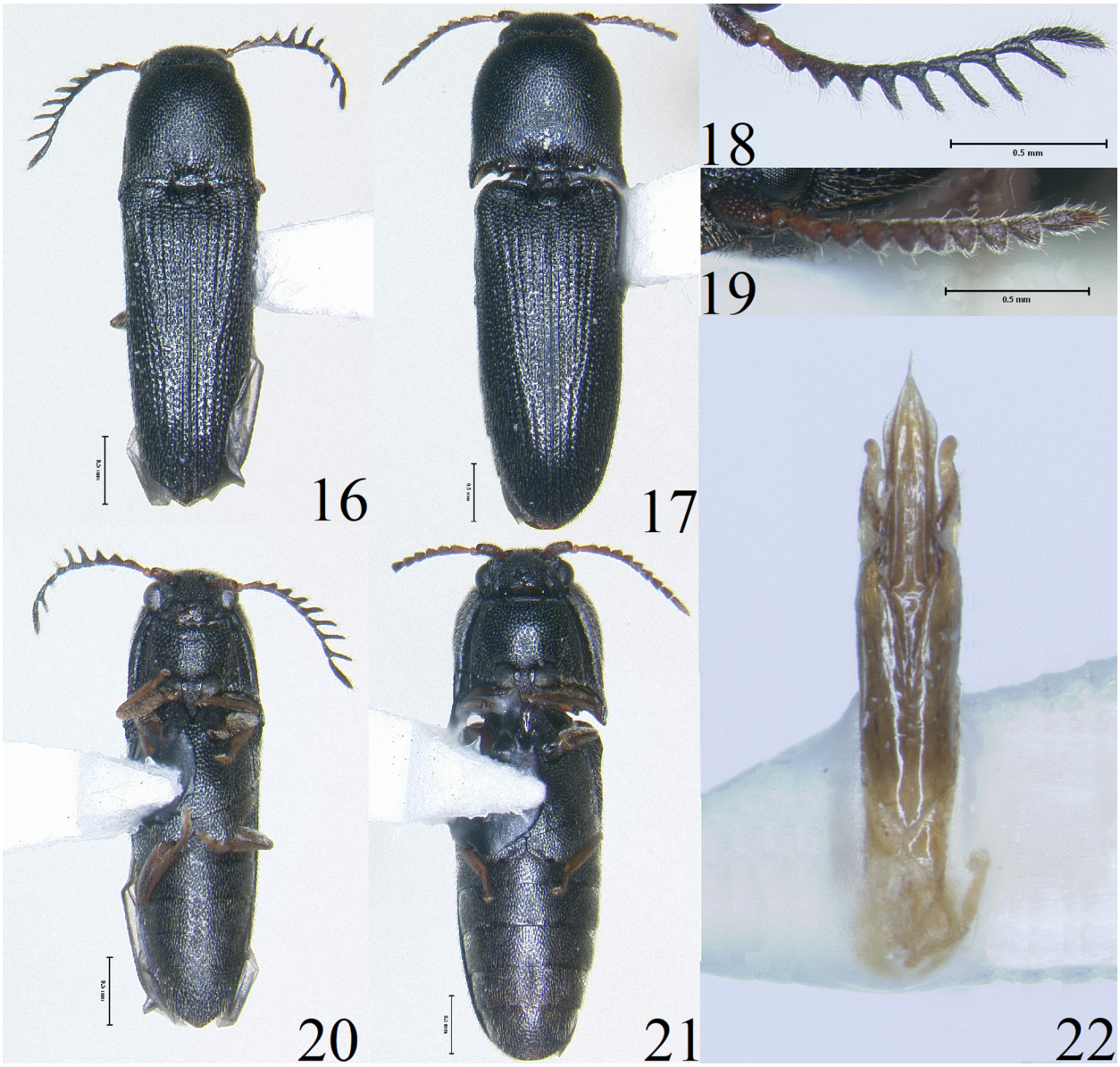
Type. Male holotype was supposed to be in the Bonvouloir collection at the Paris Museum (MNHN). An image request was made to the museum a few years ago but they could not fulfill the request due to the unavailability of the specimen within their museum.

Specimens examined. Thirty-six specimens were available for study (including data provided for one Texas specimen through personal communication by J. Muona via email): **UNITED STATES of AMERICA: FLORIDA: Alachua County:** "Florida, Alachua Co. / Gainesville, San / Felasco Hammock / September 29, 1997 / Vince Golia / 'beating'" // "*Deltometopus* / *amoenicornis* / male / (Say)" // "*Deltometopus* / nr. '*ereptus*' / Bonvouloir / Det. R.L. Otto / 2014" (1, ABSC); "Florida: Alachua Co. / San Felasco H.P.S.P. / 29.7172, –82.4594 / October 2–17, 2021 / Lindgren funnel trap / Kyle E. Schnepp" (1, KESC); "Florida: Alachua Co. / San Felasco H.P.S.P. / 29.7172, –82.4594 / March 26–April 3, 2022 / V-flight intercept trap / Kyle E. Schnepp" (3, KESC); "Florida: Alachua Co. /



Figures 9–15. *Deltometopus amoenicornis* (Say). **9)** Male, dorsal habitus. **10)** Male, ventral habitus. **11)** Female, dorsal habitus. **12)** Female, ventral habitus. **13)** Male, antenna. **14)** Female, antenna. **15)** Male, aedeagus. (Scale: 9–14 = 0.5 mm; 15 = no scale)

San Felasco H.P.S.P. / 29.7172, –82.4594 / April 3–10, 2022 / V-flight intercept trap / Kyle E. Schnepp" (4, KESC); "Florida: Alachua Co. / San Felasco H.P.S.P. / 29.7172, –82.4594 / April 10–18, 2022 / V-flight intercept trap / Kyle E. Schnepp" (4, KESC); "Florida: Alachua Co. / San Felasco H.P.S.P. / 29.7172, –82.4594 / April 21–30, 2022 / V-flight intercept trap / Kyle E. Schnepp" (3, KESC); "Florida: Alachua Co. / San Felasco H.P.S.P. / 29.7172,



Figures 16–22. *Deltometopus ereptus* Bonvouloir. **16)** Male, dorsal habitus. **17)** Female, dorsal habitus. **18)** Male, antenna. **19)** Female, antenna. **20)** Male, ventral habitus. **21)** Female, ventral habitus. **22)** Male, aedeagus. (Scale: 16–21 = 0.5 mm; 22 = no scale)

–82.4594 / April 30–May 8, 2022 / V-flight intercept trap / Kyle E. Schnepp" (2, KESC); "Florida: Alachua Co. / San Felasco H.P.S.P. / 29.7172, –82.4594 / May 8–15, 2022 / V-flight intercept trap / Kyle E. Schnepp" (1, KESC); "Florida: Alachua Co. / San Felasco H.P.S.P. / 29.7172, –82.4594 / May 15–22, 2022 / V-flight intercept trap / Kyle E. Schnepp" (2, KESC); "Florida: Alachua Co. / San Felasco H.P.S.P. / 29.7172, –82.4594 / May 29–June 5, 2022 / V-flight intercept trap / Kyle E. Schnepp" (1, KESC); "Florida: Alachua Co. / San Felasco H.P.S.P. / 29.7172, –82.4594 / June 5–July 3, 2022 / V-flight intercept trap / Kyle E. Schnepp" (1, KESC); "Florida: Alachua Co. / San Felasco H.P.S.P. / 29.7172, –82.4594 / July 3–17, 2022 / V-flight intercept trap / Kyle E. Schnepp" (2, KESC); "Florida: Alachua Co. / San Felasco H.P.S.P. / 29.7172, –82.4594 / August 14–28, 2022 / V-flight intercept trap / Kyle E. Schnepp" (1, KESC); **Highlands County:** "FL: Highlands Co. / Archbold Biol. Sta. / 11 Sept. 1996 / M. Deyrup" // "Recently burned / gallberry / flatwoods / behind lab" // "Collection of the Global / Eucnemid Research Project /

(Robert L. Otto)" (green framed white label) (1, GERP); "FL: Highlands Co. / Archbold Biological Station / Lake Annie Bayhead J Dunlap / 5/11/2010 Flight Trap / N27.21016 W81.34684" // "*Deltometopus* / nr. '*ereptus*' / Det. R.L. Otto / 2014" (1, ABSC); **Pasco County:** "St. Leo / Pasco Co., FLA / May 4, 1985 / M. Deyrup" // "in / rotten / wood" (handwritten) // "Deltometopus / nr. '*ereptus*' / Det. R.L. Otto / 2014" (1, ABSC); **Sumter County:** "FL: Sumter Co. / Green Swamp WMA / May 2001 / Morris and Nigg / Malaise Trap" // "Collection of the Global / Eucnemid Research Project / (Robert L. Otto)" (green framed white label) (1, GERP); **GEORGIA: Chatham County:** "GEORGIA: Chatham Co. / 1.8 km N of Garden City / 32.13055, −81.15275, 3m / 11–25 Sep 2019, LFT / E. Kennedy" (2, CMNH); "GEORGIA: Chatham Co. / 3.3 km ESE of Savannah / 32.07521, −81.06649, 3m / 19 Apr–3 May 2022, LFT / E. Kennedy" (1, CMNH); **OKLAHOMA: Choctaw County:** "OKLAHOMA: Choctaw Co. / 7.5 mi. S Antlers / Indian Nations Turnpike / 34.121°N, 95.579°W / 31-V-2007, S.M. Clark" // *Deltometopus* / nr. *ereptus* / Bonvouloir / Det. R.L. Otto / 2016" (1, BYUC); **TEXAS: Brazos County:** "Texas / College Station / April 21, 1932" // "H.J. Reinhard / collector" // "Deltometopus ereptus Bonv. / J. Knull det. 1957" (1, FMNH); **VIRGINIA: Rockbridge County:** "VIRGINIA: Rockbridge Co. / 2.6 km NE of Buena Vista / 37.75223, -79.33457 / 14 Aug–16 Sep 2014, LFT / D. Heltzel" (1, CMNH).

Redescription. Length, 3.0–4.5 mm. Width, 1.0–1.2 mm. Body subcylindrical, elongate; uniformly black; antennae dark reddish brown to infuscate reddish black; legs including tarsi dark reddish brown; head, pronotum and elytra clothed with short, recumbent yellowish setae (Fig. 16–17). **Head:** Subspherical; integument closely punctate, somewhat shiny; frons convex, with median, triangle-shaped, shallow fovea above frontoclypeal region; apical margin of frontoclypeal region evenly rounded, about 2.0 times wider than base; keels prominent along the lateral margins of the frontoclypeal region from the antennal insertions down to the apical margin; mandibles stout, bidentate, densely punctate. **Antenna** (Fig. 18–19): Sexually dimorphic. ♂♂: Pectinate from antennomeres IV–VIII, attaining nearly ⅓ the length of the body; flagellomere I longer than wide, nearly as long as the combined lengths of II and III; flagellomeres II and III strongly serrate; flagellomeres IV–VIII longer than wide; ramus arising on middle of flagellomere IV; rami arising near apical end of flagellomeres V–VIII; flagellomere IX simple, elongate. ♀♀: Simply serrate, attaining nearly ⅓ of the length of the body; flagellomere I longer than wide; flagellomeres II–VIII each quadrate, simply serrate; flagellomere IX elongate, slightly longer than VIII. **Pronotum:** Integument shiny, densely punctate; longer than wide, with moderate, sharp, divergent hind angles; lateral sides bell-shaped, basally narrow, sides sinuous and narrowing craniad; disc convex often with short, shallow median groove in females, without in males; base sinuous. **Scutellar shield:** Quadrate, sub-triangular, setose, punctate and distally rounded. **Elytra:** Distinctly striate; striae punctate; interstices elevated; humeri somewhat depressed basally; integument shiny, closely punctate to transversely rugose throughout. **Legs:** First tarsomere slightly shorter than the combined lengths of the remaining four on mesothoracic and metathoracic tarsi; tibiae rounded in cross section; metathoracic tarsomeres I–III simple; metathoracic tarsomere IV excavate-emarginate; metathoracic tarsomere V elongate; pretarsal claws simple. **Venter** (Fig. 20–21): Closely punctate, with short, recumbent yellowish setae; hypomeron with basally wide, basally opened lateral antennal grooves; antennal grooves shallowly and closely punctate; metathoracic episterna apically wide; elytral epipleura punctate; metathoracic coxal plates medially about 2.0–2.5 times wider than laterally; last abdominal ventrite apically rounded. **Aedeagus** (Fig. 22): Basal piece longer than wide, laterally parallel-sided, dorsally open, apically rounded; remaining parts elongate, laterally parallel-sided; parameres short, sinuous, apically rounded, without hook-like lateral teeth; secondary lateral lobes basally attached to parameres, elongate, apically pointed; median lobe elongate and broad, apically pointed, deeply and narrowly bifid, longer than parameres and secondary lateral lobes. Ratios between lengths of lateral/secondary lateral lobes to median lobe are 1.0:1.2 in *D. amoenicornis* and 1.0:1.5 in *D. ereptus*.

Distribution. This rarely encountered eucnemid species is known from a number of locales in the southern United States particularly in Florida, Georgia, Oklahoma, Texas and Virginia. Type locality of *D. ereptus* is Louisiana (Bonvouloir 1871).

Biology. Five specimens were taken from Lindgren funnel traps placed in Florida, Georgia and Virginia. Twenty-four specimens were taken from a V-flight intercept trap placed in a state park in Alachua County, Florida. One specimen was taken from a Malaise trap placed in a wildlife management area in Sumter County, Florida. One specimen was taken from a recently burned gallberry flatwood near the backside of the lab at the Archbold

Biological Station in Highlands County, Florida. One specimen was beaten from foliage in Florida. One specimen was taken from a flight trap in Florida. One specimen was taken from rotten wood in southern Florida. Immature stages remain unknown.

Discussion

Identities of these species were ascertained through extensive study while working with a number of Eucnemidae loaned to me by the Florida State Collection of Arthropods and Carnegie Museum of Natural History. The new, updated identification keys provided here will facilitate the identification of these eucnemids against other closely related species. Although *I. bicolor* is morphologically similar to *I. obliqua*, the coloration of legs and elytra are diagnostic and warrant establishing a distinct species status for the eucnemid species.

The sudden appearance of *D. amplicollis* in the United States suggests the species recently arrived here from Southeast Asia or Japan sometime in 2021. No other records exist prior to 2020 from extensive surveys done in much of the eastern United States through the bark beetle surveys conducted by the United States Department of Agriculture. Garden City, where first records of the species have been discovered, is located just north of Savannah, Georgia. Savannah is a port city on the Atlantic coastline with extensive international commercial shipping traffic. It is quite possible that one of these ships, for purposes of maintaining its buoyancy, released their ballast water containing woody debris infested with larvae of *D. amplicollis*. The woody debris can then wash up on the nearby shoreline, allowing the eucnemid to complete its development and spread into new areas adjacent to the shoreline. The possibility exists for other non-native plants and animals to also be introduced in the same area following the release of ballast water from these ships prior to docking at local shipyards. The practice of releasing ballast water containing foreign biological material from these ships is quite common along the Atlantic coastline, Pacific coastline and the Great Lakes region as they travel to their destination ports, which has allowed non-native flora and fauna to arrive here unimpeded and establish itself in these new areas. All areas near port cities around the world are at risk of seeing non-native flora and fauna being introduced and spread where they are not intended to be naturally thriving, thereby putting the balance of nature at risk of irreparable damage that could lead to local extinctions due to overcrowding and/or competition, alterations to the ecosystems and ultimately a decline in biodiversity in those areas, especially aquatic and semi-aquatic ecosystems.

Untreated wooden crates and pallets in those ports have also harbored serious wood-infesting pests as they entered newer areas. Several examples include the Emerald Ash Borer (*Agrilus planipennis* Fairmaire (Coleoptera: Buprestidae) initially introduced in eastern North America through infested wooden crates. These beetles have so far spread across the region causing great devastation through killing all known ash trees (*Fraxinus* sp. (Oleaceae)) in the region and reducing the diverse structure of the forest ecosystem. Two members of the Asian long-horned beetle genus *Anoplophora* Hope have been introduced accidentally in Europe and North America. *Anoplophora chinensis* (Forster) (Coleoptera: Cerambycidae) was introduced in a number of European nations as a citrus pest while a second species, *Anoplophora glabripennis* (Motschulsky) (Coleoptera: Cerambycidae) has been introduced in a number of European nations and eastern North America killing a number of deciduous tree species, especially maples (*Acer* sp. (Aceraceae)). These beetles were introduced in these areas through untreated wooden crates via commercial shipping. Box cars on railroad systems and shipping containers may also contribute accidental introductions of exotic species into these new areas.

Based on my personal experiences working with Eucnemidae, especially exotic species, these eucnemids haven't had much of an impact on the native species in the area as these beetles require only dead wood to breed and have shown no competition with other eucnemid species for the same resource. These beetles are of no economic concern for they do not attack and kill living trees unlike other members of Coleoptera like Buprestidae, Cerambycidae and Curculionidae s. Initially on the onset of establishing new territories, these eucnemid population numbers will be high, but over time, the frequencies of encountered individuals will drop as they become acclimatized to the new environment. Based on additional specimens found during collection events in 2023 from a number of locales in the area of Savannah, GA, it would appear these beetles have successfully become established in the United States. Hackberry (*Celtis* sp.; Cannabaceae) and sycamore trees (*Plantanus* sp.; Plantanaceae) in the area may serve as suitable host species to support their developments here in the United States,

since these beetles have been associated with these plant groups in Japan. It is likely elm (*Ulmus* sp.; Ulmaceae) may also be a suitable host for the development of *D. amplicollis* in this region.

Male *D. ereptus* is easily distinguishable from the widespread, common species *D. amoenicornis* based on the antennal structure and overall length of the basal piece in relation to the length of the aedeagus. Identifying females of *D. ereptus* however, is more challenging when compared against females of *D. amoenicornis*. Both species can be found together in the same locales as in the case of the state park in Florida, and may be elsewhere in the southern United States. Presence of keels along the lateral margin of the frontoclypeal region seems to be the best character state to distinguish female *D. ereptus* from *D. amoenicornis*.

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