1021

A revision of *Dyscolotaxia* Horn, 1890
(Coleoptera: Eucnemidae: Macraulacinae: Macraulacini),
with the description of *Amazotaxia* new genus
from South America

Robert L. Otto

W4806 Chrissie Circle, Shawano, WI 54166, USA

A revision of *Dyscolotaxia* Horn, 1890
(Coleoptera: Eucnemidae: Macraulacinae: Macraulacini),
with the description of *Amazotaxia* new genus
from South America

Robert L. Otto

W4806 Chrissie Circle, Shawano, WI 54166, USA
tar1672@yahoo.com
 https://orcid.org/0000-0002-5679-4044

Abstract. The Neotropical eucnemid genus, *Dyscolotaxia* Horn, is revised following the examination of specimens from five collections, examination of the published original description of *Plesiofornax tetratoma* Chassain, and from images provided by Fernanda Salazar-Bueaño (QCAZI). *Dyscolotaxia championi* Horn is redescribed with included descriptions of the male genitalia and a female specimen. Three new species of false click beetles (Coleoptera: Eucnemidae) are described from the Neotropical region. These **new species** are: *Dyscolotaxia chiriquiensis* (Panama), *Dyscolotaxia hispaniolensis* (Dominican Republic) and *Dyscolotaxia picea* (Ecuador). *Amazotaxia* **new genus** is described from South America for *Plesiofornax tetratoma* Chassain, creating *Amazotaxia tetratoma* (Chassain) **new combination**. Morphology of both *Dyscolotaxia* and *Amazotaxia* in relation to *Pleisofornax* Cocquerel are reviewed along with biogeographical hypotheses for these groups. An identification key is provided for species of *Dyscolotaxia* in the Neotropical region. Images for all species of *Dyscolotaxia* and *Amazotaxia* are provided.

Key words. Taxonomy, systematics, Antilles, Central America, South America, Amazonian Rain Forest, Mesoamerican Rain Forest.

Resumen. El género Neotropical eucnemid, *Dyscolotaxia* Horn, se revisa luego del examen de especímenes de cinco colecciones, el examen de la descripción original publicada de *Plesiofornax tetratoma* Chassain y de imágenes proporcionadas por Fernanda Salazar-Bueaño (QCAZI). *Dyscolotaxia championi* Horn se vuelve a describir con descripciones incluidas de los genitales masculinos y un espécimen femenino. Se describen tres nuevas especies de escarabajos de falso clic (Coleoptera: Eucnemidae) de la región Neotropical. Estas **nuevas especies** son: *Dyscolotaxia chiriquiensis* (Panamá), *Dyscolotaxia hispaniolensis* (República Dominicana) y *Dyscolotaxia picea* (Ecuador). Se describe un nuevo *género Amazotaxia* de Sudamérica para *Plesiofornax tetratoma* Chassain, creando una **nueva combinación** *Amazotaxia tetratoma* (Chassain). Se revisa la morfología tanto de la *Dyscolotaxia* como de la *Amazotaxia* en relación con *Pleisofornax* Cocquerel junto con las hipótesis biogeográficas para estos grupos. Se proporciona una clave de identificación para las especies de *Dyscolotaxia* en la región Neotropical. Se proporcionan imágenes para todas las especies de *Dyscolotaxia* y *Amazotaxia*.

Palabras clave. Taxonomía, Sistemática, Antillas, América Central, América del Sur, Selva Amazónica, Selva Mesoamericana

Introduction

In the species description for *Plesiofornax tetratoma* Chassain (Chassain 2011), Chassain wrote that the species represents a transition between *Plesiofornax* Cocquerel and *Dyscolotaxia* Horn, based on the presence of medially undefined lateral antennal grooves on the hypomera and the elongated terminal four antennal segments similar to that of *Dyscolotaxia*. In studying the information and images found in both Chassain (2011) and Chassain and Touroult (2011), based on external morphology, the species does not belong to either group even though it shows similarities to *Dyscolotaxia* and *Plesiofornax*. In addition, I examined *Dyscolotaxia* specimens from several collections and discovered a new species attributable to the group. A second new species was discovered amongst

the series of unidentified Eucnemidae collected from Dominican Republic from the Florida State Collection of Arthropods (FSCA). I contacted the invertebrate museum (QCAZI) in Ecuador to check their holdings for *Dyscolotaxia* specimens and discovered that a small series for a third new species was present there. The three new *Dyscolotaxia* species are covered here in this paper.

Horn (1890) described *Dyscolotaxia championi* based on a single specimen collected from its type locality (Bugaba, Panama). He described its appearance as being closest to *Fornax* Laporte, but stated that it was readily distinguished by its generic characteristics. Since its discovery from Panama, *D. championi* has been taken from sites in Costa Rica. The genus is restricted to Costa Rica, the Dominican Republic, Ecuador, and Panama.

Materials and Methods

Specimens were examined through a Wild M3C 6.4–40× zoom stereo binocular microscope with 20x oculars and illuminated under a goose neck table lamp. Habitus and other structural images 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 with software version 5.01.0005. Resulting image stacks were processed using CombineZP®. All images were captured as TIFF files during the imaging process. Each image was modified through Photoshop Elements 10® software on a Toshiba Satellite® C55 series laptop computer 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 to ensure accuracy for four of the five species covered in the study. Biometrics for *Dyscolotaxia picea* Otto **new species** were provided by Fernanda Salazar-Buenaño and Rafael Enrique Cardenas Munoz. 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 midline from the apex to the base above the scutellar shield. Pronotal widths were measured across the base of the pronotal hind angles above the elytral humeri.

Aedeagi were dissected following immersion of the sectioned abdomen in a solution consisting of one KOH pellet (mass of 56.11 g/mol) dissolved in 40 ml of water for three hours. Aedeagi were suspended just below the surface of Germ-X® hand sanitizer gel for imaging. The abdomen was secured on cardstock and pinned beneath the corresponding specimen. The dissected aedeagus was stored in a microvial filled with glycerin and pinned beneath the abdomen and corresponding specimen.

The study was based on the direct examination of 38 dry mounted and pinned specimens borrowed from five collections and images of six specimens (provided from QCAZI) as noted below:

FSCA   Florida State Collection of Arthropods, Gainesville, FL, USA
GERP   Global Eucnemid Research Project, UW Dept. of Entomology, Madison, WI, USA
JMC   Jyrki Muona Collection, University of Helsinki, Finland
MNCR   National Museum of Costa Rica, San José, Costa Rica
QCAZI   QCAZ Sección Invertebrados, Pontificia Universidad Católica del Ecuador, Quito, Ecuador
SEMC   Snow Entomology Museum Collection, University of Kansas, Lawrence, KS, USA

Label data are presented verbatim, with text for each individual label placed inside quotation marks and separated from an underlying label by a slash (/). Each line on an individual label is separated by a semicolon (;). Metadata for some labels are placed inside parenthesis and/or brackets. Each specimen deposited in the collection of the Global Eucnemid Research Project (GERP) bears a green framed white label, "Collection of the Global; Eucnemid Research Project; (Robert L. Otto)".

Systematics

Subfamily Macraulacinae Fleutiaux, 1923

Diagnosis. Form oblong, elongate, or obtuse; antennomeres 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 with notched or apically deeply and narrowly bifurcate; bursa either simple or divided; spermatheca tripartite, sclerotized, divided (Otto 2016).

Tribe Macraulacini Fleutiaux, 1923

Diagnosis. Mandibles short, with a ventral tooth; legs slender; prothoracic tibiae with one apical spur; mesothoracic and metathoracic tibiae with apical spines; lateral surfaces of mesothoracic and metathoracic tibiae variable, either with hairs and simple spines or with hairs and transverse rows of spine combs; tarsomere IV usually wide, bilobed; tarsal claws either simple or basally toothed; male prothoracic tarsomere I with basal sex combs; antennal flagellomeres II–VIII variable, about equal in length; hypomeron variable, either simple, with basally closed lateral antennal grooves or with basally open lateral antennal grooves; prothoracic sternal peg high, variably elongate, excavated or truncated; median lobe without dorsal basal struts, fused with lateral lobes, with narrowly, deeply bifurcate apex; bursa divided, simple; spermatheca sclerotized, divided, U-shaped (Muona 1993; Otto 2016).

Genus *Dyscolotaxia* Horn, 1890

Type species. *Dyscolotaxia championi* Horn 1890: 239, by monotypy.

Diagnosis. Apical margin of frontoclypeal region feebly trilobed and more than twice as wide as the base; antennae capitate with elongate flagellomeres VI–IX; basally open lateral antennal grooves present; male sex combs basally present on prothoracic tarsomere I; elytral striae well developed, smooth, not punctate; metathoracic coxal plates medially 3.0–6.0 times wider than laterally; males with pair of setose sex patches present on abdominal sternites 2 and 3; elytral epipleura evenly punctate, not grooved; last visible ventrite either produced or rounded; tarsal claws simple; lateral surfaces of mesothoracic and metathoracic tibiae with setae and transverse rows of spine combs.

Diversity. This previously monotypic genus now consists of four species, all of which are distributed in the Neotropical region, particularly southern Central America south through northwestern South America and the island of Hispaniola. *Dyscolotaxia championi* Horn, the genotype for the group, has been taken in Central America, particularly Costa Rica and Panama. One new species is endemic to Panama. A second new species is also an endemic species found in the Dominican Republic on the island of Hispaniola. The last new species is known only from Ecuador.

Key to the species of *Dyscolotaxia*

1.   Last abdominal ventrite rounded (Fig. 1) **2**
—   Last abdominal ventrite strongly produced (Fig. 2) . . . ***Dyscolotaxia hispaniolensis* Otto, new species**

2(1).   Antennal flagellomeres II and III quadrate, each shorter than either IV or V **3**
—   Antennal flagellomeres II–V quadrate, subequal (Fig. 3) . . . . ***Dyscolotaxia championi* Horn**

3(2).   Antennal flagellomere VI shorter than the combined lengths of antennal flagellomeres III–V (Fig. 4) . .
        . . . . ***Dyscolotaxia chiriquiensis* Otto, new species**
—   Antennal flagellomere VI as long as the combined lengths of antennal flagellomeres III–V . . . .
        . . . .***Dyscolotaxia picea* Otto, new species**
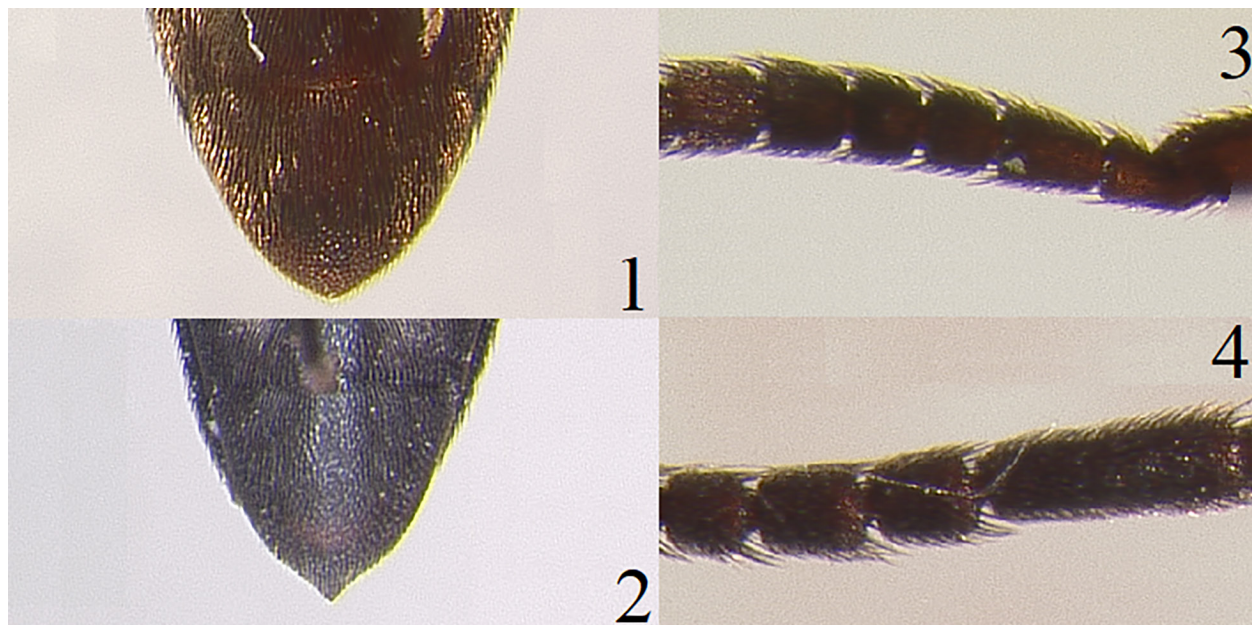
Dyscolotaxia championi Horn, 1890
Fig. 5–9

> *Dyscolotaxia championi* Horn 1890: 239; Table X, Fig. 17, 17a.

Differential diagnosis. The rounded last abdominal ventrite will distinguish *D. championi* from *D. hispaniolensis* **new species**. Quadrate antennal flagellomeres II–V will also distinguish this species from all other *Dyscolotaxia* species in the region.

Type. Not seen. Horn (1890) noted the male type was collected by Champion in Panama at Bugaba. The type for *D. championi* is placed in the collection of the Natural History Museum in London, United Kingdom.

Specimens examined. Twenty-six specimens were studied: **COSTA RICA: Alajuela Province:** "Cano Negro, 20m, R.N.; V.S. Cano Negro, Prov.; Alajuela, Costa Rica, 4 a; 17 Dic 1992, K. Flores; L-N 319100, 450200" (1, MNCR); "Playuelas, RNVS Caño Negro, Prov. Alaju; COSTA RICA, 20m. 1–18 Feb. 1994. K.; Martínez, L N 325900_454500 #; 2686" (1, MNCR); **Guanacaste Province:** "COSTA RICA Guan; 3km SE R. Naranjo; 22–25 Jan 1993; F.D. Parker" (1, SEMC); **Heredia Province:** "COSTA RICA: Prov.; Heredia, F. La Selva; 3 km S Pto. Viejo; 10°26′N 84°01′W" / "23.vii.1976; H.A. Hispenheide" (date handwritten) (1, MNCR); "COSTA RICA: Heredia; La Selva, 3.2 km SE; Puerto Viejo, 100 m; 3 Feb. 1992, W. Bell; ex.: flight intercept trap" / "Collection of the Global; Eucnemid Research Project; (Robert L. Otto)" (green framed white label) (1, GERP); "COSTA RICA: Heredia; La Selva, 3.2 km SE; Puerto Viejo, 100 m; 18 Mar. 1992, W. Bell; ex.: flight intercept trap" / "Collection of the Global; Eucnemid Research Project; (Robert L. Otto)" (green framed white label) (1, GERP); "COSTA RICA: Heredia; Pr: La Selva Bio.Sta.; 3 km S Pto. Viejo; 10°26′N 84°01′W" / "12 FEB 1993; Parceles Sucesionales; M/00/013" (1, MNCR); "COSTA RICA: Heredia; Est.Biol. La Selva, 50–; 150 m 10°26′N 84°01′W; Proy ALAS, INBio-OET" / "M/05/020; 02 Marzo 1993; Bosque primario" (1, MNCR); "COSTA RICA: Heredia; Est.Biol. La Selva, 50–; 150 m 10°26′N 84°01′W; Proy ALAS, INBio-OET" / "M/04/035; 15 Marzo 1993; Bosque primario" (1, MNCR); "COSTA RICA: Heredia; Est.Biol. La Selva, 50–; 150 m 10°26′N 84°01′W; Proy ALAS, INBio-OET" / "M/12/043; 16 Marzo 1993; Bosque primario" (1, MNCR); "COSTA RICA: Heredia; Pr: La Selva Biol, Sta.; 3 km S Pto. Viejo; 10°26′N 84°01" / "11-iv-1993; P. Hanson; Malaise Trap" (1, MNCR); "COSTA RICA: Heredia; Est.Biol. La Selva, 50–; 150 m 10°26′N 84°01′W; Proy ALAS, INBio-OET" / "M/12/075; 16 Abril 1993; Bosque primario" (1, MNCR);

Figures 1–4. *Dyscolotaxia* species. **1)** *Dyscolotaxia championi*, last abdominal ventrite, ventral view. **2)** *Dyscolotaxia hispaniolensis* Otto **sp. nov.**, last abdominal ventrite, ventral view. **3)** *Dyscolotaxia championi*, antenna, dorsal view. **4)** *Dyscolotaxia chiriquiensis* Otto **sp. nov.**, antenna, ventral view. (1–4 = no scale)

Figures 5–9. *Dyscolotaxia championi* Horn. **5)** Male, dorsal habitus. **6)** Male, antenna. **7)** Male, ventral habitus. **8)** Female, dorsal habitus**. 9)** Male, aedeagus, dorsal view. (Scale: 5–9 = 1.0 mm)

"COSTA RICA: Heredia; Pr: La Selva Biol, Sta.; 3 km S Pto. Viejo; 10°26′N 84°01" / "iv–v-1993; P. Hanson; Malaise Trap" (2, MNCR); "COSTA RICA: Heredia; Est.Biol. La Selva, 50–; 150 m 10°26′N 84°01′W; Proy ALAS, INBio-OET" / "19 Mayo 1993; M/12/106; Bosque primario" (1, MNCR); "COSTA RICA: Heredia; Est.Biol. La Selva, 50–; 150 m 10°26′N 84°01′W; Proy ALAS, INBio-OET" / "M/12/127; 14 Junio 1993; Bosque primario" (1, MNCR); "COSTA RICA: Heredia; Est.Biol. La Selva, 50–; 150 m 10°26′N 84°01′W; Proy ALAS, INBio-OET" / "M/12/134; 14 Junio 1993; Bosque primario" (1, MNCR); "COSTA RICA: Heredia; Est.Biol. La Selva, 50–; 150 m 10°26′N 84°01′W; Proy ALAS, INBio-OET" / "M/12/146; 1 Julio 1993; Bosque primario" (1, MNCR); "COSTA RICA: Heredia; Est.Biol. La Selva, 50–; 150 m 10°26′N 84°01′W; Proy ALAS, INBio-OET" / "M/09/159; 15 Julio 1993; Bosque secundario" (1, MNCR); "COSTA RICA: Heredia; Est.Biol. La Selva, 50–; 150 m 10°26′N 84°01′W; Proy ALAS, INBio-OET" / "M/12/202; 01 Setiembre 1993; Bosque primario" (1, MNCR); "COSTA RICA: Heredia; Est.Biol. La Selva, 50–; 150 m 10°26′N 84°01′W; Proy ALAS, INBio-OET" / "M/07/536; 02 Enero 1996; Bosque primario" (1, MNCR); "COSTA RICA: Prov. Heredia; Est. Biol. La Selva, 50–; 150m 10°26′N 84°01′W; 24 Feb 2004; INBio-OET-ALAS transect" (date and month handwritten) / "24 Febrero 2004; Malaise; M/26/768" (1, MNCR); "COSTA RICA: Prov. Heredia; Est. Biol. La Selva, 50–; 150m 10°26′N 84°01′W; 09 Marzo 2004; INBio-OET-ALAS transect" (date and month handwritten) / "9 Marzo 2004; Malaise; M/26/778" (1, MNCR); "COSTA RICA: Prov. Heredia; Est. Biol. La Selva, 50–; 150m 10°26′N 84°01′W; 21 Marzo 2004; INBio-OET-ALAS transect" (date and month handwritten) / "21 Marzo 2004; Malaise; M/27/789" (1, MNCR); **Limón Province:** "Valle La Estrella, R.B. Hitoy Cerere, A.C.; Amistad, Prov. Limón, COSTA RICA. 100; m. Jul 1994, M. Segura, L S; 398100_572800 #3130" (1, MNCR); **Puntarenas Province:** "Rancho Quemado, Pen. de Osa, A.C. Osa; Prov. Punta, COSTA RICA, 200 m, 4-25; Ene 1994, A.L.Marín, L S; 292500_511000 #2577" (1, MNCR).

Redescription. Male. Length, 5.0–6.0 mm. Width, 1.25–2.0 mm. Body elongate; uniformly dark brown; scape, pedicel, and antennal flagellum dark reddish brown; legs including tarsi reddish brown; head, pronotum, and elytra clothed with short, recumbent, yellowish setae (Figure 5). **Head**: Subspherical, with a faint indication of short median carina present on frons above antennal insertions; surface shiny, punctures somewhat deep, closely dispersed; apical margin of frontoclypeal region feebly trilobed, more than 2 times wider than base; interantennal carina present at base of frontoclypeal region; mandibles stout, bidentate, densely punctate. **Antennae** (Fig. 6): Capitate with flagellomeres VI–IX forming an elongate club, reaching slightly more than ½ the length of the body; with last 2.5 segments extending beyond pronotal hind angles; flagellomere I elongate, almost twice as long as II; flagellomeres II and III subequal, each quadrate and shorter than IV; flagellomeres IV and V subequal, each longer than wide; flagellomeres VI–VIII subequal, each longer than wide and as long as flagellomeres III–V combined; flagellomere IX longer than VIII. **Pronotum**: Surface shiny; punctures somewhat deep, closely spaced; slightly longer than wide, with well developed hind angles; lateral sides parallel sided at basal ½ and arcuate at apical ½; disc convex without depressions or carinae; base sinuous. **Scutellar shield**: Triangular shaped, longer than wide, punctate, setose, and distally rounded. **Elytra**: Striae indicated as solid lines; interstices flattened;

surfaces shiny, transversely rugose at humeri, very closely and shallowly punctate elsewhere. **Legs**: First tarsomere as long as the combined length of remaining four on mesothoracic and metathoracic tarsi; tibiae rounded in cross section; lateral surface of mesothoracic and metathoracic tibiae with setae and transverse rows of spine combs; metathoracic tarsomeres I–III simple; metathoracic tarsomere IV excavate, as wide as III; metathoracic tarsomere V elongate; pretarsal claws simple. **Venter** (Fig. 7): Punctures somewhat deep, very closely dispersed; surface with recumbent, yellowish setae; hypomeron with basally opened, lateral antennal grooves; metathoracic episterna parallel sided; elytral epipleura simple, punctate; metathoracic coxal plates medially 3.0–6.0 times wider than laterally; last abdominal ventrite apically rounded.

Sexual dimorphism. Females (Fig. 8) are similar to males but can be distinguished by slightly shorter antennae reaching ~⅓ of the body length; flagellomeres VI–IX slightly enlarged compared to previous antennal segments; absence of sex patches on abdominal sternites; and slightly larger and broader body with lengths of 7.0–7.5 mm and widths of 2.0–2.5 mm.

Aedeagus (Fig. 9). Basal piece longer than wide, laterally parallel sided, dorsally opened, apically rounded; remaining parts elongate, narrow, constricted laterally just above the basal piece, laterally sinuous; parameres short, apically rounded, laterally unsclerotized; lateral tooth present midway on each lateral lobe, unsclerotized; median lobe elongate and basally broad, apically pointed, bifid, and much longer than the parameres.

Distribution. *Dyscolotaxia championi* is an uncommonly encountered Costa Rican species found mainly on the Caribbean side (north and east of the central mountains) of the country at lower elevations between 50–150 meters above sea level. One record (the type locality) is from a single district in the Chiriquí Province of Panama outside of Costa Rica. There is one record of *D. championi* from the Pacific side (south and west of the central mountains) of Costa Rica in the Osa Peninsula.

Biology. Two adults were taken from a flight intercept trap. Five adults were taken from Malaise traps placed at a single locale in the Heredia province of Costa Rica. Nearly all Costa Rican specimens were taken from a lowland moist broadleaf forest at elevations between 50–150 m. One Osa Peninsular specimen from Rancho Quemado was taken from a transition between the northern dry broadleaf forest and the southern seasonal moist forest (Johnson, pers. com). All of these records are at a much lower elevation compared to the Bugaba record in Panama. The type location (Bugaba) is at 1000 m (Selander and Vaurie 1962). Unlocking the mysteries of their biology, particularly their larvae, may help to clarify the status of these beetles collected in Costa Rica compared to the holotype collected in Panama. Larvae and pupae are unknown.

Note. All examined Costa Rican specimens were identified based on printed information and illustrations in Horn (1890). All Costa Rican specimens have antennal flagellomeres II–V being subequal as described and illustrated (Figure 17a) in Horn (1890), and as such, those specimens are currently regarded as conspecific with the type described from Panama.

Dyscolotaxia chiriquiensis Otto, new species
Fig. 10–13

Differential diagnosis. The rounded last abdominal ventrite will distinguish *D. chiriquiensis* **new species** from *D. hispaniolensis* **new species**. Longer than wide antennal flagellomeres IV and V each in relation to antennal flagellomere III will distinguish the new eucnemid species from *D. championi*. Antennal flagellomere VI being shorter than the combined lengths of III–V will distinguish *D. chiriquiensis* **new species** from *D. picea* **new species**.

Type material. Male holotype: "PANAMA: Chiriqui Prov.; La Fortuna, "Hydrolog.; Trail", 08°42′N, 82°14′W; 1200 m, 9–12 VI 1996; J. Ashe & R. Brooks #187; ex: flight intercept trap" / "*Dyscolotaxia*; *championi*; Horn; Det. R.L. Otto; 2014" (folded) / "**HOLOTYPE:**; *Dyscolotaxia*; *chiriquiensis* ♂; Otto; Det. R.L. Otto; 2020" (red printed label). The holotype is deposited in SEMC.

Paratypes. 4 ♂♂: **PANAMA:** 1 ♂, "PANAMA: Chiriqui Prov.; La Fortuna, "Cont. Divide; Trail", 08°46′N, 82°12′W; 1150 m, 23-V–9-VI-1995; J. Ashe, R. Brooks #155; ex: flight intercept trap" / "Collection of the Global; Eucnemid Research Project; (Robert L. Otto)" (green framed white label) / "**PARATYPE:**; *Dyscolotaxia*; *chiriquiensis* ♂; Otto; Det. R.L. Otto; 2020" (yellow printed label) (GERP); 1 ♂, "PANAMA: Chiriqui Prov.; La Fortuna, "Hydro. Trail"; 08°42′N, 82°14′W; 1150 m, 23-V–9-VI-1996; J. Ashe, R. Brooks #156; ex: flight intercept trap" /

Figures 10–13. *Dyscolotaxia chiriquiensis* Otto **sp. nov.**, holotype (SEMC). **10)** Male, dorsal habitus. **11)** Male, antenna. **12)** Male, ventral habitus. **13)** Male paratype (SEMC), aedeagus, dorsal view. (Scale: 10–13 = 1.0 mm)

"*Dyscolotaxia*; *championi*; Horn; Det. R.L. Otto; 2014" (folded) / "**PARATYPE:**; *Dyscolotaxia*; *chiriquiensis* ♂; Otto; Det. R.L. Otto; 2020" (yellow printed label) (SEMC); 1 ♂, "PANAMA: Chiriqui; 5.6 km N Boquete; La Culebra Trail, 1650 m; 8°49′23″N, 82°25′18″W; 15 – 19 Jun 1996, J. Ashe; R. Brooks PAN1AB96 177B; ex: flight intercept trap" / "*Dyscolotaxia*; *championi*; Horn; Det. R.L. Otto; 2014" (folded) / "**PARATYPE:**; *Dyscolotaxia*; *chiriquiensis* ♂; Otto; Det. R.L. Otto; 2020" (yellow printed label) (SEMC); 1 ♂, "PANAMA: Chiriqui Prov.; 4 km E. Boquete; Valle Palo Alto; 08°48′33″N, 82°23′59″W; 29-vii-1999; J.B. Woodley 99/065" / "Collection of the Global; Eucnemid Research Project; (Robert L. Otto)" (green framed white label) / "**PARATYPE:**; *Dyscolotaxia*; *chiriquiensis* ♂; Otto; Det. R.L. Otto; 2020" (yellow printed label) (GERP). Paratypes are deposited in GERP and SEMC.

Description. Male holotype: Length, 6.0 mm. Width, 1.5 mm. Body elongate; uniformly black; scape black, pedicel dark reddish, antennal flagellum dark brown; femur and tibiae black; tarsi dark brown; head, pronotum, and elytra clothed with short, recumbent, yellowish setae (Fig. 10). **Head**: Subspherical, with a faint indication of median carina present on frons above antennal insertions; surface shiny, punctures somewhat deep, closely dispersed; apical margin of frontoclypeal region feebly trilobed, more than 2 times wider than base; interantennal carina present at base of frontoclypeal region; mandibles stout, bidentate, densely punctate. **Antennae** (Fig. 11): Capitate with flagellomeres VI–IX forming an elongate club, reaching ⅔ the length of its body; with last 3 segments extending beyond pronotal hind angles; flagellomere I elongate, almost twice as long as II; flagellomeres II and III subequal, each longer than wide and shorter than IV; flagellomeres IV and V subequal, each longer than wide; flagellomeres VI–VIII subequal, each longer than wide and as long as flagellomeres IV–V combined; flagellomere IX longer than VIII. **Pronotum**: Surfaces shiny; punctures somewhat deep, closely spaced; slightly longer than wide, with well developed hind angles; lateral sides weakly arcuate and narrowed craniad; disc convex without depressions or carinae; base sinuous. **Scutellar shield**: Triangular shaped, longer than wide, punctate, setose, and distally rounded. **Elytra**: Striae indicated as solid lines; interstices flattened; surface shiny, transversely rugose at basal ½, very closely and shallowly punctate at apical ½. **Legs**: First tarsomere as long as the combined length of remaining four on mesothoracic and metathoracic tarsi; tibiae rounded in cross section; lateral surface of mesothoracic and metathoracic tibiae with setae and transverse rows of spine combs; metathoracic tarsomeres I–III simple; metathoracic tarsomere IV excavate, as wide as III; metathoracic tarsomere V elongate; pretarsal claws simple. **Venter** (Fig. 12): Punctures somewhat deep, very closely dispersed; surface with recumbent, yellowish setae; hypomeron with basally-opened, lateral antennal grooves; metathoracic episterna parallel sided; elytral epipleura simple, punctate; metathoracic coxal plates medially 3.0–6.0 times wider than laterally; last abdominal ventrite apically rounded.

Sexual dimorphism. Females are unknown.

Aedeagus (paratype) (Fig. 13). Basal piece longer than wide, laterally parallel sided, dorsally opened, apically rounded; remaining parts elongate, narrow, constricted laterally just above the basal piece, laterally sinuous; parameres short, apically rounded, laterally unsclerotized, with lateral tooth present at midway; median lobe elongate and basally broad, apically pointed, bifid, and much longer than the parameres.

Variations. Four male paratypes examined. Paratypes measured 5.0–6.0 mm long and 1.0–1.5 mm wide. Two paratypes as long as and as wide as the holotype. Two other paratypes shorter and narrower than the holotype. Antennae and legs more infuscate reddish in two paratypes. Antennae and legs as dark as the holotype in two other paratypes. Median carina on the frons poorly developed in two paratypes, strongly indicated in two other paratypes. No other exoskeletal differences observed between these paratypes and the holotype.

Distribution. This newly described eucnemid is an apparently endemic species in Panama, taken from a number of locales in a single province.

Biology. Four adults were taken from a flight intercept trap. These eucnemids have been taken from a Talamancan premontane forest, which is a moist broadleaf forest. Larvae and pupae are unknown.

Etymology. The specific epithet is derived from a combination of two words, 'Chiriquí', the name of the province in Panama and '-ensis', a Latin adjectival suffix meaning "pertaining to", from which the new species has been taken.

Dyscolotaxia hispaniolensis Otto, new species
Fig. 14–18

Differential diagnosis. The strongly produced last abdominal ventrite along with an Antillean distribution will distinguish this new species from all known *Dyscolotaxia* species.

Type material. Male holotype: "DOMINICAN REP: Prov.; Barahona, nr. Filipinas; Larimar Mine; 26-VI –7-; VIII-1992: R. Woodruff; Skelley; window trap" / "Dyscolotaxia; Det.; P.J. Johnson 1997" (black framed white label; "Dyscolotaxia" and "97" handwritten on label) / "**HOLOTYPE:**; *Dyscolotaxia*; *hispaniolensis* ♂; Otto; Det. R.L. Otto; 2021" (red printed label). Holotype is deposited in FSCA.

Paratype. 1 ♂: **DOMINICAN REPUBLIC:** "DOMINICAN REP: Prov.; Barahona, nr. Filipinas; Larimar Mine; 26-VI –7-; VIII-1992: R. Woodruff; Skelley, window trap" / "**PARATYPE:**; *Dyscolotaxia*; *hispaniolensis* ♂; Otto; Det. R.L. Otto; 2021" (yellow printed label) (FSCA). Paratype is deposited in FSCA.

Figures 14–18. *Dyscolotaxia hispaniolensis* Otto **sp. nov.**, holotype (FSCA). **14)** Dorsal habitus. **15)** Antenna. **16)** Ventral habitus. **17)** Male paratype (FSCA), aedeagus, dorsal view. **18)** Male paratype (FSCA), aedeagus, lateral view. (Scale: 15, 17–18 = 0.5 mm; 14, 16 = 1.0 mm)

Description. Male holotype: Length, 6.0 mm. Width, 1.75 mm. Body elongate; uniformly black; scape and flagellomeres VI–IX brown-black, pedicel and flagellomeres I–V dark reddish brown; femur and tibiae blackish; tarsi dark brown; head, pronotum, and elytra clothed with short, recumbent, yellowish setae (Fig. 14). **Head**: Subspherical, without indication of median carina on frons above antennal insertions; surface shiny, punctures somewhat deep, closely dispersed; apical margin of frontoclypeal region feebly trilobed, more than 2 times wider than base; interantennal carina present at base of frontoclypeal region; mandibles stout, bidentate, densely punctate. **Antennae** (Fig. 15): Capitate with flagellomeres VI–IX forming an elongate club, reaching slightly beyond half the length of the body; with last 3 segments extending beyond pronotal hind angles; flagellomere I elongate, about twice as long as II; flagellomeres II and III subequal, quadrate, each slightly shorter than IV; flagellomeres IV and V subequal, quadrate; flagellomeres VI–VIII subequal, each longer than wide and as long as flagellomeres III–V combined; flagellomere IX slightly longer than VIII. **Pronotum**: Surface shiny; punctures somewhat deep, closely spaced; slightly longer than wide, with well developed hind angles; lateral sides arcuate and narrowed craniad; disc convex without depressions or carinae; base sinuous. **Scutellar shield**: Triangular shaped, longer than wide, punctate, setose, and distally rounded. **Elytra**: Striae indicated as solid lines; interstices flattened; surfaces shiny, very closely and shallowly punctate. **Legs**: First tarsomere as long as combined length of remaining four on mesothoracic and metathoracic tarsi; tibiae rounded in cross section; lateral surface of mesothoracic and metathoracic tibiae with setae and transverse rows of spine combs; metathoracic tarsomeres I–III simple; metathoracic tarsomere IV excavate, as wide as III; metathoracic tarsomere V short; pretarsal claws simple. **Venter** (Fig. 16): Punctures somewhat deep, very closely dispersed; surface with recumbent, yellowish setae; hypomeron with basally opened, lateral antennal grooves; metathoracic episterna parallel sided; elytral epipleura simple, punctate; metathoracic coxal plates medially 3.0–6.0 times wider than laterally; last abdominal ventrite apically produced.

> **Sexual dimorphism.** Females are unknown.

> **Aedeagus (paratype)** (Fig. 17–18). Basal piece longer than wide, laterally parallel sided, dorsally opened, apically rounded; remaining parts elongate, apically narrow, constricted laterally above attachment point of median lobe; parameres elongate, apically rounded, each without lateral tooth; median lobe elongate and basally broad, strongly narrowed halfway, apically pointed, bifid, and much longer than parameres.

> **Variations.** One male paratype examined. Paratype measured 5.75 mm long and 1.75 mm wide. Paratype slightly shorter than and as wide as the holotype. Femur and tibiae dark brown, slightly lighter in color compared to the holotype. No other additional exoskeletal differences observed between the paratype and the holotype.

Distribution. This new Antillean eucnemid is an endemic species on the island of Hispaniola, in the Dominican Republic.

Biology. Two adults were taken from a window trap. Larvae and pupae are unknown.

Etymology. The specific epithet is derived from a combination of two words, 'Hispaniola', the name of the island of origin and '-ensis', a Latin adjectival suffix meaning "pertaining to", from which the new species has been taken.

Dyscolotaxia picea Otto, new species
Fig. 19–22

Differential diagnosis. The rounded last abdominal ventrite will distinguish *D. picea* **new species** from *D. hispaniolensis* **new species**. Longer than wide antennal flagellomeres IV and V each in relation with antennal flagellomere III will distinguish this new species from *D. championi*. Antennal flagellomere VI being as long as the combined lengths of III–V will distinguish *D. picea* **new species** from *D. chiriquiensis* **new species**.

Type material. Male holotype: "ECUADOR COTOPAXI; Las Pampas 1500m; 78°57'04″W 00°25'16″S; 3 Sep. 1997 F. Maza"/ "QCAZ I; 268703" / "**HOLOTYPE:**; *Dyscolotaxia*; *picea* ♂; Otto; Det. R.L. Otto; 2022" (red printed label). Holotype deposited in QCAZI.

> **Paratypes.** 5 ♂♂: **ECUADOR:** 1 ♂, "ECUADOR COTOPAXI; LAS PAMPAS 1300m; MAY1997 GOnore" / "QCAZ I; 268704" / "**PARATYPE:**; *Dyscolotaxia*; *picea* ♂; Otto; Det. R.L. Otto; 2022" (yellow printed label) (QCAZI); 1 ♂, "ECUADOR COTOPAXI; LAS PAMPAS 1500m; 28MAY1997 GOnore" / "QCAZ I; 268707" / "**PARATYPE:**; *Dyscolotaxia*; *picea* ♂; Otto; Det. R.L. Otto; 2022" (yellow printed label) (QCAZI); 1 ♂, "ECUADOR COTOPAXI; LAS PAMPAS; 12JUN1997GOnore" / "QCAZ I; 268702" / "**PARATYPE:**; *Dyscolotaxia*;

Figures 19–22. *Dyscolotaxia picea* Otto **sp. nov.**, holotype (QCAZI). **19)** Male specimen with labels. **20)** Male, dorsal habitus. **21)** Male, antenna. **22)** Male, ventral habitus. (19–22 = no scale) (Images provided by Fernanda Salazar-Buenaño (QCAZI))

picea ♂; Otto; Det. R.L. Otto; 2022" (yellow printed label) (QCAZI); 1 ♂, "ECUADOR COTOPAXI; Las Pampas 1500m; 78°57′04″W 00°25′16″S; 3 Sep. 1997 F. Maza" / "QCAZ I; 268705" / "**PARATYPE:**; *Dyscolotaxia*; *picea* ♂; Otto; Det. R.L. Otto; 2022" (yellow printed label) (QCAZI); 1 ♂, "ECUADOR PICHINCHA; Unión del Toachi 950m; 00°21′05″S 78°57′10″W; 5–12 Abril 2003 MMosquera; Ex: Malaise trap" / "QCAZ I; 268706" / "**PARATYPE:**; *Dyscolotaxia*; *picea* ♂; Otto; Det. R.L. Otto; 2022" (yellow printed label) (QCAZI). Paratypes are deposited in QCAZI.

Description. Male holotype: Length, 6.84 mm. Width, 2.20 mm. Body elongate; uniformly black; scape brownish black, pedicel and antennal flagellum dark reddish brown; femur and tibiae brownish black; tarsi brownish black; head, pronotum, and elytra clothed with short, recumbent, yellowish setae (Fig. 19–20). **Head**: Subspherical, without indication of median carina on frons above antennal insertions; surface shiny, punctures somewhat deep, closely spaced; apical margin of frontoclypeal region feebly trilobed, more than 2 times wider than base; interantennal carina present at base of frontoclypeal region; mandibles stout, bidentate, densely punctate. **Antennae** (Fig. 21): Capitate with flagellomeres VI–IX forming an elongate club, reaching nearly ⅔ the length of its body; with last 3 segments extending beyond pronotal hind angles; flagellomere I elongate, almost twice as long as II; flagellomeres II and III subequal, each quadrate and shorter than IV; flagellomeres IV and V subequal, each longer than wide; flagellomeres VI–VIII subequal, each longer than wide and as long as combined lengths of flagellomeres III–V; flagellomere IX slightly longer than VIII. **Pronotum**: Surface shiny; punctures somewhat deep, closely spaced; longer than wide, with well developed hind angles; lateral sides arcuate and narrowed craniad; disc convex without depressions or carinae; shallow groove present at base above scutellar shield, extending ¼ the length of pronotum; base sinuous. **Scutellar shield**: Triangular shaped, longer than wide, punctate, setose, and distally rounded. **Elytra**: Striae indicated as solid lines; interstices flattened; surfaces shiny, transversely rugose at basal ½, very closely and shallowly punctate at apical ½. **Legs**: Tibiae rounded in cross section; lateral surface of mesothoracic and metathoracic tibiae with setae and transverse rows of spine combs; metatarsomeres I–III simple; metathoracic tarsomere IV excavate, as wide as III; metathoracic tarsomere V and pretarsal claws missing on holotype. **Venter** (Fig. 22): Punctures somewhat deep, very closely dispersed; surface with recumbent, yellowish setae; hypomeron with basally opened, lateral antennal grooves; metathoracic episterna parallel sided; elytral epipleura simple, punctate; metathoracic coxal plates medially 3.0–6.0 times wider than laterally; last abdominal ventrite apically rounded.

Sexual dimorphism. Females are unknown.

Variations. Five male paratypes examined through provided images. Paratypes measured 6.24–6.97 mm long and 2.03–2.25 mm wide. One paratype much longer and wider than the holotype. Four paratypes shorter and narrower than the holotype. Three paratypes with more infuscate reddish-colored scape. Two paratypes with similarly colored scape compared to the holotype. In one of the paratypes, first tarsomere as long as the combined lengths of the remaining four on mesothoracic and metathoracic tarsi. Metathoracic tarsomere V short with simple pretarsal claws. No other exoskeletal differences observed between these paratypes and the holotype.

Distribution. This newly described eucnemid is an endemic species in Ecuador taken from two different locales from 950–1500 meters above sea level.

Biology. One specimen was taken from a Malaise trap in 2003. These eucnemid beetles have been taken from lower premontane forests in the Andes. Larvae and pupae are unknown.

Etymology. The specific epithet is derived from the dark black coloration of the species' habitus.

Genus *Amazotaxia* Otto, new genus

Type species. *Plesiofornax tetratoma* Chassain, **designated here**.

Description. Male. Body elongate, approximately 3.5 times longer than wide, dorsally convex and ventrally well sclerotized. **Head**: Surface with short, recumbent setae. Antennae with 11 antennomeres, tubular, rounded in cross-sectional view, setose; capitate with very elongate flagellomeres VI–IX; scape 3.0 times longer than pedicel; pedicel globular, subterminally attached to scape, shorter than flagellomere I; flagellomere I longer than flagellomere II; flagellomere IX slightly longer than VIII. Compound eyes round, well developed, small, not incised. Antennal groove absent in genal regions between base of mandible and compound eye. Frontoclypeal region subtriangular, apically rounded, ~2 times wider than the base. Mandibles well developed, robust. Maxillary and labial palpi concealed behind mandibles. Labrum concealed. **Pronotum**: Arcuate, convex, and setose. Laterally narrowed apically. About as long as wide. Lateral pronotal ridge entire. Disc convex; base sinuate. **Scutellar shield**: Longer than wide, distally rounded. **Elytron**: Elongate, convex, laterally marginate, setose. Disc with well-developed, smooth-lined striae. Humeral region striate. Interstices flattened. Excretory punctures/groove present at elytral apices. **Legs**: Prothoracic legs shortest, metathoracic legs longest. Prothoracic tibia apically rounded, flattened, setose with one apical spur. Lateral side of mesothoracic and metathoracic tibiae with setae and flat spines. First prothoracic tarsi with basal sex combs. Metathoracic tarsi, including claws, as long as tibia. Metathoracic tarsi I–III simple, round. Metathoracic tarsi IV short, excavated-emarginated, as wide as III. Metathoracic tarsi V short with simple claws. Tarsal formula 5-5-5. **Venter**: Surfaces with recumbent setae. Prothoracic sternal peg basally broad, short. Notosternal suture about as long as hypomeral base. Hypomeron with medially undefined, very shallow lateral antennal grooves. Elytral epipleura punctate, not grooved. Metathoracic episterna parallel sided. Metathoracic coxal plate medially 3.0–6.0 times wider than laterally. Tarsal grooves absent on mesothoracic and metathoracic sterna. Abdomen with 5 visible ventrites, convex medially.

Etymology. The generic name is a combination of two words, the stem of the new name, '*Amazo-*', is based on the word Amazon, a region of South America from where the eucnemid was previously discovered and the root '*-taxia*', in which it is based from the root of the related group, *Dyscolotaxia*. Gender: feminine.

Diversity. The new group is monotypic, with a single species known only from French Guiana.

Amazotaxia tetratoma (Chassain, 2011), new combination
Fig. 23–26

Plesiofornax tetratoma Chassain 2011: 118–120; Fig. 3–4.

Type. Not seen. Chassain (2011) noted the male type was collected by Giuglaris in Bélizon, French Guiana. The holotype for *P. tetratoma* is in the Chassain collection placed in the Muséum national d'Histoire naturelle in Paris France (MNHN).

Specimens examined. Five male specimens were available: **FRENCH GUIANA:** "French Guiana Belizon, +4.25 -52.65; 2015-06-12, JL Giuglaris leg." (2, JMC); "French Guiana Belizon, +4.25 -52.65; 2015-08, JL Giuglaris leg"

Figures 23–26. *Amazotaxia tetratoma* (Chassain). **23)** Male, dorsal habitus. **24)** Male, antenna. **25)** Male, ventral habitus. **26)** Male, aedeagus, dorsal view. (Scale: 24, 26 = 0.5 mm; 23, 25 = 1.0 mm)

(2, JMC); "FRENCH GUIANA; BELLIZON; x 2016; lg: J.L. GIUGLARIS" / "Collection of the Global; Eucnemid Research Project' (Robert L. Otto)" (green framed white label) (1, GERP).

Redescription. Length, 6.0–7.0 mm. Width, 1.75–2.0 mm. Body oblong, elongate; uniformly dark reddish brown; scape, pedicel, and antennal flagellum dark reddish brown; legs, including tarsi, dark reddish brown; head, pronotum, and elytra clothed with short, recumbent, yellowish setae (Fig. 23). **Head**: Subspherical, without indication of short median carina; surface dullish, rugose; apical margin of frontoclypeal region evenly rounded, about 2 times wider than base; interantennal carina absent at base of frontoclypeal region; mandibles stout, bidentate, densely punctate. **Antennae** (Fig. 24): Capitate with flagellomeres VI–IX forming an elongate club, reaching nearly ½ the length of its body; with last 2 segments extending beyond pronotal hind angles; flagellomere I elongate, almost twice as long as II; flagellomeres II and III subequal, each quadrate and shorter than IV; flagellomeres IV and V subequal, each slightly longer than wide; flagellomeres VI–VIII subequal, each longer than wide and as long as flagellomeres IV–V combined; flagellomere IX slightly longer than VIII. **Pronotum**: Surface dullish; rugose; slightly longer than wide, with well developed hind angles; lateral sides slightly arcuate, narrowing craniad; disc convex without depressions or carinae; short lineal depression near base, extending ¼ the length of pronotum above scutellar shield; base sinuous. **Scutellar shield**: Triangular shaped, longer than wide, slightly rugose, setose, and distally rounded. **Elytra**: Striae indicated as solid lines; interstices flattened; surfaces dullish, rugose; excretory groove/pit present at elytral apices. **Legs**: First tarsomere as long as combined length of remaining four on mesothoracic and metathoracic tarsi; tibiae rounded in cross section; lateral surface of mesothoracic and metathoracic tibiae with setae and single spines; metathoracic tarsomeres I–III simple; metathoracic tarsomere IV excavate, as wide as III; metathoracic tarsomere V short; pretarsal claws simple. **Venter** (Fig. 25): Punctures somewhat deep, very closely dispersed; surface with recumbent, yellowish setae; hypomeron with very shallow, medially undefined lateral antennal grooves; metathoracic episterna parallel sided; elytral epipleura simple, punctate; metathoracic coxal plates medially 3.0–6.0 times wider than laterally; last abdominal ventrite apically rounded.

    Sexual dimorphism. Females are unknown.

    Aedeagus (Fig. 26). Basal piece longer than wide, laterally parallel sided and narrowing apically, dorsally opened, apically truncated; remaining parts elongate, basal ⅓ narrowed, apical ⅔ wider; lateral sides sinuous; parameres short, apically rounded; lateral tooth present at midway on each paramere; median lobe elongate and basally narrowed, apically pointed, bifid, and much longer than the parameres.

Distribution. Chassain and Touroult (2011) reported this common, endemic eucnemid species from a number of localities in French Guiana.

Biology. The holotype was taken from a flight intercept trap (Chassain 2011). SEAG (Société entomologique Antilles Guyane) has employed a number of trapping techniques through use of Malaise traps and various light traps during their expeditions into the Amazonian rain forests in French Guiana and is possible that all known adult specimens have been taken through these methods. Larvae and pupae are unknown.

Note. The illustration of the genitalia provided by Chassain (2011: figure 4) for *P. tetratoma* do not match with the observed dissected aedeagus associated with the examined male specimen before me. The illustrated aedeagus showed the presence of secondary lateral lobes basally attached to the lateral lobes. Chassain (2011) made no mention of the presence of secondary lateral lobes in the original description, which questions the inclusion of the illustration for the aedeagus associated with the species. The dissected aedeagus associated with one of the specimens before me lacks these structures, which is problematic for diagnostic purposes. Further research on this issue will be conducted during the forthcoming faunal research for Eucnemidae in French Guiana in the near future.

Diagnosis and discussion. Chassain (2011) wrote *P. tetratoma* is intermediate between *Dyscolotaxia* and *Plesiofornax*. He felt the species is more closely allied to *Plesiofornax*. However, after observing the external morphology of *P. tetratoma*, the species does not fit in either *Dyscolotaxia* or *Plesiofornax*. A number of character states were discovered to distinguish the new group from *Dyscolotaxia* and *Plesiofornax*. Firstly, the absence of transverse spines on the lateral sides of the mesothoracic and metathoracic tibiae and secondly, the slightly wider base of the frontoclypeal region. *Dyscolotaxia* and *Plesiofornax* have transverse rows of spines present on the lateral sides of the mesothoracic and metathoracic tibiae and have a narrower base of the frontoclypeal region (especially in *Dyscolotaxia*). *Amazotaxia* have a wider base of the frontoclypeal region and lack transverse rows of spines on the lateral surfaces of the mesothoracic and metathoracic tibiae. Thirdly, the presence of specialized sex patches on abdominal sternites 2 and 3 in male specimens of *Dyscolotaxia* will further distinguish *Dyscolotaxia* from both *Amazotaxia* and *Plesiofornax*. Lastly, capitate, tubular antennae will further distinguish both *Amazotaxia* and *Dyscolotaxia* from *Plesiofornax*. *Plesiofornax* have serriform antennae with antennal flagellomeres III–VIII being subequal. These observed character states provide enough evidence to warrant the description of a new genus group.

Amazotaxia appear to be more closely related to *Dyscolotaxia* based on overall external morphology and restricted Neotropical distribution compared to *Plesiofornax*. It is impossible to tell if the loss of features such as the medial ridge along the lateral antennal grooves of the hypomeron, along with transverse spines on the lateral sides of the mesothoracic and metathoracic tibiae, constitutes derived features or primitive features retained by the group. *Amazotaxia* are restricted to the Amazonian rainforest in French Guiana. It is possible the genus may also occur in northern Brazil, adjacent to the borders of French Guiana and Suriname. Further surveys in both countries, along with areas such as Guyana and Venezuela, will help explore the extent of the species' range in South America.

Dyscolotaxia are seemingly restricted to the extreme northwestern areas of South America, from Ecuador, presumably north through Colombia, to Panama and Costa Rica, and on Hispaniola. *Dyscolotaxia* have not been reported from Colombia, though it is probable that the genus is present. *Dyscolotaxia* appear to be restricted to the valleys or basins within the series of Cordilleras or ranges of the Andes Mountains in both Ecuador and Colombia. Further surveys in other parts of South America, Lesser Antilles, Greater Antilles (Cuba, Puerto Rico, Jamaica), and areas north of Costa Rica may yield additional information on the extent of their range in the Neotropical region.

The presence of *D. hispaniolensis* **new species** in Dominican Republic within the Antilles represents an interesting discovery. The new species is undoubtedly a *Dyscolotaxia*, based on observed external morphology of the new species. The presence of an apically produced last abdominal ventrite along with the loss of the lateral spine on the parameres will distinguish *D. hispaniolensis* from any known species of *Dyscolotaxia*. The presence of the new *Dyscolotaxia* species in the Antilles can only be explained through known palaeobiogeographical hypotheses.

Graham (2003) discussed the formation of the Proto-Greater Antilles in the Pacific Ocean during the Cretaceous Epoch and how these islands began to coalesce throughout geological time. Graham further noted these islands (as part of the Caribbean plate) drifted between the North American and South American landmasses and

ended up in the Gulf of Mexico where it presently sits after it collided with the Bahamas Platform. Pindell and Kennan (2009) continued that discussion by modifying the formation hypothesis into the theory that is generally accepted today. They believed the Antilles and Aves Ridges were originally subaerial to a submerged chain of volcanic edifices formed northwest of the South American continent in what is present day Columbia/Ecuador, which connected the continent to North America during the Cretaceous Epoch (130–110 million years ago). As the plate broke away and drifted northeastward, it collided with the Florida and Bahamas platform and created two deformational belts to the north, allowing Cuba, Hispaniola, Puerto Rico, and the Virgin Islands to uplift. Tobago and the leeward Antilles were also uplifted as the plate collided with the Columbian and Venezuela plates in the south during the Eocene Epoch (57 million years ago). As the Greater and Lesser Antilles uplifted from these collisions, volcanism continued in the Aves Ridges and lasted from 75–48 million years ago, creating the volcanic chain that we see today. Since then, volcanism has ceased in the Aves Ridges (Aitken et al. 2009).

One of the much-discussed hypotheses on Caribbean biogeography is the GARRLandia hypothesis by Iturralde-Vinent and MacPhee (1999), which suggests that the Aves Ridge emerged from the oceanic surface to create a landmass where it began at northern South America and terminated at Cuba/Hispaniola (Greater Antilles). This landmass existed for 2 million years and allowed organisms to cross into the Caribbean region before the ridges submerged beneath the oceanic surface. Iturralde-Vinent and MacPhee used fossil evidence to explain how some mammals reached the Greater Antilles in the Caribbean. However, their hypothesis generated discussion and controversy regarding how these islands in the Caribbean became populated. That hypothesis was largely dismissed by Ali (2012) and Ali and Hedges (2021) based on phylogenetic evidence of different vertebrates, including reptiles, amphibians, and mammals by examining how various clades colonized these islands in the Caribbean. Iturralde-Vinent and MacPhee believed these islands were populated by vicariance through long distance and organisms were dispersed over water from a nearby continent, especially invertebrates and plants.

Other studies offer ideas of colonization through vicariance, in which organisms colonized these islands after arriving from the continent. Rosen (1975, 1978 and 1985) published his studies discussing his hypothesis of island colonization of megafauna such as reptiles and mammals. He suggested these animals arrived from nearby continents and colonized these islands, which, through endemism by vicarance, independently evolved into new species while the West Indies drifted away from these landmasses.

Roncal et al. (2020) examined four primary hypotheses of island colonization, including vicariance, GAARlandia, long distance dispersal, and in-situ speciation (speciation occurring within or between islands) by using plants from the Caribbean to revise the discussion of regional paleogeography. Roncal et al. used the Time-For-Speciation Effect hypothesis to examine colonization time for groups of plants in the region through phylogenetic analysis. Mathematical equations were used to calculate estimated time of colonization occurring for each group. Their results that showed plant colonization took place repeatedly over the last 60 million years from continental America, especially from Central and South America. Most colonization (over 80%) took place after the purported GARRlandia event as proposed by Iturralde-Vinent and MacPhee (1999), thereby refuting that hypothesis along with the Cretaceous vicariance model from Rosen (1975). Through their models, Roncal et al. concluded that over water dispersal (especially for seed plants) from Central and South America allowed plants to colonize and evolve on these islands. Most colonization occurred more recently than the Oligocene Epoch.

After the closure of the Panamanian Isthmus more than 3 million years ago, biotic exchanges between the North American (higher elevation species) and South American (lower elevation species) landmasses commenced, which allowed *Dyscolotaxia* (originally a South American group) and other biotic groups to extend their ranges through Central America northward. This may explain why there are no collection records for *Dyscolotaxia* north of Costa Rica.

Acknowledgements

Literature Cited

Aitken T, Mann P, Escalona A, Christeson GL. 2009. Evolution of the Grenada and Tobago basins and implications for arc migration. Marine and Petroleum Geology 28(1): 235–258.

Ali JR. 2012. Colonizing the Caribbean: Is the GAARlandia land-bridge hypothesis gaining a foothold? Journal of Biogeography 39: 431–433.

Ali JR, Hedges SB. 2021. Colonizing the Caribbean: New geological data and an updated land-vertebrate colonization record challenge the GAARlandia land-bridge hypothesis. Journal of Biogeography 48: 2699–2707.

Chassain J. 2011. Description de deux espèces nouvelles d'Eucnémides des genres *Calyptocerus* Guérin-Méneville et *Plesiofornax* Coquerel (Coleoptera, Eucnemidae, Macraulacinae) de Guyane. Le Coléoptériste 14(2): 114–121.

Chassain J, Touroult J. 2011. Les Eucnémides de Guyane (Coleoptera: Eucnemidae). p. 78–88. In: Touroult J (ed.). Contributions à l'Étude des Coléoptères de Guyane. Tome III. ACOREP-France; Paris. 88 p.

Graham A. 2003. Geohistory models and Cenozoic paleoenvironments of the Caribbean region. Systematic Botany 28(2): 378–386.

Horn G. 1890. Fam. Eucnemidae. Biologia Centrali-Americana, Insecta, Coleoptera, Serricornia. Volume III, Part 1: 210–257, plate 10.

Iturralde-Vinent M, MacPhee RD. 1999. Palaeogeography of the Caribbean region: Implications for Cenozoic biogeography. Bulletin of the American Museum of Natural History 238: 1–95.

Muona J. 1993. Review of the phylogeny, classification and biology of the family Eucnemidae (Coleoptera). Entomologica Scandinavica Supplement 44: 1–133.

Otto RL. 2016. The false click beetles (Coleoptera: Eucnemidae) of Laos. Entomologica Basiliensia et Collectionis Frey 35: 181–427.

Pindell JL, Kennan L. 2009. Tectonic evolution of the Gulf of Mexico, Caribbean and northern South America in the mantle reference frame: an update. Geological Society London Special Publications 328(1): 1–55.

Roncal J, Nieto-Blázquez ME, Cardona A, Bacon CD. 2020. Chapter 20. Historical biogeography of Caribbean plants revises regional paleogeography. p. 521–546. In: Rull V, Carnaval AC (eds.). Neotropical diversification: Patterns and processes. Springer; New York, NY. 830 p.

Rosen DE. 1975. A vicariant model of Caribbean biogeography. Systematic Zoology 24(4): 431–464.

Rosen DE. 1978. Vicariant patterns and historical explanation in biogeography. Systematic Zoology 27: 159–188.

Rosen DE. 1985. Geological hierarchies and biogeographic congruence in the Caribbean. Annals of the Missouri Botanical Garden 72(4): 636–659.

Selander RB, Vaurie P. 1962. A gazetteer to accompany the "Insecta" volumes of the "Biologia Centrali-Americana". American Museum Novitates 2099: 1–70.