Revista Colombiana de Entomología 43 (1): 85-90 (Enero - Junio 2017)

First records of weevils (Coleoptera: Curculionidae) in Quaternary Colombian copal

Los primeros registros de gorgojos (Coleoptera: Curculionidae) del cuaternario colombiano copal

GEORGE POINAR, JR.[1], ANDRIS BUKEJS[2] and ANDREI A. LEGALOV[3]

Abstract: Three new weevil species, *Stenommatus copalicus* sp. nov. (Curculionidae: Dryophthorinae), *Conotrachelus dysaethrius* sp. nov. and *Cydianerus eukrinus* sp. nov. are described and figured from Quaternary Colombian copal. Keys to recent and fossil species of New World *Stenommatus*, recent and fossil species of *Conotrachelus* with broken carinae of the 2nd and 5th elytral intervals and a body size greater than 7.0 mm, and recent and fossil species of New World *Cydianerus*, are provided. These are the first records of Curculionidae from Colombian copal and the first records of the genera *Stenommatus* and *Cydianerus* in Colombia.

Keywords: Taxonomy. Systematics. Quaternary copal.

Resumen: Se describen e ilustran cuatro nuevas especies preservadas en copal del Cuaternario Colombiano: *Stenommatus copalicus* sp. nov. (Curculionidae: Dryophthorinae), *Conotrachelus dysaethrius* sp. nov., *Cydianerus eukrinus* sp. nov. Se incluyen claves para las especies recientes y fósiles de Stenommatus en las especies del Nuevo Mundo, recientes y fósiles de *Conotrachelus* con carenas de segunda y los intervalos de élitros quinto roto y tamaños de cuerpo más de 7,0 mm; y se dan las especies recientes y fósiles de *Cydianerus* en Nuevo Mundo. Es el primer registro de especímenes pertenecientes a Curculionidae preservados en copal colombiano y los primeros registros de los géneros *Stenommatus* y *Cydianerus* en Colombia.

Palabras clave: Taxonomía. Sistemática. Copal Cuaternario.

Introduction

Copals are Quaternary subfossil resins that can contain both extinct and extant species of animals and plants (Poinar *et al.* 2001, 2013). Representatives of the superfamily Curculionoidea in copal are known from African, Madagascar, Celebes, Japanese and Danish samples (Legalov 2015) although bark-beetles are the most richly represented group of copal curculionoids.

The importance of copal inclusions is that they can illustrate faunal changes that have occurred relatively recently. Quaternary weevils are mainly represented by recent species (Kiselev and Nazarov 2009). Extinct Pleistocene insects in copal are rare (Hinojosa-Díaz and Engel 2007; Azar *et al.* 2009; Stroiński and Szwedo 2011; etc.). Of the several hundred species of Late Pleistocene weevils, primarily from river and lake deposits, 24 species (with 16 extant) occurred in copal (Legalov 2015).

In this paper, we describe three new weevil species of the subfamilies Dryophthorinae, Molytinae, and Entiminae from copal of Santander province, Colombia. These are the first records of the family Curculionidae in Colombian copal.

Material and methods

Colombian copal is the subfossil resins of leguminous trees of the genus *Hymenaea* sp. (Fabaceae) (Langenheim 1995, 2003). The age of Colombian copal still remains an open question, however it is usually dated within the age range of 60 years (postbomb) to 2.5 Ma years [Holocene–Pleistocene–Pliocene] (Anderson 1996; Lambert *et al.* 1995; Penney *et al.* 2013; Poinar 1992; Ragazzi *et al.* 2003; Stinchcomb 1998). Accurate determinations made by means of 14C revealed that some pieces of Colombian copal from the Santander province are approximately 200 years old (Clifford et al. 1997), and this age corresponds to nearly recent resin.

Type strata and locality. Colombian Quaternary copal; Santander province, Andes region, Columbia, South America.

The type specimens are deposited in the Poinar amber collection maintained at Oregon State University (PACO, Corvallis, OR, USA) and the private collection of Andris Bukejs (ABDL, Daugavpils, Latvia).

Observations and photographs were made with a Nikon 140 SMZ-10 stereoscopic microscope, Nikon SMZ 745T stereomicroscope and Zeiss Stemi 2000-C binocular microscope. Helicon Focus Pro X64 and CombineZP were used to stack photos for better clarity and depth of field.

Taxonomy

Curculionidae Latreille, 1802
Dryophthorinae Schoenherr, 1825
Dryophthorini Schoenherr, 1825
***Stenommatus* Wollaston, 1873**
***Stenommatus copalicus* Poinar, Bukejs *et* Legalov sp. nov.**
(Fig. 1)

Diagnosis. This new species differs from the previous fossil *S. pulvereus* Davis *et* Engel, 2006 from Dominican amber in possessing shorter elytra, weaker pronotal punctation, a narrowing of the elytra in the apical ¼, and a brown body. It differs from *S. leptorhinus* Poinar *et* Legalov, 2015 by its

[1]Ph. D. Department of Integrative Biology, Oregon State University, Corvallis, OR 97331 USA, *poinarg@science.oregonstate.edu*, corresponding author.
[2] Ph. D. Institute of Life Sciences and Technologies, Daugavpils University, Vienības Str. 13, Daugavpils, Latvia, *carabidae@inbox.lv*. [3] Ph. D., Doctor of Science. Institute of Systematics and Ecology of Animals, ul. Frunze 11, Novosibirsk, 630091 Russia, *fossilweevils@gmail.com*.

Figure 1. *Stenommatus copalicus* sp. nov., holotype, habitus, dorsolateral view.

large body and longer pronotum with intervals as wide as the striae. *S. copalicus* sp. nov. is similar to the recent *S. sulcifrons* Champion, 1909 from Central America, but differs in its wider body, larger pronotal punctation, and greater convex elytral humeri.

Description. Body elongate, weakly convex dorsally; rufous, head and basal ¼ of rostrum dark brown; glabrous. Head relatively small, 0.6 times as long as rostral length; rostrum quite long, 2.8 times as long as wide in middle, cylindrical, curved, slightly dilated towards apex in apical 1/3; with small and dense punctuation; about 0.8 times as long as pronotum; eyes large, narrowly-oval, almost flat, closely approximate to each other on underside of head; forehead flat, vertex convex; temples large, distinctly longer than transverse diameter of eye; vertex with slight punctuation. Antennae inserted laterally near middle of rostrum, relatively short, reaching anterior margin of pronotum; scape large, elongate, weakly clavate, about 5.5 times longer than wide, 0.6 times as long as rostrum; flagellum short, compact, 4-articled (appears 3-articled), flagellomeres indistinctly visible, subequal in length, trapezoidal, widened distally, last flagellomeres wider than previous; antennal club 1-articled, ovoid with widely rounded apex, dilated apically, nearly as long as flagellum, apically subtruncate. Pronotum elongate, distinctly narrower than elytral base, widest in middle; with deep constriction in anterior ¼; anterior and posterior margins straight, lateral margins weakly rounded, anterior margin narrower than posterior margin; pronotal punctures round, dense and large (slightly smaller than elytral punctures); distance between adjacent punctures distinctly smaller than diameter of puncture; intervals convex; scutellum minute, subtriangular. Elytra ovoid-elongate, weakly convex, widest in basal 1/3; humeri convex; base with convex borders; subparallel in basal ½, in apical 1/4 abruptly narrowed towards apex and jointly rounded apically, about 1.8 times as long as pronotum; elytral punctures round, large and dense, arranged in regular striae; distance between strial punctures convex, very narrow, about 4.0-5.0 times smaller than diameter of puncture; striae distinct throughout entire length of elytra; intervals very narrow (as distance between strial punctures) and convex; pygidium not exposed. Legs relatively short; femora weakly clavate, slightly flattened, without denticles; tibiae flattened, straight with parallel sides; uncus large with sickle-shaped inward curve; mucro tooth-shaped, small; apical setal combs absent; tarsi 5-jointed, slender, short, about 1/2 as long as tibiae; 1st-4th tarsomeres trapezoidal, 1st-2nd tarsomeres small, nearly equal, about as wide as uncus at base; onychium elongate, subcylindrical, 0.9 times as long as tarsomeres 1st-4th combined; claws small, free and simple.

Measurements. Body length (without rostrum) 2.2 mm, rostrum length (in lateral view) 0.45 mm.

Etymology. The specific epithet of this new species is formed from the word "copal".

Material examined. Holotype: "Nr. AB 035" [white printed label], "Holotype / *Stenommatus copalicus* sp. nov." [red printed label] in ABDL; sex unknown. A complete beetle embedded in an elongate copal piece (length 42 mm, width 21 mm); ventral side of specimen almost invisible because of its location in copal piece. Animal syninclusions: one winged Isoptera; 6 undetermined small insects; few body parts of insects (antenna, legs, tarsus). Few very small gas bubbles and little cracks diffusely spread throughout the copal piece.

Remarks. This new species belongs to the subfamily Dryophthorinae based on its geniculate antennae with a compact antennal club, 1st article of club elongated with other articles fused, pronotum without lateral carina, and flagellum with 4 flagellomeres. The flagellum with 4 flagellomeres, 5-jointed tarsi, antennae inserted near the middle of the rostrum, and pygidium exposed indicate placement in the tribe Dryophthorini. The rostrum almost equal in length to the pronotum, the eyes closely approximate to each other on the underside of the head, and an apically subtruncate antennal club are characteristics of the genus *Stenommatus*.

Key to recent and fossil species of *Stenommatus* in New World

1. Pronotum finely punctate; elytral intervals 2.0-2.5 times as long as striae width. Bolivia… *S. inflexus* Hustache, 1938
1'Pronotum coarsely punctate; elytral intervals as wide as or narrower than striae width.....2
2. Rostrum elongate, 4.5 times as long as wide in middle. Dominican amber …… *S. tanyrhinus* Poinar et Legalov, 2015
2' Rostrum short, 1.7–3.0 times as long as wide in middle …..... 3
3. Rostrum thick, 1.7-1.8 times as long as wide in middle. …. 4
3' Rostrum thin, 2.8-3.0 times as long as wide in middle. ….. 6
4. Body wide. Mexico. …..... *S. fryi* Wollason, 1873
4' Body narrow..... 5
5. Antennal scrobe very shallow; body black. Dominican amber…..... *S. pulvereus* Davis et Engel, 2006
5' Antennal scrobe distinct; body black, but rostrum, scape, flagellum, tarsi brownish. Central America …..... .....…. *S. sulcifrons* Champion, 1909
6. Body large (2.2 mm); pronotum longish; elytra 1.9 times as long as pronotum; striae narrow, with intervals as wide as striae. Colombian copal…..... *S. copalicus* sp. nov.
6' Body small (1.4 mm); pronotum shortish; elytra 2.4 times as long as pronotum; striae wide, with intervals 0.4–0.6 times as wide as striae. Dominican amber ..... *S. leptorhinus* Poinar *et* Legalov, 2015.

Molytinae Schoenherr, 1823
Conotrachelini Jekel, 1865
***Conotrachelus* Dejean, 1835**
***Conotrachelus dysaethrius* Poinar, Bukejs et Legalov, sp. nov.**
(Fig. 2)

Diagnosis. This new species differs from *C. pertusicossis* Fiedler, 1944 from Colombia by its rufous body, rostrum slightly curved, scutellum rhombic and apex of elytra not rounded. From the Colombian *C. subquadraticollis* Fiedler, 1944, it differs by the longer rostrum, narrower pronotum, rhombic scutellum, smooth humeri, and the apex of the elytra bearing large blunt teeth.

Description. Body slightly elongate, convex dorsally; rufous; glabrous; with erect and semierect quite elongate scales. Rostrum long, slightly curved; small and densely punctate; 12.1 times longer than width at apex, 9.4 times longer than width in middle, 5.7 times longer than width at base; 1.1 times as long as pronotum; eyes large, oval, almost flat; forehead almost flat; vertex weakly convex, densely punctate; temples short. Antennae inserted laterally before middle of rostrum, quite long; scape large, elongate; antennal club compact. Pronotum bell-shaped, without middle carina and middle stria, without erect groups of scales; 1.5 times longer than width at apex, 0.7 times longer than width in middle and at base, widest near middle, narrowing to apex; lateral margins almost straight; anterior margin 0.5 times as long as posterior margin; pronotal punctures round, dense and large; distance between adjacent punctures distinctly smaller than diameter of puncture; intervals convex; scutellum rhombic, 1.5 times longer than width in middle. Elytra almost trapezoidal, convex, widest in basal 1/3, 1.6 times longer than wide at base and in middle, 2.4 times longer than wide at apical fourth, 2.5 times as long as pronotum; in basal quarter subparallel, further narrowing towards apex; elytral apex truncated with toothed portions; humeri smooth; elytral striae regular and distinct; intervals carinate, 4.0 times as wide as striae; carinae of 2nd and 5th intervals broken. Prosternum with distinct postocular lobes; precoxal portion of prosternum elongate; postcoxal portion of prosternum short; procoxal cavities separated; prosternum with ventral channel; mesocoxal cavities widely separated; mesepimeron not ascended; metasternum quite short; metepisternum quite broad, 6.1 times longer than width in middle. Abdomen flattened; 1st ventrite elongate; 2nd ventrite 0.7 times as long as 1st ventrite; 2nd - 4th ventrites almost equal in length; 5th ventrite 1.3 times as long as 4th ventrite; pygidium not exposed. Legs quite long; femora distinctly clavate, slightly flattened, large tooth; tibiae flattened, curved, with apical setal combs and ancus, without mucro; uncus large and curved; mesotibiae 4.5 times longer than width in middle; metatibiae 4.7 times longer than width in middle; tarsi long; 1st-3rd tarsomeres conical; 5th tarsomere elongate; tarsomeres with pulvilli on underside; claws free, large, clearly diverging, with teeth.

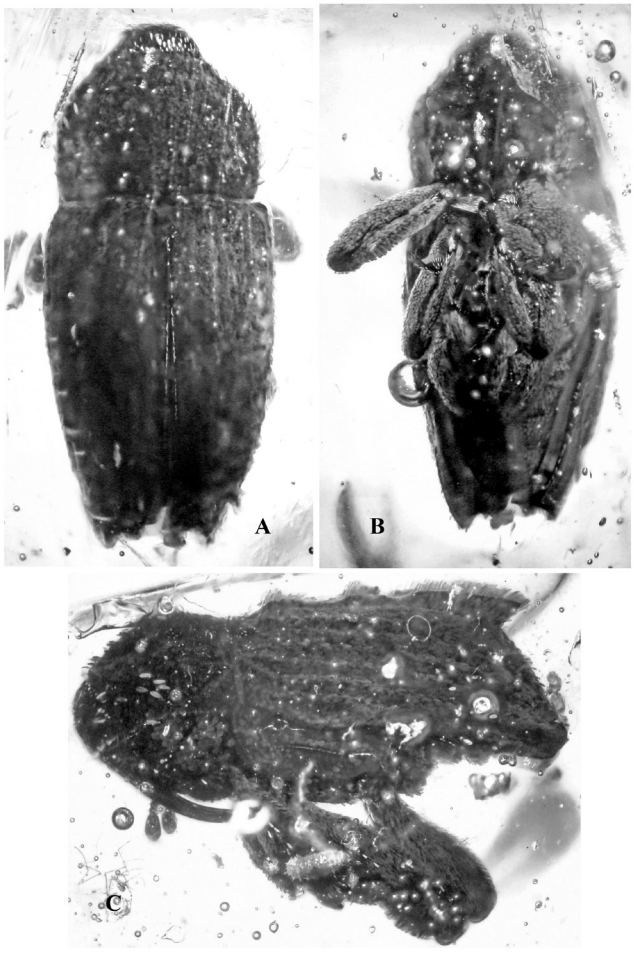

Figure 2. *Conotrachelus dysaethrius* sp. nov., holotype, habitus: **A.** Dorsal view. **B.** Ventral view. **C.** Lateral view.

Measurements. Body length (without rostrum) - 8.5 mm, rostrum length - 2.6 mm.

Etymology. From the Greek “dysaithrios” = murky

Material examined. Holotype: C-7-345A in PACO.

Remarks. This new species belongs to the subfamily Molytinae based on the long tibiae with large unci and the mesepimeron not being ascended. The prosternum with a ventral channel suggests placement in the tribe Conotrachelini. The pronotum with distinct postocular lobes and elytra with carinate intervals indicates placement in the genus *Conotrachelus* and to sub group 2 of group 2 (sensu Fiedler 1944) based on the broken carinae of the 2nd and 5th intervals.

Key to recent and fossil species of *Conotrachelus* with carinae of 2nd and 5th elytral intervals broken and body size greater than 7.0 mm

1. Rostrum shorter than head and pronotum together. Columbia ….....… *C. subquadraticollis* Fiedler, 1944
1’ Rostrum as long as head and pronotum together…....… 2
2. Body rufous; rostrum slightly curved; scutellum rhombic; apex of elytra containing large blunt teeth. Columbian copal …..... *C. dysaethrius* sp. nov.
2’ Body black; rostrum distinctly curved; scutellum trapezoidal; apex of elytra rounded. Columbia …. *C. pertusicossis* Fiedler, 1944.

Entiminae Schoenherr, 1823
Entimini Schoenherr, 1823
***Cydianerus* Schoenherr, 1840**
***Cydianerus eukrinus* Poinar, Bukejs et Legalov, sp. nov.**
(Fig. 3)

Diagnosis. This new species differs from *C. latruncularius* (Perty, 1832) from South America by the carinate elytral intervals, elytra parallel-sided, a narrower, granulated pronotum not constricted to the base and the antennae not reaching the humeri. From *C. araneiformis* (Dalman, 1833) from Brazil it differs by the granular pronotum, narrow carina of elytral intervals, elytra parallel-sided, longer rostrum and antennae not reaching the humeri. From *C. flexuosus* (Pascoe, 1881) from Brazil it differs by the granular pronotum, unicolorous scales on the elytra and carinate elytral intervals.

Description. Body wide-elongate, convex dorsally; rufous; shiny. Head large, 0.4 times as long as rostral length; rostrum short, curved, dilated towards the apex in apical 1/3; large and densely punctate; 0.9 times as long as pronotum; with 3 carinae; nasal plate prominent; mentum with setae; scrobes oblique; pterygium partially visible from above; eyes large, oval, weakly convex, 0.7 times longer than wide; forehead flat, 0.8 times as wide as rostrum base width; temples short, 0.4 times as long as eye length; vertex weakly convex, densely punctate; mandibles with prominent scars of attachment of deciduous process. Antennae inserted laterally near apical third of rostrum, elongate, almost reaching anterior margin of elytra base; scape large, elongate, 4.5 times longer than wide, 0.7 times as long as rostrum, reaching eye; flagellum long, 7-articled; flagellomeres trapezoidal, widened distally; 1st flagellomere 2.0 times longer than wide, 0.3 times as long and 0.6 times as wide as scape; 2nd flagellomere 1.8 times longer than wide, 0.7 times as long and 0.8 times as wide as 1st flagellomere; 3rd flagellomere 1.6 times longer than wide, 0.6 times as long and 0.8 times as wide as 2nd flagellomere; 4th flagellomere 1.4 times longer than wide, equal in length and 1.1 times as wide as 3rd flagellomere; 5th flagellomere 1.1 times longer than wide, 1.1 times as long as and 1.4 times as wide as 6th flagellomere; 6th flagellomere 1.6 times longer than wide, 1.4 times as long as and 1.4 times as wide as 5th flagellomere; 7th flagellomere 1.4 times longer than wide, equal in length and 1.1 times as wide as 6th flagellomere; antennal club 3-articled, 0.5 times as long as flagellum; 1st club article 1.5 times longer than wide, 1.6 times as long and 1.5 times as wide as 7th flagellomere; 2nd club article 0.6 times longer than wide, 0.5 times as long as and 1.2 times as wide as 1st club article; 3rd club article 1.3 times longer than wide, 1.7 times as long as and 0.9 times as wide as 2nd club article. Pronotum bell-shaped, 1.1 times longer than wide at apex, 0.8 times longer than wide in middle, 0.9 times longer than wide at base, distinctly narrower than elytral base; greatest width before middle; disk weakly convex, with large granulation; distance between granules distinctly smaller than diameter of puncture; scutellum trapezoidal, convex. Elytra convex, 2.2 times longer than wide at base, 1.5 times longer than wide at humeri, 1.4 times longer than wide in middle, 1.7 times longer than wide at apical fourth; 2.8 times as long as pronotum; elytral base 1.1 times as wide as pronotum base; greatest width before middle; humeri weakly convex; elytral punctures round, large and dense, arranged in regular striae; distance between strial punctures convex, very narrow, about 4.0-5.0 times smaller than diameter of puncture; striae distinct throughout entire length of elytra; intervals very narrow (as distance between strial punctures) and convex; pygidium not exposed. Thorax punctate; precoxal portion of prosternum equal in length to postcoxal portion, procoxal cavities contiguous, 1.8 times as long as precoxal portion; postocular lobes of prosternum with long vibrissae mesocoxal cavities widely separated, metasternum tumid; metepisternum quite narrow. Abdomen convex ventrally; 1st and 2nd ventrites elongate; 1st ventrite shorter than 2nd and 3rd ventrites combined; 2nd ventrite 0.7 times as long as 1st ventrite; 3rd ventrite 0.8 times as long as 2nd ventrite; 4th ventrite 0.6 times as long as 3rd ventrite. Legs long; femora weakly clavate, without denticles; profemora 2.4 times longer than wide; mesofemora 3.4 times longer than wide; metafemora 3.6 times longer than wide; tibiae flattened, almost straight, without uncus and mucro, with apical setal combs; protibiae 7.3 times longer than wide in middle; mesotibiae 8.6 times longer than wide in middle; metatibiae 8.6 times longer than wide in middle; tarsi long and quite wide; 1st and 2nd tarsomeres trapezoidal; 3rd tarsomere bilobed; onychium elongate, subcylindrical; claws long, simple, connate at base; metatarsus: 1st tarsomere 2.2 times longer than wide at apex; 2nd tarsomere 1.3 times longer than wide at apex, 0.8 times as long and 1.3 times as wide as 1st tarsomere; 3rd tarsomere bilobed, 0.7 times longer than wide at apex, equal in length and 1.8 times as wide as 2nd tarsomere; 5th tarsomere 3.0 times longer than wide at apex, 1.2 times as long and 0.3 times as wide as 3rd tarsomere.

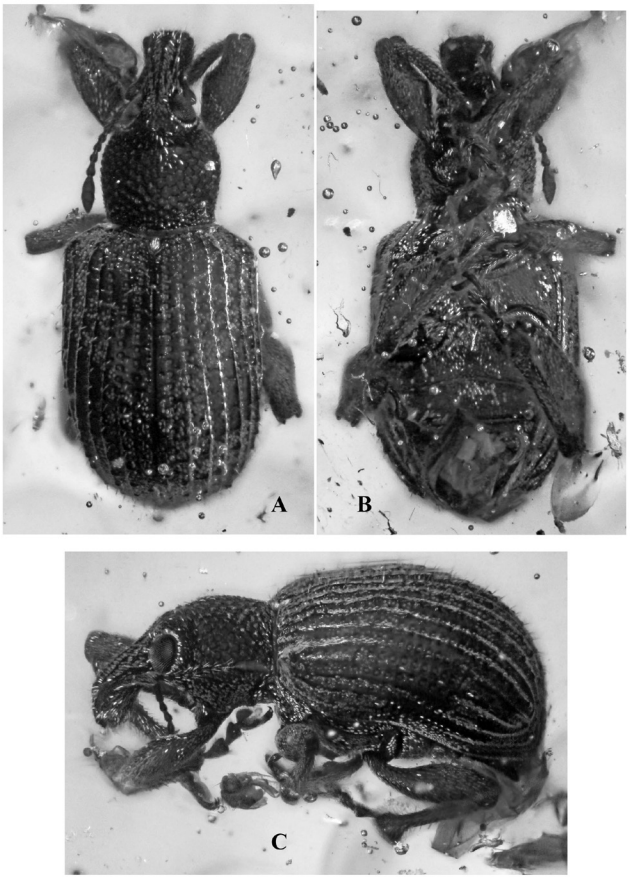

Figure 3. *Cydianerus eukrinus* sp. nov., holotype, habitus: **A.** Dorsal view. **B.** Ventral view. **C.** Lateral view.

Measurements. Body length (without rostrum) – 6.7 mm, rostrum length – 3.0 mm.

Etymology. From the Greek "eukrines" = clear

Material examined. Holotype: C-7-345B in PACO.
Remarks. This new species belongs to the subfamily Entiminae based on the mandibles with prominent scars of attachment of deciduous processes, rostrum short and tibiae without uncus. The swollen metasternum and 2nd ventrite shorter than the 3rd and 4th ventrites combined suggest placement in the tribe Entimini. The prominent nasal plate, protibiae without mucro, 1st ventrite shorter than 2nd and 3rd ventrites combined; tarsal claws connate at base, scrobes oblique, mentum with setae and postocular lobes with long vibrissae indicate placement in the genus *Cydianerus*.

Key to recent and fossil species of *Cydianerus* in New World

1. Pronotum granulated….....…2
1' Pronotum punctate…..... 4
2. Elytral intervals carinate. Elytra parallel-sided, narrower. Pronotum granulated, not constricted at base. Antennae not reaching humeri. Colombian copal …..... *C. eukrinus* sp. nov.
2' Elytral intervals convex. Elytra narrowed from humeri to apex, wider. Pronotum wrinkly-granulated, constricted at base. Antennae reaching humeri ….....…3
3. Body with green scales. Brazil…. *C. virescens* Lucas, 1857
3' Body with light scales. South America …….. *C. latrunculariu*s (Perty, 1832)
4. Elytral intervals carinate. Brazil …..…. *C. araneiformis* (Dalman, 1833) and *C. bohemani* Boheman, 1840
4' Elytral intervals convex …….....… 5
5. Elytra yellow with dark spots ……..... 6
5' Elytra not yellow, dark-color, or with transverse fasciae …….....… 7
6. Elytra parallel-sided. Brazil ….. *C. ornatus* (Pascoe, 1881)
6' Elytra narrowed from humeri to apex. Venezuela ……..... ……..... *C. wagneri* Bovie, 1907
7. Elytra with transverse fasciae. South America ……. .....*C. flexuosus* (Pascoe, 1881) and *C. bifasciatus* Hustache, 1926
7' Elytra with unicolorous scales ….....…… 8
8. Elytra wide, with dark blue scales. Panama, Colombia …… .....…… *C. pascoei* (Bovie, 1908)
8' Elytra narrower, with silvery scales. Central America …… ..... *C. argenteus* Boheman, 1840

Discussion

The genus *Stenommatus* Wollaston comprises more than 10 species distributed in Central and South America, Madagascar, Mascarene Is., Society Is., India, Japan, New Guinea and Australia (Hustache 1924; Osella 1979; Alonso-Zarazaga and Lyal 1999). Three species were described from Miocene Dominican amber (Davis and Engel 2006; Poinar and Legalov 2015). The beetles probably occur under the bark of dead or dying trees (Morimoto 1978). The biology of Dryophthorini is poorly investigated.

Conotrachelus is the largest genus of the subfamily Molytinae distributed in the New World and numbers more than 1090 species (Fiedler 1940, 1944; Wibmer and O´Brien 1986; O´Brien and Wibmer 1982). New species have been described fairly recently (O'Brien and Couturier 1995; Salas-Araiza and Romero-Nápoles 2012). The beetles are associated with various plants and the larvae develop in fruits or galls (Schoof 1942). Only *C. florissantensis* Wickham, 1912 from the Late Eocene of the Florissant beds in North America is known in fossil form (Wickham 1912).

The tribe Entimini is represented by 7 genera with 44 species in Central and South America, namely *Rhigus* Schoenherr, 1823 (13 species), *Cydianerus* (10 species), *Polyteles* Germar, 1829 (7 species), *Entimus* Germar, 1817 (7 species), *Phaedropus* Schoenherr, 1823 (5 species), *Nesocomptus* Vanin et Gaiger, 2005 (1 species) and *Trachyus* Kuschel, 1955 (1 species) (Gaiger 2001; Morrone 2002; Vanin 1983; Vanin and Gaiger 2005; Vaurie 1952). One species from the genus Entimus was described from the Middle Eocene Green River (USA) deposits (Scudder, 1876).

Acknowledgements

We thank Alex E. Brown (California: Berkeley) for providing the *Conotrachelus* fossil and are grateful to O. Jaeger (Germany: Dresden), K.-D. Klass (Germany: Dresden), P. Limbourg (Belgium: Brussels), H. Perrin (France: Paris), A.G. Kirejtshuk (Russia: St.-Petersburg and France: Paris), B.A. Korotyaev (Russia: St.-Petersburg) for the opportunity to study comparative material deposited in the Institut Royal des Sciences Naturelles de Belgique, Museum National d'Histoire Naturelle (France: Paris), Museum für Tierkunde, Senckenberg Naturhistorischen Sammlungen Dresden and the Zoological Institute of the Russian Academy of Sciences.

The study was partially supported by the Federal Fundamental Scientific Research Programme for 2013-2020, project no. VI.51.1.7 and the Russian Foundation for Basic Research, project no. 15-04-02971a.

Literature cited

ALONSO-ZARAZAGA, M. A.; LYAL, C. H. C. 1999. A world catalogue of families and genera Curculionoidea (Insecta: Coleoptera) (excepting Scolytidae and Platypodidae). Barcelona, Entomopraxis, 316 p.

ANDERSON, K. B. 1996. The nature and fate of natural resins in the geosphere. VII. A radiocarbon (14C) age scale for description of immature natural resins. An invitation to scientific debate. Organic Geochemistry 25 (3/4): 251-253.

AZAR, D.; NEL, A.; WALLER, A. 2009. Two new Ptiloneuridae (Psocodea: Psocomorpha) from Colombian copal. Denisia 86: 21-28.

CLIFFORD, D. J.; HATCHER, P. G.; BOTTO, R. E.; MUNTEAN, J. V.; MICHELS, B.; ANDERSON, K. B. 1997. The nature and fate of natural resins in the geosphere. VIII. NMR and Py-GC-MS characterization of soluble labdanoid polymers, isolated from Holocene class I resins. Organic Geochemistry 27 (7/8): 449-464.

DAVIS, S. R.; ENGEL, M. S. 2006. Dryophthorine weevils in Dominican amber (Coleoptera: Curculionidae). Transactions of the Kansas Academy of Science. 109: 191-198.

FIEDLER, C. 1940. Monograph of the South American weevils of the genus *Conotrachelus*. British Museum (Natural History), London. 365 p.

FIEDLER, C. 1944. Neue südamerikanische *Conotrachelus* aus der Sammlung Chevrolat's im Reichsmuseum in Stockholm (Col. Curc. Cryptorhynch.). Arkiv för Zoologi 35A: 1-63.

GAIGER, F. 2001. Systematic revision and cladistic analysis of the genus *Rhigus* Schoenherr, 1823 (Coleoptera, Curculionidae). Revista Brasileira de Entomologia 45 (1): 43-85.

HINOJOSA-DÍAZ, I. A.; ENGEL, M. S. 2007. A new fossil orchid bee in Colombian Copal (Hymenoptera: Apidae). American Museum Novitates 3589: 1-7.

HUSTACHE, A. 1924. Synopsis des Curculionides de Madagascar. Bulletin de l'Académie Malgache 7: 1-545.

KISELEV, S. V.; NAZAROV, V. I. 2009. Late Cenozoic Insects of Northern Eurasia. Paleontological Journal 43 (7): 723-850.

LAMBERT, J. B.; JOHNSON, S. C.; POINAR, G. O. Jr. 1995. Resins from Africa and South America: criteria for distinguishing between fossilized and recent resin based on NMR spectroscopy. p. 193-202. In: Anderson, K. B., Crelling, J.C. Amber, Resinites, and Fossil Resins. American Chemical Society, Symposium series 617. American Chemical Society, Washington.

LANGENHEIM, J. H. 1995. Biology of amber-producing trees: focus on case studies of *Hymenaea* and *Agathis*. pp. 1-31. In: Anderson, K. B.; Crelling, J. C. Amber, Resinites, and Fossil Resins. American Chemical Society, Symposium series 617. American Chemical Society, Washington.

LANGENHEIM, J. H. 2003. Plant resins: chemistry, evolution, ecology and ethnobotany. Timber Press, Portland, Cambridge. 586 p.

LEGALOV, A. A. 2015. Fossil Mesozoic and Cenozoic weevils (Coleoptera, Obrienioidea, Curculionoidea). Paleontological Journal 49 (13): 1442-1513.

MORIMOTO, K. 1978. Check-list of the family Rhynchophoridae (Coleoptera) of Japan, with descriptions of a new genus and five new species. Esakia 12: 103-118.

MORRONE, J. J. 2002. The Neotropical weevil genus *Entimus* (Coleoptera: Curculionidae: Entiminae): Cladistics, biogeography, and modes of speciation. The Coleopterists Bulletin 56: 501-513.

O´BRIEN, C. W.; WIBMER, G. J. 1982. Annotated checklist of the weevils (Curculionidae sensu lato) of North America, Central America, and the West Indies (Coleoptera: Curculionoidea). Memoirs of the American Entomological Institute 34: 1-382.

O'BRIEN, C. W; COUTURIER, G. 1995. Two new agricultural pest species of *Conotrachelus* (Coleoptera: Curculionidae: Molytinae) in South America. Annales de la Société Entomologique de France 31 (3): 227-235.

OSELLA, G. 1979. Nuove specie di Curculionidi delle isole Mascaregne (Coleoptera). Revue Suisse de zoologie 86 (1): 37-48.

PENNEY, D.; WADSWORTH, C.; GREEN, D. I.; KENNEDY, S. L.; PREZIOSI, R. F.; BROWN, T. A. 2013. Extraction of inclusions from (sub) fossil resins, with description of a new species of stingless bee (Hymenoptera: Apidae: Meliponini) in Quaternary Colombian copal. Paleontological Contributions 7: 1-6.

POINAR, G. O. Jr. 1992. Life in Amber. Stanford University Press, Stanford, CA. 350 p.

POINAR, G. Jr.; LEGALOV, A. A. 2015. New species of the genera *Dryophthorus* Germ. and *Stenommatus* Woll. (Coleoptera: Dryophthoridae) in Dominican amber. Historical Biology 27 (5): 508-513.

POINAR, G. O. Jr.; BROWN, A.; BROWN, S.; POINAR, R. 2001. Stuck in Time (Madagascar copal). Fauna Magazine 2: 70-76.

POINAR, G. O. Jr.; CHAMBERS, K. L.; BROWN, A. E. 2013. *Hippocratea volubilis* (Celastraceae) in Cotui copal from the Dominican Republic. Journal of the Botanical Research Institute of Texas 7: 375-370.

RAGAZZI, E.; ROGHI, G.; GIARETTA, A.; GIANOLLA, P. 2003. Classification of amber based on thermal analysis. Thermochimica Acta 404: 43-54.

SALAS-ARAIZA, M. D.; ROMERO-NÁPOLES, J. 2012. Especies de *Conotrachelus* (Coleoptera: Curculionidae: Molytinae) asociadas a guayaba y descripción de una nueva especie. Revista Colombiana de Entomologia 38 (1): 124-127.

SCHOOF, H. F., 1942. The genus *Conotrachelus* DeJean (Coleoptera, Curculionidae) in the North Central United States. Illinois Biological Monographs 19 (3): 5-170.

SCUDDER, S. H. 1876. Fossil Coleoptera from the Rocky mountain territories. Bulletin of the United States Geological and Geographical Survey of the Territories, 1876, vol. 2: 77-87.

STINCHCOMB, B. L. 1998. A few notes on Colombian amber. MAPS Digest 21: 3-5.

STROIŃSKI, A.; SZWEDO, J. 2011. *Yuripopoverus africanus* gen. et sp. n. from East African copal (Hemiptera: Fulgoromorpha: Ricaniidae). Polskie Pismo Entomologiczne 80: 679-688.

VANIN, S. A. 1983. Revision of *Phaedropus* Schoenherr with notes on the male genitalia of Entimini (Coleoptera: Curculionidae: Leptopiinae). Coleopterists Bulletin 37: 283-298.

VANIN, S. A.; GAIGER, F. 2005. A cladistic analysis of the genera of the tribe Entimini (Coleoptera, Curculionidae), with description of a new genus and species from the Amazonian region. Zootaxa 1053: 1-21.

VAURIE, P. 1952. Revision of the genus *Entimus* with notes on other genera of Entimini (Coleoptera Curculionidae). Revista Chilena de Entomología 1: 147-171.

WIBMER, G. J.; O´BRIEN, C. W. 1986. Annotated checklist of the weevils (Curculionidae sensu lato) of South America (Coleoptera: Curculionoidea). Memoirs of the American Entomological Institute 39: 1-563.

WICKHAM, H. F. 1912. On some fossil Rhynchophorus Coleoptera from Florissant Colorado, Bulletin of the American Museum of Natural History 31: 41-55.

Received: 27-Jan-2016 • Accepted: 26-Jul-2016

Suggested citation:

POINAR, G. JR.; BUKEJS, A.; LEGALOV, A. A. 2017. First records of weevils (Coleoptera: Curculionidae) in Quaternary Colombian copal. Revista Colombiana de Entomología 43 (1): 85-90. Enero-Junio 2017. ISSN 0120-0488.