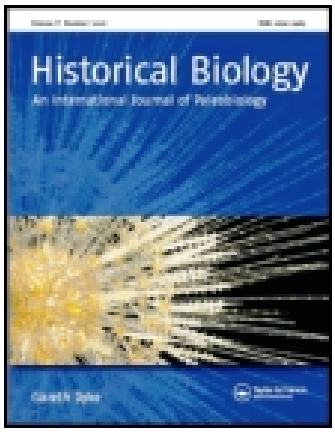

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Paleotrichius dominicanus n. gen., n. sp. (Coleoptera; Cetoniidae), a flower beetle in Dominican amber

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Paleotrichius dominicanus n. gen., n. sp. (Coleoptera; Cetoniidae), a flower beetle in Dominican amber

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A new genus and species of flower beetle, *Paleotrichius dominicanus*, n. gen., n. sp. (Coleoptera: Cetoniidae: Trichinae) is described from Dominican amber. The new taxon is distinguished from all other New World trichines by the combination of the shape of the clypeus, pronotum, protibia, the femoral and tibial armature, the mesosternal process separating the middle coxae, the distinct strial pattern on the elytra and the approximate claws. The beetle may have been quite colourful and a strong flyer attracted to flowers. The larvae most likely developed in decaying hardwoods in the Dominican amber forest. This is the first amber representative of the family Cetoniidae.

Keywords: flower beetle; Cetoniidae; Tertiary beetle; Dominican amber

Introduction

The American tropics contain a wealth of scarab beetles, including dung scarabs (Scarabaeidae), horned scarabs (Dynastidae), shiny scarabs (Rutelidae), chafers (Melolonthidae) and flower beetles (Cetoniidae) (Smith 2006). While 4620 scarab species have been recorded in Latin America, only 200 are flower scarabs (Hogue 1993). While relatively uncommon, cetoniids are some of the most interesting of the scarabs since the often-colourful adults are excellent flyers and can serve as pollinators of flowers (Gory and Percheron 1833; Krikken 1984; Hogue 1993). The large size of many scarabs, including the flower beetles, probably accounts for their rarity in amber since most are strong enough to free themselves from the sticky resin. The present study describes the first flower beetle in amber, which is one of the largest beetles described from any amber deposit.

Materials and methods

The specimen was obtained from mines in the Cordillera Septentrional of the Dominican Republic. Dating of Dominican amber is still controversial with the latest purposed age of 20–15 mya based on foraminifera (Iturralde-Vincent and MacPhee 1996) and the earliest as 45–30 mya based on coccoliths (Cêpek in Schlee 1990). In addition, Dominican amber is secondarily deposited in sedimentary rocks, which makes a definite age determination difficult (Poinar and Mastalerz 2000). A range of ages for Dominican amber is possible since the amber is associated with turbiditic sandstones of the upper Eocene to lower Miocene Mamey Group (Draper et al. 1994). Dominican amber was produced by the leguminous tree, *Hymenaea protera* Poinar (1991) and a reconstruction of the Dominican amber forest based on amber fossils indicated that the environment was similar to that of the present-day tropical moist forest (Poinar and Poinar 1999). The specimen is in a rectangular block of amber 20 mm in length and 11 mm in width and is complete with the exception of the left foreleg and left middle leg that were both cut off at the mid femur. Observations, drawings and photographs were made with a Nikon SMZ-10 stereoscopic microscope. Systematics and terminology follow that of Krikken (1984, 2008).

Description

Diagnostic characters that place the fossil in the family Cetoniidae (Leach, 1815) include the masked mandibles and labrum, a long, narrow eye canthus, 10-segmented antennae, exposed antennal implantation on clypeal side, conical, projecting procoxae, simple tarsal claws of equal size, seven distinct abdominal sternites, propygidium attached to anteanal sternite, meso- and metatibiae with one external elevation, tibial apices 2–3 lobate–dentate and exposed pygidium.

Characters that align the fossil with the subfamily Trichiinae are the absence of posthumeral emarginations, the mesepimeron only slightly protruding in front of the antehumeral carina and the middle coxae separated by a mesometasternal protrusion. Placement in the tribe Trichiini (Fleming, 1821) is based on the straight eye canthus, pronotum evenly convex except for an impressed

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Figure 1. Dorsal view of *P. dominicanus* in Dominican amber.

Figure 2. Ventral view of *P. dominicanus* in Dominican amber.

midline, protibiae with two external denticles and the mesotibia with a single anteapical external elevation. Since it was not possible to place the fossil in an extant genus, it is described below in a new genus.

Paleotrichius Poinar, n. gen.
Clypeus with moderate anteromedian emargination, anterior margin moderately elevated; eye-canthus straight, mandibles not visible from above; pronotum subhexagonal, all borders marginate; mesepimera barely visible from above; protibia short, with two external denticles and single internal apico-internal spur; metafemur with apical spur; metatibia with pronounced tibial apex, external elevation and internal toothed apical spur; elytral disc flat, each elytron with single pronounced punctate stria adjacent to suture; remaining striae more or less effaced or represented by complete or partial rows of punctures; claws simple, sickle shaped, approximate; body 15.7 mm in length.

Type species. *Paleotrichius dominicanus* n. sp.

P. dominicanus Poinar n. sp. (Figures 1–6).
With characters listed in the generic diagnosis.

Material examined: Holotype female: moderately elongate body, total length, 15.7 mm; pronotum and abdominal ventrites reddish-brown; pygidium and propygidium metallic with reddish hue; clypeus and elytra blue-black; two large, white blotchy areas on each elytron; surface of head, thorax and abdomen essentially glabrous except for

Figure 3. Lateral view of *P. dominicanus* in Dominican amber.

Figure 4. Surface of clypeus of *P. dominicanus* in Dominican amber.

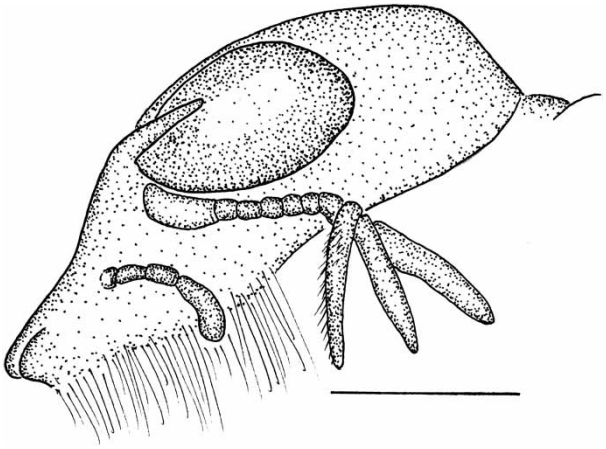

Figure 5. Lateral view of head of *P. dominicanus* showing antenna, eye canthus and maxillary palp. Bar = 1 mm.

setae-bearing punctures; yellowish brown pilosity limited to ventral surfaces.

Head. Narrow, width slightly over half width of pronotum, head length, 2.9 mm, width (across eyes), 2.7 mm; eye canthus straight, length, 530 μm; entire surface of head densely punctate, anterior margin of clypeus moderately emarginated and moderately elevated anteriorly; surface of clypeus heavily punctated, many punctures bearing single minute white seta; ventral surface of clypeus setose; gula prominent; mentum emarginate anteriorly, in accordance with clypeal shape; antenna 10-segmented scape claviform, length, 380 μm; pedicel length, 130 μm; length antennomeres: 3, 100 μm; 4, 100 μm; 5, 100 μm; 6, 150 μm; 7, 130 μm; length lamella on antennomere 8, 880 μm; length lamella on antennomere 9, 830 μm; length lamella on antennomere 10, 880 μm; maxillary palps four segmented, length palpomeres; 1, 75 μm; 2, 150 μm; 3, 180 μm; 4, 380 μm; antennae glabrous except for short hairs on dorsal surface of lamella of eighth antennomere.

Thorax. Pronotum subhexagonal, slightly convex with indented midline, all borders marginate, length, 3.4 mm, width, 4.9 mm; pronotal disc punctate, some punctures bearing setae; procoxae adjacent, projecting; mesocoxae separated by mesometasternal protrusion; metacoxae separated by narrow protrusion; protibia shovel shaped, extremely short, less than half length of protarsus, length, 1.6 mm, protibial apex with pointed apico-internal spur, flattened apico-external denticle (length, 870 μm), and short external denticle; protarsus 5.0 mm long, length protarsomeres: 1, 636 μm; 2, 636 μm; 3, 636 μm; 4, 727 μm; 5, 1. 3 mm; claws long, sickle shaped, approximate, length, 1.1 mm; mesotibia (length, 3.0 mm) with external protrusion (length, 530 μm) located approximately 3/5 length of shaft; two pointed internal denticles located apically and subapically; length mesotarsus, 5.3 mm; length mesotarsomeres: 1, 454 μm; 2, 909 μm; 3, 909 μm; 4, 1.0 mm; 5, 1.0 mm; claws sickle

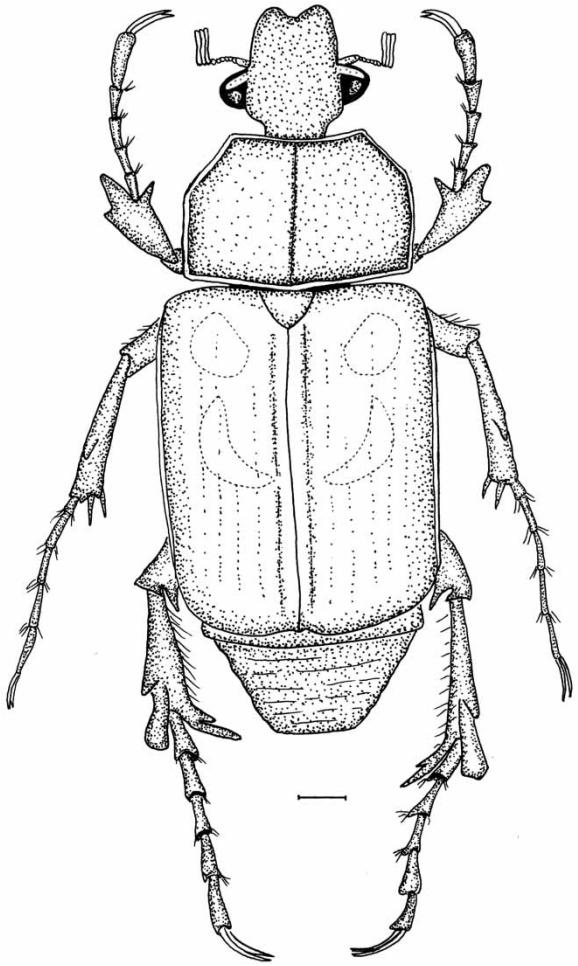

Figure 6. Partial reconstruction of *P. dominicanus*. Dashed areas on elytra indicate Cretaceous areas. Note the metatibial apex extended beyond the tarsal insertion and spurs. Punctures not included. Bar = 1 mm.

shaped, approximate, 1.0 mm long; metafemora slender, with apical inner denticle; metatibia setose on inner side; length, 3.0 mm; with sub-apical external elevation positioned 2/3 length of shaft; metatibia with large apical, inner, toothed spur and prominent tibial apex 1.7 mm in length; metatibial apex extended beyond tarsal insertion and spurs; metatarsus (length, 6.7 mm) longer than metatibia, metatarsomere lengths: 1, 1.3 mm; 2, 1.0 mm; 3, 909 μm; 4, 1.0 mm; 5, 1.2 mm; claws sickle shaped, approximate, 1.3 mm long; scutellum triangular, length, 730 μm, width, 1.1 mm; elytra broadly rectangular, with transversely convex slightly irregular surface; sides marginate; length, 7.4 mm, width, 5.9 mm; each elytron with longitudinal umbo at lateral margin and single deep punctured stria adjacent to suture; additional striae more or less effaced; 5–7 additional complete or partial rows of punctures; some punctures positioned randomly; Cretaceous areas on elytra are as shown in Figure 6.

Abdomen. Reddish brown; length, 9.5 mm; with seven visible sternites; anal sternite (7) densely setose along apex; other sternites with scattered sparse hairs; propygidium and pygidium reddish-metallic coloured; propygidium 4.8 mm wide; pygidium transverse, slightly convex, length, 1.9 mm, width at base, 4.3 mm; width at truncate apex, 1.7 mm.

Male. Unknown.

Type. Holotype deposited in the Poinar amber collection (accession # C-7-411) maintained at Oregon State University, Corvallis, OR, USA.

Type locality. Amber mines in the northern portion of the Dominican Republic.

Etymology. The generic name is a combination of 'paleos' for old and the subfamily name of the fossil. The specific name refers to the type locality.

Diagnosis. There are currently nine New World genera in the tribe Trichiini (Blackwelder 1944; Howden 1968, 1972, 1988; Krikken 1984, 2008; Delgado-Castillo and Morón 1991). These all differ from *Paleotrichius* in the following characters: *Apeltastes* (Howden, 1968) has an elongate body and the side margins of the prothorax are convex; *Dialithus* (Parry, 1849) has the anterior margin of the clypeus not reflexed anteriorly, the marginal line on the posterior border of the pronotum is indistinct or absent and the elytra are without any striae; *Gnorimella* (Casey, 1915) has a setose pronotal disc and the anterior margin of the clypeus is reflexed and only shallowly emarginate, *Paragnorimus* (Becker, 1910) lacks a median grove on the pronotal disc and the clypeus is reflexed; *Peltotrichius* (Howden, 1968) has a shallowly emarginate and setose clypeus disc, the pronotum is strongly convex behind and the fore tibia has only two denticles; *Trichiotinus* (Casey, 1915) has a setose elytral disc with shining elytra or each elytron has a pair of slightly elevated intervals; *Giesbertiolus* Howden, 1988 (Krikken 2008) has a pronotum with straight or rounded side margins and bidentate fore tibiae and *Iridosoma* (Delgado-Castillo and Morón, 1991) has contiguous mesocoxae, the pronotum is longer than wide and the dorsal body surface is covered with setae. The combination of the shape of the clypeus, pronotum, protibia, the femoral and tibial armature, the mesosternal process separating the middle coxae, together with the sculptural pattern on the elytra and approximate claws distinguishes *Paleotrichius* from all extant New World Trichini.

Discussion

Aside from the single deep punctate stria adjacent to the suture, the presence and position of possible additional elytral striae on *P. dominicanus* is difficult to separate from distortion of the elytral surface that occurred during the fossilisation process. Any additional striae seem to be effaced, however, there are definite rows of punctures, some of which are curved, while other rows appear to run for short distances. Some punctures near the sides appear to be randomly positioned. It is difficult to determine the original pattern of the Cretaceous markings since much of colour appears to have faded and the borders are faint and indistinct. The colouration and markings proposed for *P. dominicana* were interpreted from observations made under various light intensities and viewing angles. It is impossible to determine the actual colour patterns that were on the living beetle, but they probably did not vary considerably from that presented here. Cetoniid beetles are known to be quite colourful with varied markings on their surfaces (Gory and Percheron 1833; Sakai and Nagai 1998).

Of the 224 scarabaeid fossil species known, only 12 have been attributed to the Cetoniidae (Krell 2007). These include two species of *Genonota* (Zhang 1989) and one species of *Macronota* Wiedemann (Zhang 1989) from Chinese Miocene deposits and several species of *Trichius* from German Miocene deposits. Some undescribed specimens occur in the Kenyan Miocene (Paulian 1976), the German Eocene and the Danish Holocene (Johnson and Krog 1948; Wappler 2003; Krell 2007). All the above are incomplete compression fossils and the systematic placement of some has been questioned (Carpenter 1992). None of these show any resemblance to the present Dominican amber fossil.

Most adult trichiine flower beetles are strong fliers and feed on flowers and nectar as well as soft fruits and plant exudates (Howden 1968; Krikken 1984). The larvae of the New World Trichiini live in decaying wood of hardwood trees (Howden 1968). Presumably, *P. dominicanus* was a flower visitor and the larvae developed in decaying hardwoods in the amber forest, possibly in the resin-producing *Hymenaea* trees. The short protibiae and long

approximate claws suggest that the feeding or ovipositional habits of *P. dominicanus* were somewhat specialised.

There are no members of the Trichiini in the Dominican Republic nor elsewhere in the Caribbean today; in fact the extant cetoniid fauna of Hispaniola is depauperate, with only three species recorded, all in the Tribe Gymnetini (Perez-Gelabert 2008). The present fossil is the first cetoniid in amber and one of the largest described beetles in any amber deposit.

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