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*Bicalcasura maculata* gen. n., sp. n. (Curculionoidea: Dryophthoridae) in Dominican amber

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## **Abstract**

A new genus and species, *Bicalcasura maculata* gen. n., sp. n. (Coleoptera: Curculionoidea: Dryophthoridae) is described from Dominican amber as the first fossil member of the Tribe Diocalandrini. The new genus is characterized by procoxae located in the middle of the prothorax, a thick, short and strongly curved rostrum with the scape not reaching the pronotum, a weak extension of the rostrum in respect to the antennal attachment, slightly elongated 5th ventrite, narrow (not bilobed) 3rd tarsomere, and a pair of apical spurs on the protibiae. This set of characters separates the fossil from the extant genus *Diocalandra* Faust, 1894, the only other member of this tribe. A list of weevils (Curculionoidea) described from Dominican amber is included.

**Keywords:** Curculionoidea, Dryophthoridae, new taxa, Dominican amber, Tertiary weevil.

## **Introduction**

The weevil family Dryophthoridae is widely distributed, but reaches its greatest diversity in the tropics. Five subfamilies include approximately 150 genera and 1200 species worldwide (Kuschel 1995). The Dryophthoridae, which was previously included within the family Curculionidae (Legalov 2006), is represented in the Neogene of Europe (Heer 1847; Heyden and Heyen 1866; Piton and Piton 1935; Zherikhin 2000). However, the oldest members occur in Eocene deposits of Baltic (Zherichin 2000) and Rovno amber (Nazarenko, Perkovsky 2009) and North American (Scudder 1893; Wickham 1911) and French lacustrine deposits (Piton, Theobald 1935; Zherichin 2000). Three species of Orthognathini and Dryophthorini were previously described from Dominican amber (see Table 1 with a summary of Curculionoidea described from Dominican amber). The present study describes a new genus in the Diocalandrini, a tribe that was unknown in the fossil state.

## **Materials and methods**

The specimen was obtained from La Bucara mine in the Cordillera Septentrional of the Dominican Republic. Dating of Dominican amber is controversial with the latest proposed age of 20-15 mya based on foraminifera (Iturralde-Vinent 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 and a re-construction of the Dominican amber forest based on amber fossils indicated that the environment was similar to that of a present day tropical moist forest (Poinar and Poinar 1999).

## **Descriptions**

**Dryophthoridae** Schoenherr, 1825

**Rhynchophorinae** Schoenherr, 1833

**Diocalandrini** Zimmerman, 1993

***Bicalcasura*** Poinar and Legalov, n. gen. (Figures 1-4).

Type species: *Bicalcasura maculata* Poinar and Legalov, n. sp

Rostrum thick, short, strongly curved; prementum invisible in ventral view; scrobes ventral, directed obliquely ventral to front of eyes, almost reaching them; geniculate antennae inserted before base of rostrum ventrally, with compact shiny oval, not depressed antennal club; scape not reaching pronotum; funicle with 6 flagellomeres; 7th flagellomere added to antennal club; 1st article of club elongated, other articles fused; pronotum without lateral carina; scutellum large distinct; prothorax in same plane with meso- and metathorax; mesepimeron smaller than mesepisternum; 1st and 2nd ventrites fused and suture not distinct; 1st ventrite stronger elongate, much longer than 2nd ventrite; 5th ventrite slightly elongated; pygidium exposed, without medial sulcus; separated procoxae located in middle of prothorax; tibiae with distinct subapical tooth at inner angle and mucro; tarsi falsely-4-jointed; 3rd tarsomere not bilobed, narrow.

#### *Etymology*

The genus is derived from the Latin *bi* = two, the Latin *calcar* = spur and the Latin *sura* = calf of the leg, in reference to the double spur at the apex of the fore tibia.

#### *Diagnosis*

This new genus is close to the genus *Diocalandra* Faust, 1894 but differs by the procoxae located in the middle of prothorax, thicker short and strongly curved rostrum, scape not reaching pronotum, weak extension of rostrum in antennal attachment, slightly elongated 5th ventrite, and narrower not bilobed 3rd tarsomere.

#### *Remarks*

The new genus belongs to the family Dryophthoridae based on the antennae geniculate, with compact shiny antennal club, funicle with 6 flagellomeres, 7th flagellomere added to antennal club, 1st article of club elongated, and other articles fused, prementum invisible in ventral view, pronotum without lateral carina, and 1st and 2nd ventrites fused.

The procoxa separated, funicle with 6 flagellomeres, tarsi falsely-4-jointed, antennae inserted before base of rostrum, large distinct scutellum, and pygidium exposed, suggest placement in the subfamily Rhynchophorinae.

The a mesepimeron smaller than mesepisternum, antennal club oval, not depressed, suture between 1st and 2nd ventrites not distinct, prothorax in same plane with meso- and metathorax, scrobe directed obliquely ventral to front of eyes, almost reaching them, tibiae with distinct

subapical tooth at inner angle and mucro, pygidium without medial sulcus, and 1st ventrite stronger elongate, much longer than 2nd ventrite, provides evidence that the new genus belongs to the tribe Diocalandrini.

Type species

*Bicalcasura maculata* Poinar and Legalov, n. sp. (Figures 1-4)

## **Description**

Length body, 3.3 mm; length rostrum 0.9 mm.

Body brown, naked, appearing silvery-shiny from the presence of cavities between specimen and internal surface of its impression. Elytra light-brown with dark apex and dark spots in the middle on 4th-10th intervals.

*Head.* Rostrum 3.1 times as long as width at apex, 4.1 times as long as width in middle, 2.9 times as long as width in antennal insertion, 0.5 times as long as pronotum, slightly expanded at apex and in antennal attachment, finely and densely punctate; without grooves and carinae; frons wide, flattened, roughly punctate; eyes large, rounded, 0.9 times as long as width, equal to base of rostrum, not protruding from contour of head, displaced ventrally; vertex weakly flattened, punctate; temples short, 0.3 times as long as eye, punctate; antennae short, not reaching middle of pronotum; scape 5.0 times as long as width, equal in length to flagellum; 1st-2nd flagellomeres elongated, of equal length; 2nd-6th flagellomeres trapezoidal; flagellomeres: first oval, 1.8 times as long as width, 0.2 times as long as and 0.7 times as narrow as scape; second narrower, 2.3 times as long as width; third equal in length and width, 0.4 times as long as second; fourth 1.7 times as long as width, 1.7 times as long as third; fifth equal in length and width, 0.8 times as long as fourth; sixth 1.7 times as wide as length, 1.3 times as long as fifth; club 0.7 times as long as flagellum; first club article trapezoidal, 1.1 times as long as width, 2.8 times as long and 4.3 times as wide as seventh flagellomere; other articles 0.6 times as long as width, 0.5 times as long as first article, weakly acuminate.

*Pronotum.* Pronotum elongate, apices 2.0 times as long as width, in middle and at base 1.5 times as long as width; disk with distinct pronotal groove, weakly narrowed at base, densely wrinkled-punctate, without striae.

*Elytra.* Elytra weakly elongated and weakly convex, 2.0 times as long as width in middle; greatest width in middle, 1.5 times as long as pronotum; humeri flattened; punctured striae regular and distinct; punctures oval, dense; intervals weakly convex, 2.5-3.0 times as wide as striae.

*Thorax.* Prothorax densely punctate; pre- and postcoxal parts of prothorax elongated, almost equal length, 2.2-2.3 times as long as procoxae; procoxal cavities round, 3.1 times as long as mesosternal process; mesocoxal cavities rounded, narrowly separated; metepisternum narrow; metathorax weakly convex, punctate; metacoxal cavities widened.

*Abdomen.* Abdomen convex; first ventrite elongated; second ventrite 2.8 times as long as first; 3rd ventrite 0.8 times as long as second; 4th ventrite 1.2 times as long as 3rd; 5th ventrite 1.2 times as long as 4th.

*Legs.* Legs long; femora weakly clavate, without teeth; profemora length / width = 3.0; mesofemora length / width = 2.8; metafemora length / width = 3.4; trochanter triangular; tibiae almost curved, weakly widened at apices; protibiae with pair of spurs on apex; mesotibiae length / width = 4.5; metatibiae length / width = 5.3; tarsi long; 1<sup>st</sup>-3rd tarsomeres trapezoidal; fifth tarsomere elongated; claws large, free, without teeth; protarsi: first tarsomere 5.0 times as long as width; second tarsomere 2.0 times as long as width, 0.4 times as long as first tarsomere; third tarsomere 1.7 times as long as width, 1.3 times as long as second tarsomere; fifth tarsomere 4.5 times as long as width, 1.8 times as long as third tarsomere; mesotarsi: first tarsomere 4.0 times as long as width; second tarsomere 2.5 times as long as width, 0.6 times as long as first tarsomere; third tarsomere 1.7 times as long as width, of equal length second tarsomere; fifth tarsomere 5.5 times as long as width, 2.2 times as long as third tarsomere; metatarsi: first tarsomere 3.2 times as long as width; second tarsomere 1.3 times as long as width, 0.5 times as long as first tarsomere; third tarsomere 1.3 times as long as width, 1.3 times as long as second tarsomere; fifth tarsomere 5.0 times as long as width, 2.0 times as long as third tarsomere.

*Type:* Holotype deposited in the Poinar amber collection (accession # C-7-413) maintained at Oregon State University, Corvallis, Oregon.

*Type locality:* Amber mine (La Bucara) in the northern portion of the Dominican Republic.

*Etymology:* The specific epithet is derived from the Latin *maculata* = spot, in reference to the maculae on the elytra.

## Discussion

Insect fauna in Dominican amber is very rich and diverse (Poinar and Poinar 1999) and Curculionoid beetles were well represented (Legalov 2013). Thus far only representatives of the Brentidae, Dryophthoridae and Curculionidae have been described (Table 1).

While the host plant of *B. maculata* is unknown, Dryophthorid larvae appear to prefer palms and other mopcots (Thompson 1992). Not only have palm bugs and palm beetles been described from Dominican amber (Poinar and Santiago-Blay, 1997; Poinar 1999), but palm flowers in the tribes Roystoneae (*Roystonea palea* Poinar 2002), Corypheeae (*Palaeoraphe dominicana* Poinar 2002) and Cryosophileae (*Trithrinax dominicana* Poinar 2002) also have been described from Dominican amber (Poinar 2002a, 2002b). Thus there was a diverse population of palms on which the larvae of *Bicalcasura maculata* could have developed.

The fossil weevil has at least 17 phoretic deutonymphs of uropodid mites (Acarina: Uropodidae) attached to its legs by anal pedicels. It is obvious that uropodid mites inhabit the same niche as *Bicalcasura maculata* in the Dominican amber forest. This association between mites and dryophthorid weevils occurs with extant members and Davis and Engel (2006) noted mites on two separate species of Dryophthorinae in Dominican amber.

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Table 1. Summary of Curculionoidea described from Dominican amber.

**Brentidae**

Cyphagoginae

Dominibrentini: *Dominibrentus leptus* Poinar, 2009

**Dryophthoridae**

Orthognathinae:

Orthognathini: *Mesocordylus longiscapus* Davis and Engel, 2009

#### Dryophthorinae

Dryophthorini: *Dryophthorus acarophilus* Davis and Engel, 2006

Dryophthorini: *Stenommatius pulvereus* Davis and Engel, 2006

#### Rhynchophorinae

Diocalandrini: *Bicalcasura maculata* Poinar and Legalov, present work

### **Curculionidae**

#### Molytinae:

Anchonini: *Velatis dominicana* Poinar and Voisin, 2003

#### Cossoninae

Dryotribini: *Micromimus orcus* Davis and Engel, 2007

*Caulophilus ashei* Davis and Engel, 2006

*Caulophilus bennetti* Davis and Engel, 2007

*Caulophilus falini* Davis and Engel, 2007

*Caulophilus swensoni* Davis and Engel, 2007

*Dryotribus amplioculus* Davis and Engel, 2007

*Paralicus abnormis* Davis and Engel, 2007

Proecini: *Proeces longirostrum* Davis and Engel, 2007

Himatinini: *Stenotrupis breviscapus* Davis and Engel, 2007

Cossonini: *Cossonus hinojosai* Davis and Engel, 2007

#### Conoderinae

Zygopini: *Geratozygops atropos* Davis and Engel, 2006

#### Entiminae

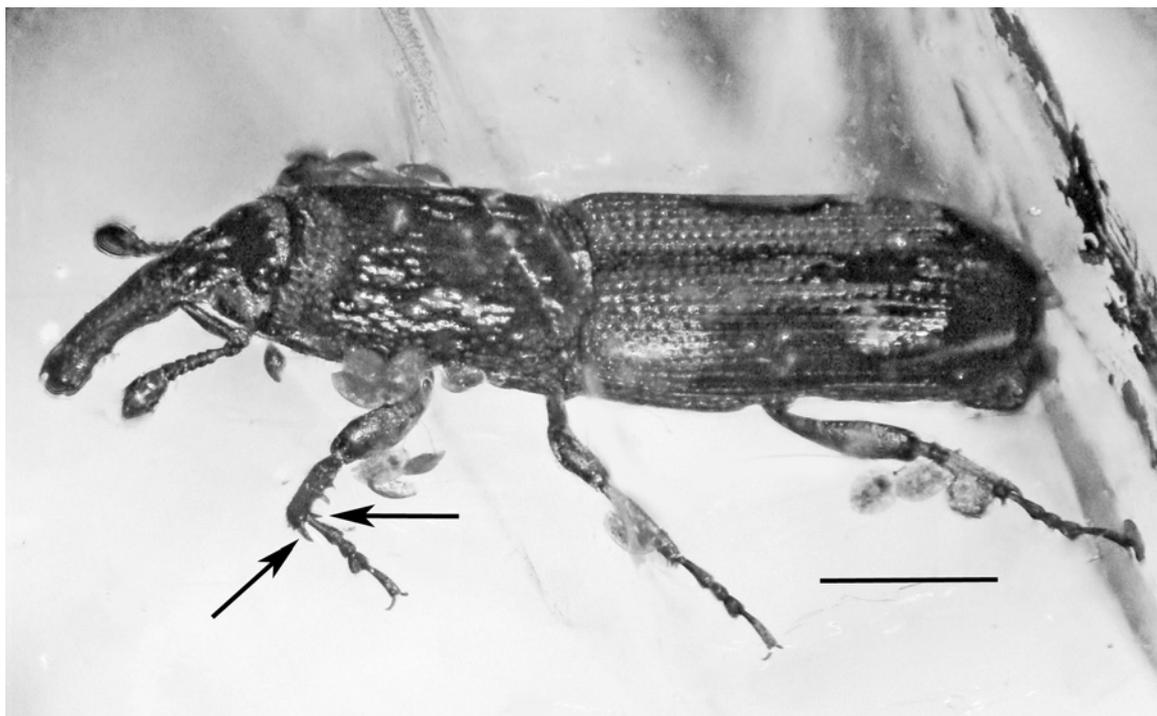
Eudiagogini: *Promecops tumidirostris* Poinar and Brown, 2011

Figures:

1. Dorsal view of Holotype of *Bicalcasura maculata* in Dominican amber. Scale bar = 0.67 mm.



2. Dorsal-lateral view of Holotype of *Bicalcasura maculata* in Dominican amber. Arrows show two apical spurs at apex of fore tibia. Scale bar = 0.67 mm .



3. Ventral view of Holotype of *Bicalcasura maculata* in Dominican amber. Scale bar = 0.7 mm.



4. Ventral view of head and thorax of Holotype of *Bicalcasura maculata* in Dominican amber. Arrows show spurs at apex of fore tibia. A= anal pedicel attaching a phoretic deutonymph of a uropodid mite to the mid femur of the fossil weevil. Scale bar = 0.56 mm.

