

Discoclavata dominicana n. gen., n. sp., (Coleoptera: Bostrichidae) and
Lissantauga epicrana n. gen., n. sp. (Coleoptera: Ecumenidae) in Dominican amber

George Poinar, Jr., Department of Zoology, Oregon State University, Corvallis, OR
97331

Email: poinarg@science.oregonstate.edu

Abstract

A new genus and species of bostrichid, *Discoclavata dominicana* n. gen., n. sp., (Coleoptera: Bostrichidae) and a new genus and species of eucnemid, *Lissantauga epicrana* n. gen., n. sp. (Coleoptera: Eucnemidae) are described from Dominican amber. Diagnostic characters of *Discoclavata dominicana* include an extended body, strongly hypognathous head, asparate dorsal surfaces of pronotum and elytra, 10 antennomeres with a large, oval two-articled club, flattened and grooved metafemora that receive the flattened metatibia, 5-segmented, slender tarsi with the first tarsomere miniscule, 2nd, 3rd and 4th tarsomeres small, subequal and fifth tarsomere longer than the others combined. Diagnostic characters of *Lissantauga epicrana* include a glabrous, silvery metallic body, pectinate antennae with the antennal insertions positioned below the eyes, a helmet-shaped pronotum with the anterior angles nearly reaching the antennal insertions, the antennae close to the eyes, angled apical margins of the elytra and a long first tarsomere. These are the first descriptions of Bostrichidae and Eucnemidae from Dominican amber.

Keywords: Bostrichidae, Eucnemidae, Dominican amber, Tertiary fossil beetles.

Introduction

Members of the Bostrichidae, commonly known as Branch and Twig beetles, have nearly a global distribution with 89 extant genera and some 570 species (Lawrence, 2010). Most of the 7 subfamilies attain their greatest diversity in the tropics and subtropics but some 70 species occur in North and South America (Arnett, 1968; Blackwelder 1945). These beetles are mainly stem, wood and root borers that attack living or dead wood, including well-seasoned lumber. They can cause damage to dwellings and furniture, eventually reducing the wood to a fine powder, which is why they are also called powder-post beetles. They also destroy cereal grains and dried root crops (Rees, 2004).

Species of Eucnemidae, commonly known as false click beetles, also have nearly a global distribution, with over 1000 species (Boomker 1985). Most eucnemids live in decaying wood, recently killed trees or under the bark of deciduous trees. Their feeding habits are little known, but apparently some are carnivorous and others feed on fungi (Arnett, 1968, White, 1983, Muona, 2002)

Materials and methods

The specimens were 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-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). Observations, drawings and photographs were made with a Nikon SMZ-10 stereoscopic microscope. Helicon Focus Pro X64 was used to stack photos for better clarity and depth of field.

Description

Series Bostrichiformia

Superfamily Bostrichoidea

Family Bostrichidae

Subfamily Bostrichinae

The specimen is in a rectangular block of amber 5 mm in length and 3 mm in width and is complete with the exception of the left fore leg and left middle leg that are missing at the mid femur.

Discoclavata Poinar, n. gen.

Diagnosis: Elongate, narrow, body with asperate dorsum; head strongly hypognathous; eyes small, projecting laterally; 10-segmented antennae with second flagellomere longest and 2-articled oval club; tarsi 5-segmented with first tarsomere miniscule and fifth tarsomere twice as long as tarsomeres 2-4 combined; metafemora flattened and grooved to receive flattened metatibiae in repose; scutellum and elytral suture absent.

Comments: The hypognathous head, the irregular, oval club two-segmented club, metatarsi as long as the metatibiae and truncate anterior margin of the pronotum place the fossil in the subfamily Bostrichinae (Booth et al. 1990; Fisher 1950). The structure of the antennal club and first two antennomeres, the flattened, grooved metafemora that receive the flattened metatibiae, the long 5th tarsomere and the apparent flightless condition separate *Discoclavata* from extant genera.

Etymology: The generic name is from the Latin “discors = different and the Latin “clava ” = club, referring to the structure of the antennal club.

Type species: *Discoclavata dominicana* n. sp.

Discoclavata dominicana Poinar, n. sp. (Figs. 1-7)

Description: With characters listed in the generic diagnosis. Length, 3.4 mm; dorsum dark brown; sex unknown.

Head: Inserted in prothorax; eyes small, projecting laterally; composed of about 50 ommatidia; mandible unidentate; labial palp three-segmented with apex of terminal palpal segment narrowed and sclerotized; maxillary palp 4-segmented; antennae short,

glabrous, 10- segmented, with second antennomere longest, first antennomere next longest, antennomeres 3-8 short, transverse; terminal two antennomeres forming an irregular, oval club with first club segment cup-shaped and enclosing base of oval, slightly asymmetrical second club segment.

Thorax: Pronotum narrow, length/width ratio = 2.1; anterior margin truncate; lateral carinae simple, incomplete; surface asperate, with rows of tubercles arising from rounded bases (punctures); each tubercle bears terminal cylindrical extension greater than height of tubercle; elytra long, narrow, twice length of pronotum, with length/width ratio = 3.7; anterior margin truncate; surface with series of slightly undulating asperate striae (12 or more) containing rows of short tubercles bearing terminal cylindrical extensions greater than height of tubercle; elytral edges not marginated; apical declivity of elytra without protuberances; scutellum and elytral suture not evident; metafemora flattened, equal in length to corresponding metatibia, with inner margin grooved to partially receive flattened metatibia in repose; tibia not serrate, protibia lacking terminal armature; metatarsus shorter than metatibia; tarsi 5-5-5 but appearing as 4-4-4 since first tarsomere greatly reduced; tarsomeres 2, 3 and 4 short; fifth tarsomere nearly twice length of previous tarsomeres combined; tarsomeres not lobed or bearing felt beneath; protarsus with series of long, straight, ventral setae; fifth metatarsomere with short subterminal, ventral, terminally-directed spine with long seta positioned shortly behind; claws long, robust, curved, simple, with single, long, straight empodium.

Abdomen: With five smooth, dark-brown equally wide ventrites, pygidium rounded.

Type: Holotype deposited in the Poinar amber collection (accession # C-7- 305E) maintained at Oregon State University, Corvallis, Oregon.

Type locality: Amber mines in the Cordillera Septentrional of the Dominican Republic.

Etymology: The specific name is from the Latin “discors = different and the Latin “clava” = club, referring to the unique type of antennal club.

Discussion

One distinguishing character of *D. dominicana* is its long, narrow body in relation to its width (Figs 1, 2). This feature, along with the flattened grooved metafemora (Fig. 3), which allows partial reception of the flattened tibia and absence of wings (Figs. 2,4) suggests that the species inhabited very narrow galleries in woody plants. While the feeding and ovipositional habitats of the fossil are unknown, because of its wingless state, it could have been monophagous rather than polyphagous, the latter being the condition for most bostrichids (Sittichaya et al. 2009). A clue to the plant host of *D. dominicana* is the presence of several *Prioria* sp. (Fabaceae) flowers enclosed in the same amber piece. Members of this plant genus were noted previously in Dominican amber (Poinar and Poinar 1999).

The absence of a scutellum and an elytral suture indicate *D. dominicana* is a flightless species. As far as could be determined, there are no known extant flightless bostrichids (Lawrence 2010). Males of the wood-boring scolytid beetle, *Xyleborus dispar* Fab., are flightless, as are both sexes of the grain-infesting weevil, *Sitophilus granarius* Hustache that infests stored products (Rees, 2004). Another unusual character of *D. dominicana* is the presence of tubercles bearing scale-like extensions on the dorsum of both the pronotum and elytra (Fig. 5). Similar long extensions were referred to as “club-shaped hairs” on *Minthea armstrongi* Vrydagh (1958) and as “broad scale-like

setae” on *M. rugicollis* (Walker) by Sittichaya et al. (2009). These structures are not common on bostrichids, which normally have the upper surface glabrous or covered with fine hairs (Lawrence 2010).

The antennal structure of *D. dominicana* is unique, with the second antennomere the longest of the funicle (Fig. 6) and the club consisting of a cup-shaped basal segment and a single asymmetrical terminal one (Fig. 7). The terminal asymmetrical club segment has a faint groove on one side that could indicate it evolved from two separate segments. Two-segmented clubs do occur in members of the tribe Lyctini (Sittichaya et al. 2009; Gerberg 1957) and *Lyctus simplex* Reitt. has the first club segment cup shaped and the terminal one slightly asymmetrical (Gerberg 1957). However, in other aspects, *D. dominicana* has little in common with members of this Tribe.

The structure of the tarsi is another apparently unique character. While the first tarsomere is often obscure in bostrichids, the remaining segments are usually subequal in length or if the 5th segment is long, then the second tarsomere is also long, as is the case with *Apate francisca* Fab. as illustrated by Wolcott (1933). An extremely long distal tarsomere following 3 short, transverse tarsomeres as occurs in the fossil is rare in bostrichids.

The Bostrichidae is represented in Meso and South America by 30 genera in the subfamilies Dysidinae, Dinodrinae and Bostrichinae, with most representatives occurring in the latter subfamily (Blackwelder 1945). In Hispaniola, the Bostrichinae is limited to five species in four genera (*Apate* Fabricius, *Dendrobiella* Casey, *Tetrapriocera* Horn, and *Xylomeira* Lesne (Perez-Gelabert 2007). The above discussed characters separate the present fossil from these extant genera. The compression fossil, *Protapate contorta*

Wickham (1912) was described from the Florissant shales of Colorado (Wickham 1912). Other still undescribed bostrichids occur in Baltic, Mexican and Dominican amber deposits (Poinar 1992).

Elateroidea

Eucnemidae Eschscholtz, 1829

The specimen is in a triangular piece of amber with sides 9 mm by 6 mm by 6 mm and is complete with the exception of the missing right fore leg.

Lissantauga Poinar, n. gen.

Diagnosis: Body elongate, punctate, silvery-metallic, completely glabrous, nearly parallel-sided from dorsal view, 3.9 times longer than wide; head deflexed, partly reposed in prothoracic cavity, with distinct frontal carina; eyes small, flattened; antennae 11-segmented with all segments subequal; antennomeres 3-11 strongly pectinate; antennae inserted close to eyes; pronotum slightly longer than wide, lateral margins complete, hind angles extending backward, sides with faint carinae; disk with central depression flanked by two longitudinal carinae; front edge of prosternum straight; sternal grooves for reception of antennae; elytra striate, punctate, lateral margin sinuate, basal margin angled, fitting into cavity at base of pronotum; legs small, thin; tarsi 5-segmented with first tarsomere longest; protibia not armed with apical tooth; entire ventrum covered with silver-metallic punctures; abdominal sternites 5.

Type species: *Lissantauga epicrana* n. sp.

Comments: Having the antennal insertions near the eyes is an elaterid character since eucnemids typically have the antennae inserted on the front, distant from the eyes.

However elaterids have the front edge of the prosternum lobed, not straight as it is in *Lissantauga*. Also in most elaterids, the pronotum not the widest part of the body as it is with *Lissantauga*. A diagnostic character of *Lissantauga* is its glabrous, metallic body. Normally, eucnemids possess some type of pubescence, even if it is sparse. The latter character, the eyes positioned near the antennal insertions and the angled anterior elytral margins (these are normally rounded in eucnemids) separates *Lissantauga* from currently known eucnemids (Arnett 1968: Muona 2002, White 1983, Boomker 1985).

Etymology: The generic name is from the Greek “lissos” = smooth, polished” and the Greek “antauges” = reflecting light.

Lissantauga epicrana Poinar, n. sp. (Figs. 8-12)

Description: With characters listed in the generic diagnosis. Male; length, 4.7 mm; entire body glabrous, punctate and silvery metallic.

Head: Deflexed; partly receded in prosternal cavity; covered with minute silvery punctures; eyes lateral, small, flattened; frontal carina extends across head; labrum fused with frons with weak impression separating them; antennae glabrous, 11- segmented with all antennomeres subequal; antennomeres 3-11 strongly pectinate with rami of 3rd antennomere smallest, rami of 4th antennae next smallest and all other rami subequal in length; antennae fitting into cavities on underside of head; antennal insertions close to, below and slightly in front of eyes (Fig. 11).

Thorax: Prothorax excavated beneath for reception of head; pronotum helmet-shaped, wider than elytra, 1.4 mm in length, length/width ratio = 1.2, front margin truncate, with anterior angles approximately 90° and nearly reaching antennal insertions; pronotum with faint lateral carina; lateral borders margined; disk silver-metallic, with median sulcus bordered by angled carinae; posterior angles acute, extending backward past anterior borders of elytra; procoxae conical, their cavities open behind, separated by triangular prosternal process; mesocoxae separated; metacoxae short, transverse; metepisternum long, wide, narrowed near base by elytron; metasternum long and wide, with central groove; scutellum triangular; elytra 3.3 mm long, narrow, silvery metallic; slightly over twice length of pronotum, with length/width ratio = 2.8; widest at 1/3 its length, then narrowing terminally; bearing 10-12 punctated striae; elytral suture with minute stria punctures; legs delicate, with slender femora and tibiae; tarsal formula 5-5-5 with first tarsomere longest; claws simple.

Abdomen: With five silvery-metallic sternites.

Type: Holotype deposited in the Poinar amber collection (accession # C-7-17) maintained at Oregon State University, Corvallis, Oregon.

Type locality: Amber mines in the Cordillera Septentrional of the Dominican Republic.

Etymology: The specific name is from the Greek “epikranon” = helmet.

Discussion

False click beetles are widely distributed, with over 1000 species worldwide (Boomker 1985) and some 55 genera in 5 subfamilies reported from the New World

tropics (Blackwelder, 1945). However only a single extant species, *Microrhagus albofasciatus* (Fisher) is known from Hispaniola (Perez-Gelabert 2007).

Fossil eucnemids are rare. Most have been described from Baltic amber (Muona, 1993), however none of these fit the description of *Lissantauga*. Putative undescribed eucnemids have been reported from the Middle Eocene lacustrine deposits of the Eckfelder Marr in Germany (Wappler, 2003) and from the Eocene London Clay of Bognor Regis in England (Britton, 1960).

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Figures

Figure 1. Lateral view of *Discoclavata dominicana* in Dominican amber. Bar = 570 μ m.



Figure 2. Dorsal view of *Discoclavata dominicana* in Dominican amber. Bar = 560 μm .

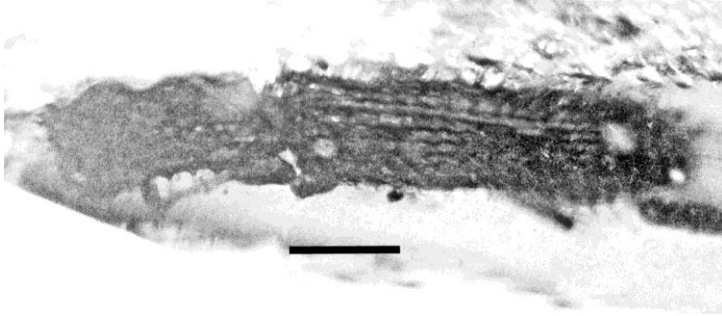


Figure 3. Hind leg of *Discoclavata dominicana* in Dominican amber showing flattened and grooved metafemur, flattened tibia, short metatarsomeres 2,3, and 4 and elongate fifth metatarsomere. Top arrow shows empodium, middle arrow shows spine and lower arrow shows seta. Bar = 140 μm .

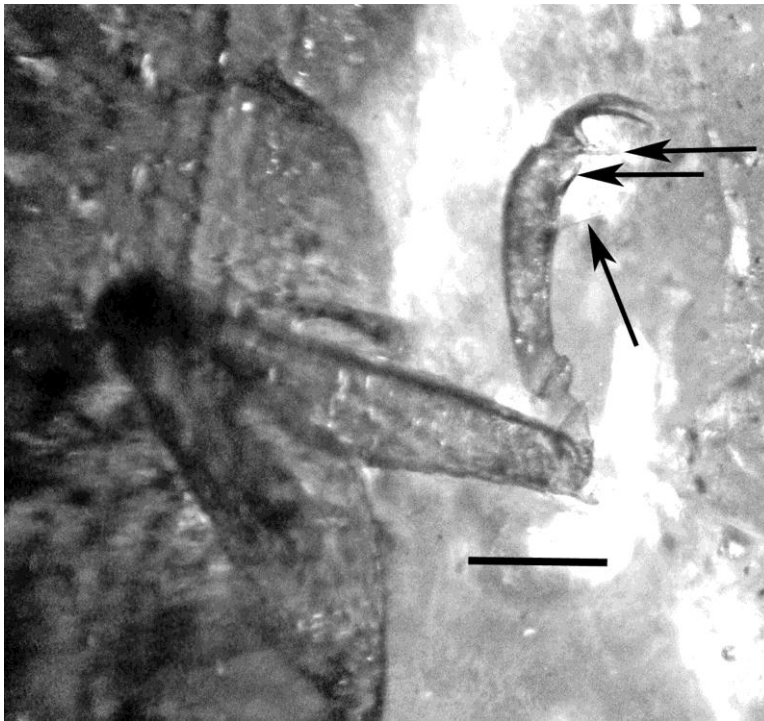


Figure 4. Base of elytra of *Discochlorata dominicana* in Dominican amber, showing undulant striae and lack of elytral suture. Bar = 180 μm .

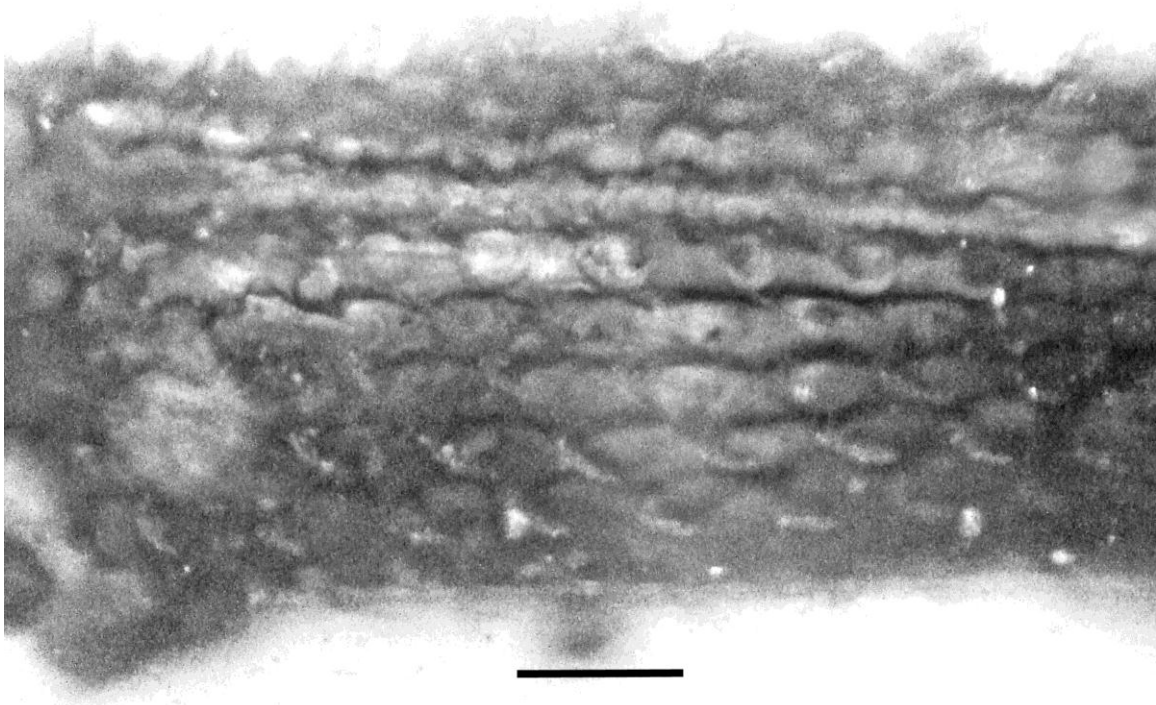


Figure 5. Tubercles (arrows) with setal extensions on elytrum of *Discoclavata dominicana* in Dominican amber. Bar = 176 μm .

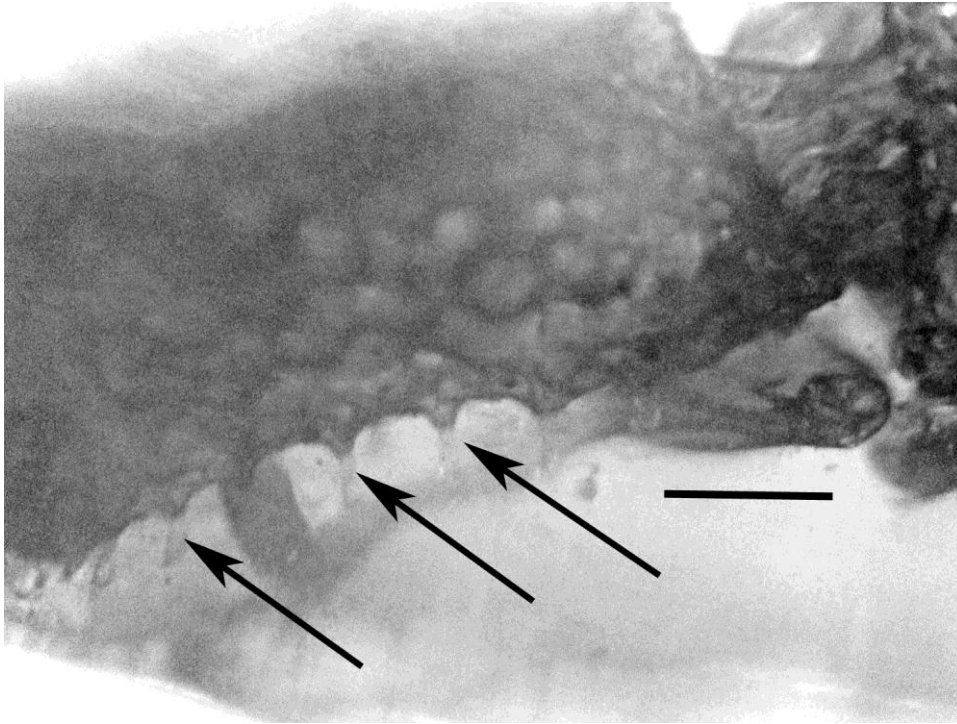


Figure 6. Lateral view of head of *Discoclavata dominicana* in Dominican amber. Short arrow shows first antennomere. Long arrow shows second antennomere. Note setae on the ventral surface of the protarsus. Bar = 120 μm .

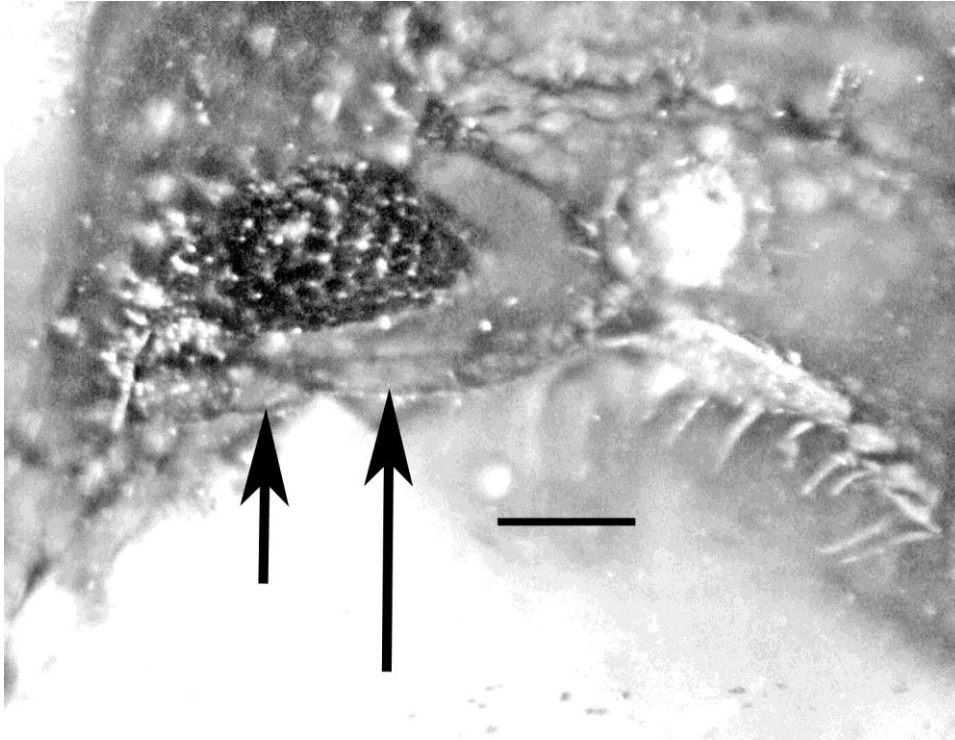


Figure 7. Two-segmented antennal club of *Discoclavata dominicana* in Dominican amber with cup-shaped basal segment and asymmetrical terminal segment. Bar = 73 μm .

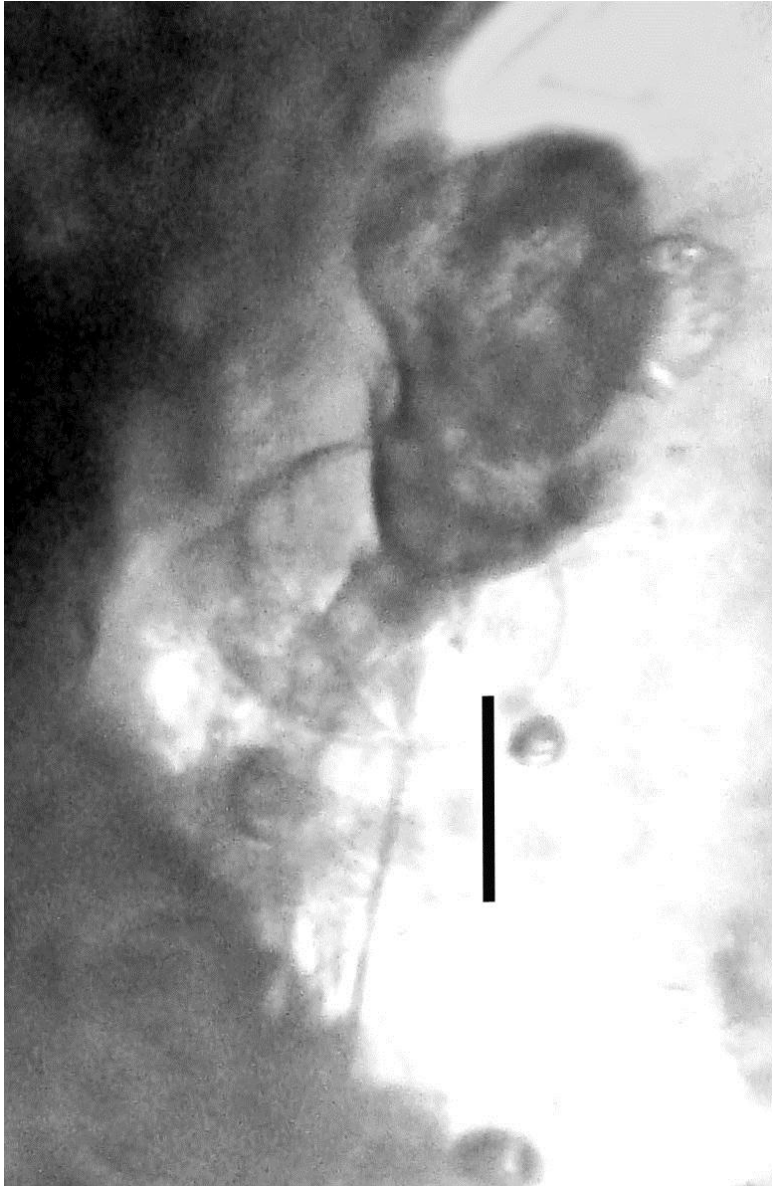


Figure 8. Lateral view of *Lissantauga epicrana* in Dominican amber. Bar = 600 μm .

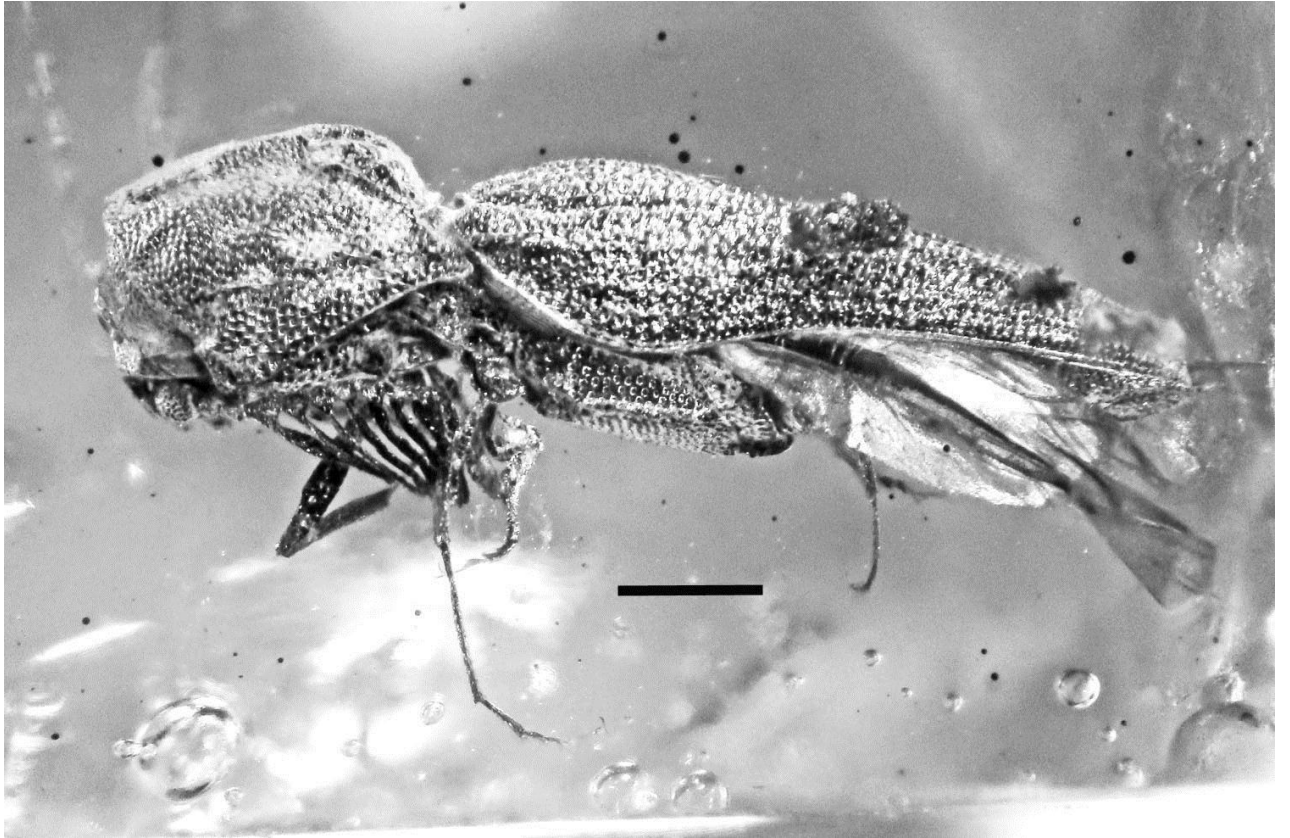


Figure 9. Dorsal view of *Lissantauga epicrana* in Dominican amber. Bar = 760 μm .



Figure 10. Ventral view of *Lissantauga epicrana* in Dominican amber. Bar = 760 μm .

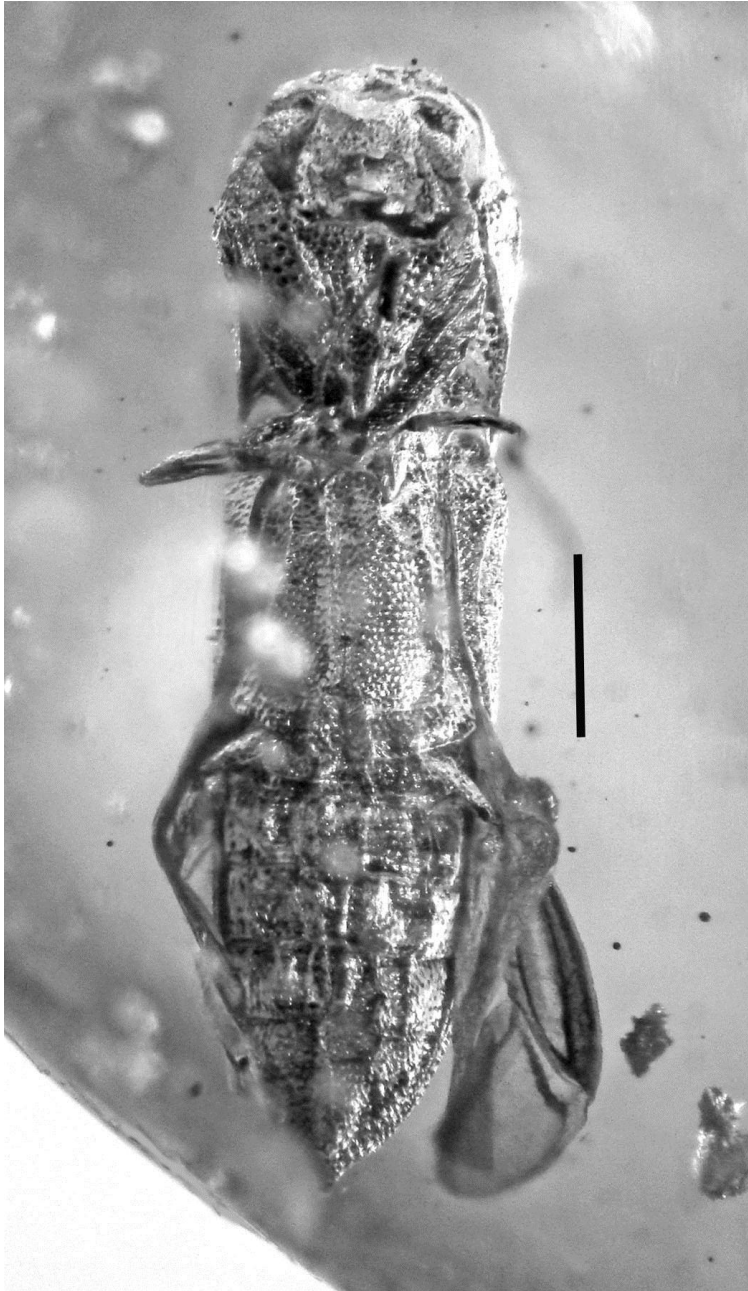


Figure 11. Detail of head and pronotum of *Lissantauga epicrana* in Dominican amber.

Upper arrow shows eye. Lower arrow show antennal insertion. Bar = 380 μm .

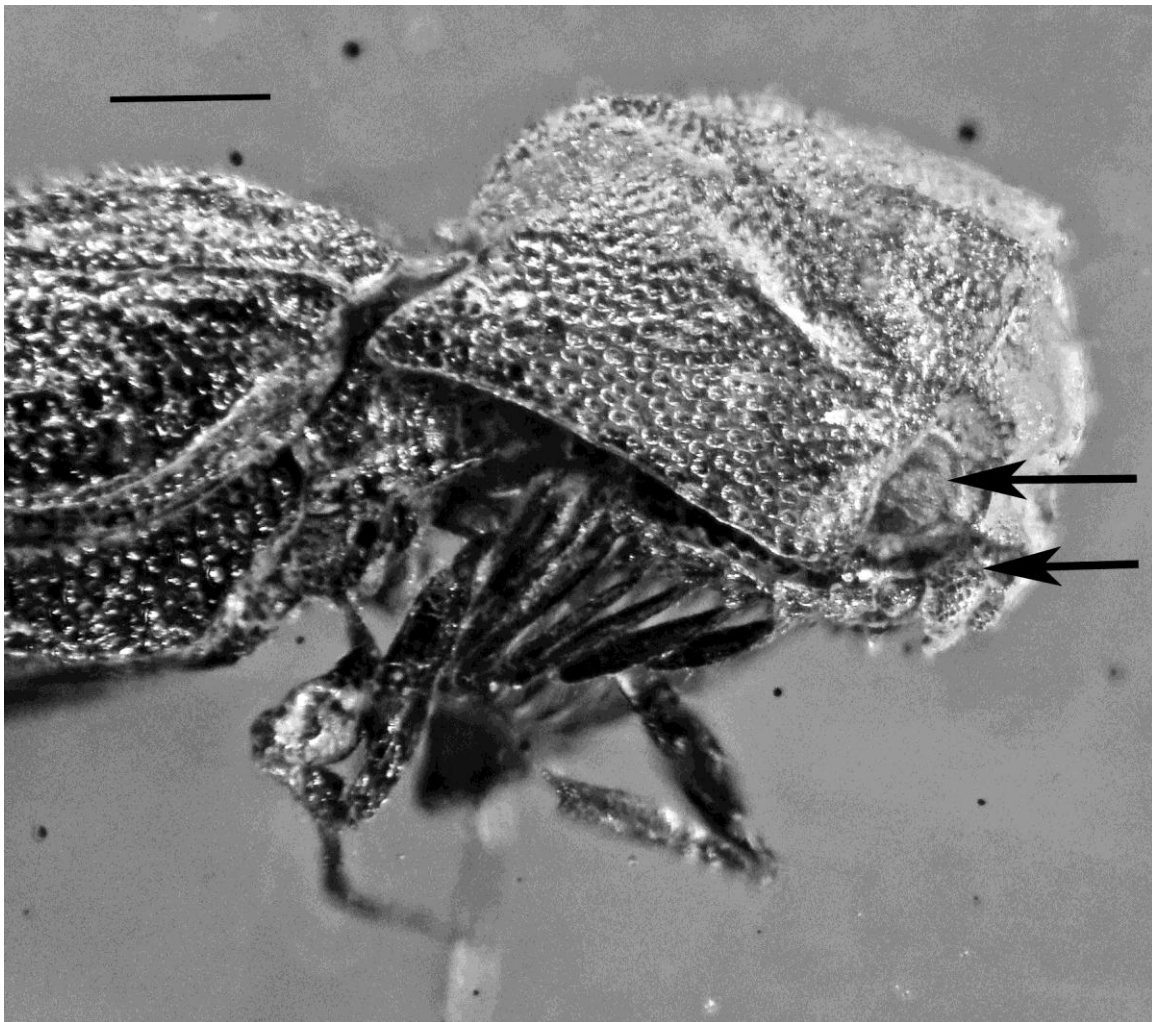


Figure 12. “En face” view of *Lissantauga epicrana* in Dominican amber. Arrows show antennal insertions. Bar = 330 μm .

