

Two new longhorned beetles from Dominican amber (Coleoptera, Cerambycidae)

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Abstract: Two new fossil cerambycid species included in Dominican amber, *Elaphidion tocanum* nov.sp. (Cerambycinae Elaphidiini), from La Toca (Middle Eocene-Early Oligocene) and *Kallyntrosternidius bucarensis* nov.gen. nov.sp. (Lamiinae Acanthocinini) from La Bucara (Late Oligocene) are described. Comparisons with extinct and extant *Elaphidion*-species and extant genera of American Acanthocinini are provided.

Key words: Coleoptera, Cerambycidae, Elaphidiini, Acanthocinini, palaeontology.

Santrauka: Publikacijoje aprašomos dvi naujos fosilinių ūsuočių rūšys, išlikusios Dominikos gintare: *Elaphidion tocanum* nov.sp. (Cerambycidae Elaphidiini) iš La Toca (vidurinis eocenas – ankstyvasis oligocenas) ir *Kallyntrosternidius bucarensis* nov.gen. nov.sp. (Lamiinae Acanthocinini) iš La Bucara (vėlyvasis oligocenas). Pateikiamas šių rūšių palyginimas su fosilinėmis ir dabartinėmis *Elaphidion* rūšimis bei dabartinėmis Amerikos Acanthocinini gentimis.

Raktiniai žodžiai: Coleoptera, Cerambycidae, Elaphidiini, Acanthocinini, paleontologija.

Introduction

Unlike Baltic amber, Dominican amber has a much more recent history regarding research on the cerambycid fauna; nevertheless, the amount of new fossil species increases year after year. After the first publication by MARTINS & GALILEO (1999), dating only 10 years ago, the papers by VITALI (2004), NEARNS & BRANHAM (2005) and VITALI (2006, 2007b) have allowed to know already five fossil cerambycid species included in Dominican amber.

In this paper new species belonging to Elaphidiini and Acanthocinini are described, strongly improving the knowledge of the Antillean and the American cerambycid fossil fauna.

According to the literature, fossil Elaphidiini have been described for nearly one century (WICKHAM 1911, 1914), already revised (LINSLEY 1942) and listed as such by well-known catalogues (LINSLEY 1961, CARPENTER 1992). Actually, *Elaphidion fracticorne* WICKHAM, 1911, *Anelaphus extinctus* (WICKHAM, 1914) and *Stenosphenus pristinus* WICKHAM, 1914 were described on poorly preserved specimens from the Early Oligocene shales of Florissant, Colorado. However, none of them showed at least one typical character (spines on antennae, apex of femora or elytra) that somehow justified their attribution to Elaphidiini; hence, they were finally deemed as Cerambycidae incertae sedis (LINGAFELTER 1998). So,

the only verifiable Elaphidiine was the *Elaphidion* sp. that POINAR (1992) mentioned from Dominican amber much more recently. Nevertheless, only the description of *Elaphidion inclusum* VITALI, 2007 has provided the first certain fossil species belonging to this tribe.

Fossil Acanthocinini have also been known for nearly the same period of time, after the description of *Leptostylus scudderi* WICKHAM, 1914 from Florissant. Only one other fossil Acanthocinini was described (*Acanthocinus schmidti* SCHMIDT, 1967 from Late Pliocene shales of Willershausen, Germany), but, while the European fossil is extremely similar or even identical to current species, the American one is very uncertain. In fact, though WICKHAM (1914) noticed a resemblance with *Styloleptus biustus* (LECONTE, 1852) and *Leptostylus terraecolor* (HORN, 1880) of the Recent, the asymmetrical shape of the prothorax does not allow recognising the genus either. Actually, POINAR (1992) also recorded *Eugamandus* sp. from Dominican amber, but this specimen is possibly referable to *Pterolophosoma otilliae* VITALI, 2006. Hence, *Kallyntrosternidius bucarensis* nov.sp. is the first fossil belonging to Acanthocinini with a certain identity.

Materials and methods

The *Elaphidion*-specimen is fossilised in an oval piece of yellowish amber measuring 13x20 mm. Due to the original amber cutting and polishing, the cerambycid is missing the right antenna after the basal part of the antennomere III, the left antennae after the apical part of the scape, and the right hind leg after the knee. The longhorn lies with folded legs inside another piece of red amber, which also envelops two small spiders and a spider skin, a scelionid wasp, the incomplete wings of a barklice and several tiny flies of different unidentified families. Moreover, the lateral left margin of the pronotum is missing, though completely included in the amber. On the other side, the surface of the inner red amber looks as covered by very fine confused fissures and includes the legs of the cerambycid as a cloth. The fissures might be interpreted as fractures of the inner red amber, but the conditions of the longhorn let think that it was included in amber when it was already dead and even partially eaten, while the fissures are actually the rests of a spider cobweb.

The acanthocinine specimen is fossilised in a round piece of yellow amber measuring 16x19 mm. Unlike the previous piece, this amber contains a multitude of bubbles, some of them double or triple, some even containing a small drop of water. This kind of amber is very different from all Dominican amber that I have examined containing cerambycids or tenebrionids (VITALI 2004, 2006, 2007a, b, 2008) both for colour and number of bubbles, but the means at my disposal do not allow to further look into the question.

Only a small non-biting midge (Diptera Chironomidae) is present along with the included cerambycid. Due to the original amber cutting and polishing, this specimen is missing the right antenna after the half of the antennomere VIII.

According to the collector, the former specimen was excavated at the mine La Toca and the latter one at La Bucara, both mines being located in the Cordillera Septentrional of the Dominican Republic (Hispaniola).

According to ITURRALDE-VINENT & MACPHEE (1996), all of the main amberiferous deposits in the Dominican Republic could have been formed in a single sedimentary basin during the late Early Miocene through early Middle Miocene (~20-15 Myr BP). Nonetheless, POINAR (1992) mentioned that other authors had stated that the amber excavated at La Toca and La Bucara is much more ancient. According to the nuclear magnetic resonance data, the age estimated for La Toca should be 30-40 Myr BP, while the age of surrounding sedimentary rock on basis of nanofossils suggests to date La Toca until 30-45 Myr BP and La Bucara until 20-30 Myr BP.

These geological dates were compared with the GeoWhen Database of the Physics Department, University of California at Berkeley, according to the 2004 time scale endorsed by the International Commission on Stratigraphy. According to such database, the most ancient period (La Toca) corresponds to the Middle Eocene-Early Oligocene, while the younger (La Bucara) to the Late Oligocene, making these amber contemporaneous or even previous to the Baltic ones and to the Florissant shales.

After purchase, both amber pieces have been little modified through the use of abrasive papers in order to obtain faces parallel to the features that need be examined, and successively smoothed with papers having finer and finer granulation.

Observations of the fossil were made using a stereomicroscope with 20-40x eyepieces equipped with micrometer and digital photographic system. After examination, the pieces were coated for preservation in viscous Araldite Epoxy.

The reconstruction of the habitus was obtained using a mixed traditional-computer graphic technique.

Results

Elaphidion tocanum nov.sp. (Figs 1-4)

Holotype: Hispaniola, Dominican Republic, mine La Toca, ex. coll. K. LUZZI DR4256, author's coll. FS36B21.

Etymology: The species name derives from the mine La Toca, the collecting locality.

Description: ♀, body length 14 mm, width 4 mm (measured across humeri).

General habitus relatively small, flattened; body coloration pitch-brown with irregular patches of white pubescence, legs reddish brown.

Head glabrous and covered with a close extremely fine puncturing; frons largely concave; antennal tubercles widely separated and scarcely elevated; labrum transverse; eyes coarsely faceted, strongly reniform, prominent.

Antennae (11-segmented); scape bowed, glabrous; pedicel one-fifth as long as scape. Resting parts missing.

Pronotum obovate, imperceptibly transverse, scarcely narrower than head and evidently narrower than elytra; apex inflated and abruptly bowed, front margin deeply furrowed and constricted by a narrow apical bourrelet slightly convex anteriorly; sides laterally unarmed, rightly convergent toward the base; base bi-



Fig. 1: *Elaphidion tocanum* nov.sp., ♀, Holotype, dorsal view.



Fig. 2: *Elaphidion tocanum* nov.sp., ♀, Holotype, particular of the head.



Fig. 3: *Elaphidion tocanum* nov.sp., ♀, Holotype, ventral view.

sinuate, finely furrowed along the margin. Disc sparsely pubescent and covered with a close large alveolate puncturing and three smooth callosities: a longitudinal drop-shaped median one, very narrow anteriorly and enlarged on the middle, occupying nearly the entire discal length without reaching both margins; two lateral ones in the form of the numeral "7" located on the middle of the pronotal length.

Scutellum small, semi-elliptical, transverse, twice as wide as long.

Elytra feebly constricted after humeri and enlarged apically, 2.5 times as long as wide (measuring at humeri excluding the apical spines), finely furrowed along the lateral margin; base straight; humeri rounded, fairly prominent; apex rightly truncate, with a fairly long acute spine at the sutural angle and another at the outer angle, slightly diverging exteriorly, 3 times as long as sutural one; surface covered with fine sparse points disappearing after the apical third, and with small irregular patches of recumbent short white hairs, letting large glabrous area; apical fifth with white erect pubescence along the outer and the apical margin.

Legs fairly long; femora fusiform, without carinae, covered with semi-recumbent pubescence, profemora with obtuse rounded teeth at the apex, meso- and metafemora with longer rounded teeth at the apex; tibiae sub-linear, without carinae, acutely bispinose at the apex, covered with no detectable pubescence; tarsi rela-

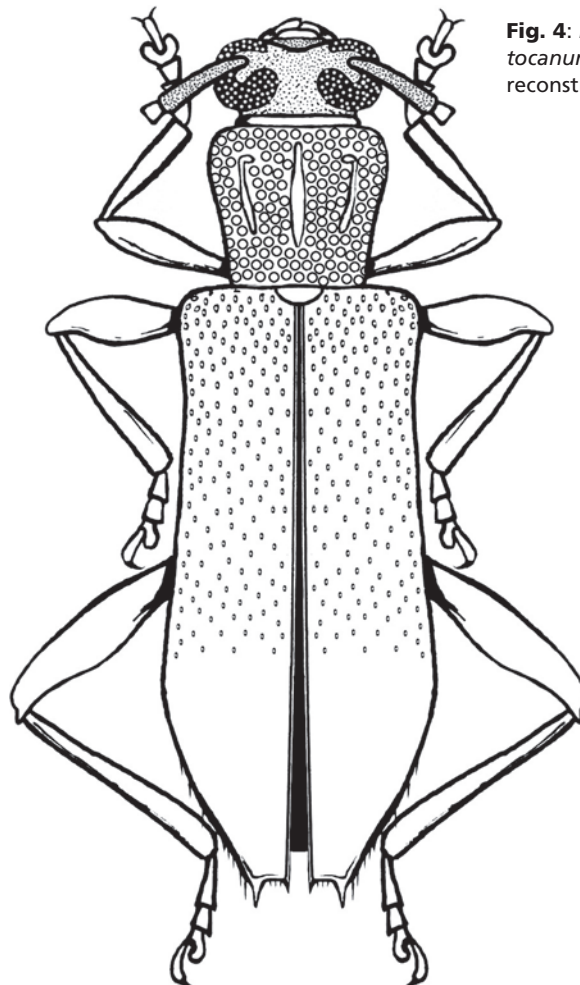


Fig. 4: *Elaphidion tocanum* nov.sp., ♀, reconstruction.

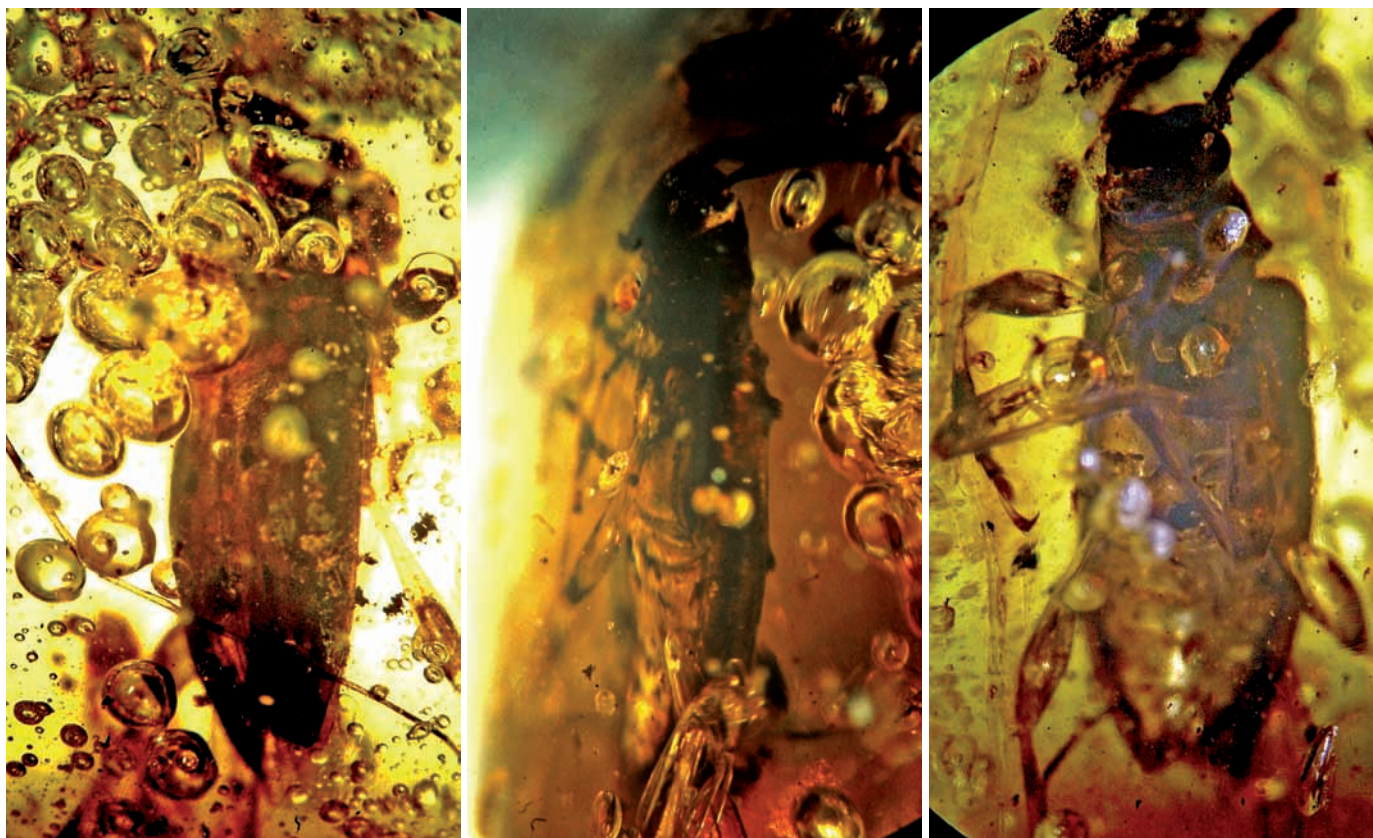


Fig. 5: *Kallyntrosternidius bucarensis* nov.sp., ♂, Holotype, dorsal view. **Fig. 6:** *Kallyntrosternidius bucarensis* nov.sp., ♂, Holotype, lateral view. **Fig. 7:** *Kallyntrosternidius bucarensis* nov.sp., ♂, Holotype, ventral view.

tively long; metatarsus (left) scarcely visible, metatarsomere I as long as II and III together; metatarsomeres III deeply bilobed, as long as II; onychium as long as metatarsomere III.

Ventral side mostly scarcely visible; abdomen apparently smooth, with a short dense pubescence at the sides of the visible sternites; urosternites II-V sub-equal, two-third as long as urosternite I; urosternite V trapezoidal, truncate at the apex, with some long semi-recumbent setae along the outer margin.

Differential diagnosis: Body size and proportions, pronotal callosities, pubescence and bispinose elytral apex allow to attribute this fossil to the genus *Elaphidion* with sufficient certainty even in absence of the antennal characters (LINGAFELTER 1998; LINGAFELTER & IVIE 2004).

By considering the fossil species, *Elaphidion tocanum* nov.sp. is distinguishable from *E. inclusum* VITALI, 2007 in the bispinose elytral apex, the different pronotal sculpture and body pubescence, and probably also in the larger size (14 rather than 7.6 mm). The first character is stable and independent from the sex in the *Elaphidion*-species, making both fossil species recognisable at the first look, even if they were described from different sexes.

By considering the extant species (MONNÉ et al. 2007), *E. tocanum* is difficult to compare with its congeners since its incomplete antennae do not allow establishing whether they were unispinose or bispinose. Nonetheless, this fossil is clearly characterised by an obovate pronotum with alveolate puncturing and well-developed callosities, elytra with bispinose apex and patches of white pubescence, femora obtusely spinose at the apex.

Most of the characters are reminiscent of some species closely related to *E. irroratum* (LINNAEUS, 1767) – *E. laeve* WHITE, 1853, *E. lewisi* FISHER, 1941, *E. mimeticum* SCHAEFFER, 1905, *E. quadrituberculatum* CHEVROLAT, 1862, *E. williamsi* CHEMSAK, 1967 – largely widespread in the Antilles and Central America. Nevertheless, this fossil differs from all those species in the finer pronotal callosities and in the obovate (rather than elliptical) pronotal shape, similar to that of *E. androsensis* FISHER, 1942 from Bahamas or *E. glabratum* (FABRICIUS, 1775) from the West Indies.

In conclusion, *E. tocanum* seems to be a fairly specialised species, being more specialised than the group of small species – *E. inclusum* VITALI, 2007, *E. costipenne* FISHER, 1932, *E. cristalensis* ZAYAS, 1975, *E. elongatum* FISHER, 1942, *E. glabriusculum* (BATES, 1885) and *E.*

scabricolle (BATES, 1872) – for the well-developed elytral spines, the pronotal callosities and the irregular pattern. In contrast, it is less specialised than the Antillean species with tuberculated prothorax, such as *E. tomentosum* CHEVROLAT, 1862, *E. jamaicense* FISHER, 1932, *E. tuberculicolle* FISHER, 1932 and *E. difflatus* ZAYAS, 1975.

Kallyntrosternidius nov.gen.

Type species: *Kallyntrosternidius bucarensis* nov.sp. (monotypic).

Etymology: This name is the composition of the old-Greek word "Kállyntron" (= brush) and the generic name "Sternidius" (Lamiinae, Acanthocinini). Gender masculine.

Description: Oval, elongate.

Head vertical; front squared, convex, longitudinally grooved, finely punctured; antennal tubercles widely separated and feebly elevated; labrum transverse; eyes reniform, finely faceted, lower eye lobes very long, 3 times as long as cheeks.

Antennae (♂) eleven-segmented, 2 times as long as body, surpassing the elytral apex with the base of the antennomere VI; apex of the scape and antennomeres II-VI fringed with sparse semi-erect setae beneath; scape without cicatrix, very elongate; pedicel one-sixth as long as scape; antennomere III fourth-third as long as scape; antennomeres IV-VII regularly decreasing; antennomere VIII as long as scape; antennomeres IX-XI regularly decreasing (antennomere proportions according to the formula: 3: 0.5: 4: 3.5: 3.2: 2.8: 2.5: 3: 2.8: 2.5: 2.2).

Pronotum transverse, twice as wide as long (measuring across teeth) and anteriorly convergent; apex less than three-fourth as wide as base, grooved with a wide, slightly incised transversal furrow along the margin; base two-third as wide as elytra (measuring across humeri), sinuate, grooved with a fine, transversal furrow extending below teeth onto sides; sides with an outward directed, strong blunt conical tooth placed at basal third; disk with two blunt callosities placed at each side of the middle; surface smooth. Scutellum extremely small, scarcely visible due to amber bubbles.

Elytra parallel-sided to the apical third; base right; humeri rounded; middle of the disc with a conspicuous basal tuft of black hairs located on a short longitudinal callus, and a small pre-median tuft of black hairs; apex obliquely truncated; disc covered by fine irregular and fairly dense puncturing.

Legs normal; procoxal cavities posteriorly largely open; mesocoxal cavities outer closed; femora club-shaped; tibiae regularly enlarged at the apex; mesotibiae

feebly grooved a bit before the apex; meso- and metatibiae feebly sinuate, with two very small apical spines and a dense short, black pubescence at the apex. Tarsi relatively long; metatarsi only one-seventh shorter than metatibiae; metatarsomere I more than 2.5 times as long as II, acutely spined at the apex; metatarsomere II acutely spined at the apex; metatarsomere III scarcely shorter than II, very deeply incised at the apex; onychium twice as long as II, with simple, very widely divergent claws.

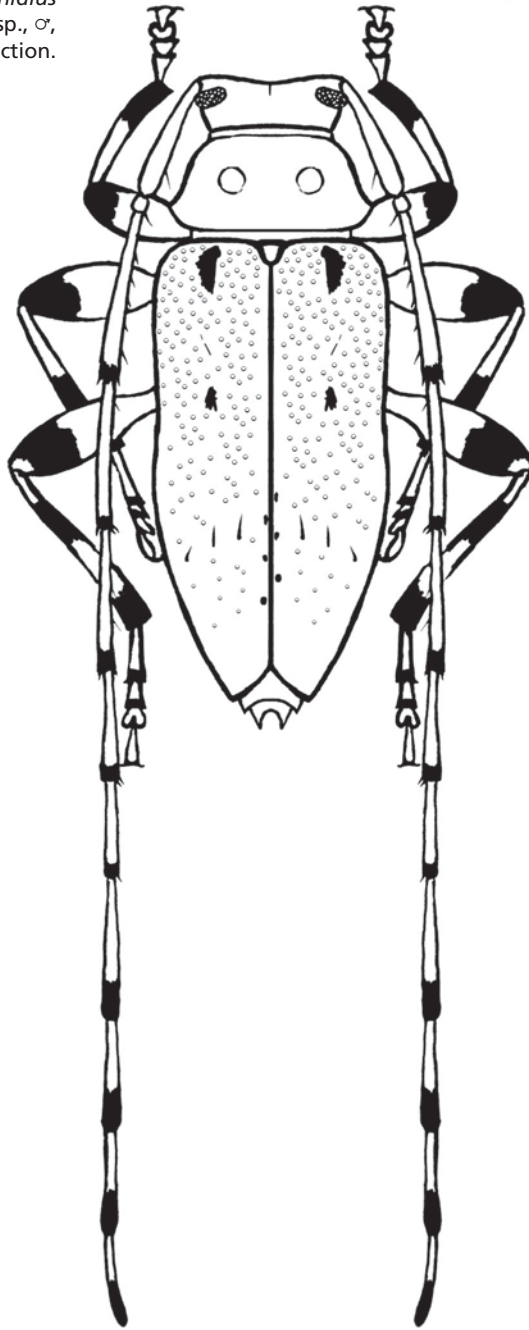
Underside very sparsely irregularly punctured and covered with a very fine recumbent pubescence; prosternum very narrow (one-sixth as wide as each procoxal cavity), posteriorly slightly shorter than coxae, abruptly enlarged and truncate, hind slope flat; mesosternum trapezoidal, posteriorly restricted and truncate, anteriorly scarcely wider than prosternum and nearly one-half as broad as mesocoxal cavities, front slope arched; ventrites equal, each shorter than metasternum; pygidium (ventrite VII) truncate in the middle and acutely produced at each side forming an equilateral triangle; ventrite VIII acutely produced at each side forming a long triangle, ventrite IX acutely triangular.

Differential diagnosis: *Kallyntrosternidius* is characterised by the following set of characters: pronotum with outward directed, strong blunt conical teeth placed at basal third, basal furrow extending onto sides, disk with two blunt callosities; elytra flat with basal callus and brushes of hairs; antennae very long.

The myriad of taxonomic problems due to the cryptic and extremely variable morphology of the Acanthocinini makes questionable the attribution of real affinities to extant taxa; however, this new genus is not apparently related to other ones currently present in Hispaniola. *Lagocheirus*, *Leptostylus* and *Leptostylopsis* have pronotal teeth placed at middle of sides; *Styloleptus* has broad rounded tubercles, *Urgleptes* has backward directed acute spines, *Alcidion* has variable spines or teeth, but always misses callosities on pronotum and elytra.

Among the remaining Antillean genera, *Kallyntrosternidius* seems more related to *Sternidius* LECONTE, 1873 (= *Liopinus* LINSLEY & CHEMSAK, 1995). Such genus, which is especially widespread in Western North America and fragmentally present in Mexico, Cuba and Venezuela, is characterised by similar size, antennae, pronotal teeth and maybe also elytral pattern. Though some specimens of *S. gracilipes* (LINSLEY, 1942) and *S. misellus* (LECONTE, 1852), and the holotype of *Amniscus alpha vicinus* HALDEMAN, 1847 show smooth elytral callosities analogue to the tuft of hairs of *Kallyntrosternidius*, this genus is nonetheless characterised by smooth pronotum and elytra. The differences between *Kallyntrosternidius* and *Sternidius* are possibly specific or sub-

Fig. 8: *Kallyntrosternidius bucarensis* nov.sp., ♂, reconstruction.



generic, practically the same slight differences that have been observed (VITALI 2007b) between *Hemierana* AURIVILLIUS, 1923 and *Paleohemilophus* MARTINS & GALILEO, 1991. Nonetheless, the fact that the elytral tufts of hairs in *Kallyntrosternidius* are not evidently a primitive character justifies the formation of a new genus. This genus, therefore, seems to be paraphyletic with respect to other allied genera.

A close relation also seems to occur with *Astyliidius parvus* (LECONTE, 1873), since this species is characterised by similar size, antennae, pronotal callosities and teeth, though it is also missing the tufts of hairs on the elytra. Yet the apparently Vancouverian distribution of

such species makes this relationship problematic.

However, *Kallyntrosternidius* apparently seems more specialised than both genera due to the presence of the tuft of hairs. Similar structures are present in the Neotropical genus *Nealcidion* MONNÉ, 1977, which, nevertheless, misses teeth at the pronotal sides and has spines at the elytral apex.

Kallyntrosternidius bucarensis nov.sp. (Figs 5-8)

Holotype: Hispaniola, Dominican Republic, mine La Bucara, ex. coll. K. LUZZI DR8519, author's coll. FS37B22.

Etymology: The species name derives from the mine La Bucara, the collecting locality.

Description: ♂, body length 6.5 mm, width 2.6 mm (measured across humeri). Characters of the genus.

Pubescence pattern difficult to assess: apparently brown; elytra reddish at base, with a post-basal irregular V-shaped whitish band, some small irregular black vitæ forming a post-median band, and some small black points along the posterior half of the sutural margin.

Antennae light; scape, pedicel and apex of the remaining antennomeres dark.

Legs light; femora confusedly darkened at apex; tibiae darkened at the apical third, metatibiae also with a dark ring at the end of the basal fourth; tarsi light with the tarsomeres I-II narrowly darkened at the apex, onychium darkened on the apical half.

Biological remarks

The coarsely faceted eyes and the systematic position of *Elaphidion tocanum* imply a nocturnal phenology, while opposite characters of *Kallyntrosternidius bucarensis* imply the opposite phenology. Like other fossil cerambycids included in Dominican amber, both species were in all likelihood characterised by activity on logs and branches of humid forests of *Hymenaea protera* POINAR, 1991, the amber-producing tree (POINAR 1991). It is questionable whether the larvae could also be directly related to such plant; presently, no larva of the genus *Elaphidion* bores *Hymenaea*-trees (MONNÉ 2001).

Discussion

The description of two further cerambycids included in Dominican amber confirms some particularities already previously noticed about that fauna (VITALI 2007b).

The fossil cerambycid fauna of Hispaniola included both extant genera living in the Antilles (*Plectromerus*, *Elaphidion*) and extinct genera having relationship with extant taxa living on the continent (*Paleohemilophus*, *Pterolophosoma*). *Elaphidium tocanum* nov.sp. belongs to the former group, *Kallyntrosternidius bucarensis* nov.sp. to the latter one.

Moreover, all species found in Dominican amber, though fairly primitive, were nonetheless more specialised than others present today on the American continent: *Elaphidium tocanum* is more specialised than some species, such as *E. glabriusculum* (BATES, 1885) from Panama and *E. scabricolle* (BATES, 1872) from Nicaragua, while *Kallyntrosternidius bucarensis* is more specialised than *Astyldius* and *Sternidius* spp.

This fact can be explained by the presence of an ancient bridge once connecting the northern Greater Antilles to the northwestern South America (ITURRALDE-VINENT & MACPHEE 1999). Accordingly, this bridge carried into the Antilles primitive Gondwanan species, which independently evolved and gradually substituted the more primitive ones. Instead, the larger availability of continental habitats allowed the surviving of such primitive species.

An original observation is that, among the genera found in Dominican amber, all still living genera belong to the Cerambycinae, while all extinct ones belonged to the Lamiinae.

This fact might depend on the puzzled systematics of Lamiinae, whose taxa sometimes have uncertain definitions and limits. A reason for this might be that Lamiinae are a relatively young group, whose intermediate taxa are still existing and do not allow to define split groups.

Nevertheless, an ecological reason might be that Lamiinae are actually more related to tropical habitats than Cerambycinae are. Accordingly, the climatic cooling occurring during the Quaternary Ice Ages, together with the scarce possibility of displacing, might have had dramatic consequences especially on Lamiinae, extinguishing many members of that subfamily.

Zusammenfassung

Aus Dominikanischem Bernstein aus den Minen La Toca (Mitteleozän bis Unteroligozän) und La Bucara (Oberoligozän) werden zwei neue fossile Cerambyciden-Taxa beschrieben: *Elaphidium tocanum* nov.sp. (Cerambycinae Elaphidiini), bzw. *Kallyntrosternidius bucarensis* nov.gen. nov.sp. (Lamiinae Acanthocinini). Diese werden zu systematischen Zwecken mit fossilen wie rezenten *Elaphidion*-Arten sowie mit heutigen Gattungen der amerikanischen Acanthocinini verglichen.

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