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New fossil cerambycids (Coleoptera: Cerambycidae) from Baltic amber belonging to the collection Hoffeins

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Three new fossil cerambycid species from Baltic amber, *Pedostrangalia (s. str.) pristina* sp. n. (Lepturinae, Lepturini), *Japanopsimus balticus* sp. n. (Cerambycinae, Opsimini), and *Stenhomalus hoffeinsorum* sp. n. (Cerambycinae, Obriini) are described and compared to extant congeners and fossil allied taxa. The extant Laotian species *Hypoeschrus simplex* Gressitt & Rondon, 1970 is transferred to the genus *Japonopsimus* Matsushita, 1935 as follows: *Japanopsimus simplex* (Gressitt & Rondon, 1970) comb. n.

Key words: Coleoptera, Cerambycidae, fossil, Baltic amber, new species, new combination.

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INTRODUCTION

At the beginning of July 2013 I received in study some cerambycids included in Baltic amber from the private collection of Christel and Hans Werner Hoffeins (CCHH), Hamburg, Germany. Beside two specimens (CCHH 282-2 and 286-3) of *Nothorhina granulicollis* (Zang, 1905), the examination of this material has revealed the presence of three unknown species.

Until today, 16 valid cerambycid species have been recognised from succinite (Vitali, 2011; Alekseev, 2013), two of them being only known from Bitterfeld amber. To these species *Spondylis crassicornis* Giebel 1856 should be added, whose type - currently burnt during the WWII - possibly corresponded to *Nothorhina granulicollis* (Vitali, 2006).

In this paper three new species from Baltic amber, among which the first fossil representative of the tribe Obriini Mulsant, 1839, will be described. A one new combination is established for an extant Laotian species, once erroneously attributed to another tribe.

This new contribution allows improving the scientific knowledge of this fauna, enriching its biodiversity but also corroborating the hypotheses already sustained concerning environmental characteristics and more recent dating (Early Oligocene) of the Baltic amber (Vitali, 2009; 2011).

MATERIALS AND METHODS

The pieces, labelled "Baltic amber" without further origin data, are preserved embedded in rectangular transparent blocks composed of 2-component polyester resin (Voss' Chemie) as described in Hoffeins (2001).

Observations of the fossils were made using a stereomicroscope with 20-40x eyepieces

equipped with micrometer system. Pictures were taken by Hans Werner Hoffeins using a Nikon Coolpix 4500 camera attached to a Wild M3Z microscope.

According to the owners' intentions, type materials will be deposited at the Deutsches Entomologisches Institut Müncheberg (SDEI), Germany.

SYSTEMATIC PART

Cerambycidae Latreille, 1802
Lepturinae Latreille, 1802
Lepturini Latreille, 1802
***Pedostrangalia* Sokolov, 1897**

Pedostrangalia (s. str.) pristina *sp. n.*
(Figs. 1-3)

Holotype. Specimen CCHH 643-2. The insect is preserved inside a sub-triangular piece of amber embedded in a rectangular resin block measuring 16x15x7 mm.

The beetle lacks the left antenna except for a part of the scape, the dorsal part of the articles I-IV of the right antenna, and the dorsal side of the right eye. The apical part of the elytra, the procoxae, and part of the tarsi of the head are covered with milky turbidity.

The left side is partially covered by an opaque layer corresponding to the old surface of the ambrosia where the insect was plunged. The lateral death position with respect to this surface implies that the beetle was included after its natural death.

The amber piece contains several stellate hairs but no further inclusions.

Differential diagnosis. With respect to the congeners of the Recent, *P. pristina* sp. n. does not show affinity with the European *P. revestita* (Linnaeus, 1767) due to the different pronotal shape. The elytral pattern reminds of *Stenurella vaucheri* (Bedel, 1900), suggesting a close phyletic relation between *Pedostrangalia* and *Stenurella*.

With respect to other fossil species, *P. pristina* sp. n. might only be confused with *Strangalia berendtiana* Zang, 1905, which differs in the following characters: pronotum more elongate and conical, elytra convergent apically, three-banded elytral pattern. Zang noticed a particular antennal formula (antennomeres I, III and IV equal, V much longer as previous) and a single, extremely long, metatibial spine. Such characters correspond to none taxon of the Recent and probably, they should be considered as misinterpreted. Finally, the added drawing showed tarsi typical of *Strangalia*, which nevertheless were not made explicit in the description.

Description. Undetermined sex, probably male; length 8.3 mm. General habitus small, elongated, drop-shaped; body black, elytra with some yellow spots on the apical third.

Head relatively short; cheeks developed but relatively short; clypeus and forehead transverse; antennal tubercles widely separated, fairly elevated; eyes relatively close to the base of the mandibles, emarginate at the upper side, uniformly convex at the under one, finely faceted; temples relatively long, as long as the cheeks, parallel-sided, abruptly converging backward; neck as long as temples. Last (IV) maxillar palpomere obliquely truncate at the apex, twice as long as III; III palpomere globose, as long as wide; II palpomere elongated, as long as IV. Antennae 11 segmented, inserted between the eyes, hardly reaching the elytral apex, glabrous, extremely finely and densely punctured; scape sub-linear; pedicle scarcely longer than broad, nearly one-fourth as long as scape; antennomere III one-fourth longer than scape; antennomere IV hardly longer than scape; antennomere V hardly one-third longer than scape; following antennomeres decreasing in length (proportions according to the formula: 1.5: 0.4: 2.0: 1.6: 2.2: 1.9: 1.8: 1.4: 1.3: 1.2: 1.4).

Fig. 1. *Pedostrangalia (s. str.) pristina* sp.nov.: lateral view

Fig. 2. *Pedostrangalia (s. str.) pristina* sp.nov.: dorsal view

Prothorax transverse, bell-shaped, regularly enlarged posteriorly, hind angles acute, embracing the elytral base; apex and basis finely grooved; disc feebly convex above, without longitudinal furrow, everywhere covered with a

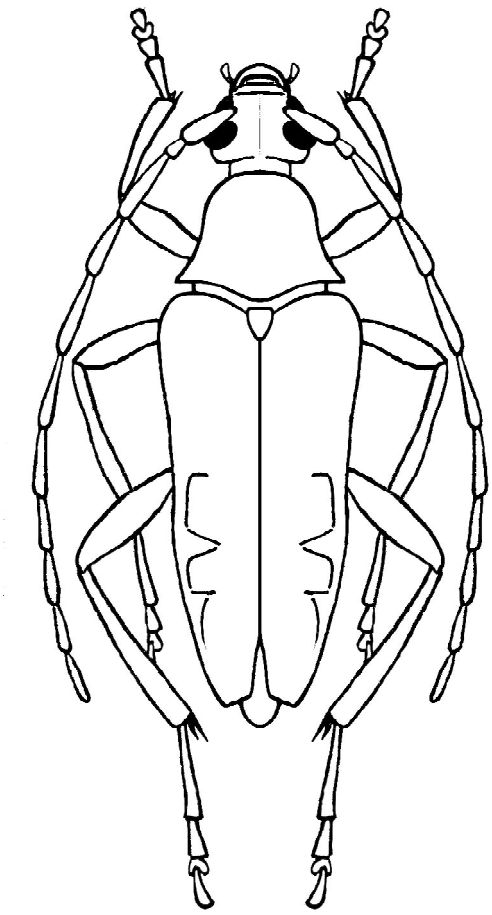

Fig. 3. *Pedostrangalia (s. str.) pristina* sp.nov.: reconstruction

fine dense punctuation. Scutellum small, forming an equilateral triangle.

Elytra long, 2.6 times as long as wide at the shoulders, flat above, nearly parallel-sided, feebly constricted at the sides, then apically convergent and obliquely emarginated at the apex; marginal apex acute; surface covered with a coarse dense punctuation and a fine short recumbent pubescence.

Ventral side convex, apparently unpunctuated and covered with a pubescence analogue to the

dorsal one; prosternum in lateral view regularly convex; procoxal cavities posteriorly closed.

Legs long; femora slightly club-shaped; tibiae linear, rectilinearly truncated at the apex, finely punctured and pubescent; apex of mesotibiae armed with two equal spines; apex of metatibiae with two unequal spines, the longest one being one-third as long as the metatarsomere I. Metatarsi long, one-fourth shorter than the metatibiae; metatasomere I one-fourth longer than the following articles together; metatarsomere II two-fifths as long as I; metatarsomere III one-half as long as II, deeply incised at the apex; onychium, as long as II (proportions according to the formula: 2.4: 1.0: 0.5: 1.0).

Etymology. The scientific epithet is a Latin adjective meaning "ancient".

Remarks. The present specimen might correspond to the *Grammoptera*-species mentioned by Klebs (1910) and following authors (Statz, 1938; Linsley, 1961; Abdullah, 1967; Larsson, 1978; Spahr, 1981; Poinar, 1992); nonetheless, its emarginate elytra apex does not fit this genus.

The fauna of the Recent includes several genera of Holarctic Lepturini characterised by emarginated elytral apex and prothorax embracing the elytral base with the posterior angles. Unfortunately, their taxonomy is still unclear since authors of different countries often focused their interests on local faunas, ignoring related taxa of other regions. Consequently, species evidently belonging to the same phyletic line are differently classified in European, Asian and Nearctic fauna. Generally, two groups may be recognised. The former one, which is characterised by normally conformed metatarsi, includes taxa such as *Leptura* Linnaeus, 1758; *Nakanea* Ohbayashi, 1963; *Etorofus* Matsushita, 1933; *Stenurella* Villiers, 1974; *Nustera* Villiers, 1974; *Strangalia* Audinet-Serville, 1835; *Carlandrea* Sama & Rapuzzi, 1999. The latter group, which is characterised by a ventral furrow on the two first metatarsi, includes only *Pedostrangalia* Sokolov, 1897 and two subgenera, identified by the size of temples: large (s. str.) or narrow (*Neosphenalia* Löbl, 2010). Some authors include *Pedostrangalia pubescens* (Fabricius, 1787) in "*Etorufus*" [sic!] or *Etorofus* incorrectly, since such genus has normal tarsi.

Concerning this new species, it was impracticable to detect the real features of the tarsi; nonetheless, the specimen shows strongly developed temples, character shared only by *Pedostrangalia* (s. str.). Moreover, the general habitus, in particular the prothorax, fits this genus. Actually, *Pedostrangalia* (s. str.) may be considered as the most primitive taxon among the ones previously examined, due to the archaic features of the head.

This subgenus is currently widespread in Central Asia, including Northern Laos, with few species reaching the West-Palearctic.

The biology of most *Pedostrangalia*-species is nearly unknown; however, they are thermophile temperate taxa with diurnal adults and larvae related to rotten or living broadleaf-trees, occasionally to conifers.

Cerambycinae Latreille, 1802
Opsimini LeConte, 1873
***Japanopsimus* Matsushita, 1935**

***Japanopsimus balticus* sp. n.**
(Figs. 4-5)

Holotype. Specimen CCHH 1347-1. The insect is preserved inside a squared piece of amber embedded in a squared resin block measuring 16x16x3mm.

The beetle is included over a convex opaque layer corresponding to the old surface of the ambrosia. The ventral side and the dorsal eyes lobes are covered with milky turbidity.

The death position suggests that the specimen was attracted by the ambrosia and drowned in-

side, floating for some time. This position corresponds nearly perfectly to that already observed in *Europsimus germanicus* Vitali, 2011, the only other known fossil belonging to the Opsimini. Analogously, this amber did not contain stellate hairs but a large number of bubbles and wood residuals.

Differential diagnosis. This new taxon is a clear representative of the Opsimini, a tribe comprising one fossil genus from Bitterfeld amber and three genera of the Recent (Matsushita, 1933; Linsley, 1962; Holzschuh, 1984; Vitali, 2011). *Opsimus quadrilineatus* Mannerheim, 1843 and both species of *Dicentrus* LeConte, 1880 are widespread in temperate rainforests of Vancouverian, while *Japonopsimus* Matsushita, 1935 shows a relict distribution in Eastern Asia, *J. orientalis* (Matsushita, 1933) being present in Taiwan and *J. exocentroides* Holzschuh, 1984 in Bhutan.

To these species should be added *Japonopsimus simplex* (Gressitt & Rondon, 1970) **comb. n.** from the mountains of Northern Laos. Its authors described it as *Hypoeschrus* Thomson, 1864 (Xystrocerini), but the long pedicle and the basally concave pronotum belong evidently to the Opsimini.

The prothorax is bidentate at each side in the fossil *Europsimus germanicus* and in *Dicentrus*, while it is unidentate in *Opsimus* and *Japonopsimus*. Due to antennal structure (antennomere II only twice as long as wide, II-IV much shorter than V), this fossil should be ascribed to *Japonopsimus*, even if the scape, shorter than that of other species, matches more that of *Opsimus*.

With respect to the extant congeners, *J. balticus* sp. n. is more closely related to *J. simplex*, sharing an obtuse tubercle at each side of the prothorax (whereas other species have a more or less evidently acute spine).

With respect to *Europsimus*, *J. balticus* sp. n. shows more archaic characters: shorter scape, longer pedicle, undivided last antennomere, single prothoracic spine, concave pronotal base, and more elongated elytra.

Description. Male, body length 6 mm. General habitus small, flat, densely covered with a semi-recumbent pubescence; body pitch-brown, pubescence dark.

Head short; forehead vertical, covered with some sparse raised setae, sculpture not detectable; antennal tubercles widely separated and scarcely elevated; inter-antennal furrow obsolete; eyes large, coarsely faceted, very strongly reniform, and scarcely prominent; under eye-lobes nearly occupying all space of cheeks. Maxillar palpomeres sub-equal, last palpomere evidently longer than the preceding one, truncated at the apex. Antennae 11-segmented, 1.4 times as long as body (the apex of the antennomere VII surpasses the elytral apex); antennomeres cylindrical, covered with a fairly dense semi-recumbent pubescence; scape club-shaped, fairly elongated (surpassing the anterior margin of the pronotum); pedicle elongated, twice as long as wide, less than one-half as long as scape; antennomere III hardly as long as scape; antennomere IV hardly longer than scape; antennomere V three-fourths longer than scape, the remaining progressively shortened (antennomere proportions according to the formula: 3.4: 1.4: 3.3: 3.5: 6.0: 4.7: 4.2: 3.5: 3.0: 2.4: 3.0).

Prothorax feeble transverse, larger than head and as wide as elytra; apex feebly convex; middle of each side armed with an obtuse hooked tubercle; base anteriorly concave in the middle; disc flat, covered with a fine and dense umbilicate puncturing. Scutellum very small, semicircular, transverse.

Elytra 2.4 times as long as wide at shoulders, parallel-sided, flat above; base straight; shoulders rounded; apices largely separately rounded; disc without longitudinal ridges, covered with a puncturing extremely dense and finer as that of the pronotum and some long semi-recumbent setae.

Fig. 4. *Japanopsimus balticus* sp.nov. Habitus: dorsal view

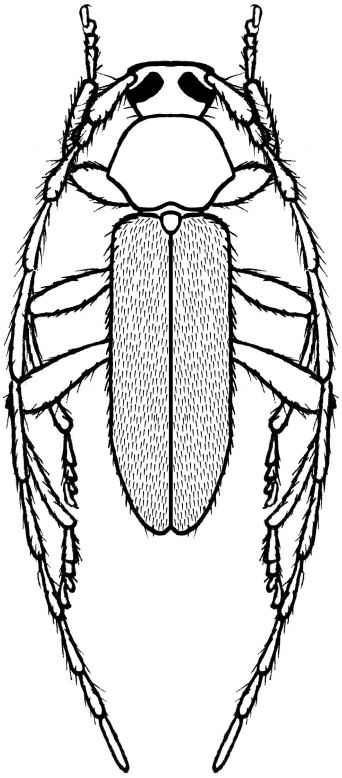

Fig. 5. *Japanopsimus balticus* sp.nov.: reconstruction

Ventral side covered by milky turbidity and difficultly observable. It shows a fine sparse puncturing and some short recumbent setae; procoxae globose, procoxal cavities rounded externally, not observable posteriorly; mesocoxal cavities not observable; visible urosternite I twice as long as II or III, remaining urosternites covered by the hind wings.

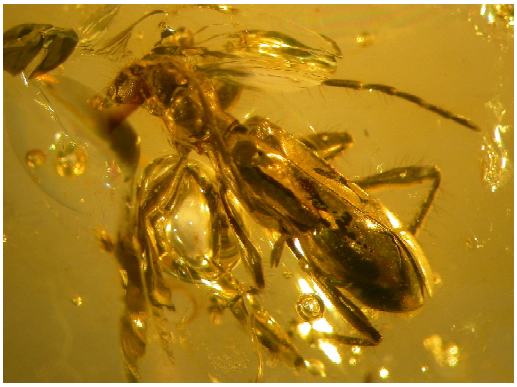

Fig. 6. *Stenhomalus hoffeinsorum* sp.nov. Habitus: dorsal-lateral view

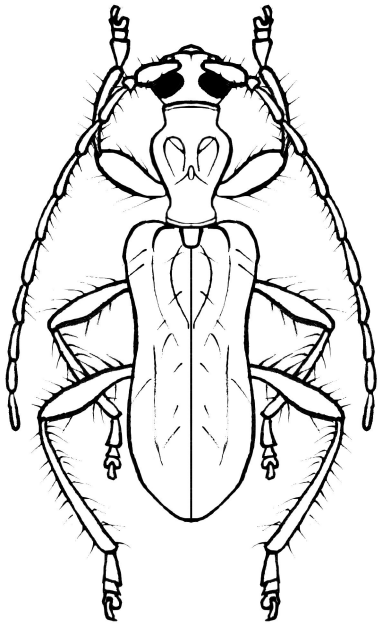

Fig.7. *Stenhomalus hoffeinsorum* sp.nov.: reconstruction

Legs relatively short, covered with a dense semi-recumbent pubescence; femora clavate; tibiae linear; tarsi relatively long; metatarsum two-thirds

as long as metatibia; metatarsomere I shorter than the remaining articles together.

Etymology
The scientific epithet is a Latin adjective meaning "inhabitant or related to Baltic".

Remarks
Concerning the supposed biology of *J. balticus* sp. n., the same hypotheses given for *Europsimus germanicus* may be inferred. In all likelihood, this species was a temperate element of the Baltic fauna, sharing the same habitat as *Nothorhina granulicollis*. Nevertheless, the probable primary dependence from temperate Arcto-Tertiary conifers (*Sequoia, Calocedrus, Cupressus, Psedotsuga, Tsuga*) made this species more vulnerable to the climatic changes occurred during the Secondary, pushing it to extinction, whereas *Nothorhina* survived in modern conifer forests (*Abies, Picea, Pinus*).

The presence of this fossil in Baltic amber allows throwing more light in the evolution of Opsimini. The current distribution of this tribe seems to fit a glacial spread through Beringia, having its original nucleus in Western America or Eastern Asia. Nonetheless, the trophic preferences of the Vancouverian species and the presence of *Europsimus* in Bitterfeld amber imply that extant American Opsimini are actually temperate Arcto-Tertiary elements (Vitali, 2011).

The discovery of a fossil *Japanopsimus* in Baltic amber implies that this Asian genus is another Arcto-Tertiary element. Moreover, the occurrence of two different fossil genera of Opsimini in succinite suggests that the nucleus of this tribe was originally located in Europe.

Cerambycinae Latreille, 1802
Obriini Mulsant, 1839
***Stenhomalus* White, 1855**

***Stenhomalus hoffeinsorum* sp. n.**
(Figs. 6-7)

Holotype. Specimen CCHH 526-3. The insect is preserved inside a rectangular piece of amber embedded in a rectangular resin block measuring 14x10x3 mm. It is placed on a fairly large bubble, while some small mirror-shaped surfaces (probably deriving from the amber modelling process) are multifariously located.

The beetle naturally misses the apical part of the left antenna, cut after the half of the article VIII and evidently lost before its inclusion.

The death position suggests that the specimen was attracted by a flowing ambrosia and drowned, swimming inside for a certain time.

Differential diagnosis. The abdominal morphology, the posteriorly well extended metepisterna, the antennal setae, and the prothoracic shape make this species a plausible member of *Stenhomalus* White, 1855. Currently, this genus includes 65 species, very largely widespread in tropical Africa and Asia to New Caledonia, with only one representative in Europe: *S. bicolor* (Kraatz, 1862). Several species have been recently transferred from the close genus *Obrium* Dejean, 1821, making difficult to trace the effective geographic range of this taxon. Moreover, though numerous species have been newly described or analysed, no author provided a key to *Stenhomalus*; consequently, I am unable to compare this fossil to all extant congeners.

However, *S. hoffeinsorum* sp. n. does not seem directly related to *S. bicolor* or closely related species, due to the general habitus, the smooth pronotum and the elytral setae. Instead, its particular pubescence makes this fossil possibly similar to *S. longicornis* (Bates, 1873), from Japan, or *S. unicolor* Niisato & Hua, 1998, from Zheijang (East China).

Description. Female, body length 5.9 mm. General habitus small, parallel; elytra covered with some sparse, fairly long, raised setae; body apparently reddish brown, elytra dark brown.

Head short; forehead oblique, smooth; antennal tubercles widely separated and scarcely el-

evated; inter-antennal furrow fine; eyes large, coarsely faceted, strongly reniform, laterally prominent. Palpi small; last maxillar palpomere three times as long as the preceding one, ovoid, truncate at the apex. Antennae eleven-segmented, filiform, shorter than body, glabrous, except for some long raised setae at the underside of the segment I-VIII; scape club-shaped, bowed; pedicle globose one-fourth as long as scape; antennomere III three-fifth as long as scape; antennomere IV hardly as long as scape; antennomere V more than one-fifth longer than scape; the other ones progressively shortened; antennomere VIII and XI as long as scape (antennomere proportions according to the formula: 2.0: 0.5: 1.6: 1.9: 2.6: 2.5: 2.3: 2.0: 1.9: 1.7: 2.0).

Prothorax longer than wide, inflated in the middle, strongly constricted before the apex and subcylindrical to the base; apex straight, evidently wider than base, finely furrowed along its margin; sides armed with a blunt conical tubercle at the middle; base straight, two-thirds as wide as elytral base, coarsely furrowed along its margin; disc with a pair of large bulges on the middle and a much smaller one located posteriorly; surface extremely finely punctured and with some long raised setae along the middle. Scutellum elongated, parallel sided, largely rounded at the apex.

Elytra four times as long as wide at shoulders, feebly constricted at the sides, flat above, posteriorly enlarged and convex; base concave in correspondence of the posterior angles of the prothorax; shoulders rounded; lateral margins furrowed to the apical enlargement; apex largely rounded; disc smooth, weakly longitudinally concave near suture just behind scutellum, covered with some raised long setae, irregularly disposed on the first two-thirds of the elytral length.

Ventral side (Fig. 7) extremely finely punctured, smooth; procoxae globose, procoxal cavities rounded and posteriorly closed; metepisterna inferiorly convex, apically pointed, reaching the metacoxal cavities; urosternite visible I longer than the following together, covered with some very short setae; urosternite II posteriorly concave, with a narrow brush of dense black hairs on the middle of the base and a series of long bowed black hairs along the apical margin, delimiting a rounded area located posteriorly to the previous brush; following urosterites scarcely visible because of milky turbidity; however, covered with long thin bowed hairs.

Legs relatively slim, covered with some long raised setae, femora clavate; tibiae linear; tarsi short; metatarsi one-half al long as metatibiae; metotarsomere I as long as the two following articles together.

Etymology. This new species is dedicated to Christel and Hans Werner Hoffeins, who kindly allowed me to examine their valuable collection of amber Cerambycids.

The scientific epithet is not neuter but masculine plural.

Remarks. *Stenhomalus hoffeinsorum* sp. n. is the first described fossil species belonging to the Obriini. Burmeister (1832) recorded *Obrium* prope *testaceum* and Klebs (1910) recorded *Obrium* sp. about three specimens of his own collection. Subsequent authors (Giebel, 1856; Scudder, 1885; Handlirsch, 1907; Statz, 1938; Linsley, 1961; Abdullah, 1967; Larsson, 1978; Poinar, 1992; Vitali, 2009) mentioned these records without describing any species. Vitali (2011) suggested that the new fossil species *Tillomorphites robustus* might have been confused with an obriine, though it actually belongs to the Tillomophini Lacordaire, 1869.

Even if biological considerations are probably still ventured, this fossil seems to corroborate the biology already supposed for other Cerambycids from Baltic amber. Analogously to the closest species of the Recent, *S. hoffeinsorum* sp. n. was in all likelihood a nocturnal thermophil species related to temperate, neither tropical nor subtropical, forests.

CONCLUSIONS

Baltic amber is usually referred to Upper Eocene age and subtropical environmental conditions; nonetheless, both assumptions do not correspond to the cerambycids described from succinite (Vitali, 2009; 2011).

It has been known for a long time (Zang, 1905; Klebs, 1910) that *Nothorrhina granulicollis* is the most common cerambycid of Baltic amber, representing up to 64% of all inclusions. This genus is presently widespread in Scandinavia, Siberia and in the Himalayan region, where it bores mountain pines.

Moreover, the species belonging to extant genera (*Paracorymbia*, *Strangalia*, *Necydalis*, *Clytus*, *Pogonocherus*) show evident correlations with temperate mixed forests. Other ones, generally known for single specimens, are apparently links between extant taxa currently widespread in temperate regions, though their true habits remain speculative.

The three species described in this paper also imply connections to forests with temperate characteristics, corroborating the hypothesis, already more circumstantially formulated (Vitali, 2009), that the Baltic biocenosis should be backdated at least to the Early Oligocene.

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