Pseudosieversia europaea new species from Baltic amber (Coleoptera, Cerambycidae, Lepturinae)

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Abstract

A new fossil cerambycid species, *Pseudosieversia europaea* nov. sp., included in Baltic amber (Upper Eocene) is described. The belonging to this genus, today only widespread in Far East, and its relationships with related genera and current species are discussed. Hypothesis of palaeological history of such and related species is yielded.

Key-words

Coleoptera, Cerambycidae, Lepturinae, Rhagiini, *Pseudosieversia*, fossil, Baltic amber, new species.

Introduction

Lepturinae are rarely preserved fossils. Firstly ZANG (1905) described *Strangalia berendtiana* (probably *Leptura*) from Baltic amber. This has been the only Lepturini-species among 74 cerambycids reported by HANDLIRSCH (1908). Later KREBS (1910) reported numerous species from its collection of Baltic amber, where current genera *Pachyta*, *Grammoptera* and *Strangalia* (= *Leptura*?) have been recognised at generic level by E. Reitter. In the following years several works about North American cerambycid fauna were realised by WICKHAM, describing species from fossil shales of the Florissant Lake (Colorado). They belong to the genera *Gaurotes*, *Grammoptera*, *Judolia* and *Leptura.* Among these, also *Pidonia leidyi* Wickham, 1913 and *Pidonia ingenua* Wickham, 1914 were described. Nevertheless, their conservation conditions don't permit to draw any palaeological considerations, and such species are often reputed as *incertae sedis.*

***Pseudosieversia europaea* nov. sp.**

Description. - 5,9 mm, elongated, convex above; head, pronotum and elytra yellowish, sides of the prothorax (except for lateral tooth), underside, legs and antennae greyish. Black bands along outer side of the elytra are not markings, because they disappear by inclining the point of view. They cannot be even hind wings, because their position is very different and they are transparent such as in current species (KUBOKI, *in litt.*). They could be the sides of the body, visible for transparency by perpendicular view. Nevertheless, after some days of immersion in liquid paraffin (the best conservation method against the ageing of the amber), all body became opaque pitch-black, similar to most *Grammoptera* and *Cortodera*-species. The only explanation to these facts is that the air present in thin gaps between body and amber reflects the light according to some inclinations, making the surface light and shining. Therefore, apparent yellow colour is the one of the amber stone. On the contrary, if paraffin penetrates in such gaps, they don't reflect the light and the true colour is visible. Therefore, habitus of living beetle is likely all opaque pitch-black.

Head : convex; forehead largely grooved; antennal tubercles widely separated, elevated; cheeks well developed; temples prominent; surface not distinctly punctured, glabrous; neck distinct. Mouth pieces not visible for the presence of turbidity. Eyes reddish brown (probably black in living beetle), big, feebly, but evidently emarginated at upper side, finely faceted, widely separated from the basis of the mandibles.

Antennae : hardly reach elytral apex, sparsely punctured, glabrous, carrying few setae at the apex of each joint; Scape bowed; pedicellum elongated, one-half longer as broad; 3rd joint one-fourth longer than the first; 4th joint as long as the first; 5th and 6th joint equal, one-half longer than the first; 7th joint one-fourth longer than the first; joints 9-11 progressively shorter; 11th joint stout, straight, pointed, only four times longer than broad, without terminal appendage.

Prothorax : few convex above; sides obtuse toothed at about two-third of their length from the base, grooved by two transversal furrows, one narrower, anterior and one wider, posterior; front and hind margins of the pronotum elevated, hind margin broadly enlarged at the outer angles. Lateral tubercle obtusely conical, it appears like white spot by side view, tip black. Surface glabrous, very finely, thick punctured; finely wrinkled at the underside of lateral tubercles.

Elytra : less than three times longer than broad together; basis distinctly wider than pronotum, depressed at its middle; sides parallel; apex separately rounded: epipleurae well visible behind the humeri until the apex, suture very finely reboarded; surface covered by strong, almost thick, regular punctuation and by few, erect, black setae, as long as width of the eye. Irregular disposition of such setae suggest that they are the rest of wider, semi-recumbent pubescence, similar to one of *Pidonia amentata* (Bates, 1884).

Underside : surface scarcely visible for the presence of turbidity. Prosternum forming distinct angle with intercoxal process, very finely wrinkled; metasternum very finely, thick punctured, covered by very fine pubescence; pygidium convergent-sides, two times longer than other visible sternites, exceeding the elytral apex.

Legs : long, femora slightly club-shaped, tibiae linear, surface very finely, thick punctured, tibiae carrying also some erect setae (which appear like white points). Tarsi long, scarcely visible for the presence of turbidity. Most of the left tibia and tarsus are lacking.

Differential diagnose. – Pseudosieversia europaea nov. sp. differs from all congeners of Recent age through all black coloration, smaller size, more robust antennae, pedicellum longer than broad, longer pubescence. Moreover, it differs from *P. japonica* (Ohbayashi,1937) and from *P. rufa* (Kraatz, 1879) for pitch-black appendices and more elongate prothorax, from *P. amanoi* (Hayashi, 1971) for rounded elytral apex and more toothed pronotum. For antennal character it shows more likeness with the genus *Pidonia* Mulsant, 1863.

Type material. - HOLOTYPE: female, Baltic Coast, ex coll. E. Probst (author's coll.). Conserved plunged in liquid paraffin. True patria: Scandinavia, Upper Eocene (40-37.000.000 BP).

Probably biology. - Finely facetted eyes and taxonomic position suggest diurnal phenology, probably on foliage. The inclusion in amber seems indicate its presence in coniferous forests. Baltic amber is commonly referred to one hypothetical extinct species (*Pinus* or *Pinites succinifer* Göppert); nevertheless, almost three genera (*Cedrus*, *Pseudolarix, Agathis*) could had concurred to the formation of the amber. Overall *Pseudolarix* could had been the principal responsible, since ambrosia of current species (*P. amabilis* Nelson) contains succinic acid present in most amber (GRIMALDI, 1996). Moreover, its Recent areal is limited to eastern China, such as other Tertiary relict species. Anyway, all Palaearctic broadleaf genera of the Recent have been already present in Tertiary flora. Since current *Pseudosieversia*-species are related to broadleaf forests, underbrush of mixed forests had been the probable habitat of *Pseudosieversia europaea* nov. sp.

Discussion. - The beetle is lying on its side, its legs are replied, most underside of the body is covered by white turbidity ("Verlumung"), a probable emulsion between body fluids and resin (WEITSCHAT & WICHARD, 2002). Moreover, the relative opacity of other side of amber stone and its convexity don't permit observations from angle wider than about 45° from vertical view. Therefore, it is very difficult or even impossible to certainly verify some characters that contribute to identify the genus correctly. Nevertheless, most generic characters are still well visible.

Finely facetted eyes, prominent temples, distinct neck, toothed pronotum and angulate prosternum indicate clearly the belonging to the subfamily Lepturinae, tribe Rhagiini. Elongate habitus, parallel-sides elytra, toothed prothorax restrict the field to the genera around *Pidonia* Mulsant.

Proportions of antennal joints and habitus of the pronotum (front furrow less wide than the hind one) exclude the genus *Lemula* Bates, 1884. Characteristic habitus of the head of *Lemula* is not present, but such character is not well visible.

Therefore, the beetle should belong to genera *Pseudosieversia* Pic, 1902, *Sivana* Strand, 1942 (= *Sieversia* Auct., nec Kobelt) *Macropidonia* Pic, 1901 or *Pidonia* Mulsant, 1863. Some authors reputed such genera, originally separately described, more or less synonyms with themselves. HAYASHI (1980) reputed *Sivana* younger synonym of *Macropidonia*, while KUSAMA & TAKAKUWA (1984) reputed Japanese *Pseudosieversia*-species (which also looked as not-natural group) younger synonym of *Macropidonia*.

Nevertheless, third antennal joint of *Macropidonia* is bowed, thickened, slightly shorter than the fourth, while it is straight, elongate, evidently longer than the fourth in *Pseudosieversia*, *Sivana*, *Pidonia*, *Cortodera*. Such and other characters (coloration, big size, slightly toothed prothorax) indicate clearly that *Macropidonia* belongs to collateral branch, evolved in Japan, independently from the line *Pseudosieversia-Pidonia-Cortodera*. This fact is confirmed by feminine genitals (KUBOKI, *in litt.*). *Macropidonia* could be interpreted as paraphyletic with respect to *Sivana* and *Pidonia*, but even descendent from *Pseudosieversia*-species. In particular, its coloration (all opaque black, except for red pronotum) suggests Batesian mimicry with some soldier beetles (Cantharidae). Therefore, original taxonomic status, reported also by DANILEVSKY (2002), is reputed correct. For the lack of such antennal character the fossil beetle cannot belong to the genus *Macropidonia*.

Toothed prothorax restricts the field to *Sivana* and *Pseudosieversia*. They are easy distinguished observing the males. *Sivana*-males have robust body, elytra parallel-sides, antennae slightly longer than body, while *Pseudosieversia*-ones have slender body, elytra narrower posteriorly, antennae much longer than body. Unfortunately, such characters appear less evident in females and the fossil beetle is just female. Moreover, *Sivana* is monobasic and antennal or other characters could not be even true for fossil species. Nevertheless, *Sivana* has 11th antennal joint with appendage. Such characters is not present in the fossil beetle, which therefore could not be described as *Sivana*-species. Also such genus seems to be paraphyletic with respect to *Macropidonia* and *Pidonia*, but maybe descendent from *Pseudosieversia*.

Small size, stout antennal structure and toothed prothorax make questionable the belonging to the genus *Pseudosieversia* or to very primitive *Pidonia*. Other characters, such as brightness of the body and elytra convergent-sides by males are impossible to be determined in this exemplar. Perhaps it doesn't make sense to find generic differences in one species of 40 millions of years ago, confronting only current species. Nevertheless, toothed prothorax suggests clearly the belonging to the genus *Pseudosieversia*. Moreover, since current *Pseudosieversia*-species carry more primitive characters with respect to *Pidonia* (toothed prothorax, adult life on foliage) and *Pseudosieversia* seems to be ancestor of *Pidonia*, the author reputes more correct to refer this species to the genus *Pseudosieversia*.

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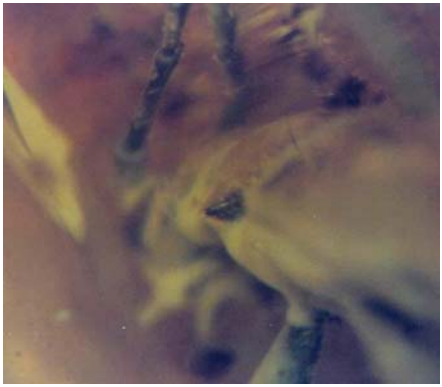

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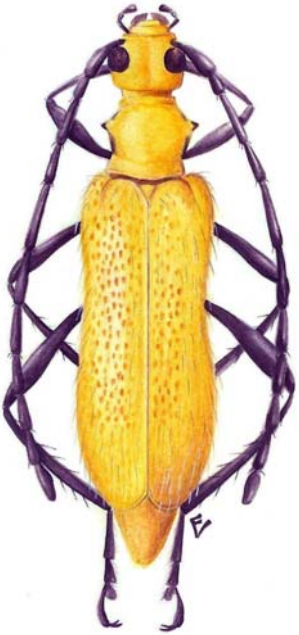

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1. *Pseudosieversia europaea* **nov. sp.**, in amber stone, 2. ditto, detail of the tooth on the pronotum, 3. ditto, reconstruction of the beetle in amber, 4. ditto, reconstruction of probable habitus of the living beetle.

Pedicellum of antennae unusually longer than broad is present in some *Pidonia* and *Grammoptera*-species, but not in current *Pseudosieversia*-species. Such character suggests wider primitively of this fossil species with respect to current ones. Maybe also its small size could be interpreted as primitive.

Hypothesis of past and Recent spread -Presently most of such genera are widespread only in far eastern Asia: *Pseudosieversia* in Japan (three species), Amur, Korea and north-eastern China (one species); *Sivana* in Amur, Korea and north-eastern China (one species); *Macropidonia* in Japan (one species). Only *Pidonia* is widespread in Holoarctic from France to California with about 150 species subdivided in seven subgenera (KUBOKI, 2003). Only *Pidonia lurida* (Fabricius, 1792) is present in Europe, isolated from Oriental congeners, but likely coming from Asia during the Upper Pleistocene (about 100.000 BP, see below).

Presence of *Pseudosieversia*-species in northern Europe during the Upper Eocene (40-37.000.000 BP) suggests wider spread of such genus (probably ancestor of *Pidonia*) in Tertiary mixed forests of Laurasia. On this basis it is possible that also American Oligocene *Pidonia*-species belong actually to the genus *Pseudosieversia.* Nevertheless, fossil shales where they are conserved don't permit to draw sure conclusions.

As already CHEREPANOV (1990) reputed, *Pseudosieversia* and *Sivana* belong to relict Tertiary biocenosis, today still present in far eastern Asia. The glaciations of the ending Pliocene (2.500.000 BP) had extinct original European fauna, displacing the taxa around *Pidonia* toward eastern Asia. From such lands they recolonised Europe during the Pleistocene. Nevertheless, Siberian coniferous forests (more important during cold ages), the formation of Turgay glaciers (Kazakhstan) and European orogenesis had limited westward their expansion. This fact could explain why such genera laid to evolve overall only in Far East. Sea regressions and transgressions during glacial and interglacial ages isolated many times Japan from continental Asia. This fact could explain the exceptional richness of species in such archipelago.

Recent areals of *Pseudosieversia* and *Pidonia* suggest that *Pseudosieversia europaea* nov. sp**.** should not be direct ancestor of only current European *Pidonia.* In fact, *Pidonia lurida* could be maybe original from Altai-Sayan, where Tertiary broadleaf forests, survived until today, have lost their fauna, which immigrated to eastern Siberia and Europe (CHEREPANOVA, 1972). Its lack in Corsica suggests that its European spread had posterior to the Sicilian sea Regression caused by the Mindel (500.000-340.000 BP), the latest age when such isle had been connected to Italy. Its European introduction could already occurred during the middle Interglacial Mindel-Riß (340.000-280.000 BP), when broadleaf forests had been predominant. Nevertheless, its lack in the Pyrennes as relict species suggests that such event could be dated more recently, in the middle Riß-Würm (120.000-75.000 BP). So European introduction could be related to very warm climatic conditions occurred during the Riß-Würm, corresponding to widest sea

transgression of the Tirrenian II. Such conditions had permitted to this species to overpass geographic barriers today still present. Recent areal indicates that it had remained isolated only in Carpathian refuges (TUMAJANOV, 1971) during the glacial maximum of the Würm (18.000 BP) and re-colonised Europe as from the Holocene. Therefore, *P. lurida* is not a Tertiary relict, but recently introduced species. This confirm the hypothesis of CHEREPANOV (1990) that *Pidonia* is taxon in young evolution.

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