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A first putative pelecotomine beetle (Coleoptera: Ripiphoridae) in Tertiary amber of the Kaliningrad Region

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Abstract. A new taxon, found in Eocene Baltic amber, *Samlandotoma seidlitzi* gen. et sp. nov., is interpreted as a primitive wedge-shaped beetle, described, illustrated and compared with the morphologically close extant and fossil relatives of the Pelecotominae subfamily. The images of "*Ripidius*" *primordialis* Stein, 1877 are presented as additional fossil records.

INTRODUCTION

The first comprehensive publication about fossil Ripiphoridae of the Cenozoic was provided by Kaupp et al. (2001). Since that time, many interesting discoveries from different Fossil-Lagerstätten were done. Extinct wedge-shaped beetles were reported and described from the Chinese middle Jurassic impression (Hsiao et al. 2017), from the Cretaceous French (Perrichot et al. 2004), the Eocene French (Batelka et al. 2006), the Cretaceous Burmese (Batelka et al. 2016, 2018; Hsiao & Huang 2018; Cai et al. 2018), the Miocene Dominican (Batelka et al. 2011), and additionally from Eocene Baltic (Batelka 2011; 2017) amber inclusions. The fossils of the putatively primitive subfamily Pelecotominae known at the moment from Cretaceous are represented by four monotypic genera in Burmese amber (*Flabellotoma heidiae* Batelka, Prokop & Engel, 2016; *Spinotoma ruicheni* Hsiao & Huang, 2018; *Plesiotoma alissae* Batelka, Engel & Prokop, 2018; *Burmitoma nalae* Batelka, Engel & Prokop, 2018), although one of them (*Spinotoma ruicheni* Hsiao & Huang) is actually retained in Pelecotominae with reservation (Batelka et al. 2018).

Three formally described wedge-shaped beetles (all placed in the subfamily Ripidiinae) are known from the Baltic amber Fossil-Lagerstätte: *Pauroripidius groehni* Kaupp & Nagel, 2001 in Kaupp, Falin & Nagel, 2001; *Ripidius primordialis* Stein, 1877; *Olemehliella krali* (Batelka, 2011). The situation with the presence of the representatives of the subfamily Pelecotominae in Baltic amber is not clear. Klebs (1910) mentioned Pelecotominae (the genus *Pelecotoma* det. by Edmund Reitter) in Baltic amber. In addition, Kaupp et al. (2001) considered them externally similar to the extant *Trigonodera* Dejean, 1834 representative

on the photograph published in the monograph of Larsson (1978: p. 96). On the other hand, Hieke & Pietrzeniuk (1984: p. 305) assumed as a possibility and then Kirejtshuk & Azar (2008: p. 31) declared that the beetle on that picture belongs to Cerophytidae and thus, the determination as Ripiphoridae is erroneous. Batelka (2011: p. 363) unambiguously rejected the identification of this photo as *Trigonodera* and the attribution of the specimen to the family Ripiphoridae at all too. Additionally, he questioned the presence of Pelecotominae in Baltic amber and emphasized the further verification of the old Klebs' report and available materials. The reasons for assignment of that Larsson's photo under question to Cerophytidae are not based in all above listed papers. Moreover, no leg details or ventral structures are visible on the photograph in dorsal view and all conclusions without examination of the beetle could be regarded as possible or speculative only. The above mentioned discussion should be resolved with that odd specimen (meanwhile looking a little similar to the specimen No 629 described below) in hands only.

Thereby, the reports of Pelecotominae in Baltic amber have not been evident and no taxa have been described or conventionally reported till now. In 2017, the author received a collection of Baltic amber pieces with beetle inclusions for identification from Friedhelm Eichmann (Germany, Hannover). The study of inclusions from this collection revealed two pieces with one ripiphorid specimen each. One of them was assigned to the species "*Ripidius*" *primordialis* Stein, 1877 [No. 756] and the examination of the second specimen [No. 629] revealed that it belongs to a new for science taxon. It is illustrated and described as a new fossil pelecotomine taxon of the Tertiary age in the present paper below. The images of "*Ripidius*" *primordialis* from the piece No. 756 are presented as additional fossil records too. The main purpose of the present contribution is to describe the fossil to allow its use for further studies.

MATERIAL AND METHODS

Two amber inclusions studied herein belong to the private collection Friedhelm Eichmann (Germany, Hannover) catalogued as No 756 and the amber piece No 629. The amber pieces were obtained from commercial sources and are likely to be deposited later in the museum of the Geological-Palaeontological Institute [Geologisch-Paläontologisches Museum] of Hamburg University, now: CeNak, Centrum of Natural History [Centrum für Naturkunde], Germany.

The pieces were polished by hand only. Photographs were taken using a Zeiss AxioCamICc 3 digital camera mounted on a Zeiss Stemi 2000 stereomicroscope. Measurements of the beetles were taken using an ocular micrometer of the stereomicroscope. Reconstruction was made based on freehand drawing during examination of the original specimens. All images were edited using Adobe Photoshop CS8® software to form the final figure plates.

SYSTEMATIC PALEONTOLOGY

Family Ripiphoridae Gemminger & Harold, 1870
Subfamily Pelecotominae Seidlitz, 1875

Genus *Samlandotoma* gen. nov.

Type species: *Samlandotoma seidlitzi* sp. nov. herein designated.

Differential diagnosis. *Samlandotoma* gen. nov. can be reliably placed within Tenebrionoidea based on its characteristic 5-5-4 tarsal formula. The combination of the following features allows the assignment of the fossil to Ripiphoridae rather than to other tenebrionoid families: pectinate antennae; exposed antennal insertions; subglobular head; large vertical and emarginate eyes; lacking abdominal spine; long and slender legs; simple claws. The simple, non-ramose two basal and two distal antennomeres, lobed penultimate tarsomere and triangular terminal maxillary palpomere of the new taxon are not characteristic of Ripiphoridae and resemble characters of several other tenebronoid families (in particular, Pyrochroidae). The antennal, head and thoracic structure together lead to a conclusion that the beetle cannot be placed in any group of Pyrochroidae (Tydessinae, Pyrochroinae, Pedilinae, and Pilipalpinae defined by Pollock (1994)) or in other tenebrionoid family. Therefore the taxon is placed in the family Ripiphoridae with some reservation.The presence of such characters as (1) non-reduced mouthparts; (2) fully developed, distally non-divergent elytra covering entire abdomen; (3) pectinate antennae; (4) distal apex of metatibia unmodified; (5) tibial spur formula reduced confirm the placement of *Samlandotoma* gen. nov. in the subfamily Pelecotominae within the family Ripiphoridae.

Samlandotoma gen. nov. can be easily distinguished from three other Baltic amber ripiphorid taxa firstly by three following characters: (1) 11-segmented pectinate antennae with elongate ramose segments (*Pauroripidius groehni* possesses flabellate 8-segmented antennae with five terminal antennomeres strongly uniflabellate, *Olemehliella krali* has flabellate 10-segmented antennae with seven distal antennomeres uniflabellate, *Ripidius primordialis* has 11-segmented antennae with 8 terminate antennomeres uniflabellate), (2) not reduced elytra covered abdomen and (3) non-reduced mouthparts with developed palpi (all known Ripiphoridae from Baltic amber belong to Ripidiinae and have the elytra shortened and mouthparts reduced to a bifurcate stylus or to a single unpaired knob).

Samlandotoma gen. nov. differs from the extinct pelecotomine genera of Myanmar by the following morphological characters: from *Spinotoma* Hsiao & Huang, 2018, *Plesiotoma* Batelka et al., 2018 and *Burmitoma* Batelka et al., 2018 by the simple claws and by the pectinate antennae; from all extinct Pelecotominae by the tibial spur formula 1-1-2, securiform apical maxillary palpomere, and unique antennal shape: ramose antennomere 3 and absence of rami on two distal antennomeres; from *Flabellotoma* Batelka et al. 2016 by the abdomen without additional microventrite between first and second ventrites and by the antennomeres 2 and 3 not compressed; from *Spinotoma* by the smooth tibiae.

Samlandotoma gen. nov. differs from extant Pelecotominae by the pectinate 11-segmented antennae bearing projections on segments 3-9, by the number of tibial spurs, by the lobed

penultimate tarsomere and by the triangular terminal maxillary palpomere. The combination of diagnostic characters listed above justifies the assignment of the fossil to a separate genus of perhaps basal position within group.

Derivation nominis. The generic name is combined from the German name of the Sambian peninsula, "Samland", in reference to the place of the Baltic amber mining, and the suffix "-toma", referring the genus *Pelecotoma* (type genus of the subfamily) and other described fossil Pelecotominae (*Flabellotoma*; *Spinotoma*; *Plesiotoma*; *Burmitoma*). The gender is feminine.

Note. The new genus is monotypic, represented by the type species only. Therefore the generic description considerably overlaps that of the species.

Samlandotoma seidlitzi sp. nov.
(Figs. 1-4)

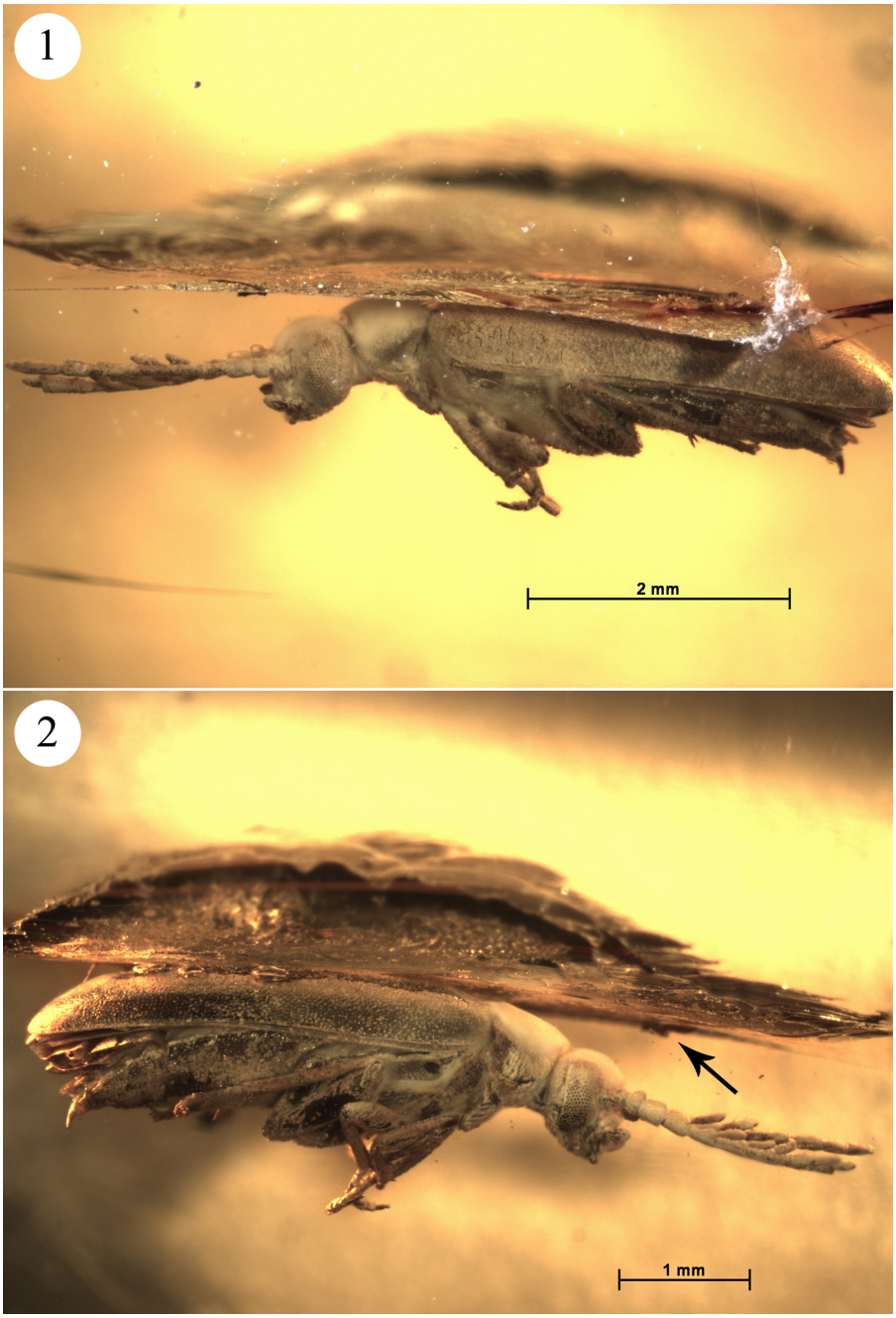
Type locality. The Samland (Sambian) Peninsula, the Kaliningrad region, Russia.

Type horizon. Baltic amber. Mid- or Upper Eocene.

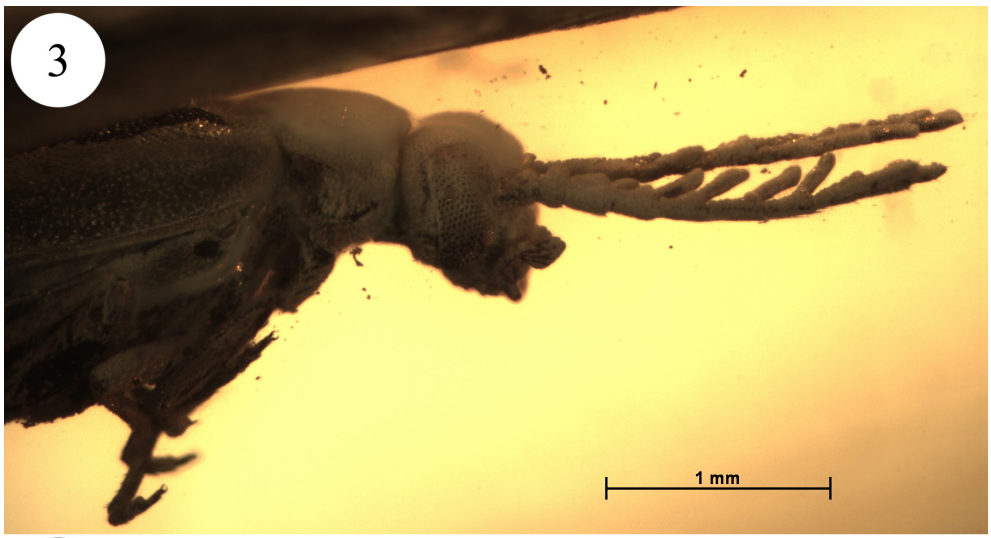
Type material. Holotype: No. 629 in the collection F. Eichmann, Hannover, Germany. Adult, male (distal parts of male aedeagus partially exposed). The almost complete beetle inclusion is preserved in a polished piece of transparent amber with a yellow shade and with approximate dimensions 51 × 20 × 8 mm without any further fixation. Two terminal antennomeres of both antennae in the beetle are missing (therefore the antennae appear 9-segmented), but two distal antennal segments of an antenna (interpreted as belonging to the beetle under study) are separately included in amber matrix in vicinity of the beetle head. Dorsal surface of head and pronotum are obscured by milky foam within the surrounding amber. Full dorsal view on the beetle is problematic because of layered structure of the amber matrix. Syninclusions are represented by numerous stellate trichomes and gas vesicle.

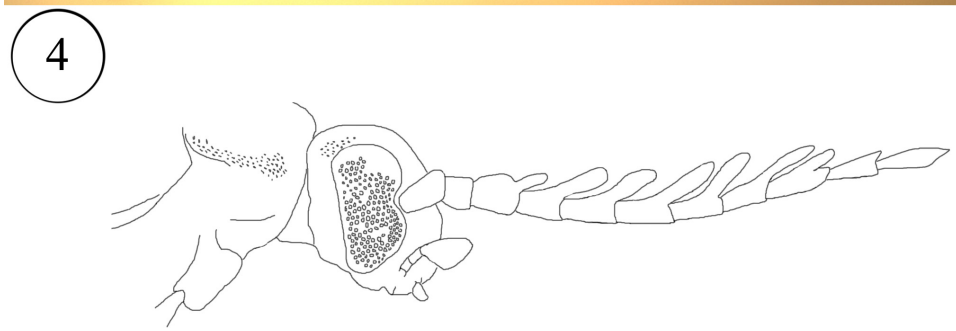
Description. Habitus elongate. Dorsum finely and irregularly punctate. Body entirely dark brown; antennae, tibiae and tarsi appear rufous. Medium-sized: total body length 4.75 mm, elytral length 3.5 mm, elytral width combined 1.3 mm, pronotal length 0.8 mm.

Head subglobular. Antennae pectinate, moderately long, extending to basal two-fifth of elytra, 11-segmented: antennomeres 3-9 with single rami (uniramose); scape and pedicel (antennomeres 1-2) and antennomeres 10-11 simple. Antennomeres 1 and 2 conical, antennomere 10 triangular and oblong, antennomere 11 spindle-shaped, acuminate. Scape longer than wide, pedicel almost as long as wide. Rami of antennomere 3 and 9 shorter than corresponding antennomere; rami of antennomeres 4-8 longer than corresponding segment. Relative length ratios of antennomeres 1-11: 12-10-14-15-15-16-12-12-14-16-20. Antennal insertions exposed, located at anterior margin of eye, distinctly separated dorsally. Compound eyes large, vertical, incised in the middle anteriorly (i.e. emarginate near antennal insertions at anterior margin), with almost straight posterior margin, distinctly separated dorsally. Eye surface slightly convex, glabrous with coarse facets. Mouthparts not reduced. Maxillary palpus with three segments discernible; two basal palpomeres cylindrical, terminal palpomere large, widened, triangular. Ultimate labial palpomere spindle-shaped, non-modified.



Figs. 1-2. *Samlandotoma seidlitzi* gen. et sp. nov., holotype, No. 629: 1- Habitus, left lateral view; 2- Habitus, right lateral view, the arrow indicate localization of terminal antennomeres interpreted as belonging to the beetle.





Figs. 3-4. *Samlandotoma seidlitzi* gen. et sp. nov., holotype, No. 629: 3- Forebody, lateral view; 4- Forebody, drawing with reconstruction of full antennae (two distal antennomeres are added).

Pronotum bordered at base, almost as long as wide at base, narrowest in proximal part (bell-shaped), not forming any neck-like structure. Pronotal disc slightly convex, finely and densely punctate. Punctation separated by distance 0.5-1.0× of one puncture diameter. Posterior pronotal angles obtuse, rounded.

Elytra subparallel-sided, relatively flat, elongate (2.7× as long as combined width), irregularly punctate, completely covering abdomen and hind wings, well sclerotized, with narrow shoulders slightly wider than basal width of pronotal disc, not separated at tip. Elytral punctuation fine, dense, separated by distance 0.5-1.0× of one puncture diameter. Elytral pubescence inconspicuous, short, fine, uniform, recumbent. Epipleura well-developed, narrow, reaching ventrite 4. Metathoracic wings present.

Legs long, slender. Procoxae apparently contiguous, conical, prominent. Tibia long, weakly longer than femur. Tibial spur formula 1-1-2. Tarsi heteromerous (tarsal formula 5-5-4), penultimate tarsomere weakly bilobed. Meso- and metatarsomere 1 the longest. Relative length ratios of metatarsomeres 1-4: 30-10-5-7. Tarsal claws small, symmetrical, with inner margin simple.

Abdomen with five freely articulated, visible ventrites of subequal length.

Note. The scutellar area (scutellum and central part of pronotal base) is invisible because of layered structure of amber and whitish opacity.

Differential diagnosis. As for genus (vide supra).

Derivatio nominis. Patronymic. The species is named after German entomologist Georg Carl Maria von Seidlitz (1840-1917) in honour of his valuable contributions to the study of Coleoptera in the Baltic Region and Europe.

Notes on possible bionomy. The majority of the entrapped in Baltic amber beetles belong to tree consortium (Alekseev & Alekseev 2016) and the most part of them evidently was saproxylic, i.e. associated with decaying and dead trees. Preimaginal stages of Pelecotominae are parasitoids of larvae of wood-boring Coleoptera (Cerambycidae and Ptinidae: Anobiinae). Larvae of the tribe Ripidiini parasitize cockroaches of the families Blattellidae, Blattidae, Ectobiidae and Nauphoetidae (Jablokoff-Khnzorian 1975; Batelka & Chaboo 2015). Both groups of host (wood-boring beetles and cockroaches) are well-represented in Baltic amber inclusions (Weitschat & Wichard 1998; Roth 2003; Anisyutkin & Gröhn 2012; Alekseev 2017; Bukejs & Alekseev 2015; Bukejs et al. 2017; Bukejs et al. 2018a; Bukejs et al. 2018b) and evidently were diverse and frequent in Eocene amber forest. The above presented description of such possibly parasitic in larval stage taxon (*Samlandotoma seidlitzi* gen. et sp. nov.) is interesting in the palaeoecological respect too.

ADDITIONAL FOSSIL RECORD OF RIPIPHORIDAE

Subfamily Ripidiinae Gerstaecker, 1855
Tribe Ripidiini Gerstaecker, 1855

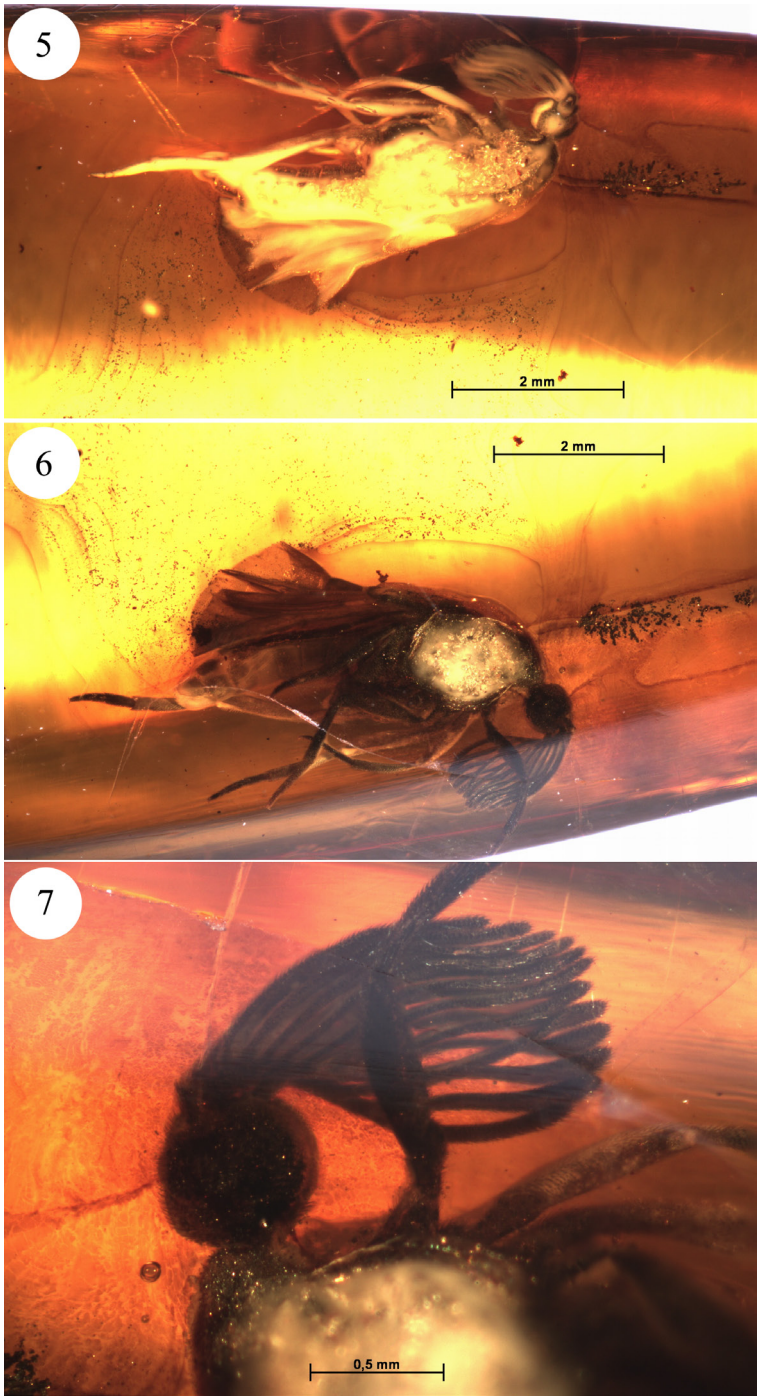
„*Ripidius*“ *primordialis* Stein, 1877
(Figs. 5-7)

Material examined: No. 756 in the collection F. Eichmann, Hannover, Germany. Adult. The complete beetle inclusion is preserved in a flat polished piece of transparent amber with a yellow-orange shade and with approximate dimensions 32 × 15 × 6 mm without any further fixation. The syninclusion is represented by one specimen of Diptera (Brachycera). The beetle (total body length consists 4.8 mm) is in a rather poor preservation state, partially darkened and covered by opaque whitish layer.

Type horizon. Baltic Amber. Upper or mid-Eocene.

Type locality. The Samland (Sambian) Peninsula, the Kaliningrad region, Russia.

Note. The specimen No. 756 was tentatively identified as „*Ripidius*“ *primordialis* Stein, 1877. The correctness of Stein's assignment of his specimen to recent genus *Ripidius* Thunberg, 1806 is under question. The holotype should be at least re-described. The unequivocal identity of the specimen No. 756 and the beetle inclusion described by Stein (1877) could be clarified by study of the holotype only.



Figs. 5-7. Probable "*Ripidius*" *primordialis* Stein, 1877: specimen No. 756: 5- Habitus, left lateral view; 6- Habitus, right lateral view; 7- Forebody, lateral view.

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