

New taxa of Baltic amber false darkling beetles (Coleoptera: Melandryidae)

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The false darkling beetles *Serropalpus ryzhkovianus* sp. nov., *S. vivax* sp. nov., *S. ingemmescus* sp. nov., *Abdera hoffeinsorum* sp. nov., *A. rikojotensis* sp. nov. and *Electroabdera marisbaltici* gen. nov., sp. nov. are described from Baltic amber. The new melandryid taxa are compared with the morphologically close extant and fossil ones. *Pseudohallomenus cretaceus* Nikitsky 1977 described in Melandryidae has been transferred into the family Tetratomidae Billberg, 1820. The check-list of all described Melandryidae species from Cretaceous and Tertiary is given.

Key words: Baltic amber, Eocene, *Serropalpus*, *Abdera*, *Electroabdera*

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INTRODUCTION

The family false darkling beetles (Melandryidae Leach, 1815) has a worldwide distribution (except Africa) and includes more as 420 extant species (60 genera) in two subfamilies: Melandryinae Leach, 1815 and Osphyinae Seidlitz, 1898.

The extinct representatives of family are known from the Upper Cretaceous (the Turonian: *Pseudocuphosis tristis* Nikitsky, 2002 and *Archaeserropalpus cretaceus* Nikitsky, 2002; the Cognac-Santonian: *Archaeoxylita zherichini* Nikitsky, 1977). Melandryid beetles are also known from Eocene ambers of Europe. One species was described from Ukrainian amber (*Orchesia rasnitsyni* Nikitsky, 2011). At least the nine following extant genera belonging to two subfamilies are reported by different authors from the Baltic succinite: *Orchesia* Latreille, 1807; *Abdera* Stephens, 1832; *Anisoxya* Mulsant, 1856; *Dircaea* Fabricius, 1798; *Phloiotrya* Stephens,

1832; *Hypulus* Paykull, 1796; *Melandrya* Fabricius, 1801; *Serropalpus* Hellenius, 1786; *Osphyia* Illiger, 1807 (Klebs 1910; Larsson 1978; Spahr 1981). Only one monotypical extinct genus possibly from the tribe Serropalpini Latreille, 1829 (*Abderina helmi* Seidlitz, 1898) and one extinct species of recent genus (*Orchesia turkini* Alekseev et Bukejs, 2012) have been described from Baltic amber till now.

The genus *Serropalpus* Hellenius, 1786 is a worldwide (except Africa and Australia) distributed genus including 11 recent species in two subgenera: *Mimoserropalpus* Pic, 1922 (one species from India and northern Vietnam) and *Serropalpus* s. str. (10 spp.). The genus *Abdera* Stephens, 1832 has a Holarctic distribution and includes 7 recent species in two subgenera: *Caridua* Strand, 1929 (3 species from Palaearctic) and *Abdera* s. str. (4 species: two from Palaearctic and two from Nearctic).

Descriptions of the three new extinct species of the genus *Serropalpus* Hell., two new extinct species of *Abdera* (s. str.) Steph. and one new taxon *Electroabdera marisbaltici* gen. nov., sp. nov. from Eocene Baltic amber are presented below.

MATERIALS AND METHODS

Eight specimens were examined during the study. Melandryid inclusions in Baltic amber were studied from three private collections:

- a) of Christel and Hans Werner Hoffeins (Hamburg, Germany) [code CCHH],
- b) of Andris Bukejs (Daugavpils, Latvia) [code CAB]
- c) of Vitaly I. Alekseev (Kaliningrad, Russia) [code: CVIA].

The amber pieces of CCHH (Nr. 824-2, Nr. 824-3, Nr. 824-1, Nr. 882-2, Nr. 882-3 and Nr. 882-1) were obtained from commercial sources (824-2, 824-3 and 882-2 in Amberif fair, 824-1 in flea market in Szczecin (Poland), 882-3 in Yantarny settlement, and 882-1 in Denmark) and registered in collection 21.04.2005, 24.11.2000, 07.10.1997, 21.04.2005, 02.07.2007 and 28.12.1997. The ambers are currently deposited in the private collection of Christel and Hans Werner Hoffeins (Hamburg, Germany) and will be given to the Senckenberg Deutsches Entomologisches Institut in Müncheberg, Germany (SDEI) as part of the institute's amber collection.

The piece (CAB-031) was obtained through E-Bay auction website in 2013. The amber is deposited in the private collection of Dr. Andris Bukejs (Daugavpils, Latvia).

The amber piece with the beetle inclusion (AWI-036) was obtained from a commercial source in the settlement Yantarny (the Kaliningrad region) in 06.2012. The amber is deposited in the private collection of Vitaly I. Alekseev (Kaliningrad, Russia) and will be given to the Paleontological Institute of Russian Academy of Sciences (Moscow, Russia) for permanent preservation.

The amber pieces from the CCHH are prepared manually and embedded in polyester resin (Hoffeins 2001). The pieces from the CVIA and CAB were polished by hand only, thus allowing dorsal and lateral views of the included beetle.

The photos were taken with a Nikon Coolpix 4500 Nikon digital camera, attached to a Wild M3Z stereo-microscope (Nr. 824-2, Nr. 824-3, Nr. 824-1) and with a Zeiss AxioCam ICc3 digital camera attached to a Zeiss Stemi 2000-c stereomicroscope (Nr. AWI-036, Nr. 882-1, Nr. 882-2 and 882-3).

SYSTEMATIC PART

Family Melandryidae Leach, 1815

Subfamily Melandryinae Leach, 1815

Tribe Serropalpini Latreille, 1829

Genus *Serropalpus* Hellenius, 1786

***Serropalpus ryzhkovianus* sp. nov.**

(Figs. 1-4)

Material examined. Holotype: Nr. AWI-036; possible male (dilated protarsi). The beetle inclusion is preserved in a polished piece of transparent amber with a yellow shade without any further fixation. The piece is flat, in form a tetragonal prism, with maximum length 22 mm, width 13 mm and height 6 mm. The syninclusions are represented by one specimen of Nematocera (possible family Sciaridae, body length 1.4 mm) and two stellate hairs. The beetle is complete, in general well-visible, lateral view and some details of elytral apex are not completely available for study because of the non-transparent white opacity of the right ventral size of specimen and splits in the amber piece.

Type strata. Baltic Amber; Eocene.

Type locality. Russia, the Kaliningrad region, the Sambian [Samland] peninsula, Yantarny village [formerly Palmnicken].

Description. Habitus is presented in photos (Fig. 1-2). Length: ca. 5.2 mm; maximal width: ca. 1.4 mm. Elongated, unicolorous: dorsal surface, un-

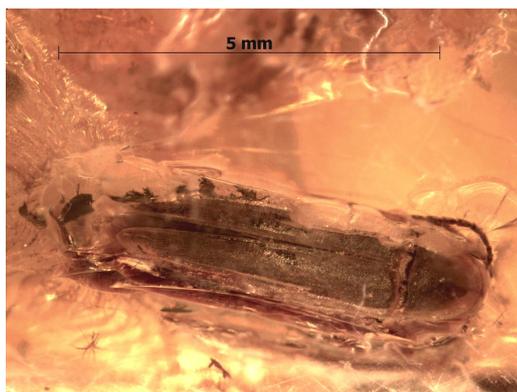


Fig. 1. *Serropalpus ryzhkovianus* sp. nov. Dorsal view



Fig. 2. *Serropalpus ryzhkovianus* sp. nov. Ventral view

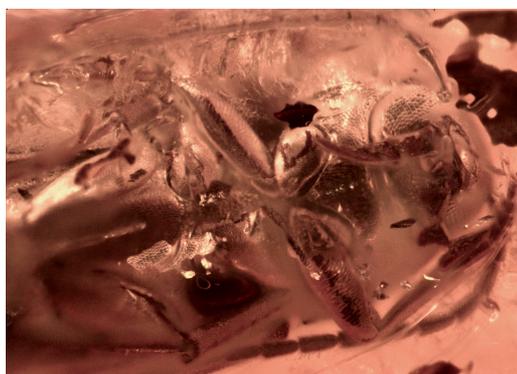


Fig. 3. *Serropalpus ryzhkovianus* sp. nov. Head and prothorax ventrally

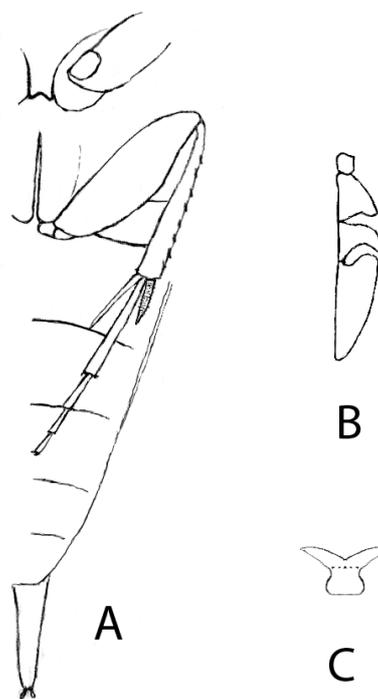


Fig. 4. *Serropalpus ryzhkovianus* sp. nov.: A – abdomen, meso- and metathorax; B – maxillary palpus; C – scutellum

derside, head, head appendages and legs are brown. Maxillary palps are lighter colored, ferrugineous. Pronotum and elytra with fine, dense and relatively homogenous punctuation, short pubescence.

Head (Fig. 3): upper surface covered with dense and fine punctuation; the points on frons are smaller than facets of eyes. Eyes lateral, large, rounded, slightly prominent, with distinct facets larger than punctures on head. Medial margin of eye slightly emarginated. Antennae 11-segmented, pubescent, with cylindrical antennomeres, extending to the middle of the elytra. The second antennomere the shortest, cylindrical. Antennomeres lengths proportions according to the formula: 15-7-12-12-12-12-12-12-12-12-16. Maxillary palpomeres (Fig. 4b) are well visible on specimen: large (length about 0.7 mm), 4-segmented; basal palpomere minute, palpomere

2 almost in form of almost equilateral triangle, palpomere 3 narrow, palpomere 4 large, cultriform, equal in length to other three together, not wider as second and third palpomeres.

Pronotum transverse, with length about 1.1 mm and width about 1.25 mm (the ratio of length to width 0.88), basally bordered. The lateral margin of pronotum is available for study in basal half only, where the pronotum is bordered. Basis of pronotum with two barely perceptible and very shallow basal impressions. Pronotal punctuation round, fine, distinct, with interspaces between punctures subequal to 2-2.5 of each puncture diameter. Pronotal disk convex. Posterior angles rounded, rectangular. Procoxae contiguous, prosternal process absent. Mesosternal process bilobed, about as broad as half of coxal diameter.

Scutellum well visible, transverse, rectangular (about 2 times wider than long) with rounded angles (Fig. 4c). Elytra elongate, subparallel, with length about 3.8 mm and width about 1.4 mm (the ratio of length to width 2.7), a little wider than pronotum in basal part; separately acuminate at apex, without furrows. Sutural stria present, fine, entire, almost parallel from elytral base to apex. Elytral punctuation fine, irregular, not forming distinct striae. Epipleura narrow, reaching third ventrite. Metathoracic wings present, macropterous.

Abdomen (Fig. 4a) with five visible ventrites, inconspicuously pubescent, with fine, dense punctuation (with interspaces subequal to 0.8-0.9 of puncture diameter). Ventrite lengths proportions: 4.0-3.5-3.0-3.0-2.5. Apex of terminal ventrite is widely rounded, simple.

Legs with tarsal formula 5-5-4, moderately long. Trochantin of first legs is visible. Tibiae spurred; spurs broad, lanceolate, serrated; protibial spurs of equal lengths, meso- and metatibial spurs of different lengths (proportions ca. 2:1), acute. The longest metatibial spur is longer than 1/2 of first metatarsomere. Outer faces of meso- and metatibiae with oblique ridges (mesotibia with 6 ridges, metatibia with 8 ones). Pro- and mesotarsi about 2/3 as long as tibiae. Protarsi with distinctly

dilated tarsomeres II-IV (tarsomere II and III triangular); the basal protarsomere is as long as all four apical segments together. Mesotarsomere IV dilated, slightly bilobed. Metatarsus long, with cylindrical segments, about 5/4 as long as metatibia, the first metatarsomere the longest, longer than all 3 tarsomeres together. Claws simple, sharp and small.

Differential diagnosis. The combination of external features (the long antennae with cylindrical segments; the features of the prothorax, claws and tarsi; visible trochantin of first legs; the ridges on meso- and metatibiae; large cultrate ultimate maxillary palpomere; absence of transverse suture on prothoracic episternum; transverse scutellum; gradually decreased ventrites) make it possible to assign the new species to genus *Serropalpus* Hellen. *Serropalpus ryzhkovianus* sp. nov. can be easily distinguished from *Abderina helmi* Seidlitz, 1898 by the cultriform ultimate maxillary palpomere, bilobed mesotarsomere VI, greater body size and long tibial spurs of different size. *S. ryzhkovianus* sp. nov. differs from all extant representatives of the genus by the absence of the well-defined basal pronotal impressions, smaller body size and the absence of elytral furrows. *S. ryzhkovianus* sp. nov. is also characterized by the acuminate elytral apices, fine pronotal punctuation, bilobed mesosternal process, 6-8 tibial ridges.

Derivatio nominis. Patronymic, specific epithet is formed from the surname of Vladimir A. Ryzhkov (1958-2012), a Germanist and connoisseur of history and nature from Kaliningrad, who helped to obtain the amber piece with the specimen.

***Serropalpus* (s.str.) *vivax* sp. nov.**
(Figs. 5-9)

Material examined. Holotype: Nr. 824-2 [CCHH]; possible female (not dilated protarsi). The beetle inclusion is preserved in a polished piece of transparent amber with a yellowish shade (measurements are 15 x 8 x 7 mm). The syninclusions are represented by the some different bits of wood dust. The beetle is in general well-visible. The 9.-



Fig. 7. *Serropalpus vivax* sp. nov. Dorsal view



Fig. 8. *Serropalpus vivax* sp. nov. Lateral view



Fig. 9. *Serropalpus vivax* sp. nov. Ventral view



Fig. 10. *Serropalpus vivax* sp. nov. Head laterally



Fig. 11. *Serropalpus vivax* sp. nov. Head ventrally

11. segments of right antenna and 3.-5. left protarsomeres are lost.

Type strata. Baltic Amber; Eocene.

Type locality. Baltic Sea coast.

Description. Habitus is presented in photos (Figs. 5-7). Length: ca. 7.5 mm; maximal width: ca. 2.0

mm. Elongated, unicolorous: dorsal surface, underside, head, head appendages and legs are brown. Pronotum and elytra with fine, dense and relatively homogenous punctation, short pubescence.

Head (Figs. 8-9): upper surface covered with dense and fine punctation; the points on frons are smaller than facets of eyes. Eyes lateral, large,

rounded, prominent, with distinct facets larger than punctures on head. Medial margin of eye slightly emarginated. Antennae 11-segmented, pubescent, with cylindrical antennomeres, extending to the middle of the elytra. Antennomeres lengths proportions according to the formula: 15-6-11-12-12-14-13-13-13-13-15. Maxillary palpomeres large, with length slightly larger than length of eye, 4-segmented; basal palpomere minute, palpomere 2 almost in form of almost equilateral triangle, palpomere 3 narrow, curved and acute, palpomere 4 large, cultriform.

Pronotum transverse, with length about 1.3 mm and width about 1.8 mm (the ratio of length to width is 0.72), basally and laterally bordered. The lateral margin is not full, reaching 2/3 of pronotal length. Basis of pronotum with two shallow basal impressions. Pronotal punctuation round, fine, dense, with interspaces between punctures subequal to 0.5 of each puncture diameter in central part. The lateral punctuation of the pronotum is arranged in transversal rows (4-8 points). Pronotal disk convex. Posterior angles acute, rectangular. Procoxae contiguous, prosternal process absent. Mesosternal process rectangular, not bilobed.

Scutellum well visible, transverse, rectangular (about 2 times wider than long) with rounded angles. Elytra elongate, subparallel, with length about 5.4 mm and width about 2.0 mm (the ratio of length to width 2.7), a little narrower than pronotum in basal part; separately rounded at apex. Sutural stria present, fine, entire, almost parallel from elytral base to apex. Elytral punctuation dense, fine, arranged in transversal rows (5-10 points, like the pronotal sides), but not forming longitudinal striae. Elytra on the disc with distinct 5-6 longitudinal very shallow furrows not reaching the apex. Epipleura narrow, reaching fourth ventrite. Metathoracic wings present, macropterous.

Abdomen with five visible ventrites, inconspicuously pubescent, with fine, dense punctuation. Apex of terminal ventrite rounded, simple. Ventrite lengths proportions: 6.0-5.0-4.5-4.0-4.0.

Legs with tarsal formula 5-5-4, moderately long. Trochantin of first legs is visible. Tibiae spurred; spurs broad, lanceolate, serrated; protibial spurs of equal lengths, meso- and metatibial spurs of different lengths (proportions ca. 2:1), acute. The longest metatibial spur is slightly shorter than 1/2 of first metatarsomere. Outer faces of meso- and metatibiae with 8 oblique ridges. Protarsus as long as protibia, mesotarsus slightly longer than mesotibia. Protarsi with distinctly flattened tarsomeres III-IV (tarsomere I and II cylindrical); the basal protarsomere is as long as II-III protarsomeres together. Mesotarsomere IV bilobed. Metatarsus long, with cylindrical segments, about 1.5 times longer than metatibia, the first metatarsomere the longest, slightly shorter than all other 3 tarsomere together. Claws simple, curved, sharp.

Differential diagnosis. The combination of external features make it possible to assign the species to subgenus *Serropalpus* s.str. Hellen. *S. vivax* sp. nov. clearly differs from *S. ryzhkovianus* by the rectangular mesosternal process, distinct longitudinal shallow furrows on elytra, very dense pronotal punctuation and the rounded apex of the elytra.

Note. The recent species within the genus show a considerable variation in adult size and development, notably *Serropalpus barbatus* (Schall.) and *S. marseuli* Nikitsky, which range from 7 mm to 18 mm. The presence of size variation in fossil species similar to that in recent ones is assumed and body lengths are not included in diagnosis.

Derivatio nominis. The epithet of the new species is Latin word "vivax", meaning "long-lived, of great vitality, ancient".

***Serropalpus* (s. str.) *ingemmescus* sp. nov.**
(Figs. 12-16)

Material examined. Holotype: Nr. 824-3 [CCHH]; possible female (not dilated protarsi). The beetle inclusion is preserved in a polished piece of transparent amber with a yellowish shade (measurements are 19 x 8 x 8 mm). The syninclusions are absent. The beetle is in general well-visible,



Fig. 12. *Serropalpus ingemmescus* sp. nov. Dorsal view



Fig. 13. *Serropalpus ingemmescus* sp. nov. Lateral view



Fig. 14. *Serropalpus ingemmescus* sp. nov. Head and pronotum laterally

but some ventral parts of the thorax and right side of body are invisible due presence of air bubbles. The 7.-11. segments of left antenna, 9.-11. of right antenna, 2.-5 left protarsomeres are lost. The beetle inclusion has a blackish tegument, because of thermal processing of the amber piece in an autoclave.



Fig. 15. *Serropalpus ingemmescus* sp. nov. Pronotum dorsally



Fig. 16. *Serropalpus ingemmescus* sp. nov. Abdomen and metatarsus laterally

Type strata. Baltic Amber; Eocene.

Type locality. Baltic Sea coast.

Description. Habitus is presented in photos (Figs. 10-11). Length: ca. 9.5 mm; maximal width: ca. 2.5 mm. Elongated, unicolorous: dorsal surface, underside, head, head appendages and legs are dark brown. Pronotum and elytra with fine, dense and relatively homogenous punctation, short pubescence.

Upper surface of head covered with dense and fine punctation; the points on frons are smaller

than facets of eyes. Eyes (Fig. 12) lateral, large, rounded, prominent, with distinct facets larger than punctures on head. Medial margin of eye slightly emarginated. Antennae pubescent, with cylindrical antennomeres, possibly extending to the middle of the elytra. Maxillary palpomeres large, with length approximately equal to the length of eye, 4-segmented; basal palpomere minute, palpomere 2 almost in form of almost equilateral triangle, palpomere 3 narrow, curved and acute, palpomere 4 large, cultriform.

Pronotum (Fig. 13) transverse, with length about 2.0 mm and width about 2.2 mm (the ratio of length to width is 0.9), basally and laterally bordered. The lateral border is not full, reaching 3/4 of pronotal length. Base of pronotum without basal impressions. Pronotal punctuation transverse oval, fine, dense. The punctuation of the pronotum (at the disc and on sides) is arranged in transverse rows of almost merged punctures (4-8 points). Pronotal disk convex. Posterior angles acute, rectangular. Procoxae contiguous. Prosternal and mesosternal processes are not visible due to air bubble in the amber on the ventral part of inclusion.

Scutellum well visible, transverse, rectangular (about 2 times wider than long) with rounded angles. Elytra elongate, widest at humeri, gradually narrowed; with length about 7.1 mm and width about 2.5 mm (the ratio of length to width 2.8), a little narrower than pronotum in basal part; separately acuminate at apex. Sutural stria present, fine, entire, almost parallel from elytral base to apex. Elytral punctation dense, fine, arranged in transversal arcuate or curved rows (like the pronotal sides), but not forming longitudinal striae. Elytra on the disc with 6 distinct longitudinal shallow furrows not reaching the apex. Epipleura narrow, reaching apex of third ventrite. Metathoracic wings present, macropterous.

Abdomen (Fig. 14) with five visible ventrites, inconspicuously pubescent, with fine, dense punctuation. Apex of terminal ventrite is rounded, simple. Ventrite lengths proportions: 8.0-7.0-4.0-4.0-4.0.

Legs with tarsal formula 5-5-4, moderately long. Tibiae spurred; spurs broad, lanceolate, serrated; protibial spurs of equal lengths, meso- and metatibial spurs of different lengths (proportions ca. 2:1), acute. The longest metatibial spur is slightly shorter than 1/2 of first metatarsomere. Outer faces of meso- and metatibiae with 12-14 oblique ridges. Protarsus slightly longer than protibia, mesotarsus slightly longer than mesotibia. Protarsi with distinctly flattened tarsomeres III-IV (tarsomere I and II cylindrical); the basal protarsomere shorter than II-III protarsomeres together. Mesotarsomere IV bilobed. Metatarsus long, with cylindrical segments, 1.6 times longer than metatibia, the first metatarsomere the longest, slightly longer than tarsomeres II-III together. Claws simple, sharp and small.

Differential diagnosis. The combination of external features make possible to assign the newly described species to subgenus *Serropalpus* s.str. Hellen. *S. ingemmescus* sp. nov. clearly differs from *S. ryzhkovianus* and *S. vivax* by the great number (12-14) of tibial ridges, additionally from *S. ryzhkovianus* - by the distinct longitudinal shallow furrows on elytra (as in *S. vivax*) and very dense pronotal punctuation with oval punctures, and from *S. vivax* - by the acuminate form of elytral apex and by the absence of pronotal impressions.

Note. The body colour of amber specimens (brown, dark brown or dark) does not have an important role in comparison of all amber insect inclusions due to the changes of colour (blackening) by thermal processing of the amber piece in an autoclave. This procedure is often made by commercial enterprises. If the researcher is sure, the amber piece is not improved and fully natural – only in this case could the colour of the tegument be included and discussed in the diagnostic part of any description.

Derivatio nominis. The epithet of the new species “ingemmescus” (transformed into jewel) is the adverb derived from the Latin verb

“ingemmesco”, meaning “to transform into jewel”.

Key to the amber species of *Serropalpus* Hellenius, 1786.

The following key to the described Baltic amber *Serropalpus* species has been compiled.

1. Base of pronotum with two shallow impressions, meso- and metatibiae with 6-8 transverse ridges 2

- Base of pronotum without distinct pair of impressions, meso- and metatibiae with 12-14 transverse ridges..... *S. ingemmescus* sp. nov.

2. Mesosternal process bilobed, elytral furrows absent..... *S. rzhkovianus* sp. nov.

- Mesosternal process rectangular, elytral furrows present..... *S. vivax* sp. nov.

Tribe Dircaeini Mulsant, 1856

Genus *Abdera* Stephens, 1832

Subgenus *Abdera* Stephens, 1832

***Abdera* (s. str.) *hoffeinsorum* sp. nov.**

(Figs. 15-22)

Material examined. Holotype Nr. 824-1 [CCHH], female (protruding ovipositor). The beetle is complete, except the lost 11. left antennomere. The inclusion is preserved in a polished piece of transparent amber of a yellowish shade (dimensions 18 x 9 x 7 mm). The syninclusions are absent.

Paratype Nr. 882-3 [CCHH], male (genitalia are visible). The beetle is complete, except the lost 7-11. left antennomeres. The inclusion is preserved in a polished piece of transparent yellowish amber (dimensions 12 x 7 x 5 mm). The syninclusions are absent. Prior to examination, the amber piece was subjected to thermal and high-pressure processing in an autoclave.

Paratype Nr. 031 [CAB], male. The beetle is complete, except the lost 2-4. right metatarsomeres. The inclusion is preserved in a polished piece of transparent yellowish-orange amber without any further fixation (dimensions of piece are 11 x 6 x 2 mm). Prior to examination, the amber piece was subjected to thermal and high-pressure processing in an autoclave. Left ventral half of the beetle covered with white opacity.

Type strata. Baltic Amber. Eocene.

Type locality. Baltic Sea coast.

Description. Body length measured along the midline from the anterior margin of the frons to elytral apex = 3.25 mm; width (measured across the broadest part of the elytra before the middle) = 1.25 mm. Habitus elongate, spindle-shaped; dorsal and ventral surfaces, head and appendages uniformly black and moderately shining (Figs. 15-17). Head, pronotum and elytra punctured and pubescent. Body length/maximum body width 2.6.

Head (except vertex) not visible from above. Eyes oval, prominent, not emarginate. The distance between eyes is about twice the diameter of one eye. Frontoclypeal suture present, straight. Antennae relatively short, extending to base of pronotum, 11-segmented, without club; antennomeres II-IV cylindrical, V-VII obconical, antennomeres VIII-X rounded and almost as long as wide. Antennomere length proportions according to the formula: 5:5:5:4:5:5:5:5:5:8. Terminal maxillary palpomere triangular and rounded.

Pronotum finely bordered laterally and basally, slightly convex, transverse, 1.6 times as wide as long, with maximal width before the basis; disk moderately densely punctured; punctures small, distinct, round, separated by distance 0.5–1.5 times the puncture diameter. Basal pits or impressions on the pronotum as well as longitudinal line absent. Lateral margins of pronotum arcuate; anterior and posterior angles rounded, appearing obtuse. Procoxae adjoining (not separated by process).

Elytra elongate, with length about 2.5 mm (the ratio of length to width 2.0), without striae, moderately convex, slightly wider than pronotum at base; disk densely and irregularly punctate; punctures small, distinct, round, separated by distance 0.5–1.5 times the puncture diameter. Pubescence fine and long, accumbent; black hairs are longer than the distance between their bases. Scutellum well visible, tetragonal, transverse, with rounded angles. Mesosternal process not visible on specimen due to position of legs. Epipleura present, reaching metacoxae. Metacoxae separated by process of first ventrite. Metathoracic wings fully developed.

Legs with tarsal formula 5–5–4. Coxae transverse. Trochantin on first legs invisible. Femora flattened, twice wider than tibia. All tibiae simple, slender. Hind tibiae with two short spurs of equal length, equal in length to the same of mesotibiae. All tarsi slender, with lobed penultimate segments, pubescent ventrally. Metatarsomere I as long as metatarsomeres II–IV combined. Tarsal claws simple, equal in length, long and acute.

Abdomen with five ventrites, irregularly and dense punctured. Ventrite IV the shortest, ventrite lengths proportions: 2.5-2.3-2.0-1.6-1.9. Apex of terminal ventrite widely rounded. The distal parts of the reproductive system are visible (Figs. 17-19), making definite sexual determination possible.

Variability. Paratype Nr. 882-3 [CCHH]. Male (Fig. 20-22). Smaller (body length = 2.9 mm; width = 1.0 mm) and more slender (body length/maximum body width 2.9) than holotype. Mesocoxae visibly separated by mesosternal process. Paratype Nr. 031 [CAB]. Body length = 2.5 mm, body width = 0.8 mm, body length/maximum body width = 3.1. Metathoracic wings fully developed (distal parts of posterior wing exposed from under apex of elytra).

Differential diagnosis. *Abdera* (s. str.) *hoffeinsorum* sp. nov. may be referred to *Abdera* s. str. Steph. due to a combination of morphological characters, such as: short antennae not reaching the middle of body length, lobed penul-

imate tarsomeres, not punctate-striate elytra, small body size (2.5-3.25 mm), rounded triangular maxillary palpomere, basally and laterally bordered pronotum, tetragonal scutellum, almost equal in lengths antennomeres II and III. The new species can be distinguished from all other *Abdera* species by the following combination of characters: uniform black color without pattern and relatively short antennae with rounded segments VIII–X. *Abdera hoffeinsorum* sp. nov. differs from the fossil *Abderina helmi* Seidlitz, 1898 (described from Baltic amber and similar in color and body size according to original description) by antennal structure (in *Abderina* reaching half of body length, slender, with cylindrical segments) and by the presence of bilobed penultimate tarsomeres.

Derivatio nominis. Patronymic, this new species is named after Christel Hoffeins and Hans Werner Hoffeins (Hamburg) who enabled me to study this and others melandryid beetle specimens from Baltic amber.

***Abdera* (s.str.) *rikojotensis* sp. nov.**
(Figs. 23-25)

Material examined. Holotype Nr. 882-1 [CCHH], male. The beetle is fully complete, but ventral side and right half of pronotum and periscutellar area of the inclusion covered with not fully transparent white opacity. The inclusion is preserved in a polished piece of transparent yellow amber (dimensions 17 x 11 x 6 mm). The syninclusions are absent.

Type strata. Baltic Amber. Eocene.

Type locality. Baltic Sea coast.

Description. Body length measured along the midline from the anterior margin of the frons to elytral apex = 3.2 mm; width (measured across the broadest part of the elytra in the middle) = 1.45 mm (body length/maximum body width 2.2). Habitus elongate, oval, slightly flattened; dorsal and ventral surfaces dark brown, moderately shining; antennae, legs, maxillary palps and



Fig. 17. *Abdera* (s. str.) *hoffeinsorum* sp. nov.
Holotype: dorsal view



Fig. 20. *Abdera* (s. str.) *hoffeinsorum* sp. nov.
Paratype, Nr. 882-3 [CCHH]: lateral view



Fig. 18. *Abdera* (s. str.) *hoffeinsorum* sp. nov.
Holotype: lateral view

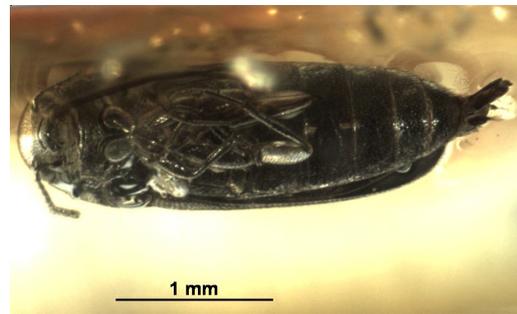


Fig. 21. *Abdera* (s. str.) *hoffeinsorum* sp. nov.
Paratype, Nr. 882-3 [CCHH]: ventral view



Fig. 19. *Abdera* (s. str.) *hoffeinsorum* sp. nov.
Holotype: ventral view

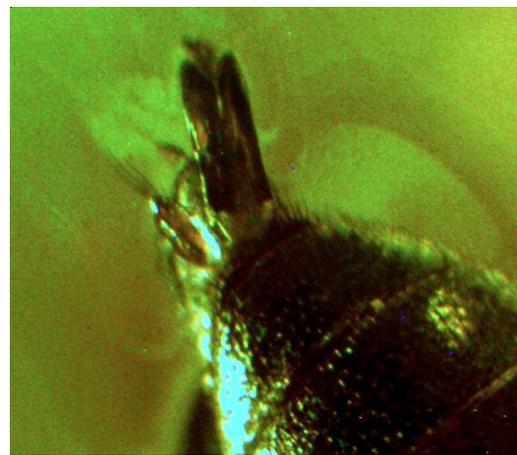


Fig. 22. *Abdera* (s. str.) *hoffeinsorum* sp. nov.
Paratype, Nr. 882-3 [CCHH]: apex of abdomen
ventrally with the everted male genitalia



Fig. 23. *Abdera* (s. str.) *rikojotensis* sp. nov. Holotype: dorsal view

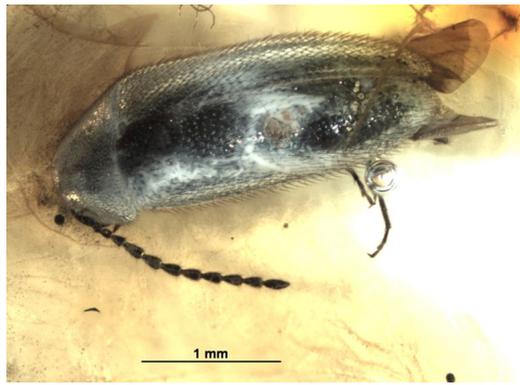


Fig. 26. *Electroabdera marisbaltici* gen et sp. nov. Latero-dorsal view



Fig. 24. *Abdera* (s. str.) *rikojotensis* sp. nov. Holotype: lateral view



Fig. 27. *Electroabdera marisbaltici* gen et sp. nov. Latero-ventral view



Fig. 25. *Abdera* (s. str.) *rikojotensis* sp. nov. Holotype: ventral view



Fig. 28. *Electroabdera marisbaltici* gen et sp. nov. Abdomen ventrally with the everted trilobate male genitalia

clypeus brownish. (Figs. 23-24). Head, pronotum and elytra irregularly punctured and pubescent.

Head (except vertex) not visible from above. Eyes oval, prominent, not emarginate. The distance between eyes is about twice one eye diameter. Frontoclypeal suture present, straight. Antennae flattened, extending to base of elytra, very short and scarcely pubescent, 11-segmented, without club. Antennomere length proportions according to the formula: 6:5:6:5:5:5:5:5:5:10. Terminal maxillary palpomere triangular and rounded.

Pronotum slightly convex, transverse, about twice as wide as long, with maximal width at the base, slightly wider than elytral base; disk moderately densely punctured; punctures small, distinct, round, separated by distance 0.5–1.5 times the puncture diameter. Basal pits or impressions on the pronotum as well longitudinal line absent. Lateral margins of pronotum arcuate and smooth; anterior and posterior angles rounded, appearing obtuse. Pronotum finely bordered laterally and basally. Procoxae adjoining (not separated by process).

Elytra elongate, with length about 2.5 mm (the ratio of length to width 1.7), without striae, moderately convex, slightly wider than pronotum at base; disk densely and irregularly punctate; punctures slightly larger than on pronotum, distinct, round, separated by distance 0.5–1.5 times the puncture diameter. Pubescence fine, accumbent. The black hairs are longer than the distance between their bases. Scutellum well visible, tetragonal, transverse, with rounded angles. Epipleura present, reaching metacoxae. Metathoracic wings fully developed.

Legs with tarsal formula 5–5–4. Coxae transverse. Mesocoxae separated by mesosternal process. Metacoxae separated by process of first ventrite. Trochantin on first legs invisible. Femora flattened, three times wider than tibia. All tibiae simple, slender. Hind tibiae with two short spurs of equal length, equal in length to those of mesotibiae. All tarsi broad, with bilobed penultimate segments. Metatarsomere I longer than

metatarsomeres II-IV combined. Tarsal claws simple, equal in length, acute.

Abdomen with five ventrites. Ventrite I the longest, ventrites II and III equal in lengths (ventrite lengths proportions: 2.5-2.0-2.0-1.5-1.2). Apex of terminal ventrite widely rounded. The distal parts of the reproductive system are visible (Fig. 25), making definite sexual determination possible.

Differential diagnosis. *Abdera* (s. str.) *rikojotensis* sp. nov. may be referred to *Abdera* s. str. Steph. due to a combination of morphological characters, such as: short antennae not reaching the middle of body length, lobed penultimate tarsomeres, not punctate-striate elytra, small body size (3.2 mm), rounded triangular maxillary palpomere, basally and laterally bordered pronotum, tetragonal scutellum, accumbent pubescence, almost equal in lengths antennomeres II and III. The new species can be distinguished from fossil *Abdera* (s. str.) *hoffeinsorum* by the brownish color of appendages and clypeus, relatively wider body, flattened antennae, broad femora and tarsi with relatively short first metatarsomere. *A. rikojotensis* sp. nov. differs from recent representatives of the genus by the broad tarsomeres and absence of the elytral color pattern.

Derivatio nominis. Specific epithet is formed after the Old Prussian toponym Rikojoto [Rykoiot, Rikojotas or Rickoyoto] – the sacred for all Old Prussian tribes place with eternal fire, an eternally green oak and with idols representing three main pagan Prussian gods (Patrimpas, Perkūnas and Patulas).

Genus *Electroabdera* gen. nov.

Type species. *Electroabdera marisbaltici* sp. nov.

Differential diagnosis. *Electroabdera* gen. nov. can be distinguished from all other extant and fossil Dircaenini by the following combination of morphological characters: very long non-clubbed antennae extending to middle of elytra,

separated by the triangular procoxal process, pronotum wider than elytra at humeri, transverse scutellum, bilobed penultimate tarsomeres, pronotal base without distinct impressions, oval non-emarginated eyes, irregular punctuated elytra, narrowly ovate and aculeate terminal maxillary palpomere. The new genus can be easily distinguished from Baltic amber *Abderina* Seidlitz, 1898 by the spindle-shaped ultimate maxillary palpomere (triangular in *Abderina*), bilobed meta- and mesotarsomere VI (simple cylindrical in *Abderina*) and triangular antennomeres, which are cylindrical in *Abderina*. *Electroabdera* gen. nov. differs from *Archaeoxylita* Nikitsky, 1977 by the separated procoxae, by the long antennae and by the form of the ultimate maxillary palpomere; from *Archaeoserropalpus* Nikitsky, 2002 and *Pseudocuphosis* Nikitsky, 2002 by the triangular antennomeres, by the irregular punctuation of elytra, by the shorter body and by the bilobed penultimate tarsomeres.

The presence of such character as the full separation of procoxae by a process links the pronotal structure of the new taxon to that of the subfamily Hallomeninae Gistel, 1848 belonging to the family Tetratomidae Billberg, 1820. At the same time the bilobed penultimate tarsomeres of all legs and pronotum without basal impressions suggest that the new taxon might be part of the tribe Dircaenini of Melandryinae, where it is tentatively referred to.

Derivatio nominis. The name of the new genus is a combination of “electron”, the Greek for «amber», and the genus name “Abdera”. Gender feminine.

Species composition. One new extinct species.

***Electroabdera marisbaltici* sp. nov.**
(Figs. 26-28)

Material examined. Holotype Nr. 882-2 [CCHH], male. The beetle inclusion is slightly damaged: the area around the right eye and base of right antenna is blackened and turbid, because of thermal processing of the amber piece in an autoclave. The beetle is complete, except the lost III-IV left metatarsomeres. The inclusion is preserved in a polished piece of transparent amber of a yellowish shade (dimensions 10.5 x 8.0 x 3.0 mm). The syninclusions are represented by two stellate hairs.

Type strata. Baltic Amber. Eocene.

Type locality. Baltic Sea coast.

Description. Body length measured along the midline from the anterior margin of the frons to elytral apex = 2.75 mm; width (measured across the broadest part of the elytra in humeral area) = approximately 1.0 mm. Habitus elongate, tapered backwards; dorsal and ventral surfaces, head and appendages uniformly black and moderately shining (Figs. 26-27). Head, pronotum and elytra irregularly punctured and pubescent.

Head (except vertex) not visible from above, narrower than pronotum. Eyes oval, prominent, without visible emargination. Antennae relatively long, extending to middle of elytra, with short pubescence, 11-segmented, without club. Antennomere length proportions according to the formula: 6:5:7:11:10:10:10:10:10:10:14. Last antennomere narrowly ovate. Terminal maxillary and labial palpomeres narrowly ovate and aculeate.

Pronotum convex, finely bordered basally, transverse, 2.2 times as wide as long, with maximal width at the base, slightly wider than elytra at humeri; disk moderately densely punctured;

punctures small, distinct, round, relatively dense, separated by distance 1-2x that of the puncture diameter. Basal impressions on the pronotum as well as longitudinal line absent. Lateral margins of pronotum arcuate; posterior angles obtuse.

Elytra elongate (elytral length/maximum elytral width 2.25), non-striate, moderately convex, slightly narrower than pronotum at base; disk densely and irregular punctate; punctures slightly larger than at pronotum, distinct, round, separated by distance 2-3x that of the puncture diameter. Pubescence black, fine, long, semirecumbent. The hairs are longer than the distance between their bases. Scutellum well visible, rounded, transverse (1.5 times as wide as long). Epipleura present, reaching first ventrite. The metepisternum restricted backwards, triangular. Metathoracic wings fully developed.

Legs with tarsal formula 5-5-4. Trochantin on first legs invisible. All coxae transverse and fully separated: prorocoxae by narrow triangular prosternal process, mesocoxae – by mesosternal process, metacoxae – by process of first ventrite. Metatibiae with two short spurs of equal length, equal in length to the same of mesotibiae. The metatibial spur is three times shorter than first metatarsomere. Meta- and mesotibiae without ridges, with long erect sparse hairs. All tarsi slender, with dilated, triangular and apparently bilobed penultimate segments. Metatarsomere I as long as metatarsomeres II-IV combined, mesotarsomere I as long as II-III combined, protarsomere I as long as protarsomere II. Tarsal claws simple, equal in length, acute, thickened at base.

Abdomen with five ventrites. Ventrite lengths proportions 18:15:8:8:8. Apex of terminal ventrite straight. The distal parts of the reproductive sys-

tem are visible, making definite sexual determination possible. Male genitalia trilobate (Fig. 28).

Differential diagnosis. As for the genus (vide supra). Additionally, *Electroabdera marisbaltici* sp. nov. can be easily distinguished from *Abderina helmi* Seidl. by the lesser body size (3.5 mm in *A. helmi* according to original description) and long semirecumbent elytral pubescence.

Derivatio nominis. The specific epithet refers to the place of the specimen origin and is formed after the Medieval Latin “mare Balticum” (the Baltic Sea).

DISCUSSION

The melandryid species described in the paper possibly lived in forested habitats and were associated with old trees or their fungi as shown by extant species of the genera. Regarding the probable fodders of the described fossil Melandryidae: the most part of the recent Holarctic *Serropalpus* species are broadly oligophagous or even polyphagous and develop usually in hard wood of recently dead or weakened coniferous trees (*Picea*, *Pinus*, *Abies*, *Calocedrus*, *Chamaecyparis*, *Pseudotsuga*, *Tsuga canadensis*, *Sequoiadendron giganteum*); the species of the genus *Abdera* are mycophages, i.e. usually develop in arboreal fungi (mainly in the fruiting bodies of bracket fungi such as *Inonotus* and *Phellinus*). Consequently, the fossil species could be in all likelihood related to an analogous kind of fodder. Most recent melandryid beetles have a very short-lived adult stage, which in nature are scarce dusk-flying forms. The comparatively large number of family representatives in the Baltic amber (the family is numerous in succinite) could be additional argument for seasonally limited secretion of the resin and sea-

sonal selection of the fauna trapped in the Eocene resin .

The current Holarctic distribution of *Abdera* suggests that *Abdera hoffeinsorum* sp. nov. and *A. rikojotensis* sp. nov. were a temperate or even cold element of the Eocene Baltic fauna. The distribution of the recent *Serropalpus* is more ambiguous: the genus contains tropical species, but a significant proportion of the species live in temperate regions and several are found even in the boreal zone. Considerations about fossil *Serropalpus* seem to be still premature at present.

Wood infested with fungi was evidently abundantly available in the “amber forests” and the group of beetles utilizing this resource surely was numerous and rich in species. The descriptions of the extinct species belonging to *Anisoxya* Muls., *Dircaea* F., *Phloiotrya* Steph., *Hypulus* Payk., *Melandrya* F. and new taxa of generic level are very probable and should be expected.

A list of all fossil Melandryidae species described from Cretaceous and Tertiary was compiled. Totally, 14 melandryid species are known.

Checklist of known Melandryidae species described from Cretaceous and Tertiary.

Family Melandryidae Leach, 1815

Subfamily Melandryinae Leach, 1815

1. *Abdera hoffeinsorum* sp. nov. [Eocene]
2. *Abdera rikojotensis* sp. nov. [Eocene]
3. *Abderina helmi* Seidlitz, 1898 [Eocene]
4. *Archaeoxylita zherichini* Nikitsky, 1977 [Upper Cretaceous]
5. *Archaeoserropalpus cretaceus* Nikitsky, 2002 [Upper Cretaceous]
6. *Electroabdera marisbaltici* gen. et sp.nov. [Eocene]
7. *Melandrya (Emmesa) colorata* (Scudder, 1900) [Oligocene]
8. *Orchesia rasnizyni* Nikitsky, 2011 [Eocene]
9. *Orchesia turkini* Alekseev et Bukejs, 2012 [Eocene]
10. *Pseudocuphosis tristis* Nikitsky, 2002 [Upper Cretaceous]
11. *Serropalpus ingemmescus* sp. nov. [Eocene]
12. *Serropalpus ryzhkovianus* sp. nov. [Eocene]
13. *Serropalpus vivax* sp. nov. [Eocene]

Subfamily inserta

14. *Cicindelopsis eophilus* Cockerell, 1921 [Eocene]

The fossil record of superfamily Tenebrionoidea includes within Melandryidae also *Pseudohallomenus cretaceus* Nikitsky 1977, which was originally described as an melandryid. According to the original description (the simple narrow tarsi of all legs, procoxae separated by a prosternal process and the relatively short spurs of the metatibiae and the closeness to recent

Hallomenus), this beetle included in the Upper Cretaceous retinite from Eastern Taymyr can be considered as a member of the subfamily Hallomeninae Gistel, 1848. By the modern system of beetles families (Bouchard et al. 2011) it is placed in the family Tetratomidae Billberg, 1820.

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