

ASIDA GROEHNI SP. NOV., THE FIRST AND THE OLDEST FOSSIL REPRESENTATIVE OF THE SUBFAMILY PIMELIINAE FROM EOCENE BALTIC AMBER (COLEOPTERA: TENEBRIONIDAE: ASIDINI)

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Abstract.— *Asida groehni* sp. nov. (Coleoptera, Tenebrionidae, Asidini) is described from Eocene Baltic amber from the Kaliningrad Region (Russia). This is the first fossil species belonging to the genus *Asida* Latreille, 1802 and only the eighth described darkling beetle species from Eocene Baltic amber. This species helps support the hypothesis that the climate in this part of Europe was warmer during Eocene, as no *Asida* species are currently present in the Baltic area due to not appropriate climate. This new fossil species is similar to modern *Asida* species in the subgenus *Planasida* Escalera, 1907, which occur in the Iberian Peninsula and the Maghreb, but it differs from all known *Asida* in pronotal sculpturing and pilosity, and by its yellow brown shiny cuticle, well visible on the pronotal disc. Despite species-level differences, the new extinct species appears to fit easily within the extant genus *Asida*.



Key words.— Coleoptera, Tenebrionidae, Russia, Kaliningrad, *Asida groehni*, new species, fossil, Eocene, Baltic amber.

INTRODUCTION

Tenebrionidae from Upper Eocene Baltic amber are well known since the late 19th Century but poorly studied until now. Kirejtshuk *et al.* (2008) compiled a list of 23 taxa of darkling beetles from Baltic amber, the great majority of these being identified only to the genus level, or placed in genera and species as *incertae sedis*. Currently only seven identified and described species are known from Baltic amber: *Mycetocharoides baumeisteri* Schaufuss, 1888, *Isomira avula* Seidlitz, 1898, *Pentaphyllus cioides* Kirejtshuk, Merkl et Kernegger, 2008, *Vabole triplehorni*

Alekseev et Nabozhenko, 2015, *Nalassus* (s. str.) *klebsi* Nabozhenko, Perkovsky et Chernei, 2016, *Yantaroxenos colydioides* Nabozhenko, Kirejtshuk et Merkl, 2016 and *Palorus platycotyloides* Alekseev et Nabozhenko, 2017. Generic composition of European Upper Eocene tenebrionid fauna includes 19 recent genera from the subfamilies Lagriinae, Tenebrioninae, Alleculinae and Diaperinae (Kirejtshuk *et al.* 2008, Nabozhenko *et al.* 2016a, Alekseev and Nabozhenko 2017) and 3 extinct genera: *Mycetocharoides* Schaufuss, 1888 (Alleculinae: Alleculini), *Yantaroxenos* (Lagriinae: Belopini) (Nabozhenko *et al.* 2016b) and *Vabole* (Tenebrioninae: Palorini) (Alekseev and

Nabozhenko 2015). Fossil specimens from one of the largest tenebrionid subfamilies, Pimeliinae, are known for only three species described from Florissant Formation (USA), Chadronian (37.2–33.9 Ma), and Miocene Dominican amber (Kirejtshuk *et al.* 2008).

In this paper, a new extinct species is described and illustrated, belonging to the tribe Asidini Fleming, 1821 (subfamily Pimeliinae) and to the genus *Asida* Latreille, 1802. It comes from Eocene Baltic amber found in the Kaliningrad Region of Russia. It is the first amber fossil species that can be assigned to the tribe Asidini. In spite of its peculiarities, this fossil specimen belongs to the extant genus *Asida*, but corresponds to a new species as described below.

Asida Latreille, 1802 is one of the most diverse darkling beetle genera in the Palaearctic area, with ~145 known species, most occurring in the Iberian Peninsula, France, Italy, and the Maghreb (Aliquò and Soldati 2014, Pérez-Vera and Avila 2012, Soldati 2008, 2009). The genus is remarkably diverse in the Western Mediterranean countries, especially on mountains and major islands, with many endemic species and subspecies. As an example, in the isolated Corso-Sardinian archipelago (~32,770 km² in area) there are at least 25 known species of *Asida*, of which 24 are strictly endemic (some species also have endemic subspecies) (Soldati 2016).

MATERIAL AND METHODS

A unique specimen was available for this study. The type specimen comes from the collection of Dr Carsten Gröhn (Glinde, Germany) and is deposited in the Centrum of Natural History (CeNak) (Earlier Museum of Geologische Palaeontologische Institut, GPIH) of the University of Hamburg, Germany.

Body length measurements are from the tip of the clypeus to the elytra apex.

Photographs were taken using a Sony® DSC-W7 digital camera mounted on a Wild® M5 stereomicroscope and multiple images at different focal planes, about 10 per figure, were stacked using Combine ZM software (Hadley 2010) and edited using Adobe Photoshop CS4. However, photos were hard to obtain because of the poly-angular deformations due to the convexity of the amber piece and its inclusions, so only few focal planes were utilizable.

TAXONOMY

Taxonomic position. The new species must be included in the family Tenebrionidae, tribe Asidini, based on the following combination of characters: antennae inserted under lateral expansions of genae,

concealing at least base of scape dorsally; procoxal cavities closed externally; tarsal formula 5–5–4; mentum nearly filling buccal cavity, concealing cardo, stipes and basal palpomeres; antennae with strongly widened penultimate and smaller apical (11th) antennomeres, 11th antennomere amplexed into 10th; meso- and metacoxal cavities closed by meso- and metaventrite externally; membrane between frontoclypeus and labrum concealed; hind tentyrioid, without visible intersegmental membranes; pro-, meso-, metasternal processes and abdominal intercoxal process very wide, widely rounded apically; epipleura strongly widened, 2 times wider than metepisterna; body robust, strongly convex; pronotum trapezoidal, with strongly and widely flattened lateral sides; elytra with sculptured costae (ribs); body covered with dense granules and setae. It belongs to the genus *Asida* by the following morphological characters: body with thin recumbent pilosity, elytra generally with costae, last ones often fragmented and covered by a dense and erected setation, or sometimes substituted by groups of setiferous granules; normally with 4 costae, rarely 5–6, or only 1–2 or none; disc of pronotum with dense and coarse setiferous punctation or granulation; lateral margins of pronotum with dense setation, base more or less bisinuate, middle of base weakly bowed; ventrites with dense punctation and/or granulation, with dense and weak setation, more or less opaque.

Asida groehni sp. nov. (Figs 1–3)

Description. Body dorsally and ventrally with yellow brown cuticle and black sculpture, more or less dense; body length 12.5 mm, maximal width 6.5 mm. The holotype is a female, with one apical coxite visible.

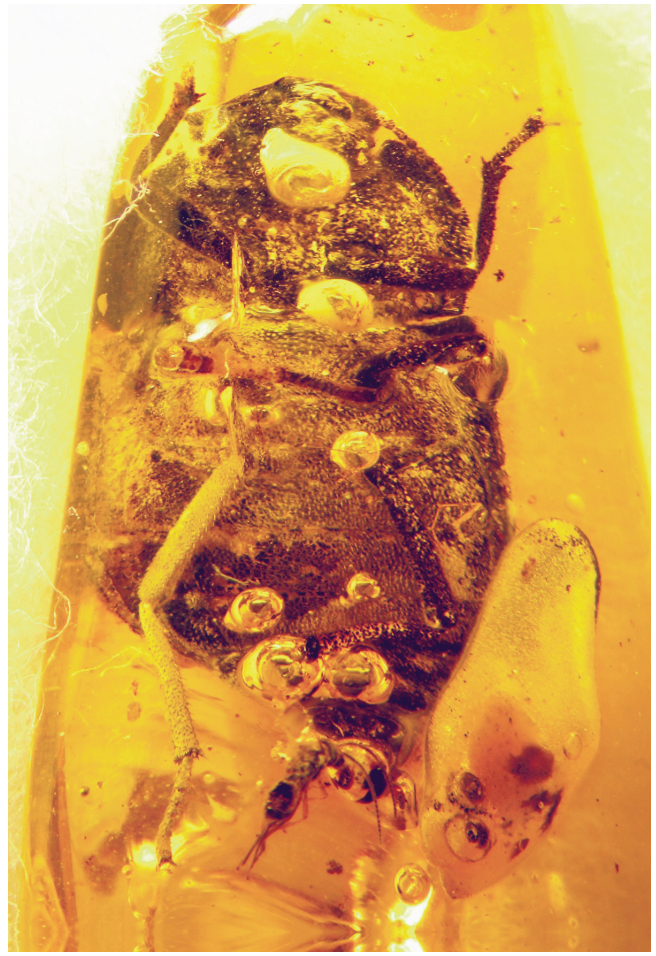
Head strongly and closely punctate, each puncture with a whitish, apically truncate and posteriorly pointed seta; head strongly expanded in front of the eyes with maximum width at the rounded angle of the genae; antennae short, moderately thickened, not reaching backwards the posterior half of the pronotum, 1.09 times as short as maximal pronotal length; 1st antennomere 1.5 times longer than broad, 2nd nearly spherical, transverse, 3rd (longest of antenna) at least 2 times longer than broad, 4th and 5th about 1.5 times longer than broad, 6th to 9th with subequal length and width or weakly transverse, 10th very large and weakly transverse, 11th shorter and narrower than penultimate antennomere, partly placed in the base of the 10th; right antenna presented by only two first antennomeres.

Pronotum transverse, 1.6 times broader than long, with strongly and regularly rounded sides, but clearly sinuate before acute posterior angles; anterior angles strongly projecting, anterior margin deeply curved;

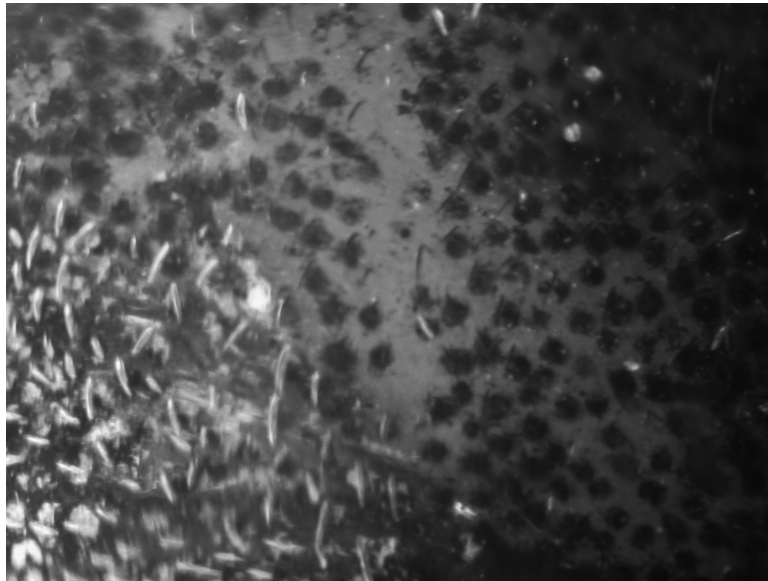
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Figures 1–3. *Asida groehni* sp. nov., female holotype (L=12.5 mm); (1) from above; (2) from below; (3) Disc of the pronotum (detail).

base of the pronotum clearly bisinuate, middle of base posteriorly prominent at the same level than posterior angles; lateral margins narrow and little elevated, lateral sides thick, fringed with fine, whitish and apically acuminate setae; pronotum with coarse and dense punctation, each puncture with strong black granule clearly contrasting with the yellow brown cuticle (Fig. 3); surface between punctures with numerous thin, whitish and apically acuminate setae; middle of disc of pronotum with smooth but well visible longitudinal line, without punctures or granules (Fig. 3); prosternal process flattened, vertically declivous behind procoxae; prothoracic hypomera with sculpture and setation similar to ones of pronotum but with shorter, paintbrush-shaped and in front directed setae.

Elytra subparallel, widest in the posterior third, but apically acuminate; each elytron with only one visible costa nearly at the middle (the right elytron is very damaged), but hardly closer to suture than to lateral margin; costa thin, weakly elevated, from behind base of elytra to elytral declivity; humeral angles right but apically rounded; base of elytra broader than base of pronotum; cuticle glossy and shiny with coarse, slightly dense and irregular punctation, similar to pronotal punctation but finer and less thick, each puncture with a strong black granule; surface between this punctation with numerous long, whitish and apically acuminate setae, as on pronotum; epipleura glossy and shiny, with minute and sparse granulation, each granule with short, whitish, apically truncate and paintbrush-shaped seta; abdominal ventrites with a granulose punctation similar to one of pronotum and elytra, and with dense whitish, more or less thin and apically acuminate setae.

Legs slender, tarsi shorter than corresponding tibiae; protibiae slender with strong and protruding apical tooth.

Type material. Holotype, ♀. Eocene amber from Yantarny (Kaliningrad Region of Russia), about 40 Million years old. Type number GPIH no. 4593, coll. Gröhn no. 8502, Tenebrionidae, *Asida groehni*, HOLOTYPE SOLDATI & NABOZHENKO 2016/7 (Figs 1–2), deposited in the Centrum of Natural History (CeNak) (Earlier Museum of Geologische Palaeontologische Institut, GPIH) of the University of Hamburg, Germany.

Remarks. The complete beetle inclusion is preserved in a small polished piece of transparent amber with the dimensions 35 × 18 × 9 mm. In the same inclusion there are one specimen of an unidentified Hymenoptera and numerous gas bubbles. The type specimen has the right elytron very damaged, some right protarsomeres, left mesotibia and mesotarsus, left metatarsus are absent, and right antenna has only two first antennomeres.

Stratigraphic and geographic range. Eocene amber of North Europe.

Etymology. We dedicate this new fossil species in honour of Dr Carsten Gröhn (Glinde, Germany), who kindly sent us this fossil from his collection to study.

COMPARISON AND DISCUSSION

Asida groehni sp. nov. differs from all known recent *Asida* in the very peculiar sculpture on the pronotum where setae are not coming from granules nor punctures, but emerge between these structures (Fig. 3), and the yellow brown shiny cuticle, well visible on disc of the pronotum (artifact of preservation?). However, *A. groehni* sp. nov. still appears to belong to the genus *Asida* based on its general shape, size, sculpture, setation and appendage conformation.

Within *Asida*, the new species is related to the subgenus *Planasida* Escalera, 1907 based on the shape of the body, plane and very transverse pronotum, clear brown cuticle and sculpture of the pronotum. In this subgenus there are numerous extant species from the Iberian Peninsula and North Africa, most occurring in arid and semi-desert areas. But in *Planasida* there are generally no true costae on the elytra, and the sculpture on the pronotum is composed of simple granules, without any punctation.

Arid-adapted terrestrial Tenebrionidae are poorly presented in known fossils for taphonomic reasons: the terrestrial insects rarely fall into the wood resin and other suitable substrate for good fossilization (Yefremov 1940). Therefore most extinct species belong to dendrophilic groups (Kirejtshuk *et al.* 2008). Asidini, as with most of Pimeliinae, generally occur in arid and open places where they can be found under stones, detritus, or low vegetation. Currently only one species of this tribe, *Pelecyporus (Stenosides) primus* (Wickam, 1910), originally described in *Ologlyptus* Lacordaire, 1859, is known from an impression fossil from the Oligocene, Florissant Lake Beds (Colorado, USA). However, due to the preservation method and lack of modern review, it has yet to be positively confirmed as a member of the tribe Asidini. Therefore, the discovery of a comparatively large xerophilic terrestrial beetle in Baltic amber is unusual. However, some *Asida* species are found in dry open forests, in particular in coniferous forests, at least in the Mediterranean area. It is the case in Morocco (Benyahia *et al.* 2015) and in France and Corsica (Soldati 2006), living in the dry litter, between leaves and leaf-mould.

Asida groehni sp. nov., as some other fossil Tenebrionidae from Baltic amber, belongs to a genus that is not currently present in this part of Europe and helps support the hypothesis that this region was warmer during at least part of the Eocene. Species belonging to the genera *Luprops* Hope, 1833, *Statira* Serville, 1828, *Leichenium* Dejean, 1834 and *Cteniopinus* Seidlitz,

1896 described from Baltic amber (Kirejtshuk *et al.* 2008) are now present only in arid, tropical or Mediterranean climates. Regarding the genus *Asida* Latreille, 1802, the only recent species occurring in Middle Europe is *A. sabulosa* (Fuessly, 1775) which reaches its northern most limits in Belgium, Luxembourg and Southwestern Germany.

Asida groehni sp. nov. has the complex of arid-adapted characters as living species of Asidini: mentum large, entirely concealing maxillae except for palpi; mesocoxal cavities without trochantine, externally closed by meso- and metaventrite; no abdominal membranes visible; membranes between labrum and frontoclypeus concealed; strongly widened epipleura and fused elytra. All these xeromorphic characters indicate that the genus *Asida* was xerophilic at least already in Early Eocene.

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REFERENCES

- Alekseev, V. I. and M. Nabozhenko. 2015. A new fossil Tenebrionid beetle of the tribe Palorini (Coleoptera: Tenebrionidae) from Eocene Baltic Amber: 127–130. *In*: Thomas, D. B., Smith, A. D. and R. L. Aalbu (eds.). A tribute to Honorary Member Dr. Charles A. Triplehorn. The Coleopterists Society Monograph 14. Supplement to the Coleopterists Bulletin, 69(4).
- Alekseev, V. I. and M. Nabozhenko. 2017. *Palorus platycotylodes* sp. n., the second fossil representative of the tribe Palorini (Coleoptera: Tenebrionidae) from Baltic Amber. *Acta zoologica Bulgarica*, 69(2): 167–170.
- Aliquò, V. and F. Soldati. 2014. Updating the CD-Rom on Coleoptera Tenebrionidae of Italy and the check-list of the same family. *Biodiversity Journal*, 5(3): 429–442.
- Benyahia, Y., Soldati, F., Rohi, L., Valladarès, L., Maatouf, N., Courtin, O., El Antry, S. and H. Brustel. 2015. First survey of Darkling beetles (Coleoptera, Tenebrionidae) of Talasemtane National Park, Western Rif, Morocco. Checklist, the Journal of biodiversity data, 11(5): 1–9.
- Hadley, A. 2010. Combine ZM software, new version. <http://www.hadleyweb.pwp.blueyonder.co.uk/CZM/News.htm>
- Kirejtshuk, A. G., Merkl, O. and F. Kernegger. 2008. A new species of the genus *Pentaphyllus* Dejean, 1821 (Coleoptera, Tenebrionidae, Diaperinae) from the Baltic amber and checklist of the fossil Tenebrionidae. *Zoosystematica Rossica*, 17(1): 131–137.
- Nabozhenko, M. V., Perkovsky, E. E. and L. S. Chernei. 2016a. A new species of the genus *Nalassus* Mulsant (Coleoptera: Tenebrionidae: Helopini) from the Baltic amber. *Paleontological Journal*, 50(9): 1–6.
- Nabozhenko, M. V., Kirejtshuk, A. G. and O. Merkl. 2016b. *Yantaroxenos colydioides* gen. and sp. n. (Tenebrionidae: Lagriinae) from Baltic Amber. *Annales Zoologici*, 66(4): 563–566.
- Pérez Vera, F. and J. M. Avila. 2012. Los Asidini marroquíes. Ensayo monográfico sobre la tribu Asidini (Coleoptera, Tenebrionidae) en el Reino de Marruecos. Monografías electrónicas S.E.A. n°3. Sociedad Entomológica Aragonesa, www.sea-entomologia.org, Zaragoza. 203 pp., pls. 136.
- Soldati, F. 2006. Les *Asida* Latreille, 1802 de la faune de France (Coleoptera, Tenebrionidae). *Rutilans, Villelongue-dels-Monts*. 55 pp.
- Soldati, F. 2008. Family Tenebrionidae, Tribe Asidini, pp. 30–34 and 128–139. *In*: I. Löbl and A. Smetana (eds.). Catalogue of Palaearctic Coleoptera. Volume 5. Tenebrionidea. Apollo Books, Stenstrup, 670 pp.
- Soldati, F. 2009. Revision of the genus *Asida* Latreille, 1802. Part I. The *Polasida* Reitter, 1917 group (Coleoptera, Tenebrionidae). *Annales Zoologici*, 59(1): 31–46.
- Soldati, F. 2016. *Opatrum iwani* sp. nov., a new species of Southern Corsica (Coleoptera, Tenebrionidae). *Revue de l'Association roussillonnaise d'Entomologie*, 25(1): 1–13.
- Yefremov, I. A. 1940. Taphonomy: new branch of paleontology. *Pan-American Geologist*, 74(2): 81–93.

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