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New genus and species of Lamprosomatinae (Coleoptera: Chrysomelidae) from Eocene Baltic amber

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ABSTRACT

Fossil records of Lamprosomatinae (Coleoptera: Chrysomelidae) are scarce. Till now only three findings of this subfamily were reported and all originated from Eocene Baltic amber. Based on well-preserved specimen, *Damzenius anitae* gen. et sp. nov. is described and illustrated from this Lagerstätte. A key to the known extinct species of Lamprosomatinae is provided. Assumed minimum age of Lamprosomatinae is dated as mid-Eocene to Upper Eocene (47.8–33.9 Ma). The diverse fossil Lamprosomatinae representatives provide strong evidence for the presence of thermophilic, humid and mixed forest, and indicative of warm temperate, humid, equable climate with reduced thermal seasonality in the Eocene Europe.

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INTRODUCTION

Lamprosomatinae Lacordaire, 1848 (Coleoptera: Chrysomelidae) contains about 250 extant species belonging to 14 genera and four tribes: Cachiporrini Chamorro et Konstantinov, 2011 (1 genus), Lamprosomatini Larcordaire, 1848 (10 genera), Neochlamysini Monrós, 1958 (2 genera), and Sphaerocharini Clavareau, 1913 (1 genus) (Seeno and Wilcox, 1982; Chamorro and Konstantinov, 2011; Chamorro, 2014), and its distribution is mostly restricted to Neotropic (Jolivet et al., 2012). The Palaearctic fauna of this subfamily includes three genera and 29 species belonging to the tribe Lamprosomatini, most of them distributed in Asian part of the region (Konstantinov, 2010), while a sin-

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gle species, *Oomorphus concolor* (Sturm, 1807), is known from Recent Europe (Warchałowski, 2003).

Lamprosomatines mostly feed on woody plants. Documented hosts include Bombacaceae, Combretaceae, Fabaceae, Melastomataceae, and Myrtaceae (Jolivet, 1978; Caxambú and Almeida, 2003; Chamorro, 2014). Larvae build portable fecal cases and actively feed on the bark of live trees (Monrós, 1956; Erber, 1988; Caxambú and Almeida, 1999; Chamorro, 2014; Chaboo et al., 2016).

Fossils of Lamprosomatinae are scarce (Bukejs and Nadein, 2015). Till now only three fossils were reported and all belong to Lamprosomatini and originated from Eocene Baltic amber: *Succinoomorphus warchalowskii* Bukejs et Nadein, 2015, *Archelamprosomius balticus* Bukejs et Nadein, 2015, and *A. kirejtshuki* Bukejs et Nadein, 2015. In the present paper, a new extinct genus and species belonging to Lamprosomatinae is described from this fossil resin.

MATERIAL AND METHODS

The material examined is deposited in the collection of Andris Bukejs (Daugavpils, Latvia) [ACAB] maintained at Institute of Life Sciences and Technologies, Daugavpils University (Daugavpils, Latvia). The amber piece was polished by hand, allowing improved views of the included specimen, and was not subjected to any supplemental fixation.

Observations of this specimen were made using a Nikon SMZ 745T stereomicroscope. The photographs were taken using a Canon 70D camera with a macro lens (Canon MPE-65 mm). Extended depth of field at high magnifications was achieved by combining multiple images from a range of focal planes using Helicon Focus software. Measurements were taken using an ocular micrometer (expressed in millimeters). The following references were used for the comparison with extant taxa: Monrós (1956, 1958), Medvedev (1968), and Chamorro and Konstantinov (2011).

Baltic amber occurs in the “blau Erde” (“blue earth”), which can be found throughout northern Europe (Denmark, Sweden, Germany, Poland, and Lithuania), approximately 45 m below the surface, and in many places this unit is approximately 5 m below sea level (Engel, 2001). The greatest amber concentration, and from where most material originates, occurs on the Sambia peninsula (Samland), Kaliningrad Region, Russia. Exposed deposits can erode, and amber is washed up on shores not only of the Baltic countries, but as far away as the eastern coasts of England (Engel, 2001). Baltic amber is usually dated to the Upper Eocene (Priabonian, 37.2–33.9 Ma) (Aleksandrova and Zaporozhets, 2008; Perkovsky et al., 2007), although there are other estimates of the age of Baltic amber that extend as far back as the mid-Eocene (Lutetian, 47.8–41.3 Ma) (Ritzkowski, 1997; Szwedo and Sontag, 2013). According to Turkin (1997), Baltic amber was produced by *Pinus succinifera* (Conw.) Schub., which together with oak in the Eocene, dominated the humid mixed forest cover of Northern and Central Europe. More recent work on the chemical composition of Baltic amber has also suggested that trees within the family Araucariaceae or Sciadopityaceae might be candidates for the production of this amber deposit (Langenheim, 2003; Wolfe et al., 2009; Lambert et al., 2015).

SYSTEMATIC PALAEONTOLOGY

Order COLEOPTERA Linnaeus, 1758
Family CHRYSOMELIDAE Latreille, 1802
Subfamily LAMPROSOMATINAE Lacordaire, 1848
Tribe LAMPROSOMATINI Lacordaire, 1848

Remarks. The specimen considered here was assigned to the tribe Lamprosomatini on the basis of a combination of characters defined by Chamorro and Konstantinov (2011) and also by Monrós (1956, 1958): (1) abdominal ventrites with fine transverse folding on their borders; (2) abdominal ventrite 5 not excised in shape of arc; (3) pygidium completely covered by elytra; (4) scutellum acutely triangular; (5) elytral punctation arranged in regular striae; and (6) pronotum and elytra hairless.

DAMZENIUS gen. nov.

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Type species. *Damzenius anitae* sp. nov., here designated

Included species. The new genus includes the type species only.

Differential diagnosis. *Damzenius* gen. nov. differs from extinct *Succinoomorphus* in possessing tarsal claws appendiculate with denticle basally; shape of antennomeres 9–10; epipleura with strong, convex projection in anterior one-third of elytral length; ventrolateral side of meso- and metatibiae without distinct longitudinal groove; pronotal lateral margins with bordering; body more convex and oval; and from *Archelamprosomius* in possessing tarsal claws with denticle basally; frons and vertex with longitudinal medial groove; head with groove at inner and upper margins of eye; compound eyes with inner margin slightly emargin-

ated; shape of antennomeres 9–10; prohypomera distinctly concave on whole surface; metafemora extending to abdominal ventrite 2; femora and tibiae strongly flattened and widened. See also details provided in key (Appendix 1).

This new fossil genus resembles extant *Oomorphoides* Monrós, 1956, based on appendiculate tarsal claws, possession of a groove at inner and upper margins of eye, frons and vertex with longitudinal medial groove, strongly projecting basal third of the epipleura, but differs from it in slightly emarginate inner margin of eye (angularly notched in *Oomorphoides*), posterior pronotal angles not extending posterad beyond elytral base (extending posterad beyond elytral base in *Oomorphoides*), and elytral punctation very fine and inconspicuous, arranged in indistinct rows (small and distinct, forming distinct rows in *Oomorphoides*). Additionally *Damzenius* gen. nov differs from other extant genera of Lamprosomatini in the combination of the following characters: (1) tarsal claws appendiculate with denticle basally; (2) compound eyes with inner margin slightly emarginated; (3) head with groove at the inner and upper margins of eye; (4) frons and vertex with longitudinal medial groove; (5) tarsomere 4 projecting from tarsomere 3 to half of its length; (6) pronotal lateral margins slightly concave in lateral view, with narrow bordering; and (7) larger body size.

Etymology. The generic epithet is a patronym dedicated to Mr. Jonas Damzen (Vilnius, Lithuania), the collector of the amber piece. Gender masculine.

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

Damzenius anitae sp. nov.
Figures 1.1-2, 2.1-2

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Type material. Holotype: collection number “048” [ACAB], adult, sex unknown. Rather complete beetle (apical antennomeres of left antenna missing) is included in small, transparent yellow amber piece with dimensions 21×10×4 mm. Syninclusions consist of one small Diptera specimen, one stellate Fagaceae trichome, and numerous small gas vesicles.

Type strata. Baltic amber, mid-Eocene to Upper Eocene.

Type locality. Baltic Sea coast, Yantarny settlement (formerly Palmnicken), Kaliningrad region, Russia.

Etymology. The specific epithet is a patronym dedicated to my mother, Anita Bukeja (Daugavpils, Latvia).

Description. Body length 4.1 mm, maximum width about 2.8 mm; widely oval, convex dorsally and flattened ventrally; unicolorous black; glabrous, prosternal process with moderately dense, fine, semierect setation, abdominal ventrites with very fine, inconspicuous pubescence (more distinct on ventrite 5).

Head slightly convex, evenly covered with fine, sparse punctation and very fine microreticulation (more distinct on frons). Frons and vertex with longitudinal medial groove. Compound eyes oval, small (vertical diameter about one-third as great as length of pronotal lateral margin), convex, with distinct facets, without interfacetal setae, inner margin apparently slightly roundly emarginated; with groove at inner and upper margins of eye; distance between eyes about 1.5× as great as vertical diameter of one eye. Clypeus transverse, convex, clearly delimited from frons. Antennae poorly visible because of beetle location in amber piece, filiform, moderately long, apparently slightly reach beyond posterior margin of prosternal process; scape large, 2.1× as long as wide, apparently with triangular projection dorsally, pedicel subcylindrical, shorter and narrower than scape, antennomeres 3–5 cylindrical, elongate, slender, antennomeres 6–8 nearly transverse, slightly dilated apically, antennomeres 9–10 distinctly dilated apically, asymmetrical (slightly serrate), antennomere 10 about 0.6× as long as ultimate antennomere, antennomere 11 elongated oval with slightly narrowed apex, about 1.6× as long as preceding antennomere, antennomeres 9–11 bearing few erect setae; antennal insertions widely separated.

Pronotum strongly transverse, about 2× as wide as long, widest at base; anterior margin arcuate in frontal view; lateral margins slightly concave in lateral view, with narrow bordering, posterior margin bisinuate; anterior angles nearly right, bent ventrally and not visible from above, posterior angles right, not extending posterad beyond elytral base. Pronotal punctation fine and moderately dense. Prohypomera distinctly concave on whole surface, with small, shallow punctures and microreticulation. Intercoxal prosternal process large, distinctly longer than wide, lateral margins constricted medially, anterior margin almost straight, slightly swollen; densely covered with fine, deep punctures.

Scutellar shield minute, acutely triangular.

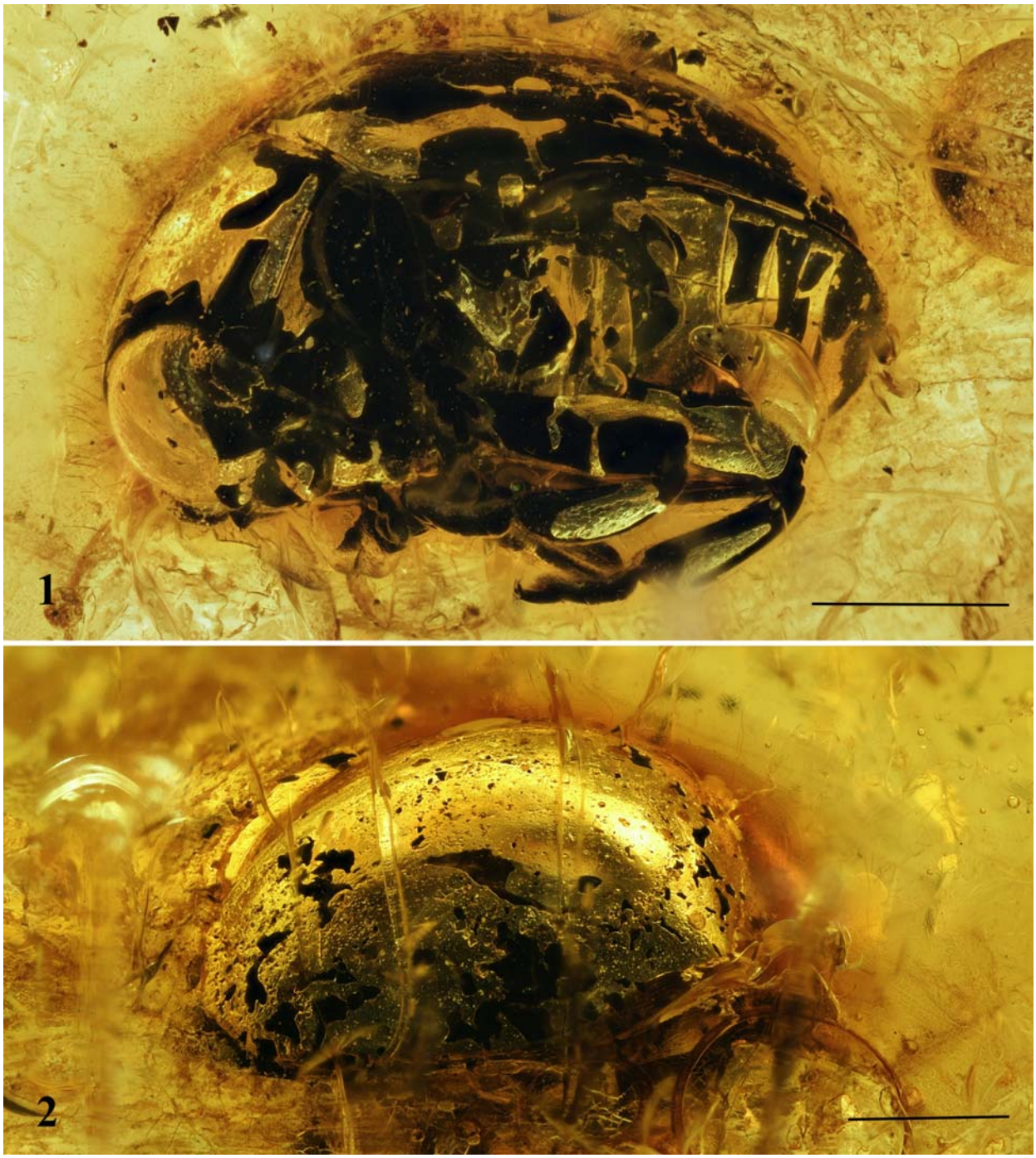

FIGURE 1. Microphotographs of Damzenius anitae gen. et sp. nov. [holotype, No. 048 (ACAB)] habitus in dorso-lateral (1), and ventro-lateral (2) views. Scale bars represent 1 mm.

Elytra smooth, strongly convex, anterior margin slightly concave, elytral suture smooth; punctation very fine and inconspicuous, more distinct on disc in anterior portion, arranged in indistinct rows. Epipleura horizontal (not visible in lateral view), narrow, widest anteriorly and gradually narrowing posteriorly, with strong, convex projection in anterior one-third of elytral length. Metaventrite slightly elevated posteriorly and medially; with microteticulation and sparse, fine punctures (more distinct in anterior portion). Metacoxae transverse, elongate. Legs robust, short; femora and tibiae strongly flattened, covered with fine, sparse punctures, microreticulation, and fine, semierect setae. Fem-

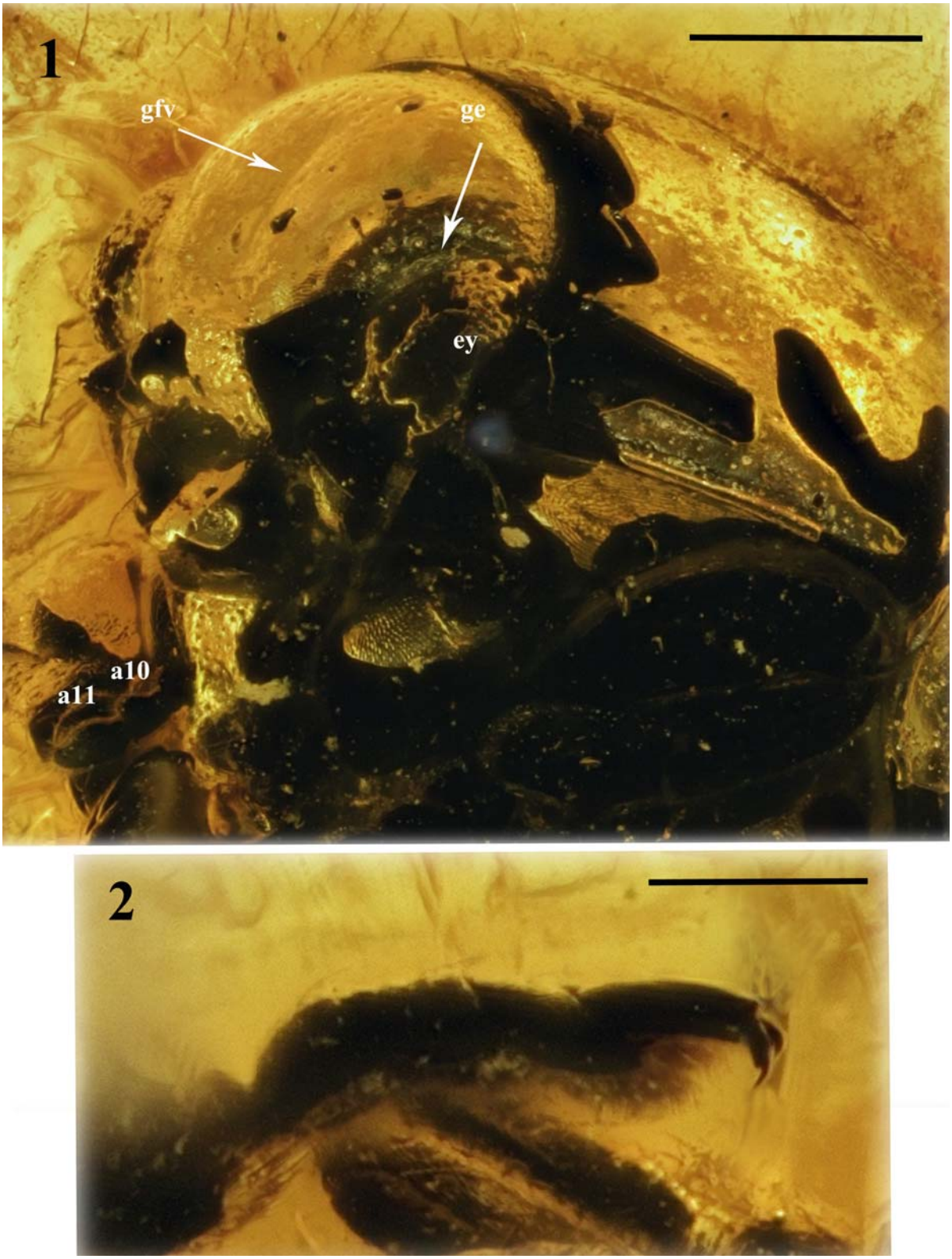

FIGURE 2. *Damzenius anitae* gen. et sp. nov. [holotype, No. 048 (ACAB)], details of forebody, in lateral view **(1)**, metatarsus with appendiculate claws in lateral view **(2)**. Abbreviations: a10 – antennomere 10, a11 – antennomere 11, gfv – frons and vertex with longitudinal medial groove, ey – compound eye with inner margin slightly emarginated, ge – groove at inner and upper margins of eye. Scale bars represent: 0.5 mm for Figure 2.1, and 0.25 mm for Figure 2.2.

ora clavate, metafemora reaching abdominal ventrite 3. Tibiae with comb of erect setae apically, protibia nearly as long as profemora, meso- and metafemora about 0.8× as long as femora respectively, ventrolateral side of meso- and metatibiae without distinct longitudinal groove. Tarsomeres 1–3 of all legs distinctly dilated apically, transverse, tarsomere 3 deeply bilobed, tarsomere 4 subcylindrical, projecting from tarsomere 3 to about half of its length; protarsi: tarsomere 1 about 1.3× as wide as long, tarsomere 2 1.7× as wide as long, tarsomere 3 1.4× as wide as long, tarsomere 4 0.3× as wide as long. Tarsal claws free, appendiculate with denticle basally, narrowly separated.

Abdomen with five visible ventrites; covered with fine, sparse punctures and microreticulation; lateral borders of ventrites fine folding; ventrite 5 simple, without fovea or impression, not excised in shape of arc, with posterior margin widely rounded. Relative length ratios of ventrites 1–5 equal to 20:10:7:7:13 (medially). Pygidium completely covered by elytra.

DISCUSSION

Chrysomelidae are well presented in Baltic amber. Currently, 26 species belonging to seven subfamilies were described from this Lagerstätte: Galerucinae Latreille, 1802 (10 species in seven genera), Cassidinae Gyllenhal, 1813 (five species in five genera), Lamprosomatinae Lacordaire, 1848 (four species in three genera), Eumolpinae Hope, 1840 (four species in three genera), Bruchinae Latreille, 1802 (one species), Criocerinae Latreille, 1804 (one species), and Cryptocephalinae Gyllenhal, 1813 (one species) (Bukejs and Konstantinov, 2013; Bukejs and Nadein, 2013, 2014, 2015; Moseyko and Kirejtshuk, 2013; Biondi, 2014; Bukejs, 2014; Bukejs and Bezděk, 2014; Bukejs and Chamorro, 2015; Bukejs and Moseyko, 2015; Bukejs et al., 2015; Legalov, 2016; Bukejs and Schmitt, 2016; Nadein et al., 2016; and Bukejs and Alekseev, 2019). Apparently, lamprosomatines were diverse and abundant in the Eocene Baltic forest. Extant representatives of this subfamily occur mostly in subtropical and tropical regions, and associated with woody plants (Jolivet, 1978; Caxambú and Almeida, 2003; Jolivet et al., 2012; Chamorro, 2014; etc.). The diverse fossil Lamprosomatinae representatives provide strong evidence for the presence of thermophilic, humid and mixed forest (Alekseev and Alekseev, 2016), and indicative of warm temperate, humid, equable climate with reduced thermal seasonality (Alekseev, 2017) in the Eocene Europe.

All known lamprosomatine fossils (*Succinoomorphus warchalowskii*, *Archelamprosomius balticus*, *A. kirejtshuki*, and *Damzenius anitae* gen. et sp. nov.) are coming from Baltic amber. Based on this data, assumed minimum age of Lamprosomatinae is dated as mid-Eocene to Upper Eocene (47.8–33.9 Ma).

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APPENDIX 1.

Key to extinct Lamprosomatinae (modified from Bukejs and Nadein, 2015)

(1) Vertex with longitudinal median groove; frons with groove at inner and upper margins of eye; compound eyes with inner margin slightly emarginated; prohypomera concave on whole surface; legs strongly flattened 2

- Vertex without longitudinal median groove; frons without groove at inner and upper margins of eye; eyes entire, not notched; prohypomera concave in posterior one-third; legs slightly flattened 3

(2) Tarsal claws appendiculate with denticle basally; pronotal lateral margins with bordering; epipleura with strong projection in basal one-third; larger, body length 4.1 mm . . . . . *Damzenius anitae*

- Tarsal claws simple; pronotal lateral margins without bordering; epipleura with weak projection in basal one-third; smaller, body length 3.2 mm ... *Succinoomorphus warchalowskii*

(3) Legs shorter, tibiae more widened apically; eyes large; elytral punctures smaller, punctures distinctly arranged in rows inter-mixed by fine and obscure punctures between them, punctural rows regular . . . . . *Archelamprosomius balticus*

- Legs longer, tibiae not widened apically; eyes small; elytral punctures larger and subuniform, punctural rows confused . . . . . *Archelamprosomius kirejtshuki*