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## A NEW FOSSIL TENEBRIONID BEETLE OF THE TRIBE PALORINI (COLEOPTERA: TENEBRIONIDAE) FROM EOCENE BALTIC AMBER

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### ABSTRACT

The tenebrionid beetle *Vabole triplehorni* Alekseev and Nabozhenko, **new genus** and **new species** (tribe Palorini), is described from Baltic amber. The new genus has the following combination of tribal characters: round eyes, compact antennae (but with weakly longitudinal antennomeres), unlobed cylindrical tarsomeres, mesocoxal cavities closed by the ventrites, and transverse, angulate scutellum. Additionally, *Vabole* has a 4-4-4 tarsal formula, which is characteristic among Tenebrionidae for some genera of the tribes Palorini, Hyocini, Rhipidandriini, Archaeoglenini, and the subfamily Lagriinae. The new genus is most similar to the extant genus *Platycotylus* Oliff, 1883 based on the strongly flattened body and longitudinal antennomeres, but differs from this genus and most genera of the tribe Palorini based on the tarsal formula, small antennomere 11 compared to the preceding antennomeres, presence of strong spines on the inner side of the tibiae, and the wide prosternal process. A brief ecological and zoogeographical discussion is provided.

Key Words: taxonomy, darkling beetle, new genus, new species, Chuck Triplehorn

Tenebrionidae are the fifth largest family of beetles, represented in the fossil record principally by arboreal species. More than 110 fossil taxa of darkling beetles, including 88 described species, are currently known (Ponomarenko and Kirejtshuk 2008).

Darkling beetles from Eocene European ambers, with only four described species, have been poorly studied. Edmund Reitter (Klebs 1910) identified 14 tenebrionid genera from Baltic amber, including two Lagriinae genera, six Tenebrioninae genera (including two specimens assigned to the recent genus *Palorus* Mulsant, 1854 of the tribe Palorini), and six genera representing the subfamily Alleculinae. Only two species of these taxa were described: *Mycetocharoides baumeisteri* Schaufuss, 1888 and *Isomira avula* Seidlitz, 1898. The first representative of the subfamily Diaperinae (*Pentaphyllus cioides* Kirejtshuk, Merkl, and Kernegger, 2008) was described rather recently (Kirejtshuk *et al.* 2008). Additionally, *Eupachypterus eocenicus* Kirejtshuk, Nabozhenko, and Nel, 2010 (tribe Pedinini *sensu lato*, subfamily Tenebrioninae) from the lowermost French Eocene amber was also recently described (Kirejtshuk *et al.* 2010).

In this paper, a new extinct genus and species are described and illustrated. The genus belongs to the tribe Palorini, subfamily Tenebrioninae.

### MATERIAL AND METHODS

A single specimen was examined during this study. The type specimen belongs to the private collection of Christel and Hans Werner Hoffeins (Hamburg, Germany). The amber piece was obtained from a commercial source (Amberif fair, Poland) and registered in collection in 2000. The amber will be deposited at the Senckenberg Deutsches Entomologisches Institut in MÜNCHENBERG, Germany as part of the institute's amber collection.

The piece was prepared manually and embedded in a block of polyester resin (Hoffeins 2001). Photographs were taken with a Nikon Coolpix 4500 digital camera attached to a Wild M3Z stereomicroscope. Reconstructions were made based on free-hand drawings during examination of the original specimen. The figures were edited using Adobe Photoshop CS8.

Measurements were taken as follows: TL (total length) = apical margin of clypeus to apex of elytra; EL (elytral length) = along elytral suture including

scutellum; EW (elytral width) = maximum width across elytra; PW (pronotal width) = maximum width across pronotum; PL (pronotal length) = along pronotal midline from anterior to posterior margin.

#### SYSTEMATIC PALAEOLOGY

**Family Tenebrionidae Latreille, 1802**

**Subfamily Tenebrioninae Latreille, 1802**

**Tribe Palorini Matthews, 2003**

**Genus *Vabole* Alekseev and Nabozhenko,  
new genus**

**Type Species.** *Vabole triplehorni* Alekseev and Nabozhenko, new species.

**Etymology.** The genus name is derived from the word “vabole” (Latvian for “beetle”). The gender is feminine.

**Description.** Body small (slightly more than 2 mm in length), oblong, subparallel-sided, strongly flattened, glabrous. Edge of frontoclypeus weakly arcuate. Labrum weakly transverse, subcircular. Antennae without club, 11-segmented, antennomere 11 very small. Antennae moderately long, reaching middle of pronotum, antennomeres 1–10 longer than wide. Apical maxillary palpomere acuminate. Dorsal margin of eye above lateral edge of gena. Pronotum narrowing basally. Prosternal process between procoxae apically widened and rounded, 2 times as broad as diameter of procoxa. Elytra without scutellary striole, scutellum transverse, angulate. Metathoracic wings present. Mesocoxal cavities narrowly closed by ventrites. Abdomen with membranes between abdominal ventrites 3–5. Abdominal ventrite 5 with lateral groove along edge. Tarsomeres subparallel, cylindrical, tarsal formula 4-4-4. All tibiae with strong spines on inner side.

**Diagnosis.** *Vabole* must be included in the family Tenebrionidae based on the following characters: antennae inserted under lateral expansions of frons, which conceals at least base of scape dorsally; external membranes visible between abdominal ventrites 3–5 and accordingly abdominal glands are likely to be present. Nearly perfect correlation between the presence of glands and external membranes between abdominal ventrites 3–5 was established by Doyen (1972). With one known exception (the tribe Palorini), Tenebrionidae with the aedeagus inverted lack defensive glands, while species with the aedeagus in the normal position possess them (Doyen 1972; Watt 1974). According to Doyen (1972), “the tenebrionid subfamily Tenebrioninae, together with the Alleculidae, Lagriidae and Nilionidae possess defensive glands and external abdominal membranes and have the aedeagus in the normal position”. For this reason, Doyen (1972) treated Tenebrioninae, Alleculinae, Lagriinae, and Nilioninae as subfamilies in the family Tenebrionidae.

Matthews and Bouchard (2008) defined a combination of characters for recognition of the tribe Palorini following the works of Halstead (1967) and Matthews (2003a, b): prominent subquadrate labrum; round or oval eyes; simple antennal sensilla; usually compact antennae; tarsomeres cylindrical, not lobed; mesocoxal cavities usually closed by ventrites; frequently scutellum transverse and aedeagus inverted; scutellary striole absent or not. *Vabole* has the following combination of tribal characters (Figs. 1–3): round eyes; compact antennae (but with weakly longitudinal antennomeres); unlobed cylindrical tarsomeres; mesocoxal cavities closed by ventrites; transverse, angulate scutellum. Additionally, *Vabole* has a 4-4-4 tarsal formula, which is characteristic among some tenebrionid genera of the tribes Palorini, Hyocini, Rhipidandriini, and Archaeoglenini, and the subfamily Lagriinae.

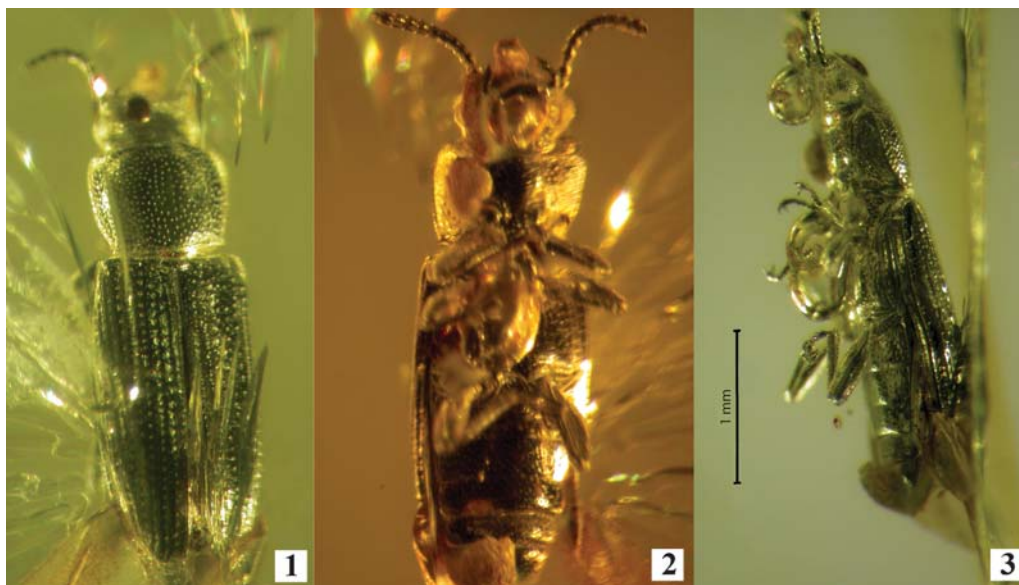
*Vabole* is most similar to the extant genus *Platycotylus* Oliff, 1883, which is distributed across Australia (eastern New South Wales, eastern Queensland, Northern Territory), Africa, and Southeast Asia (Merkl 1992; Matthews and Bouchard 2008; Schawaller 2014), based on its strongly flattened body and longitudinal antennomeres, but differs from this genus and most other Palorini genera in tarsal formula (4-4-4 in *Vabole*, *Eutermicola* Lea, 1916, and some species of *Pseudebea* Blackburn, 1903; 5-5-4 in others), the smaller antennomere 11, the presence of strong spines on the inner side of the metatibiae, and the wider prosternal process.

**Remarks.** The mesoventrite and head are only partly visible ventrally because of gas bubbles.

**Stratigraphic and Geographic Range.** Eocene amber of Central Europe.

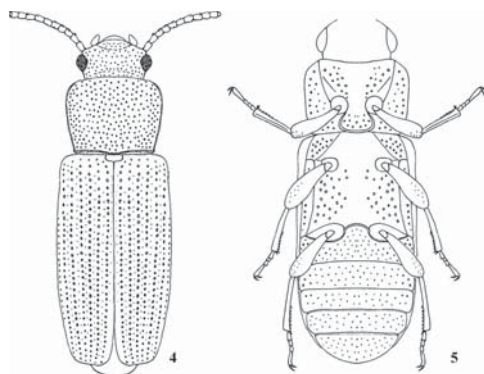
***Vabole triplehorni* Alekseev and Nabozhenko,  
new species  
(Figs. 1–5)**

**Description. Body:** TL = 2.3 mm, EW = 0.75 mm. Habitus (Figs. 1–5) elongate (TL/EW = 3.0), subparallel, narrow, glabrous, shiny; body and appendages uniformly dark brown. **Head:** Wide (0.57 mm); not constricted behind eyes, finely and moderately closely punctured. Supraorbital carina not developed. Frontoclypeus simple, without tubercles and raised borders, arcuate. Eyes lateral, entire, finely faceted, small and rounded. Interfacetal setae not apparent (at 56X magnification). Subantennal grooves absent. Punctures on head about as large as eye facet and separated by 1 diameter or more. Sides of frons not extending backwards; anterior margin of eyes visible from above. Antennae short, stout, flattened; reaching middle of pronotum; apparently 10-segmented; without distinct club. Last antennomere (XI) reduced, very short. Maxillary palps with apical segment fusiform. **Thorax:** PL = 0.63 mm, PW = 0.53 mm;



**Figs. 1–3.** *Vabole triplehorni*, habitus. 1) Dorsal view; 2) Ventral view; 3) Lateral view.

pronotum slightly flattened dorsally, without depressions, transverse (PL/PW = 1.2). Pronotal disc with small, sparse, round, irregular punctures on disc (distance between punctures about twice as large as diameter of puncture). Sides of pronotum smooth, finely beaded with coarser and denser punctation (distance between punctures less than diameter of puncture). Pronotal anterior angles widely rounded; posterior angles triangular; basal margin almost straight, entirely and narrowly beaded. Tergosternal sutures of prothorax present. Hypomeron lacking antennal cavities. Prohypomera with coarse, moderately dense punctation, punctures large, round, subequal to distance between them. Prosternal process expanded and rounded apically, 1.5 times wider



**Figs. 4–5.** *Vabole triplehorni*, habitus, reconstructions. 4) Dorsal view; 5) Ventral view.

than procoxal diameter, densely punctured. Femoral lines absent. **Scutellum:** Transverse (2.5 times wider as long), angulate, with rounded angles, without punctures. **Elytra:** EL = 1.4 mm, EW = 0.75 mm; subparallel-sided; truncate apically; slightly depressed from above; exposing part of last tergite. Elytron with 9 rows of stria punctures, intervals between stria punctures separated by 2 times puncture diameter. Scutellary striole absent. Interstices uniseriate-punctate. Elytral intervals flat, interval between striae 5–6 slightly raised. Elytral epipleuron tapering gradually posteriorly, attaining elytral apex. Hind wings fully developed. **Abdomen:** With five ventrites (relative lengths of ventrites 17-12-10-11-14); ventrites with small, irregularly placed punctures, which are lesser than punctures on thorax ventrally; intercoxal apophysis wide and rounded, about twice wider than metacoxal diameter. **Legs:** Tarsal formula 4-4-4; pro- and mesocoxae rounded, widely placed, metacoxa transverse, exposed. All tibiae with 6–7 sharp, small spines along inner margin and with 2 acute, short spurs. Protibia with furrow along outer margin. Length of apical tarsomere equal to combined length of tarsomeres 2–3. Tarsal claws simple, large, equal in size, length about half of apical tarsomere.

**Stratigraphic and Geographic Range.** Eocene amber of Central Europe.

**Etymology.** The species is named in honor of the famous coleopterist and specialist on darkling beetles, Charles A. Triplehorn.

**Type Material.** Holotype: Nr. 1470-4 [CCHH], sex unknown. The complete beetle inclusion with

partially exposed hind wings is preserved in a small polished piece of transparent amber, yellow in color, with two gas bubbles and some cracks. The amber piece is embedded in a block of polyester resin with the dimensions  $9 \times 9 \times 3$  mm. The animal syninclusions are represented by three phoretic mites (Acari: Acariformes), attached to the head (1) and thorax (2) of the beetle.

**Type Locality and Horizon.** Baltic Amber. Eocene. Baltic Sea coast.

**Diagnosis.** As for the monotypic genus.

### DISCUSSION

The tribe Palorini includes 10 genera, which are widespread in the Western and Eastern (Japan, Taiwan, Nepal) Palaearctic, Ethiopian Region, Oriental Region, and Australian Region, but absent in the New World (except for cosmopolitan introduced species) (Halstead 1967). Matthews and Bouchard (2008) specified four principal areas of generic endemism (Madagascar, northern Australia, Oriental Region, and New Zealand) and hypothesized an origin of this group before the break-up of Gondwana, with subsequent dispersion of the widespread genera *Platycotylus* and *Palorus* from Gondwana into the Palaearctic and Pacific.

The natural habitat of Palorini is under bark of dead or dying trees. Some species are also associated with ants, wood-boring beetles, and termites (Halstead 1967; Matthews and Bouchard 2008). A combination of characters (especially the strongly flattened body) suggests that *V. triplehorni* occupied a similar microhabitat as do recent representatives of *Platycotylus*, which live under loosened bark on dead trees, similar to beetles of the families Laemophloeidae, Salpingidae, and Silvanidae (Schawaller 2014). Some other characters of the genus are typical of myrmecophilous and termitophilous Palorini. *Vabole triplehorni* has a 4-4-4 tarsal formula, as do termitophilous species of *Eutermicola* and some *Pseudeba*. Additionally, *Eutermicola* has 10-segmented antennae, which are also thought to be related to termitophily. The antennae of *V. triplehorni* are 11-segmented; however, antennomere 11 is reduced in size.

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