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From Abundance to Extinction: Evolutionary History of European Aedemonini (Curculionidae) with a Description of the First Representative from Rovno Amber

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Abstract: Fossil weevils of the subfamily Molytinae are currently represented by 103 species in 42 genera from 14 tribes. Fossil records of the tribe Aedemonini are known from the Eocene of Europe. This tribe makes up 22% of the London Clay weevil specimens identified to the genus level and 16% of the Curculionidae genera. At present, the distribution of this tribe is mainly paleotropical, but it was very prominent in the paratropical biota of the London Clay in the early Eocene, and it was still represented in the biota of the amber forests of Europe that retained some tropical elements in the Priabonian. A new species, *Electrorhinus vlaskini* n. sp., from the tribe Aedemonini of the subfamily Molytinae, is described from Rovno amber. It differs from *E. friedhelmi* in the smaller body size, finely faceted eyes, a coarser rugose pronotum, and sparser scales on the body. A list of the fossil Molytinae is compiled. This is the first record of a weevil of the subfamily Molytinae in Rovno amber, and the second finding of a representative of the genus *Electrorhinus* in the late Eocene and the third record of a species of Aedemonini preserved as a fossil. A key to European species of Molytinae with a rostral channel from Europe is given.

Keywords: Molytinae; Aedemonini; new species; faunistic relations; Eocene

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1. Introduction

Some weevils of the subfamily Molytinae were previously considered the subfamily Cryptorhynchinae [1]. This subfamily included species from the tribe Cryptorhynchini along with representatives of the subtribes Cryptorhynchina, Mecistostylina, and Tylodina, tribes Aedemonini, Camptorhinini, Gasterocercini, Psepholacini, Sophrorhinini, and Torneumatini [1], or it was considered in an even wider sense with the inclusion of the tribes Cleogonini and Ithyporini [2]. Currently, a number of these tribes are included in the subfamily Molytinae [3–5].

The first finding of the tribe Aedemonini was in the London Clay (the early Eocene of England) [1,6], and the second from late Eocene Baltic amber [7].

Species of the tribe Cryptorhynchini are known from early Eocene Oise amber [8], the early Eocene Green River [9], the middle Eocene of Germany [10], late Eocene Baltic amber [11–13], the terminal Eocene of the USA [14], the latest Oligocene of Germany [15], and by many species from early Miocene Dominican and Mexican amber [16,17]. A single species of the extinct genus *Camptorrhinites* Britton, 1960, was described from London

Clay [6] as well. A species from the recent genus *Episcirrus* Kuschel, 1958, of the tribe Gasterocercini was discovered in Dominican amber [17]. Weevils from the tribes Psepholacini, Sophrorhinini, and Torneumatini are not known as fossils [11,18].

The family Curculionidae are represented in Rovno amber by 13 species from the subfamilies Erirhininae, Dryophthorinae, Cossoninae, Conoderinae, Curculioninae, and Entiminae [19–28]. This is the first record of the subfamily Molytinae in Rovno amber, and the second finding of the late Eocene genus *Electrorhinus* and the fifth of the Aedemonini.

2. Materials and Methods

The studied fossil weevil is preserved in a piece of Rovno amber from the Pugach quarry (Klesov deposit), Sarny District, Rovno Oblast, Ukraine [29]. The type specimen is deposited in the Schmalhausen Institute of Zoology of the National Academy of Sciences of Ukraine, Kiev (SIZK). Images were taken using a Leica Z16 APO stereomicroscope equipped with a Leica DFC 450 camera and a Canon EOS 6D with an MP-E 65 mm macro lens and Cognisys Stackshot 3×. Photographs were stacked using the ZereneStacker 1.04 (Zerene Systems LLC, Richland, WA, USA). The morphological terminology used in this paper follows Lawrence et al. [30].

Fossil weevils of the subfamily Molytinae have been described from the following localities:

Cerro Guido—Chile: Magallanes, Última Esperanza Province, Cerro Guido, Dorotea Formation, Upper Cretaceous, Campanian—Maastrichtian;

Assiniboine—Canada: Manitoba, Assiniboine River; Upper Cretaceous, Maastrichtian;

Arkhara—Russia: Amurskaya Oblast, Arkharinskii District, quarry at Arkhara Railway Station, Tsagayan Group, lower Paleocene, Danian;

Menat—France: Puy-de-Dome, middle-upper Paleocene, Selandian-Thanetian, 61.0–59.0 Ma;

Mors—Denmark: Fur Formation, lower Eocene, Ypresian, 54.0 Ma;

London Clay—UK: England, Sussex, Bognor Regis, lower Eocene, Ypresian, 54.0–50.0 Ma;

Roan Mountain—USA: Colorado, Garfield County, Green River Formation; lower Eocene, Ypresian, 50.6–48 Ma;

Green River—USA: Colorado, Wyoming, Utah states, 3–4 km west of railway crossing of Green River, Green River Formation, lower Eocene, Ypresian, 50.6–48 Ma;

Oise amber—France: Paris basin, Creil, Oise; lowermost Eocene, Ypresian, 53.0 Ma;

Kutschlin—Czech Republic: northwest Bohemia, near Bilina, upper Eocene, Priabonian;

Baltic amber—Russia: Kaliningrad Oblast, Baltic Sea coast and Yantarnyi quarry near Kaliningrad, Poland: Gdańsk city area, at the Wisla River estuary, Prussian Formation, upper Eocene, Priabonian, 36.8–36.4 Ma;

Rovno amber—Ukraine: Rovno Oblast, Klesov, upper Eocene, Priabonian, 37.7–33.9 Ma;

Florissant—USA: Colorado, Rocky Mountains near Pike's Peak, Florissant Formation; uppermost Eocene, Priabonian, 34.07 ± 0.10 Ma;

White River Badlands—USA: South Dakota, lower Oligocene, Rupelian, 34.0–31.2 Ma;

Brunnstatt—France: Alsace, Haut-Rhine Department, 5 km southwest of Mulhouse, terminal Eocene, Priabonian, 33.9 Ma;

Corent—France: South France, Puy-de-Dom Department, Gergovia Plateau, south of Clermont-Ferrand, lower Oligocene, Rupelian;

Sieblos—Germany: Hessen, Rhön, lower Oligocene, Rupelian;

Lužice—Czech Republic: northwest Bohemia, upper Oligocene, Chattian;

Rott—Germany: North Rhine-Westfalia, latest Oligocene, Upper Siebengebirge, near Bonn, Rott Formation, Chattian, 24.0–23.0 Ma;

Aix-en-Provence—France: Bouches-du-Rhône, Aix-en-Provence Formation uppermost Oligocene, upper Chattian, until 23 Ma;

Dominican amber—Dominican Republic: mines in the Cordillera Septentrional, lower-middle Miocene, 20–15 Ma;

Mexican amber—Mexico: Yukatan, Chiapas: mines near Simojovel, lower-middle Miocene, 20–15 Ma;

Shanwang—China: Shandong Province, Linqu County, lower Miocene, Burdigalian, 17–18 Ma;

Altamira shale—USA: California, Los Angeles Country, Woodcrest Drive, Sherman Oaks, upper Miocene;

Willershausen—Germany: Niedersachsen, Harz, upper Pliocene.

Nomenclatural acts introduced in the present work are registered in ZooBank (www.zoobank.org) under LSID urn:lsid:zoobank.org:pub:8931A219-B0E7-4F2A-85BD-0C29E9C48538.

3. Results

Systematic

Family **Curculionidae** Latreille, 1802

Subfamily **Molytinae** Schoenherr, 1823

Tribe **Aedemonini** Faust, 1898

Genus ***Electrorhinus*** Legalov, 2020

Type species: *Electrorhinus friedhelmi* Legalov, 2020, by original designation.

Electrorhinus vlaskini Legalov, Vasilenko and Perkovsky, **sp. n.** (Figures 1–4)

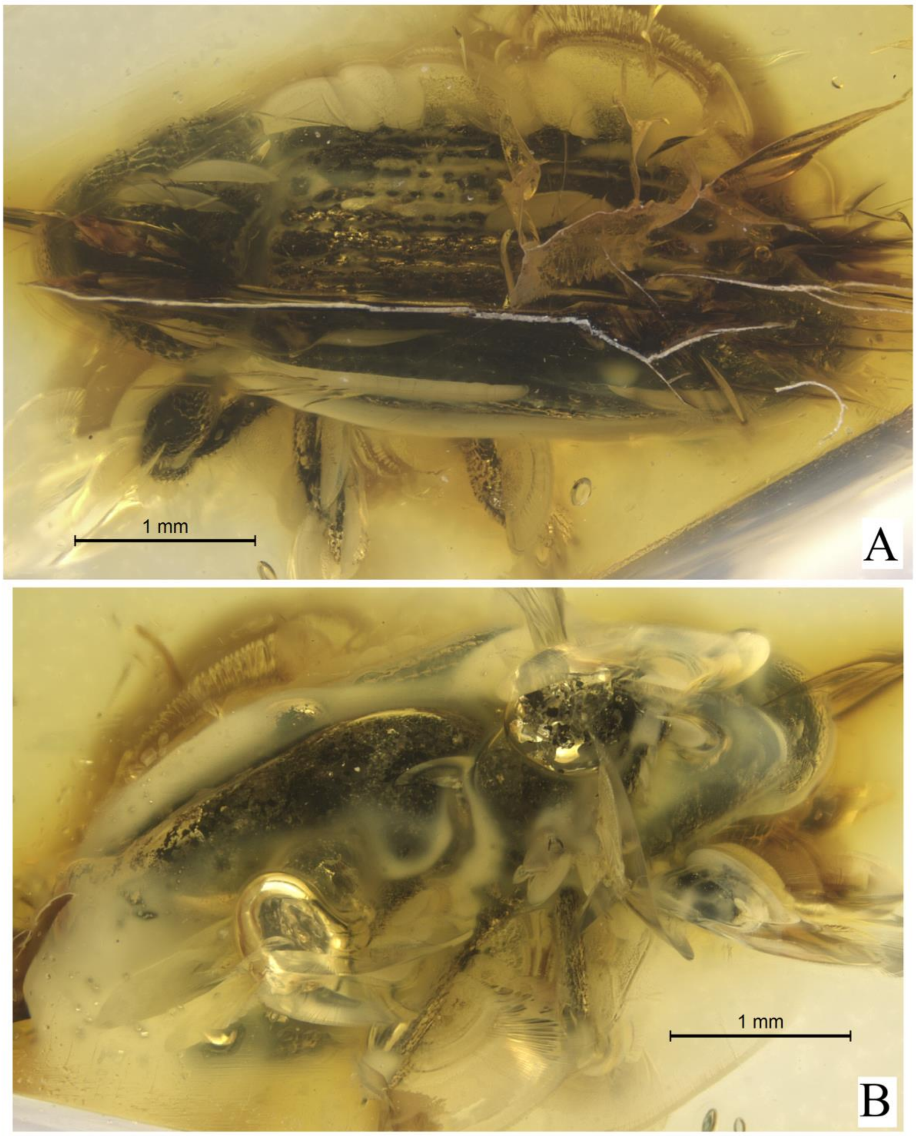

Figure 1. *Electrorhinus vlaskini* n. sp., holotype, habitus: (**A**) dorso-lateral view, left; (**B**) ventro-lateral view, right.

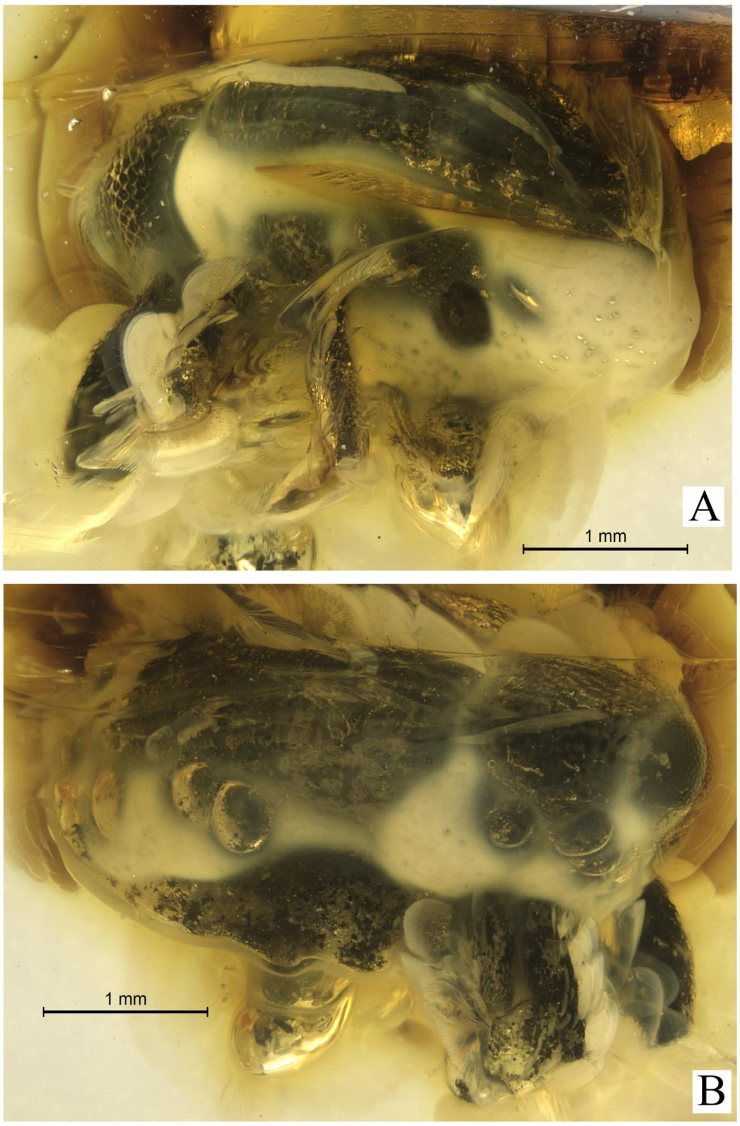

Figure 2. *Electrorhinus vlaskini* n. sp., holotype, habitus: (**A**) lateral view, left; (**B**) lateral view, right.

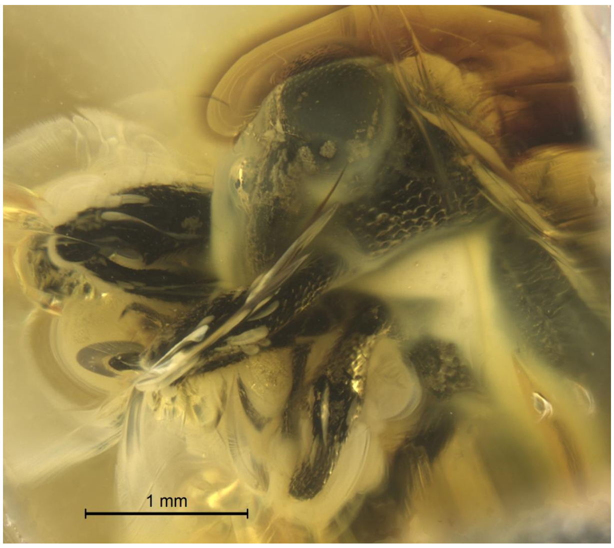

Figure 3. *Electrorhinus vlaskini* n. sp., holotype, habitus, frontal view.

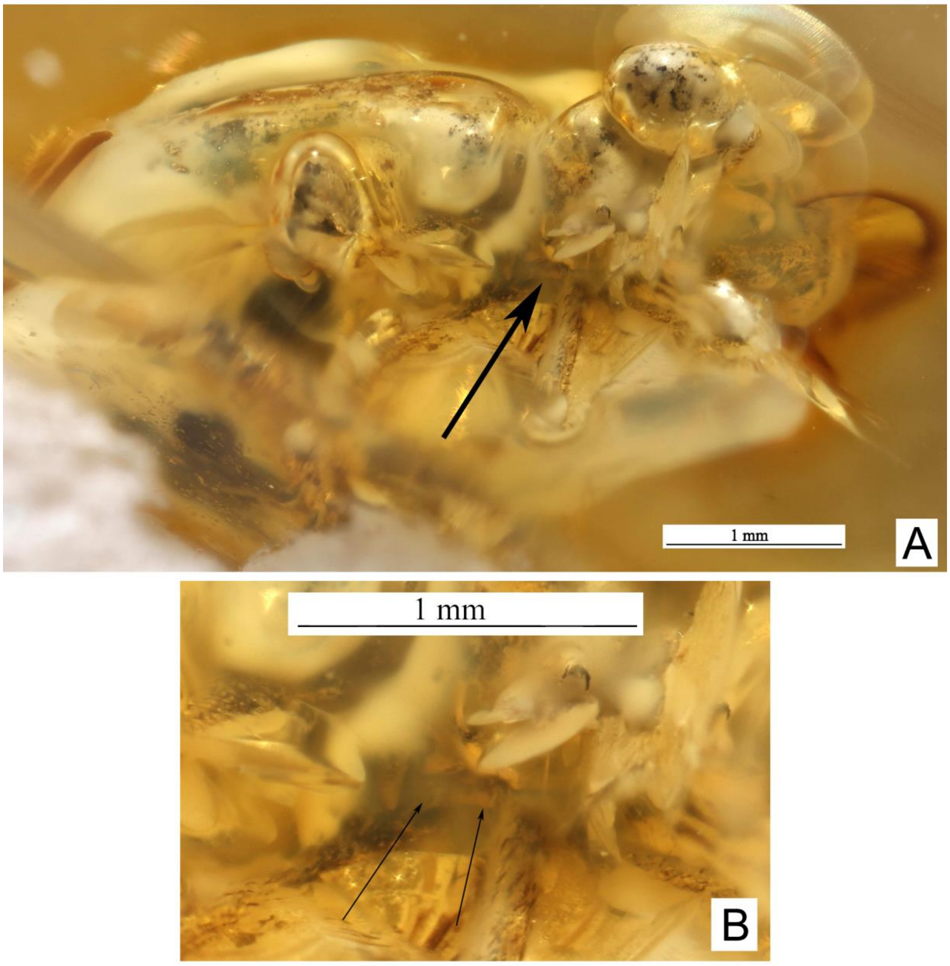

Figure 4. *Electrorhinus vlaskini* n. sp., holotype: (**A**) dorso-lateral view; (**B**) carinae in postcoxal portions of the prosternum; arrow shows carinae.

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Description. Size. Body length (without rostrum) 4.6 mm; rostrum length 0.8 mm. Body is black, with decumbent quite narrow scales. Rostrum moderately long and stout, slightly shorter than the pronotum, weakly curved, densely punctate dorsally; antennal scrobe lateral, directed under the rostrum; forehead quite narrow, slightly narrower than rostrum base, flattened dorsally, densely punctate; compound eyes large, spherical, weakly protruding from margin of head, quite finely faceted; temples short; vertex weakly convex, densely and finely punctate; antennae geniculate, inserted near middle of rostrum, geniculate; scape elongate, not reaching eye. Pronotum bell-shaped; disc weakly convex, coarsely rugose-punctate; sides weakly rounded, with large puncture; pronotal base biconcave. Elytra weakly convex, quite elongate, 3.1 times as long as pronotum; greatest width in middle; humeri weakly flattened; striae regular and distinct; elytral interstriae wide, punctate, 2.5–3.0 times as long as width of the striae. Prosternum densely punctate, with weak postocular lobes and a rostral channel bounded by carinae; procoxal cavities round, separated; postcoxal portion of prosternum bounded by carinae; metaventrite weakly convex, and coarsely punctate. Abdomen weakly convex. Legs elongate; femora weakly clavate, weakly sulcate beneath, with teeth beyond middle; metafemora reaching ventrite 3; tibiae weakly curved, flattened, with distinct uncus; tarsi elongate, with pulvilli on underside.

Material examined. Holotype: SIZK K-31315, Klesov, Rovno amber, late Eocene.

Derivation of name. The species is named in honor of paleoentomologist A.P. Vlaskin (Rovno).

Diagnosis. The new species differs from *Electrorhinus friedhelmi* in the smaller body sizes, finely faceted eyes, coarser rugose pronotum, and sparser scales on the body.

Remarks. The geniculate antennae and uncinate tibiae support the placement of this species in the family Curculionidae. Placement in the subfamily Molytinae is based on the quite large tibial uncus. The prosternum with rostral channel bounded by carinae in the precoxal and postcoxal portions of the prosternum (Figures 4 and 5) suggest placement in the tribe Aedemonini. The new species belongs to the genus *Electrorhinus* based on the femora weakly sulcate beneath and the metafemora reaching ventrite 3.

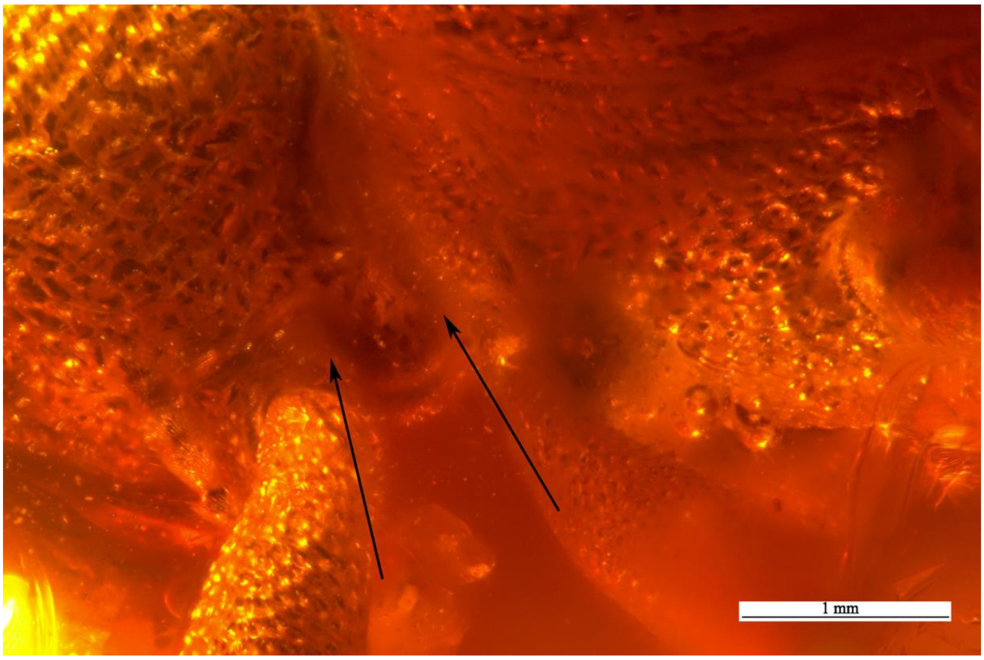

Figure 5. *Electrorhinus friedhelmi*, holotype, carinae in postcoxal portions of the prosternum; arrow shows carinae.

Key to European species of Molytinae with a rostral channel

1. Pronotal outgrowth extending beyond the head. 2

- Pronotal outgrowth not extending beyond the head..3

2. Apex of rostral channel bounded by carina. 4.9 mm. London Clay.......................... ....*Korystina gracilis* Britton, 1960.

- Apex of rostral channel not bounded by carina. 4.2 mm. Oise amber...................... ....*Sciabregma squamosa* Legalov, Kirejtshuk, and Nel, 2019.

3. Rostral channel not reaching mesoventrite. ~5 mm. London Clay............................ ....*Camptorrhinites orarius* Britton, 1960

- Rostral channel reaching mesoventrite..4

4. Postcoxal portion of prosternum bounded by carinae..5

- Postcoxal portion of prosternum not bounded by carinae...8

5. Pronotum is densely punctate. Body is smaller (4.4 mm). London Clay......................... ....*Taylorius litoralis* Britton, 1960.

- Pronotum rugose-punctate. Body is larger (4.6–6.2 mm)..6

7. Body is larger (5.7–6.2 mm). Eyes are quite coarsely faceted. Pronotum is weakly rugose. Body with denser scales. Baltic amber.............*Electrorhinus friedhelmi* Legalov, 2020.

- Body is smaller (4.6 mm). Eyes are finely faceted. Pronotum is coarser and rugose. Body with sparser scales. Rovno amber...*Electrorhinus vlaskini* Legalov, Vasilenko, and Perkovsky, sp. n.

8. Metaventrite is longer than the third ventrite. Abdominal process is narrower than coxa. Elytra with rectangular humeri...9

- Metaventrite is short, and shorter than the third ventrite. Abdominal process as broad as coxa. Elytra with reduced humeri..10

9. Vertex is densely punctured and covered with wide scales. Elytra wider than base of pronotum. Odd-numbered elytral interstices are non-raised. Elytra is 1.8 times as long as the width at the middle. 4.5–4.7 mm. Baltic amber....................*S. silvestris* Legalov, in litt.

- Vertex glabrous, covered with narrow scales. Elytra subequal to base of pronotum. Odd-numbered elytral interstices are weakly raised. Elytra are 2.6 times as long as the width at the middle. 4.0 mm. Baltic amber...................*Succinacalles uniqus* Zherikhin, 1971

10. Femora denticulate. 5.2 mm. Baltic amber..*Baltacalles triumurbium* Bukejs, Alekseev et Legalov, 2020.

- Femora without teeth...11

11. Postocular lobes are weak. Elytral interstices are rather narrow. Elytral striae are wide. 3.0 mm. Baltic amber...*Parvacalles kotthoffi* Legalov, in litt.

- Postocular lobes are stark. Elytral interstices are wide. Elytral striae are narrow. 3.3 mm. Oise amber............................*Oisecalles latosquamosus* Legalov, Kirejtshuk et Nel, 2019.

List of the fossil Molytinae

Subfamily Molytinae Schoenherr, 1823
Tribe Molytini Schoenherr, 1823
Genus *Archaralites* Legalov, 2010
A. zherichini Legalov, 2010—Arkhara [31]
Genus *Archaeoheilus* Legalov, 2018
A. gallicus Legalov, Kirejtshuk and Nel, 2019—Menat [32]
A. ovalis Legalov, 2018—Green River [33]
A. packardii (Scudder, 1893)—Green River [14]
A. provectus (Scudder, 1876)—Green River [9]
A. scudderi Legalov, 2018—Green River [33]
A. deleticius (Scudder, 1893)—White River [14]
A. lacoei (Scudder, 1893)—Florissant [14]
Genus *Furhylobius* Legalov, 2015
F. troesteri Legalov, 2015—Mors [11]
Genus *Hylobius* Germar, 1817
"*H.*" *antiquus* Heyden and Heyden, 1866—Rott [15]
"*H.*" *medianus* Zhang, 1989—Shanwang [34]
"*H.*" *plenus* Zhang, 1989—Shanwang [34]
"*H.*" *turfaceus* Zhang, 1989—Shanwang [34]
H. abietis (Linnaeus, 1758)—Willershausen [35]
Genus *Anisorhynchus* Schoenherr, 1842
"*A.*" *deletus* Deichmueller, 1881—Kutschlin [36]
"*A.*" offosus Oustalet, 1870—Corent [37]
Genus *Sinocurculia* Hong, 1984
S. granulata Hong, 1984—Shanwang [38]
S. shanwangensis Hong, 1985—Shanwang [39]
Tribe Sciabregmini Legalov, Kirejtshuk, and Nel, 2019
Genus *Sciabregma* Scudder, 1893
S. rugosa Scudder, 1893—Roan Mountain [14]
S. squamosa Legalov, Kirejtshuk, and Nel, 2019—Oise amber [8]
S. tenuicornis Cockerell, 1921—Green River [40]
Tribe Conotrachelini Jakel, 1865
Genus *Conotrachelus* Schoenherr, 1845
C. *florissantensis* Wickham, 1912—Florissant [41]
Tribe Acicnemidini Lacordaire, 1866
Genus *Electrotribus* Hustache, 1942
E. rarus Legalov, 2020—Baltic amber [7]
E. theryi Hustache, 1942—Baltic amber [42,43]
=*Pissodes henningseni* Voss, 1972

E. weigangae (Ulke, 1947)—Baltic amber [44]
=*Anchorthorrhinus incertus* Voss, 1953 [45]
=*Isalcidodes macellus* Voss, 1953
E. wolfschwenningerae (Rheinheimer, 2007)—Baltic amber [46]
Tribe Plinthini Lacordaire, 1863
Subtribe Leiosomatina Reitter, 1913
Genus *Leiosoma* Stephens, 1829
Subgenus *Palaeoleiosoma* Legalov, 2016
L. (*L.*) *klebsi* Legalov, 2016—Baltic amber [47]
L. (*L.*) *michalskii* Legalov, in litt.—Baltic amber
L. (*L.*) *shevnini* Legalov, in litt.—Baltic amber
Subtribe Typoderina Voss, 1965
Genus *Baltanchonidium* Legalov, in litt.
B. eocenicum Legalov, in litt.—Baltic amber
Tribe Magdalini Pascoe, 1870
Genus *Magdalis* Germar, 1817
"*M.*" *sedimentorum* Scudder, 1893—Florissant [14]
M. moesta Schlechtendal, 1894—Rott [48]
"*M.*" *deucalionis* (Heyden and Heyden, 1866)—Rott [15]
"*M.*" *protogenius* (Heyden and Heyden, 1866)—Rott [15]
Tribe Cleogonini Gistel, 1856
Genus *Rhysosternum* Scudder, 1893
Rh. aeternabile Scudder, 1893—Florissant [14]
Rh. longirostre Scudder, 1893—Florissant [14]
Genus *Rhyssomatus* Schoenherr, 1837
Rh. miocenae Pierce, 1965—Altamira shale [49]
Tribe Anchonini Imhoff, 1856
Genus *Anchonus* Schoenherr, 1825
A. acrolepidotus Poinar and Legalov, 2019—Dominican amber [50]
A. bothynus Poinar and Legalov, 2019—Dominican amber [50]
Genus *Velatis* Poinar and Voisin, 2003
V. dominicana Poinar and Voisin, 2003—Dominican amber [51]
Tribe Pissodini Gistel, 1856
Genus *Lithopissodes* Beier, 1952
L. luschitzensis Beier, 1952—Lužice [52]
Tribe Lymantini Lacordaire, 1865
Subtribe Lymantina Lacordaire, 1865
Genus *Bronchotibia* Poinar and Legalov, 2022
B. adunatus Poinar and Legalov, 2022—Dominican amber [53]
Tribe incertae sedis
Genus *Hylobiites* Scudder, 1895
H. cretaceus Scudder, 1895—Assiniboine [54]
Genus *Dorotheus* Kuschel, 1959
D. guidensis Kuschel, 1959—Cerro Guido [55]
Genus *Lutago* Britton, 1960
L. fetosus Britton, 1960—London Clay [6]
L. nanus Britton, 1960—London Clay [6]
Genus *Pissodites* Britton, 1960
P. argillosus Britton, 1960—London Clay [6]
Genus *Erirhinites* Britton, 1960
E. bognorensis Britton, 1960—London Clay [6]
Genus incertae sedis
"*Chalcodermus*" *kirschi* Deichmueller, 1881—Kutschlin [36]
"*Acalles*" *exhumatus* Wickham, 1913—Florissant [56]

"*Hylobius*" *carbo* Oustalet, 1874—Aix-en-Provence [37]
"*Plinthus*" *heerii* Oustalet, 1874—Aix-en-Provence [37]
"*Molytes*" *hassencampi* Heyden, 1858—Sieblos [57]
"*Pissodes*" *effossus* Heyden, 1858—Sieblos [57]
"*Pissodes*" *planatus* Foerster, 1891—Brunnstatt [58]
"*Hylobius*" *deletus* Oustalet, 1870—Corent [59]
"*Plinthus*" *redivivus* Oustalet, 1870—Corent [59]
"*Hylobius*" *morosus* Oustalet, 1874—Corent [37]
"Cryptorhynchinae Schoenherr, 1825"
Tribe Camptorhinini Lacordaire, 1866
Genus *Camptorrhinites* Britton, 1960
C. orarius Britton, 1960—London Clay [6]
Genus *Korystina* Britton, 1960

Remarks. The genus *Korystina* was described in the tribe Sophrorhinini [6]. Alonso-Zarazaga and Lyal [1] placed it in the tribe Cryptorhynchini. Legalov [11] transferred this genus in the tribe Camptorhinini. A re-examination of the description and illustrations show that *Korystina* has the rostral channel of the postcoxal portion of the prosternum bounded by carinae, which characterize the tribe Aedemonini [5], but it is not clear whether it is present on the prothorax or is also located on the mesoventrite. To finally establish the systematic position of *Korystina*, a re-examination of the type is required.

K. gracilis Britton, 1960—London Clay [6]
Tribe Aedemonini Faust, 1898
Genus *Taylorius* Britton, 1960
T. litoralis Britton, 1960—London Clay [6]
Genus *Electrorhinus* Legalov, 2020
E. friedhelmi Legalov, 2020—Baltic amber [7]
E. vlaskini Legalov, Vasilenko and Perkovsky, sp. n.—Rovno amber
Tribe Cryptorhynchini Schoenherr, 1826
Subtribe Cryptorhynchina Schoenherr, 1826
Genus *Succinacalles* Zherikhin, 1971
S. *silvestris* Legalov, in litt.—Baltic amber
S. *uniqus* Zherikhin, 1971—Baltic amber [12]
Genus *Cryptorhynchus* Illiger, 1807
"C." *annosus* Scudder, 1876—Green River [9]
"C." *kerri* Scudder, 1893—Florissant [14]
"C." *profusus* Scudder, 1893—Florissant [14]
Genus *Semnorhynchus* Faust, 1896
S. brachyrhinus Poinar and Legalov, 2014—Dominican amber [17]
S. campostegus Poinar and Legalov, 2014—Dominican amber [17]
S. contorhinus Poinar and Legalov, 2014—Dominican amber [17]
S. euryaspus Poinar and Legalov, 2014—Dominican amber [17]
S. eurystegus Poinar and Legalov, 2014—Dominican amber [17]
S. leptostegus Poinar and Legalov, 2014—Dominican amber [17]
S. megasomus Poinar and Legalov, 2014—Dominican amber [17]
S. stenostegus Poinar and Legalov, 2014—Dominican amber [17]
S. tanyrhinus Poinar and Legalov, 2014—Dominican amber [17]
Genus *Neoulosomus* O'Brien and Wibmer, 1982
Subgenus *Neoulosomus* s. str.
N. (*N.*) *hurdi* (Zimmermann, 1971)—Mexican amber [16]
N. (*N.*) *leptosomus* Poinar and Legalov, 2014—Dominican amber [17]
N. (*N.*) *megaholcus* Poinar and Legalov, 2014—Dominican amber [17]
N. (*N.*) *megus* Poinar and Legalov, 2014—Dominican amber [17]
N. (*N.*) *microholcus* Poinar and Legalov, 2014—Dominican amber [17]
N. (*N.*) *pedinus* Poinar and Legalov, 2014—Dominican amber [17]

N. (*N.*) *pediosomus* Poinar and Legalov, 2014—Dominican amber [17]
N. (*N.*) *platystegus* Poinar and Legalov, 2014—Dominican amber [17]
N. (*N.*) *scambosomus* Poinar and Legalov, 2014—Dominican amber [17]
N. (*N.*) *scambus* Poinar and Legalov, 2014—Dominican amber [17]
N. (*N.*) *stenocalypus* Poinar and Legalov, 2014—Dominican amber [17]
N. (*N.*) *stylolepus* Poinar and Legalov, 2014—Dominican amber [17]
Subgenus *Stenosomus* Poinar and Legalov, 2014
N. (*S.*) *contorhinus* Poinar and Legalov, 2014—Dominican amber [17]
N. (*S.*) *tanyrhinus* Poinar and Legalov, 2014—Dominican amber [17]
Genus *Lemmasomus* Poinar and Legalov, 2014
L. anodontotus Poinar and Legalov, 2014—Dominican amber [17]
Genus *Apharosoma* Poinar and Legalov, 2014
A. euryrhina Poinar and Legalov, 2014—Dominican amber [17]
Genus *Anlemmus* Poinar and Legalov, 2014
A. leptorhinus Poinar and Legalov, 2014—Dominican amber [17]
Genus *Odontamera* Poinar and Legalov, 2014
O. dolichosoma Poinar and Legalov, 2014—Dominican amber [17]
Subtribe Tylodina Lacordaire, 1866
Genus *Oisecalles* Legalov, Kirejtshuk et Nel, 2019
O. *latosquamosus* Legalov, Kirejtshuk et Nel, 2019—Oise amber [8]
Genus *Baltacalles* Bukejs, Alekseev et Legalov, 2020
B. triumurbium Bukejs, Alekseev et Legalov, 2020—Baltic amber [13]
Genus *Parvacalles* Legalov, in litt.
P. kotthoffi Legalov, in litt.—Baltic amber
Genus *Acalles* Schoenherr, 1826
"*A.*" *icarus* Heyden and Heyden, 1866—Rott [15]
Genus *Pseudomoides* Poinar and Legalov, 2014
P. clisaulis Poinar and Legalov, 2014—Dominican amber [17]
Genus *Paraulosomus* Hustache, 1930
P. adenolepus Poinar and Legalov, 2014—Dominican amber [17]
Genus *Paracamptopsis* Poinar and Legalov, 2014
P. stenis Poinar and Legalov, 2014—Dominican amber [17]
Tribe Gasterocercini Zherichin, 1991
Genus *Episcirrus* Kuschel, 1958
E. isolepus Poinar and Legalov, 2014—Dominican amber [17]

4. Discussion

Fossil weevils of the subfamily Molytinae are currently represented by 103 species in 42 genera from 14 tribes. The oldest forms were described from the Maastrichtian of Canada and Chile [54,55]. The most diverse Molytinae fauna is known from Miocene Dominican amber [17,50,51,53].

The tribe Aedemonini includes 33–35 extant genera [1,3] distributed in sub-Saharan Africa (excluding the desert regions of South Africa), Madagascar, Oriental Region (north to southern Sakhalin, Japan, and South Korea), Australia (except for desert areas), Micronesia, Melanesia, and Polynesia (Figure 6). Representatives of this group are absent in the New World, Western and Central Palaearctic. Fossil findings are known from the Eocene of Europe [6,7,18]. It is noted that extant species of the tribe avoid dry and cold areas. Almost all species do not cross the line of +15 °C of the mean annual temperature. Several species have adapted to colder conditions in South Korea, Japan, and southern Sakhalin. Perhaps this is due to the monsoon climate. The fossil records are all from the Eocene when the climate of Europe was warm and humid. Aedemonini make up 22% of the London Clay weevil specimens identified to the genus level, and 16% (or even a third if *Korystina* belongs to the tribe) of the Curculionidae genera. The representation of the tribe was not so significant in any other extant or extinct fauna. Even in the Afrotropical region, where at least 40% of the species and 56% of the genera of Aedemonini are distributed, they make up less than 7% of the species and less than 2.5% of the genera of Curculionidae [60]. It is highly meaningful that hyperdiverse Cryptorhynchini appear to be largely absent from the Afrotropics, where they seem to be replaced by Aedemonini [61], our data. It is interesting to combine the abundance of Aedemonini and Molytinae in general in London Clay with the extreme rarity of bark beetles (represented by a single specimen of ? *Blastophagus* Eichhoff, 1864 (=*Tomicus* Latreille, 1802)), while xylophagous insects dominate in this locality [6]. Their mineralization, at least in part, could occur in a specific microtaphotope inside pyritized wood [62].

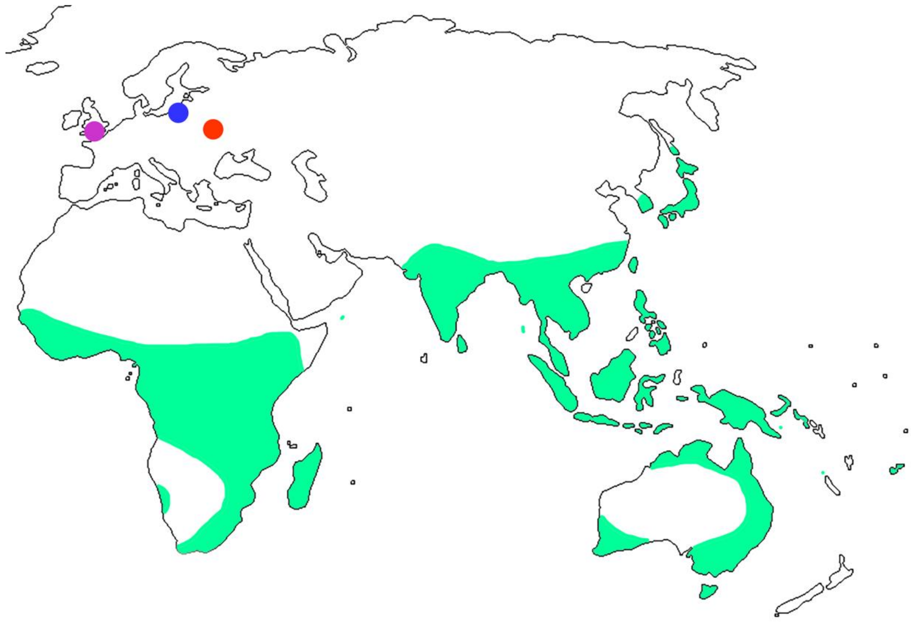

Figure 6. Distribution of the species of the tribe Aedemonini: Recent members—green shaded area; red circle—fossil record from Rovno amber; blue circle—fossil record from Baltic amber; pink circle—fossil record from London Clay.

Moreover, *Tailorius* is the second most abundant genus of the family Curculionidae (together with *Lutago*, they account for 62.5% of all weevils determined to be in the genus), and the third most abundant genus in all biotas, and accounts for 16% of all beetles identified to the genus from London Clay. Of course, an extraordinary abundance of Aedemonini in the early Eocene of Europe was not ubiquitous. For example, the species of the tribe are unknown from Oise amber, in which numerous bark beetles were found, as well as a representative of Cryptorhynchini (*Oisecalles latosquamosus* Legalov, Kirejtshuk et Nel, 2019) [8].

The abundance of Aedemonini in the London Clay may have been due to the rich and diverse tropical vegetation [63,64]. The age of the London Clay Formation is early and middle Ypresian [65]. Bognor remains the principal international source of pyritized insects [66] (p. 93). Rundle and Cooper [67] asserted that insects from the London Clay drifted out to sea with wood from the more westerly, near-shore location of the Hampshire Basin [68]. This is further supported by the presence of numerous flightless larvae [66], together with beetles with their elytra in the resting position [68]. The London Clay Formation contains one of the most important fruit and seed assemblages from the Paleogene [69]. Given its unparalleled diversity [68], more than 350 described species, and superb preservation as well as uncompressed, three-dimensionally preserved morphology [63,70], the flora offers a unique insight into the vegetation present in Europe during the hyperthermals of the early Eocene [71,72]. Numerous clades that are now largely confined to tropical latitudes, e.g., Annonaceae, Arecaceae, Burseraceae, Icacinaceae, and Menispermaceae, are well documented in the flora [63,70]. As was indicated by Collinson and Cleal [68] "in early Eocene times, a zone of lush vegetation had developed in Britain, strongly reminiscent of today's tropical rain forests, dominated by evergreen trees of the sumac, custard apple, dillenia, dogbane, frankincense, flacourtia, icacina, laurel, palm, sabia, soap berry and tea families, and mastic trees of the dogwood family", with abundant lianas of the icacina, grape vine, and moonseed families and numerous mangrove palms and rare, true mangroves in coastal areas [73–76]. The vegetation, with some reservations, has been compared with the modern paratropical rain forests of lowland Asia [68], and references therein.

Since the late Eocene, there are no fossil records of these Aedemonini beetles [18]. They may have disappeared from Europe during the Oligocene, when the European climate became colder, seasonal, and drier. The new record shows the connection of the European Priabonian fauna with the extant Paleotropical fauna. The weaver ant genus *Oecophylla* Smith, 1860, is characterized by a similar geological and geographical distribution [77,78], except for a single early Eocene finding in Okanagan [79].

The climate of the Rovno amber forest was warmer than the Baltic one [80,81], so the thermophilic beetles are much better represented there [27,82–89], resulting in only 15% of known Rovno beetles having anything in common with Baltic amber [87,90]. The genus *Electrorhinus* could be a new addition to the list of Rovno thermophilic taxa that are much rarer in Baltic amber.

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