A new weevil (Coleoptera; Nemonychidae; Oropsini trib. nov.) from Lower Cretaceous Lebanese amber

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Short communication

A new weevil (Coleoptera; Nemonychidae; Oropsini trib. nov.) from Lower Cretaceous Lebanese amber

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ABSTRACT

A new weevil, *Oropsis marinae* gen. et sp. nov., Oropsini trib. nov., is described from Lower Cretaceous Lebanese amber. The new genus is similar to the genera *Libanorhinus* Kuschel et Poinar, 1993 and *Arra* Peris, Davis et Delclòs, 2014. It differs from *Libanorhinus* in the long abdominal ventrite 1, prosternal process distinctly extends beyond procoxal cavities and tarsomere 3 weakly bilobed, and from *Arra* in the arcuate pronotal sides, antennal club with fused articles, long abdominal ventrite 1, procoxal cavities probably open posteriorly, and tarsal claws without teeth. Oropsini trib. nov. differs from the tribes Paleocartini, Selengarhynchini and Metrioxenoidini in the transversely oval and separated procoxal cavities, weakly convex and oval eyes, and the trochanters completely separating femora and coxae.

1. Introduction

The beetle family Nemonychidae Bedel, 1882 is a small relict group in the Recent fauna including about 80 species from 25 genera, however in the Mesozoic it was rather numerous and for now there have been already described more than 80 species belonging to 44 genera composing about 50% of Mesozoic curculionoids (Kirejtshuk et al., 2009b; Legalov, 2012; Gratshev and Legalov, 2014). The earliest and most numerous fauna of the family is known from the Upper Jurassic of Karatau (Gratshev and Legalov, 2014). More than 30 nemonychid species from 25 genera were described from Lower Cretaceous deposits (Legalov, 2015). The nemonychid subfamilies Rhinorhynchinae Voss, 1922 and Cimberidinae des Gozis, 1882 presented in the modern fauna are known from the Aptian–Albian of Baissa and the Barremian of Yixian (Chaomidian) (Davis et al., 2013; Gratshev and Legalov, 2014). Before current studies two nemonychid species were known, one from Lower Cretaceous Lebanese amber and another one from Spanish amber (Kuschel and Poinar, 1993; Peris et al., 2014). A new nemonychid specimen was recently recovered in Lebanese amber (Kirejtshuk and Azar, 2013) which is characterized by its better preservation in comparison with other species found in Cretaceous amber. It was possible to study many structural details of the new specimen (that were not clearly observable in others) and to propose a new tribe including three species each representing a separate genus (*Libanorhinus succinus* Kuschelet Poinar, 1993, *Arra legalovi* Peris, Davis et Delclòs, 2014 and *Oropsis marinae* gen. et sp. nov.).

2. Material and methods

The holotype examined is deposited in the Lebanese University, Faculty of Sciences II, Department of Natural Sciences. It is originated from Bouarij outcrop, Zahleh District, Central Lebanon (for geological map and illustration of the outcrop see Azar et al., 2010). The specimens were studied using an Olympus SCX9 stereomicroscope equipped by a camera Olympus at the Museum National d'Histoire Naturelle (Paris), a Leica MZ 12.0 stereomicroscope with a DFC290 digital camera, at the Zoological Institute of the Russian Academy of Sciences (St. Petersburg); a Leica MZ 9.0

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stereomicroscope with a DFC290 camera, at the Paleontological Institute of the Russian Academy of Sciences; a Leica MZ 12.5; a Leica-M165C stereomicroscope and a Nikon SMZ-10R, and a Zeiss Stemi 2000-C stereomicroscope, at the Institute of Systematics and Ecology of Animals of the Siberian Branch of Russian Academy of Sciences (Novosibirsk). The additional pictures of the holotypes of *Libanorhinus succinus* and *Arra legalovi* with important structural details were obtained from G. Poinar (Oregon State University, Corvalios) and C. Soriano (University of Kansas Biodiversity Institute, Lawrence). The method of preparation of the specimens for study was described in Azar et al. (2003).

All taxonomic acts established in the present work together with the electronic publication have been registered in ZooBank under: urn:lsid:zoobank.org:pub:6183303B-AE63-4272-9B50-6A74A11D3295.

3. Systematic paleontology

Family Nemonychidae Bedel, 1882
Subfamily Paleocartinae Legalov, 2003
Tribe Oropsini Legalov et Kirejtshuk, trib. nov.

Type genus: *Oropsis* gen. nov.

Diagnosis. Body small (length from 0.9 to 2.0 mm); body moderately convex dorsally and subflatened ventrally, weakly to moderately sclerotized; rostrum thin and long; antennae inserted subapically with one "false segmented" in loose 3-segmented club; eyes weakly convex and oval; pronotum with arcuate or straight sides and distinct lateral carinae; elytra with striae; lateral elytral edges straight; procoxal cavities transversely oval and separated, procoxal cavities weakly distant from posterior edge of prosternum; prosternal process usually distinctly extends beyond procoxal cavities; trochanters completely separating femora and coxae; abdominal ventrites free, subequal in length or ventrite 1 longer than ventrites 2 and 3 together; tarsi narrow; tarsomere 3 weakly bilobed; claws without teeth or appendiculate.
Comparison. After Legalov (2015) the subfamily Paleocartinae was interpreted as consisting of three Mesozoic tribes (Paleocartini sensu stricto, Selengarhynchini Gratshevet Legalov, 2009, and Metrioxenoidini Legalov, 2009). The new tribe differs from all mentioned tribes of this subfamily in the transversely oval and separated procoxal cavities, weakly convex and oval eyes, and the trochanters completely separating femora and coxae. The first and third features are absent in other subfamilies. The new tribe differs from the tribe Selengarhynchini also in the straight lateral edge of the elytra. From the tribe Metrioxenoidini it is distinguished also by the thin and long rostrum. The new tribe also differs from the tribe Paleocartini sensu stricto in the procoxal cavities weakly distant from the posterior edge of the prosternum.
Composition. Except the type genus, *Libanorhinus* Kuschelet Poinar, 1993 (Barremian–lowermost Aptian Lebanese amber) and *Arra* Peris, Davis et Delclòs, 2014 (Albian Spanish amber).

Genus *Oropsis* Legalov et Kirejtshuk, gen. nov.
Type species: *Oropsis marinae* sp. nov.

Etymology. The name of the new genus is formed from the Greek "ὄρος" (oros – mountain) and "ὄψις" (opsis – resembling a (specified) thing). Gender feminine.
Composition. Only type species.
Diagnosis. Labrum free; maxillary palpi elongate; gular sutures separated; antennae not geniculate, antennae inserted subapically; pronotum with distinct lateral carina; prosternal process distinctly extends beyond procoxal cavities; abdominal ventrites free and ventrite 1 long; procoxae located basally; procoxal cavities probably open posteriorly; external edges of mesocoxae not covering by mesepimeron and mesepisternum; trochanters completely separating femora and coxae; tibiae with spurs; tarsomere 3 weakly bilobed.
Comparison. The new genus seems to be closely related to *Libanorhinus* but differs in the long abdominal ventrite 1, prosternal process distinctly extends beyond procoxal cavities, and tarsomere 3 weakly bilobed. From the genus *Arra* it differs in the rounded pronotal sides, antennal club with fused articles, long abdominal ventrite 1, procoxal cavities probably open posteriorly, claws without teeth.
Notes. This new genus belongs to the family Nemonychidae because its type species shows the free labrum, separated gular sutures, not geniculate antennae, free abdominal ventrites, elongate ultimate maxillary palpomere and tibiae with spurs. It falls in the subfamily Paleocartinae because its type species has the pronotum with distinct lateral carina, procoxae located basally, antennae inserted subapically and external edges of mesocoxae not covering by mesepimeron and mesepisternum.

Oropsis marinae Legalov et Kirejtshuk, sp. nov.
Figs. 1–4

Holotype. "TAR-171A", Azar Collection, deposited in the Lebanese University, Faculty of Sciences II, Department of Natural Sciences. It was mentioned in Kirejtshuk and Azar 2013 as "genus *Libanorhinus* Kuschel et Poinar, 1993". This piece of amber is placed in a rectangular parallelepiped (1.2 × 3.0 × 23.0 mm) with the Canada Balsam medium made from microscope cover slips.
Locality and strata. Bouarij outcrop, Zahleh District, Central Lebanon; lower Barremian (Maksoud et al., 2014, 2016; Maksoud, 2015; Granier et al., 2016).
Etymology. The epithet of this species is devoted to the wife of one author of this paper, Marina V. Kirejtshuk.
Description of holotype. Body length (without rostrum) 0.9 mm, length of rostrum 0.3 mm. Body moderately sclerotized, elongate, and moderately convex dorsally and subflattened ventrally. Body dark-brown; palpi, antennae, distal part of abdomen and legs reddish. Integument covered with sparse semierect hairs.

Head capsule (without rostrum) equal in length and wide, not constricted behind eyes. Labrum well developed, separated from rostrum, semicircular. Mandibles quite small. Maxillary palpi long, probably 3-segmented. Labial palpi 3-segmented. Rostrum elongate, weakly curved, densely punctate, with weakly subflattened above plane, thickened at apex, about 4.3 times as long as wide at apex and base, and 5.2 times as long as wide in middle, about 1.2 times as long as pronotum; dorsal surface of rostrum lacking carinae. Antennae long, thin, not geniculate, reaching pronotal base, inserted at middle of rostrum. Antennomeres subconical; antennomere 1 similar in shape to other flagellomeres, about 2.7 times as long as wide; antennomere 2 subequal to antennomere 1; antennomere 3 about 3.0 times as long as wide, 0.9 times as long as and 0.7 times as wide as antennomere 2; antennomeres 3 and 7 subequal in width; antennomere 4 equal to antennomere 3; antennomeres 5–8 subequal in length and width; antennomere 5 about twice as long as wide and 0.6 times as long as antennomere 4; club compact, 2.8 times as long as wide and 0.3 times as long as funicle; its three segments fused; antennomere 9 about 1.8 times as long as antennomere 10; antennomere 10 about 0.7 times as long as antennomere 9; antennomere 11 about 0.4 times as long as antennomere 10. Antennal fovea quite deep. Eyes convex, oval, about 1.7 times as long as wide. Temples short, punctate, about 0.4 times as long as longitudinal diameter of eye. Gular suture separated and distinct.

Pronotum with arcuate sides, about 1.3 times as long as wide at apex, 0.8 times as long as wide in middle, 0.9 times as long as wide

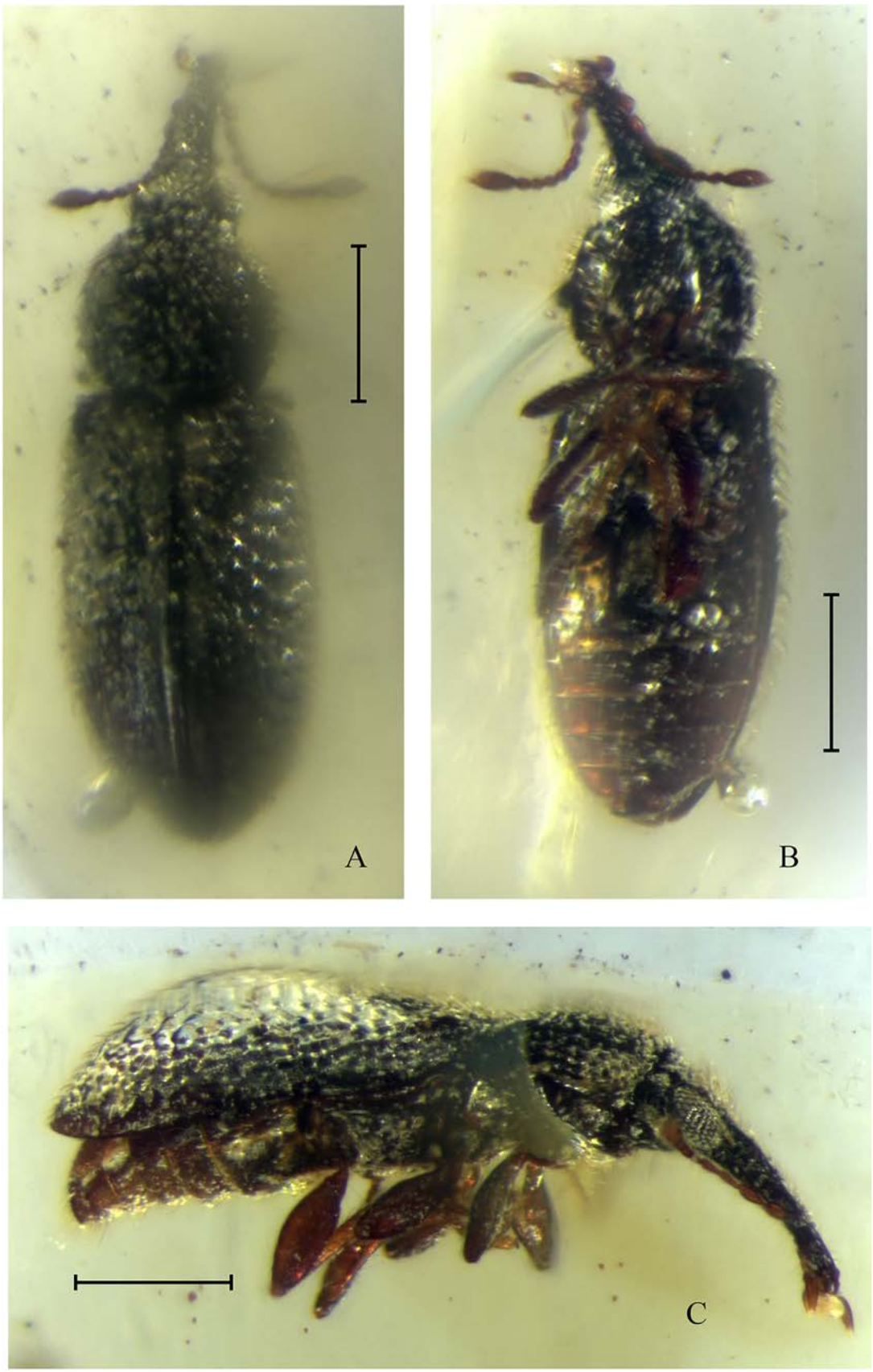

Fig. 1. *Oropsis marinae* gen. et sp. nov., holotype "TAR-171A", photographed under Zeiss Stemi 2000-C stereomicroscope with digital camera: A – body, dorsal view; B – idem, ventral view; C – idem, lateral view. Scale bar 0.2 mm.

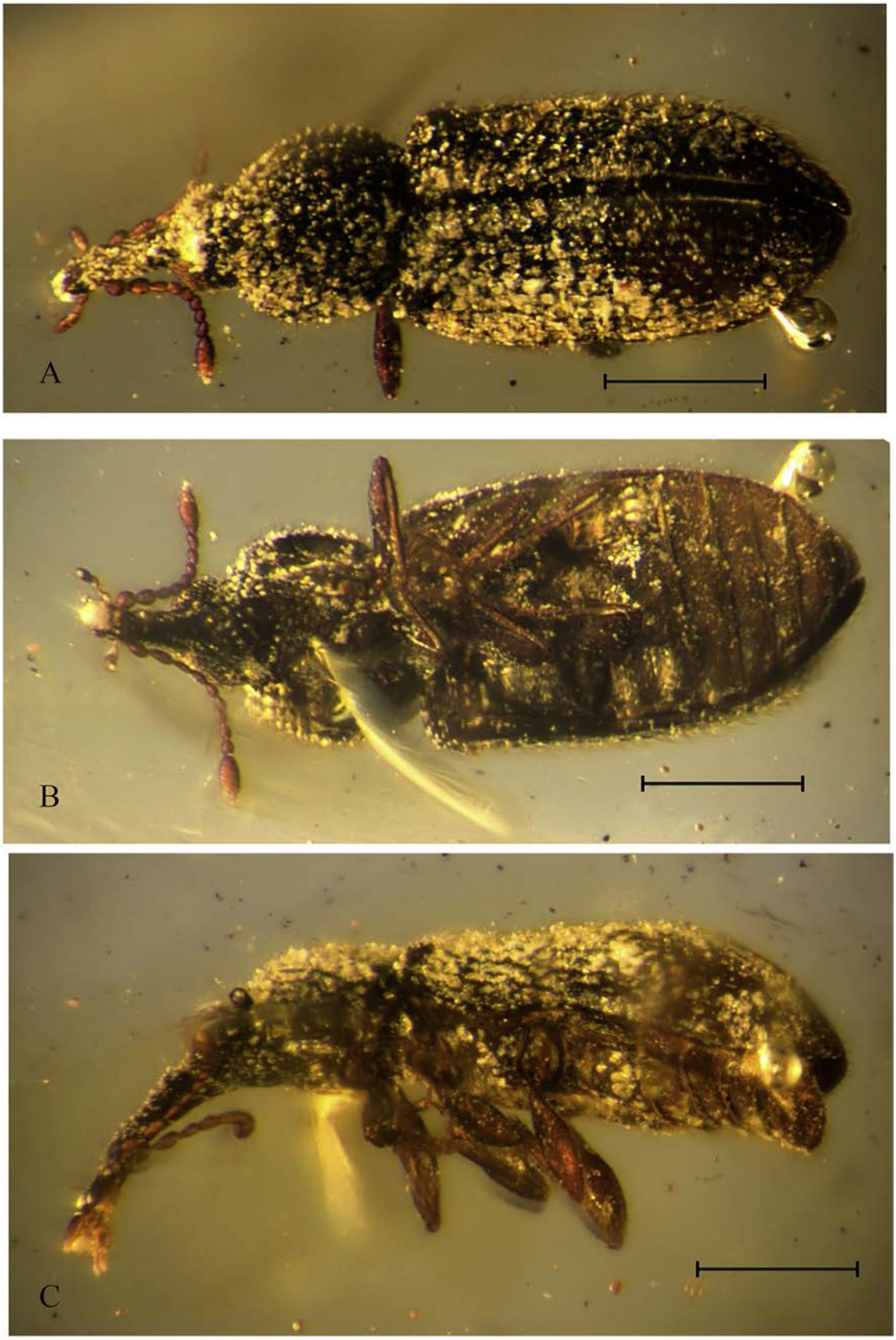

Fig. 2. *Oropsis marinae* gen. et sp. nov., holotype "TAR-171A", photographed under Olympus SCX9 with camera Olympus: A – contour of body, dorsal view; B – idem, ventral view; C – idem, lateral view. Scale bar 0.2 mm.

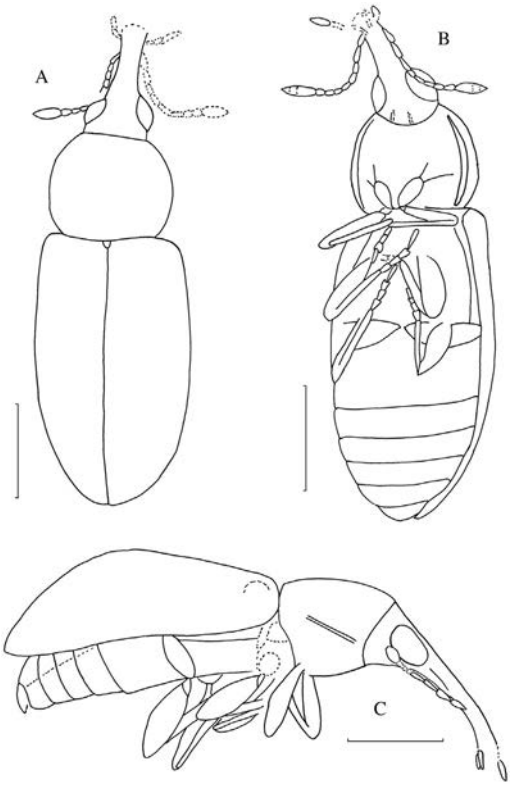

Fig. 3. *Oropsis marinae* gen. et sp. nov., holotype "TAR-171A", reconstructions: A – contour of body, dorsal view; B – idem, ventrial view; C – idem, lateral view. Scale bar 0.2 mm.

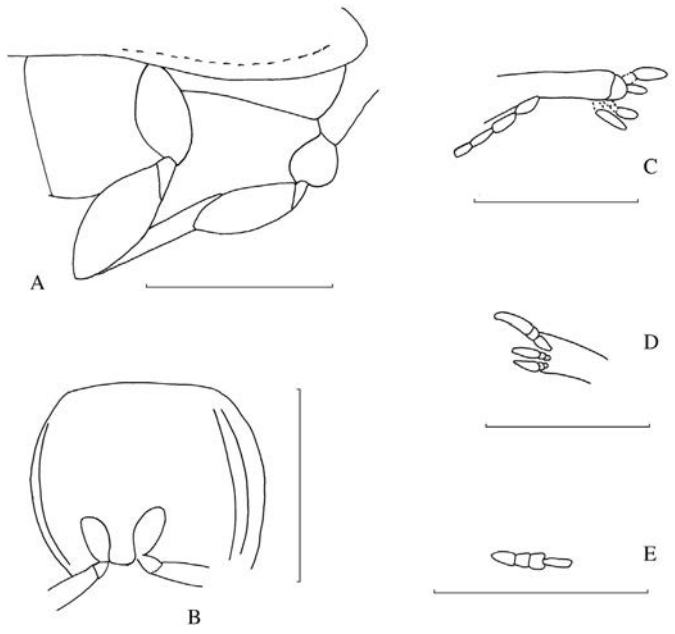

Fig. 4. *Oropsis marinae* gen. et sp. nov., holotype "TAR-171A", reconstructions: A – contour of meso- and metathorax, lateral view; B – contour of prosternum, ventral view; C – contour of apical part of rostrum, dorsal view; D – contour of apical part of rostrum, ventral view; E – contour of protarsi, dorsal view. Scale bar 0.2 mm.

at base; disc weakly flattened, distinctly punctate. Lateral carinae of pronotum distinct. Scutellum small, subtrapezoid.

Elytra almost parallel-sided, about twice as long as wide at base, 1.7 times as long as wide in middle, 2.8 times as long as wide at apical fourth, 2.5 times as long as pronotum; with well-developed humeri and epipleura; intervals convex, punctate; punctate striae narrow and weak; scutellar striole short; ninth stria not shortened. Hindwings apparently well-developed.

Precoxal portion of prosternum long, about 2.2 times as long as procoxal cavity. Procoxal cavities located at base of prosternum, transversely oval, probably open posteriorly. Prosternal process extends beyond procoxal cavities, about 0.6 times as wide as procoxal cavity. Metacoxal cavities are closed, markedly increased. Metaventrite long. Metanepisterna about 11.3 times as long as wide in middle. Abdomen convex; suture between ventrites 1 and 2 entire; ventrite 1 long, about 3.0 times as long as metacoxal cavity; ventrite 2 short, about 0.3 times as long as ventrite 1; ventrite 3 about 0.8 times as long as ventrite 2; ventrite 4 about 0.8 times as long as ventrite 3; ventrite 5 short, subequal in length to ventrite 4.

Legs long. Trochanters short and oblique, completely separating femora and coxae. Femora thickened, without teeth; profemur about 3.2 times as long as wide; mesofemur about 2.7 times as long as wide; metafemur about 2.3 times as long as wide. Tibiae almost straight, without uncus and mucro; with three apical spurs; protibia about 6.8 times as long as wide in middle; mesotibia about 6.5 times as long as wide in middle; metatibia about 7.9 times as long as wide in middle. Tarsi narrow, pseudoquadri segmented; tarsomere 1 long conical; tarsomere 2 short conical; tarsomeres 3 weakly bilobed; tarsomere 5 long and narrow; Claws free, strongly divergent, without teeth at base.

4. Discussion

Weevils are rare in Lower Cretaceous ambers. Only eight species from the families Nemonychidae, Belidae Schoenherr, 1826, Ithyceridae Schoenherr 1823, Scolytidae Latreille, 1804 and Curculionidae Latreille, 1802 were described from Lebanese, French, and Spanish ambers (Kuschel and Poinar, 1993; Soriano, 2009; Kirejtshuk et al., 2009a, 2009b; Peris et al., 2014). Five species of these families were found in Cenomanian Burmese amber (Poinar, 2006, 2009; Cognato and Grimaldi, 2009; Poinar and Brown, 2009; Davis and Engel, 2014; Legalov and Poinar, 2015). Two species of Rhynchitidae Gistel, 1848 and Ithyceridae were known from Upper Cretaceous, Turonian New Jersey amber (Gratshev and Zherikhin, 2000).

Inclusions in Lebanese amber are frequent and diverse, and 19 insect orders have been found there: Archeognatha, Blattodea, Coleoptera, Collembola, Dermaptera, Diptera, Ephemeroptera, Hemiptera, Hymenoptera, Isoptera, Lepidoptera, Mantodea, Neuroptera, Odonata, Orthoptera, Psocodea, Thysanoptera, Thysanura, and Trichoptera. The inclusions of Coleoptera constitute only 3% of general amount of insect inclusions (Kirejtshuk and Azar, 2013). Most insect groups in Lebanese amber indicate a hot, humid climate with arboreal and litter habitats, which corroborates with the results of palynological studies, i.e. a dense, wet and hot tropical forest. 37 beetle families have been recognized within more than 130 inclusions from Lebanese amber: Micromalthidae Barber, 1913, Carabidae Latreille, 1802, Staphylinidae Lameere, 1900 (including Scydmaenidae Leach, 1815, Ptiliidae Erichson, 1845, Hybosoridae Erichson, 1847, probable new family of the superfamily Scarabaeoidea, Scirtidae Fleming, 1821, ? Decliniidae Nikitsky, Lawrence, Kirejtshuk et Gratshev, 1994, Elodophthalmidae Kirejtshuk et Azar, 2008, Clambidae Fischer von Waldheim, 1821, Elateridae Leach, 1815, Throscidae Laporte, 1840, Libanophytidae fam. n., Chelonariidae Blanchard, 1845, Ptilodactylidae Laporte, 1836, Cantharidae Imhoff, 1856, Lymexylidae Fleming, 1821, ? Cleridae Latreille, 1802, Melyridae Leach, 1815, Dasytidae Laporte, 1840, Dermestidae Latreille, 1807, Ptinidae Latreille, 1802, Sphindidae Jacquelin du Val, 1858, Boganiid-like group (? Boganiidae Sen Guptaet Crowson, 1966), Kateretidae Erichson, 1943, Erotylidae

Latreille, 1802, Monotomidae Laporte, 1840, Latridiidae Erichson, 1842, Silvanid-like group (Silvanidae Kirby, 1837), Laemophloeidae Ganglbauer, 1899, Salpingidae Leach, 1815, Anthicidae Latreille, 1819, Melandryiidae Leach, 1815, Scraptiidae Gistel, 1848, Mordellidae Latreille, 1802, Aderidae Csiki, 1909, Nemonychidae, Scolytidae (Kirejtshuk and Azar, 2013; Kirejtshuk et al., 2015; etc.), although some inclusions remain without family attribution. The most specimens belong to the groups with arboreal habits (as found in wood and tree fungi) or associated with leaf litter and decomposing organic matter. A smaller proportion is composed of species of the groups, modern members of which are with aquatic and semiaquatic larvae, and one specimen could be "anthophagous" (i.e. Kateretidae). But only few specimens belong to the groups which could be linked with soil habits.

5. Conclusions

The finding of the new nemonychid of rather good preservation in the Lebanese amber make it possible to clarify some important structural details of three nemonychid genera and erect for them a separate tribe in the subfamily Paleocartinae. It was supported that the family Nemonychidae was rather diverse in the Mesozoic and, in the addition to the plesiomorphic clear lateral prothoracic carinae, not concealed palpi, femoral spurs, elytral epipleura and scutellar striolae, free abdominal ventrites, its Mesozoic members show appearance apomorphic fusing of segments in antennal club (as in most Recent Curculionidae), separated trasverse procoxae (as Jurassic Protoscelinae in Anthribidae and some Scolytidae), trochanters completely separating femora and coxae (as in some Apioninae and Nanophyinae from Brentidae), tarsal claws without teeth (as in most extant Curculionoidea). It can be preliminarily admitted that *Oropsis marinae* gen. et sp. nov. could be associated with some gymnosperm trees producing resin where its holotype was deposited.

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