



УДК 595.763

A NEW SPECIES OF THE GENUS *CLIDICUS* FROM THE LOWER CRETACEOUS OF FRANCE (COLEOPTERA: STAPHYLINIDAE: SCYDMAENINAE)

A.G. Kirejtshuk^{1, 2*}, S.A. Kurbatov³ and A. Nel²

¹Zoological Institute of the Russian Academy of Sciences, Universitetskaya emb., 1, 199034, Saint Petersburg, Russia; e-mail: agk@zin.ru, kirejtshuk@gmail.com

²Institut de Systématique, Évolution, Biodiversité, ISYEB – UMR 7205 – CNRS, MNHN, UPMC, EPHE, Muséum national d'Histoire naturelle, Sorbonne Universités, 57 rue Cuvier, CP 50, Entomologie, F-75005, Paris, France; e-mail: anel@mnhn.fr

³All-Russia Center for Plant Quarantine, Pogradichnaya, 32, Bykovo, Ramenskoe Reg., Moscow oblast, 140150, Russia; e-mail: pselaphidae@yandex.ru

ABSTRACT

Clidicus cretaceus sp. nov. from the Lower Cretaceous French amber of Archingeay is described. This finding is important to correct the phylogenetic hypotheses proposed for the tribe Clidicini.

Key words: *Clidicus*, Coleoptera, France, Lower Cretaceous, new species, Scydmaeninae, Staphylinidae

НОВЫЙ ВИД РОДА *CLIDICUS* ИЗ НИЖНЕГО МЕЛА ФРАНЦИИ (COLEOPTERA, STAPHYLINIDAE, SCYDMAENINAE)

А.Г. Кирейчук^{1, 2*}, С.А. Курбатов³ и А. Нель²

¹Зоологический институт РАН, Университетская наб., 1, 199034, Санкт-Петербург, Россия; e-mail: agk@zin.ru, kirejtshuk@gmail.com

²Institut de Systématique, Évolution, Biodiversité, ISYEB – UMR 7205 – CNRS, MNHN, UPMC, EPHE, Muséum national d'Histoire naturelle, Sorbonne Universités, 57 rue Cuvier, CP 50, Entomologie, F-75005, Paris, France; e-mail: anel@mnhn.fr

³Всероссийский центр карантина растений (ФГБУ ВНИИКР), ул. Пограничная, 32, пос. Бьково, Раменский район, Московская область, Россия; e-mail: pselaphidae@yandex.ru

РЕЗЮМЕ

Описан *Clidicus cretaceus* sp. nov. из нижнемелового французского янтаря из Аршинже. Эта находка важна для поправок в филогенетических гипотезах, предложенных для трибы Clidicini.

Ключевые слова: *Clidicus*, Coleoptera, Франция, нижний мел, новый вид, Scydmaeninae, Staphylinidae

INTRODUCTION

The subfamily Scydmaeninae Leach, 1815 is known as a rather old and conservative group, which has been recently treated as a subfamily of the staphylinine group of the Staphylinidae Latreille, 1802 (Grebennikov and Newton 2009). They are known in the fossil record since the late Mesozoic (Lower Cretaceous: O'Keefe et al. 1997; Kirejtshuk and Ponomarenko 2015; etc.).

The fossil record of the Scydmaeninae was reviewed by O'Keefe et al. (1997) and Newton and Franz (1998). Most taxa have been described from Baltic amber, while others have been described from Mexican, Sicilian, and Dominican amber, all of mid-Tertiary age or much younger, plus one species in Canadian amber of Late Cretaceous (Campanian) age. Since these two publications, eight more taxa have been recorded: *Aenictosoma doenitzi* Schaufuss, 1891 which was originally described in Cerambycidae Latreille, 1802 (Schaufuss 1891) from the mid-Eocene Baltic amber, but recently transferred to Scydmaeninae by Vitali (2006), and *Euroleptochromus sabathi* also from the Baltic amber (Jałoszyński 2012); *Leptochromus palaeomexicanus* O'Keefe (O'Keefe 2002) from the earliest Miocene Mexican amber; *Hapsomela burmitis* Poinar and Brown, 2004, *Ektatricha paradoxa* Chatzimanolis, Engel & Newton and *Electrotopos castaneus* Chatzimanolis, Engel & Newton, and *Kachinus antennatus* Chatzimanolis, Engel & Newton, all from the mid-Cretaceous Burmese amber (Poinar and Brown 2004; Chatzimanolis et al. 2010); *Kachinus magnificus* from the Early Cretaceous Spanish amber (Peris et al. 2014).

The tribe Clidicini Casey, 1897 was recently reviewed by Jałoszyński (2012) who, among others, proposed the most recent phylogenetic interpretation, while Castellini (1996) and O'Keefe (2002) proposed previous ones. The Clidicini are represented in the New World by *Leptochromus* Motschulsky, 1855 (recent and Lower/Middle Miocene Chiapas amber), *Papusus* Casey, 1897 (recent), *Palaeoleptochromus* O'Keefe, 1997 (Upper Cretaceous Grassy Lake amber), and in Eurasia by *Clidicus* Laporte, 1833 (recent and ?Upper Eocene Baltic amber) and *Euroleptochromus* Jałoszyński, 2012 (Upper Eocene Baltic amber), but also in Australia by *Clidicus* Laporte, 1833 (recent). According to the Jałoszyński's interpretations, the origin of this tribe could be either Laurentian part or Eurasian part of Laurasia with a

probable dispersion between them through Beringia before Campanian (in Cretaceous), or in Eocene (Jałoszyński 2012). The most detailed review of the data concerning the fossils of this group is given in the catalogue by Kirejtshuk and Ponomarenko (2015). In the present paper we describe a new species of *Clidicus* from the Lower Cretaceous, making it possible to reject the scenarios proposed in previous interpretations.

MATERIAL AND METHODS

The holotype of the new species is deposited in the Muséum National d'Histoire Naturelle (Paris). The specimen was studied using a stereomicroscope Olympus SCX9 in the Muséum National d'Histoire Naturelle, and also a stereomicroscope Leica MZ 16.0 in the Zoological Institute (Saint Petersburg).

The outcrop of Archingey is dated from the Latest Albian to Earliest Cenomanian. Perrichot et al. (2010) summarized the current knowledge on this amber locality. The consensus is of a forest very close to the sea, under a warm temperate to subtropical climate with possible short, dry periods. The flora of this locality included in that time abundant ferns and gymnosperms with some angiosperms. The resin mainly preserved biocoenoses of humid litter and soil habitats of the forest ground.

SYSTEMATICS

Family Staphylinidae Latreille, 1802

Subfamily Scydmaenidae Leach, 1815

Supertribe Mastigitae Fleming, 1821

Tribe Clidicini Casey, 1897

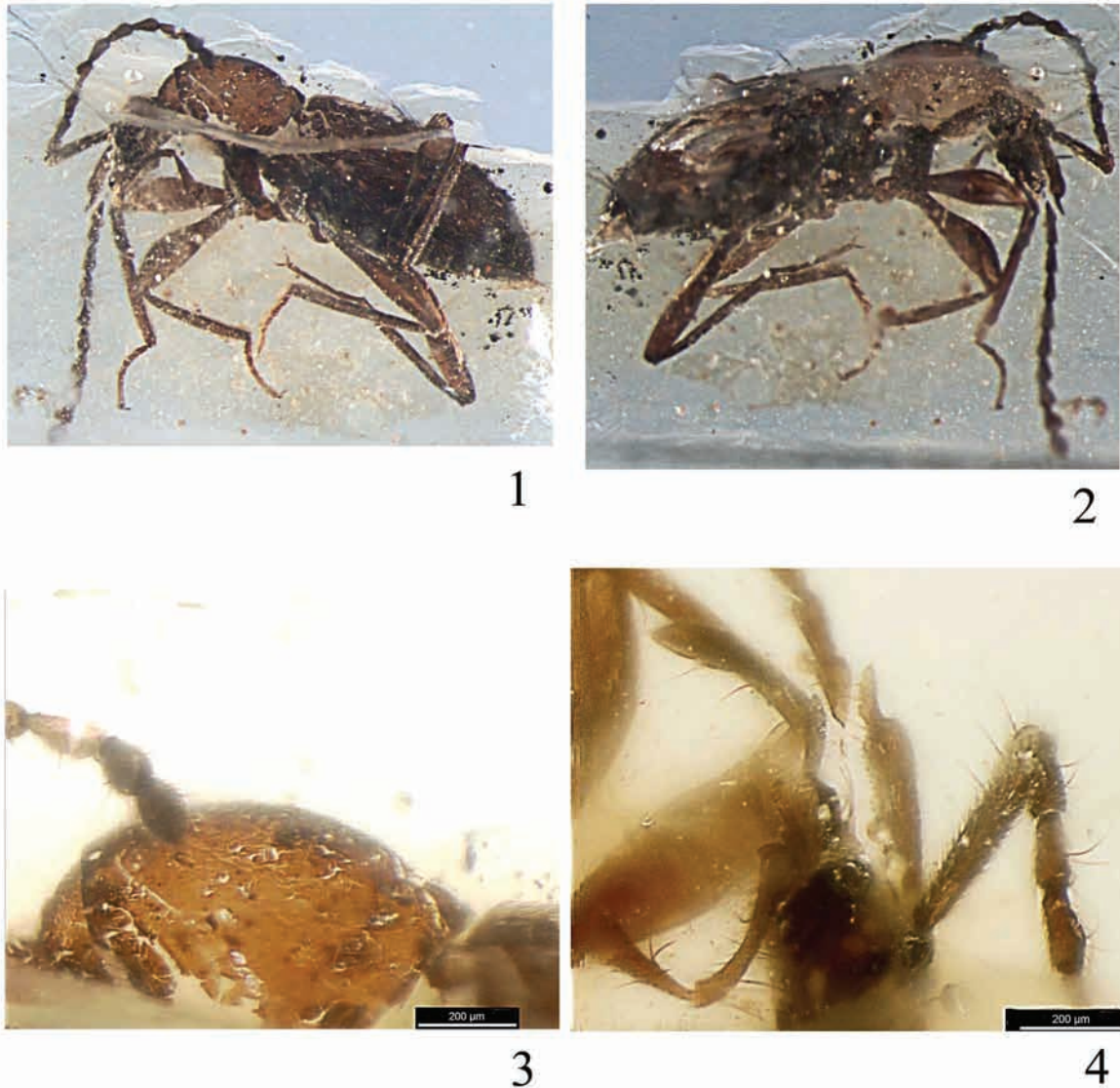
Genus *Clidicus* Laporte, 1833

Type species. *Clidicus grandis* Laporte, 1832, recent, by monotypy.

Synonym. *Erineus* Walker, 1858 (type species: *Erineus monstrosus* Walker, 1858, by monotypy).

***Clidicus cretaceus* Kirejtshuk, Kurbatov et A. Nel sp. nov.**
(Figs 1–8)

Etymology. The species epithet refers to its origin from the late Mesozoic time (Cretaceous).

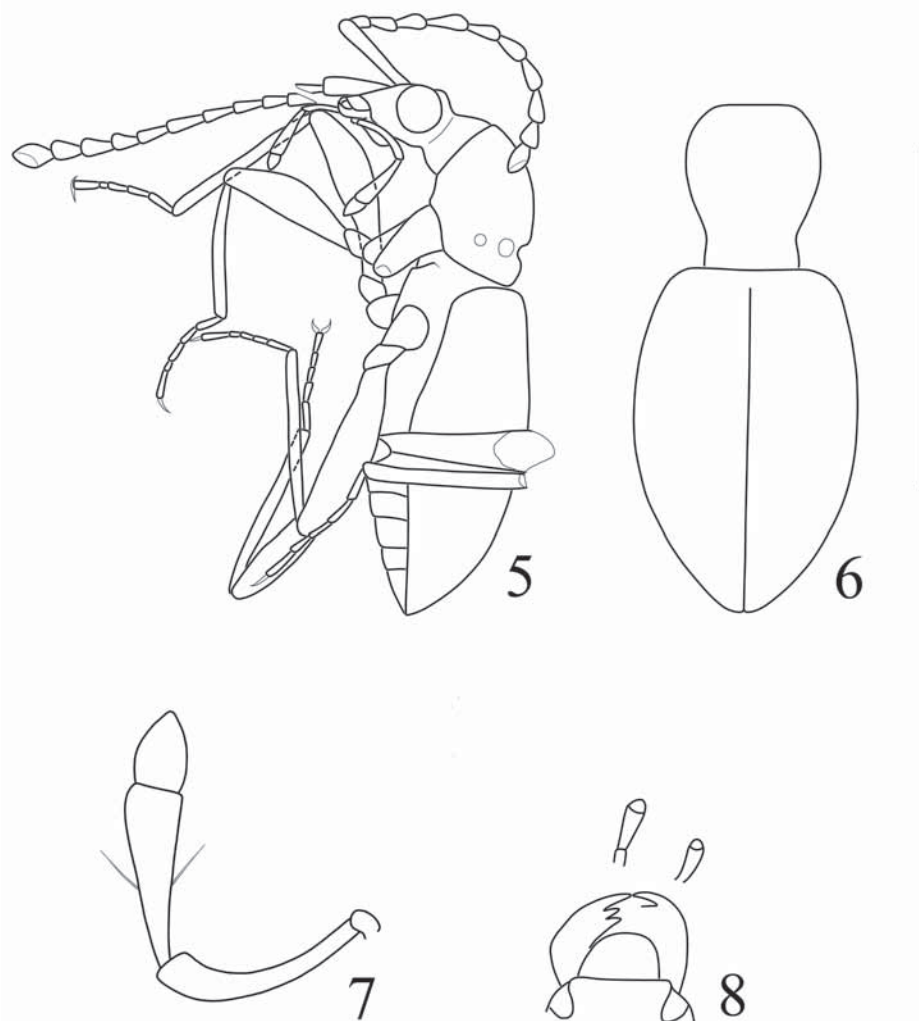


Figs 1–4. *Clidicus cretaceus* sp. nov., holotype [A52063 ('Arc 194.3 R')]; Archingeay, France; Lower Cretaceous: 1 – body, left side; 2 – body, left side; 3 – pronotum, left side; 4 – anterior part of head with appendages, anterior view. Length of specimen 2.7 mm.

Holotype. A52063 ('Arc 194.3 R'), sex unknown; flat and elongate piece of light yellow and clear amber with somewhat deformed beetle placed in Canada balsam inside elongate bar made of microscope glasses ($10 \times 5 \times 3$ mm). The beetle lacks the right half of prothorax, most part of the right elytron, and the left fore leg. The integument of elytra is covered with relatively dense setae that conceal the surface.

Description. Length 2.7, width 1.0, height about 0.8 mm. Elongate, ant-like, rather convex dorsally and

ventrally; prothorax and appendages reddish brownish; head, pterothorax and abdomen dark brown; head and prothorax nearly glabrous (only with few and very thin and long hairs on head); pterothorax and elytra with rather dense, thin and moderately conspicuous hairs; appendages with sparse, thin and short hairs. Head and pronotum without distinct punctures and alutaceous, with six very large and shallow pits (looking like suboval depressions) along posterior margin. Elytra apparently with very large and very shallow



Figs 5–8. *Clidicus cretaceus* sp. nov., holotype [A52063 ('Arc 194.3 R')]; Archingeay, France; Lower Cretaceous: 5 – body, left side; 6 – pronotum and elytra, dorsal view; 7 – maxillary base and palpus; 8 – anterior part of head with appendages, anterior view. Length of specimen 2.7 mm. Scale bar for Figs 5 and 6 = 2.0 mm.

punctures (depressions) forming not quite clear and slightly depressed longitudinal rows.

Head somewhat elongate and slightly declined (prognathous), slightly convex dorsally, somewhat narrower than pronotum and with clear “neck” which is narrower than base and main part of epicranium, temples between eyes and “neck” very short and sharply narrowing, with very large, oval, vertical and coarsely faceted eyes (diameter of eyes about half as great as entire length of head); antennal insertions between anterior parts of eyes. Labrum well exposed, visible only obliquely from side. Mandibles moderately exposed, apparently of usual structure (gently

curving along outer edge and tridentate at apex and with longest outer tooth), visible also only obliquely from side. Antennae longer than head and prothorax combined and reaching anterior fourth of elytra, 11-segmented, scape very long (markedly longer than antennomeres 2–4 combined); antennomere 2 shortest and subconical; antennomeres 3–10 subequal in length and shape, subconical (although antennomeres 8–10 somewhat thicker at apex); ultimate antennomere slightly longer than subovoid antennomere 2 and with obliquely truncate apex (appearing somewhat pointed). Pronotum much narrower than combined elytral bases, clearly longer than thick,

apparently regularly convex in cross-section, sides without any trace of carina, anterior and posterior edges subtruncate to slightly convex, widest just before the middle and slightly laterally concave between middle and base because of transverse anterobasal row of pits. Scutellum not visible clearly, apparently very small and subtruncate at apex. Elytra nearly 1.5 times as long as wide combined, longest at suture and broadly arcuate along sides, rather convex along middle and steeply sloping and somewhat declined on ventral side (lateral edges not visible dorsally), with weakly marked shoulders, adsutural lines not visible. Pygidium not exposed from under elytral apices.

Mentum rather large and subquadrangular, but its outline not clearly visible. Maxillary palpi four-segmented, palpomeres 2 and 3 comparable in length, palpomere 2 subcylindrical and palpomere 4 somewhat thickening toward oblique apex, palpomere 4 very short (about 2/7 as long as previous one) and with acute apex. Labial palpomeres 3-segmented, palpomere 2 clearly thickening apically; ultimate palpomere very short and pointed at apex. Procoxae rather large and very long projecting; apparently contiguous. Mesocoxae large and oval, long projecting and apparently contiguous. Metaventrite medially convex. Metacoxae contiguous and transverse and apparently of usual shape. Abdomen with five ventrites, ventrite 1 somewhat shorter than hypopygidium and much longer than each of ventrites 2–4 (the latter comparable in length); hypopygidium widely rounded at apex. Epipleura apparently rather narrow and elevated laterally.

Legs rather narrow and very long. Trochanters moderately large and elongate. Tibiae very narrow and comparable in shape; somewhat narrower than antennal club, pro- and mesotibiae somewhat shorter than metatibia. Femora of usual shape and moderately thickened at middle. Tarsi nearly 2/3 as long as corresponding tibiae, tarsomeres 1–4 simple or very narrowly lobed, tarsomere 4 somewhat shorter than each of other tarsomeres; claws simple and about 2/3 as long as ultimate tarsomere.

Diagnosis. The new species is interpreted as a member of *Clidicus* after its definition by O’Keele (2002) due to the distinct longitudinal rows of punctures which are slightly depressed (striate sculpture is visible in the fossil specimen only from a certain aspect) and weakly clavate femora. By its body size, this new species corresponds to recent *Clidicus aliquantulus* Jałoszyński, Hlaváč et Nomura, 2003 with

the body length 3.0–3.2 mm. However, in contrast to the latter, *Clidicus cretaceus* sp. nov. has much longer antennomeres, particularly antennomere 1 more than five times as long as wide (in *C. aliquantulus* it is about four times as long as wide), antennomere 3 nearly twice as long as wide (in *C. aliquantulus* it is scarcely longer than wide), antennomeres 4–9 about twice as long as wide (in *C. aliquantulus* antennomere 4 is slightly longer than wide, antennomeres 5–7 are subquadrate, antennomeres 8 and 9 are slightly wider than long), antennomere 10 nearly 1.5 times as long as wide (in *C. aliquantulus* antennomere 10 is subquadrate). The larger recent congeners (about 5 mm long) have shorter antennomeres than in the new species, i.e. in these recent species, the antennomeres, beginning from antennomere 2, are only slightly longer than wide, but in the larger species (larger than 5 mm) the respective antennomeres show a tendency to be longer (more than 1.5 times as long as wide: *C. monstrosus* (Walker, 1856) and some undescribed species from South East Asia). The new species seems to differ from *C. balticus* Schaufuss, 1896 (with lost type specimen) in the much smaller body size, gentler lateral outline of elytra and proportions of metatarsi.

DISCUSSION

The new finding of the genus *Clidicus* made it possible to verify the scenarios of phylogeny proposed by Jałoszyński (2012). Before the present study only one fossil species of Clidicini was recorded from Europe (Eocene *Euroleptochromus sabathi* Jałoszyński, 2012) while other fossil clidicines were known from Asia and North America. Therefore, this author after analysis of distribution of modern and available fossil species supposed that the main events of phylogeny of the tribe Clidicini happened in the areas of the origin of these fossil materials and the Beringian bridges were treated by him as the main possible factor of dispersing for ancient members of the tribe. *Clidicus cretaceus* sp. nov. shows that this tribe already lived in Europe in the Lower Cretaceous time. It could also be supposed that the first appearance of the tribe and its early differentiations took place at least before the Latest Albian to Earliest Cenomanian (age of French Cretaceous amber: Perrichot et al. 2010) and also before the occurrence of two possible trans-Beringia dispersals. The finding of this tribe in the Upper Cretaceous Canadian amber (Campanian: McKellar and Wolfe 2010) cannot be interpreted as an evidence of

a Laurasian origin of the clidicines. The discovery of Lower Cretaceous Clidicini is in accordance of a great general diversity of scydmanines in Lebanese amber dated as the oldest Lower Cretaceous amber (Barremian – lowermost Aptian age of Lebanese amber: Kirejtshuk and Azar 2008, 2013; etc.) and other amber sources of comparable age (O’Keefe et al. 1997; Poinar and Brown 2004; etc.). The infraorder Staphyliniformia (together with Scarabaeiformia) is in general characterized by comparatively early diversifications and long-term structural constancy (Krell 2000; Clarke and Chatzimanolis 2009; Chatzimanolis et al. 2013; etc.), which is consistent with a considerable diversity and presence in the Cretaceous faunas of the scydmaenine genera which are still represented in the modern fauna.

The holotype of *Clidicus balticus* should be regarded as lost. We here used the original description of that species to compare with *C. cretaceus* sp. nov. However, Jałoszyński (2012) regarded that the description of *C. balticus* does not allow “to confirm the placement of this species in *Clidicus* or even within Clidicini” (Jałoszyński 2012: p. 347). Besides, Vitali (2006) has put in this tribe *Aenictosoma doenitzi* Schaufuss, 1991 (initially proposed as a member of Cerambycidae), although because of the type specimen of this species is also now not accessible, its correct interpretation is scarcely possible.

ACKNOWLEDGEMENTS

Polina A. Kirejtshuk (daughter of the senior author, Saint-Petersburg) assisted in preparation of the illustrations for this paper. The studies of the first author were partly carried out under the framework of the Russian state research project no. 01201351189, Programme of the Presidium of the Russian Academy of Sciences “Problems of the origin of life and formation of the biosphere” and the Russian Foundation of Basic Research (grant 15-04-02971-a). We sincerely thank the anonymous referee for his very useful remarks on the first version of the paper.

REFERENCES

- Castellini G. 1996.** Revisione del genere *Leptomastax* Pirazzoli, 1855 (Coleoptera, Scydmaenidae). *Atti del Museo Civico di Storia Naturale di Grosseto*, **15**(1994): 1–137.
- Chatzimanolis S., Engel M.S., Newton A.F. and Grimaldi D.A. 2010.** New ant-like stone beetles in mid-Cretaceous amber from Myanmar (Coleoptera: Staphylinidae: Scydmaeninae). *Cretaceous Research*, **31**: 77–84.
- Chatzimanolis S., Newton A., Soriano C. and Engel M.S. 2013.** Remarkable stasis in a phloeocharine rove beetle from the Late Cretaceous of New Jersey (Coleoptera, Staphylinidae). *Journal of Paleontology*, **87**: 177–182.
- Clarke D.J. and Chatzimanolis S. 2009.** Antiquity and long-term morphological stasis in a group of rove beetles (Coleoptera: Staphylinidae): Description of the oldest *Octavius* species from Cretaceous Burmese amber and a review of the “Euaesthetine subgroup” fossil record. *Cretaceous Research*, **30**(6): 1426–1434.
- Grebennikov V.V. and Newton A.F. 2009.** Good-bye Scydmaenidae, or why the ant-like stone beetles should become megadiverse Staphylinidae sensu latissimo (Coleoptera). *European Journal of Entomology*, **106**: 275–301.
- Jałoszyński P. 2012.** Description of *Euroleptochromus* gen. n. (Coleoptera, Staphylinidae, Scydmaeninae) from Baltic amber, with discussion of biogeography and mouthpart evolution within Clidicini. *Systematic Entomology*, **37**(2): 346–359.
- Kirejtshuk A.G. and Azar D. 2008.** New taxa of beetles (Insecta, Coleoptera) from Lebanese amber with evolutionary and systematic comments. *Alavesia*, **2**: 15–46.
- Kirejtshuk A.G. and Azar D. 2013.** Current knowledge of Coleoptera (Insecta) from the Lower Cretaceous Lebanese amber and taxonomical notes for some Mesozoic groups. *Terrestrial Arthropod Reviews*, **6**(1–2): 103–134.
- Kirejtshuk A.G. and Ponomarenko A.G. 2015.** Catalogue of fossil Coleoptera. Beetles (Coleoptera) and Coleopterologists. Zoological Institute of the Russian Academy of Sciences, St. Petersburg. Updated March 2015 [updated at <http://www.zin.ru/Animalia/Coleoptera/eng/paleosys.htm>].
- Krell F.-T. 2000.** The fossil record of Mesozoic and Tertiary Scarabaeoidea (Coleoptera: Polyphaga). *Invertebrate Taxonomy*, **14**: 871–905.
- McKellar R.C. and Wolfe A.P. 2010.** Canadian amber. In: D. Penney (Ed.). Biodiversity of fossils in amber from the major world deposits. Siri Scientific Press, Manchester: 96–113.
- Newton A.F. and Franz H. 1998.** World catalogue of the genera of Scydmaenidae. *Koleopterische Rundschau*, **68**: 137–165.
- O’Keefe S.T. 2002.** Revision of the Neotropical genus *Leptochromus* Motschulsky (Coleoptera: Scydmaenidae). *Systematic Entomology*, **27**: 211–234.
- O’Keefe S.T., Pike T. and Poinar G. 1997.** *Palaeoleptochromus schaufussi* (gen. n., sp. nov.), a new antlike stone beetle (Coleoptera: Scydmaenidae) from Canadian Cretaceous amber. *The Canadian Entomologist*, **129**: 379–385.
- Peris D., Chatzimanolis S. and Delclòs X. 2014.** Diversity of rove beetles (Coleoptera: Staphylinidae) in Early Cretaceous Spanish amber. *Cretaceous Research*, **48**: 85–95.

- Perrichot V., Néraudeau D. and Tafforeau P. 2010.** Charentese amber. In: D. Penney (Ed.). Biodiversity of fossils in amber from the major world deposits. Siri Scientific Press, Manchester: 192–207.
- Poinar G. Jr. and Brown A.E. 2004.** A new subfamily of Cretaceous antlike stone beetles (Coleoptera: Scydmaenidae: Hapsomelinae) with an extra leg segment.

Proceedings of the Entomological Society of Washington, **106**: 789–796.

- Schaufuss C. 1891.** Preußens Bernstein-Käfer. I. *Berliner Entomologische Zeitung*, **36**: 53–64.

- Vitali F. 2006.** About *Aenictosoma doenitzi* Schaufuss, 1891 (Coleoptera, Cerambycidae, Scydmaenidae). *Spixiana*, **29**, 99–101.

Submitted September, 2, 2015; accepted October, 29, 2015.