First record of the family Belidae (Insecta, Coleoptera) in amber. New genus and species from the uppermost Albian amber of France

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Soriano C. 2009. — First record of the family Belidae (Insecta, Coleoptera) in amber. New genus and species from the uppermost Albian amber of France. *Geodiversitas* 31 (1): 99-104.

KEY WORDS
Insecta,
Coleoptera,
Belidae,
amber,
SW France,
Archingeay,
Lower Cretaceous,
uppermost Albian,
new genus,
new species.

ABSTRACT
Until now, fossil weevils of the family Belidae were unknown from fossil resin deposits. In this article, *Gratshevbelus erici* n. gen., n. sp. is described a from the Lower Cretaceous (uppermost Albian) amber deposits of south-western France. Recent members of this family are present only in the southern hemisphere, therefore this new finding in northern deposits helps to better understand the first stages of the radiation of this group during the Late Mesozoic.

MOTS CLÉS
Insecta,
Coleoptera,
Belidae,
ambre,
SW France,
Archingeay,
Crétacé inférieur,
Albien terminal,
genre nouveau,
espèce nouvelle.

RÉSUMÉ
Première découverte de Belidae (Insecta, Coleoptera) dans l'ambre. Une nouvelle espèce et un nouveau genre de l'ambre albien terminal de France.
Jusqu'à présent, aucun charançon fossile de la famille des Belidae n'était connu dans des dépôts d'ambre. Dans cet article, est décrite une espèce inédite d'un nouveau genre (*Gratshevbelus erici* n. gen., n. sp.) provenant de l'ambre du Crétacé inférieur (Albien terminal) du Sud-Ouest de la France. Les représentants actuels de cette famille ne sont présents que dans l'hémisphère sud, cette nouvelle découverte dans des dépôts septentrionaux d'Europe nous aide à mieux comprendre les premiers stades de la radiation de ce groupe au cours du Mésozoïque supérieur.

INTRODUCTION

Until today, nearly all families of Recent Curculionoidea Latreille, 1802 and one extinct family (Ulyanidae Zherikhin, 1993) have been described or cited in Lower Cretaceous deposits (Zherikhin & Gratshev 1995; Soriano *et al.* 2006). Most of these records belong to lithographic limestone deposits, with more than 50 genera from six families described. The most diverse outcrops of weevil species are Karatau in the Oxfordian of Kazakhstan and El Montsec in the Barremian of Spain (Soriano *et al.* 2006).

Although amber deposits from the Lower Cretaceous are usually very rich in insect inclusions, the beetle fauna preserved in such resins use to lack representatives of the Curculionoidea families. To date, Lower Cretaceous fossil resins weevils are only represented in the fossil resins by one single species of Nemonychidae Bedel, 1881 (*Libanorhinus succinus* Kuschel & Poinar, 1993) from the Lower Cretaceous of Lebanon (Kuschel & Poiinar 1993). In the Lower Cretaceous Spanish amber deposits no weevil specimen has yet been recorded (Delclòs *et al.* 2007; Peñalver *et al.* 2007).

Nowadays the family Belidae Schoenherr, 1826 is considered as a relict group of weevils, distributed in Australia, New Zealand, South and Central America and Africa. Until now, there have been only fossil members of this family described or recognized in Mesozoic deposits, with 18 species in nine genera (Appendix) from the Upper Jurassic of Kazakhstan to the Lower Cretaceous of France. The most diverse outcrop concerning belids (and curculionoids in general) is Karatau in Kazakhstan, with up to five genera with 12 species described. To date, there is no record of belids neither in Cretaceous nor in Cenozoic amber deposits.

In 1977, Arnoldi described 15 new genera of weevils from the Upper Jurassic of South Kazakhstan, placing them in a new family called Eobelidae. Since then, the systematic position of this family has been frequently discussed (Kuschel 1983; Zimmerman 1994; Zherikhin & Gratshev 1995, 1997), and finally Zherikhin & Gratshev (1995) placed these genera among the families Nemonychidae and Belidae. In this manuscript, the systematic disposal of the Belidae (comprising the subfamily Eobelinae Arnoldi, 1977) proposed by Zherikhin & Gratshev (1995, 1997) is followed.

The new weevil specimen described here was discovered in the Albian amber deposits of Archingeay-Les Nouillers, from southwest France (Néraudeau *et al.* 2002). In these deposits, beetle remains are not very frequent, and most parts correspond to partially disarticulated exemplars. Even so, in recent years a new genus and species was described of the family Ripiphoridae Gemminger & Harold, 1870 (Perrichot *et al.* 2004), and recent discoveries have shown the presence of cucujoid, staphylinids and elaterids among other families.

MATERIAL AND METHODS

The amber piece with the specimen described in this manuscript was prepared according to the technique described in Perrichot *et al.* (2004), and studied and reconstructed under incident light with a camera lucida attached to a Leica MS5 stereomicroscope. Photographs were taken with a Nikon Coolpix 4500 digital camera attached to the microscope.

SYSTEMATICS

Order COLEOPTERA Linnaeus, 1758
Suborder POLYPHAGA Emery, 1886
Superfamily CURCULIONOIDEA Latreille, 1802
Family BELIDAE Schoenherr, 1826
Subfamily EOBELINAE Arnoldi, 1977

Genus *Gratshevbelus* n. gen.

TYPE AND ONLY SPECIES. — *Gratshevbelus erici* n. gen., n. sp.

ETYMOLOGY. — Genus named in memory of the Russian paleocoleopterologist V. G. Gratshev.

TYPE HORIZON. — Lower Cretaceous, uppermost Albian (Néraudeau *et al.* 2002).

TYPE LOCALITY. — Archingeay-Les Nouillers, Charente-Maritime, SW France.

DIAGNOSIS. — The placement of this new genus among the Eobelinae is supported by the following characters:

elongated body, rostrum longer than head and pronotum together, antennal insertion located in the first third of the rostrum length, middle and hind tibiae with apical spurs and flattened elytra and ventrites. Medium-sized eobelines with pronotum and elytra distinctly and densely tuberculate. Differs from all of the Eobelinae genera already described by the distinct clavate hind femora. The broadened foretarsi resembles *Archaeorrhynchus* Martynov, 1926 and *Montsecbelus* Zherikhin & Gratshev, 1997, but the rostrum length in *Gratshevbelus* n. gen. is much shorter than in *Archaeorrhynchus*, and it lacks the characteristic dense punctation of *Montsecbelus*.

DESCRIPTION

Body of small size, elongate. Rostrum longer than head and pronotum combined, slender, almost straight; frons forming almost right angle with rostral base. Free labrum probably absent. Mandibles small and narrow, weakly projecting forwards. Antennae inserted in apical third of rostrum, first antennal segment not incrassate, almost equal to the second; funicular segments longer than broad, gradually shortening to club; last three antennal segments form a loosely three-segmented, long and rather broad fusiform club. Head moderately large; eyes relatively large, wider than rostrum, sub-oval and lateral in position; temples about as long as eyes. Pronotum transverse with basal arcuate emargination, densely and shallowy granulose. Forecoxae and midcoxae round, hind coxae reaching elytral margin. Elytra elongate, sides almost parallel, with coarse granulation. Abdominal ventrites almost equal in length. Forefemora relatively wide, almost three times wider than foretibiae; midfemora elongated, weakly clavate; hind femora broader and shorter, strongly widened at mid-length. Midtibiae straight, apparently covered by fine hairs; hind tibiae straight. Mid- and hind tarsi with first segment wider than the second, third distinctly bilobed.

Gratshevbelus erici n. sp.
(Fig. 1)

ETYMOLOGY. — Species named after the collector of the amber piece, Éric Dépré.

HOLOTYPE. — ARC328.2, inclusion of a complete beetle, collected by Éric Dépré; deposited in the Muséum national d'Histoire naturelle, Paris.

DIMENSIONS. — Body length including rostrum 2.8 mm, excluding rostrum 2.2 mm.

DESCRIPTION

Rostrum slightly longer than head and pronotum combined and 6 times longer than wide, nearly parallel-sided, and without noticeable punctation. Antennae inserted at apical third of length of rostrum; first antennal segment almost as wide as the second, and 1.4 times longer, somewhat widened distally, and about 3 times longer than broad; funicular segments almost parallel-sided, first two segments equal in length, about 2.3 times longer than broad, third to fifth 1.2 times shorter than first and second, sixth and seventh 1.3 times shorter and gradually narrowed; club as long as the previous four segments combined, maximum width 2 times the width of last funicular segment; first two segments of the club almost conical, first almost as wide as long, second slightly wider than long, third club segment oviform and rounded at apex, about 1.4 times longer than the second. Frons without noticeable punctation. Pronotum 1.2 times as long as wide, with basal arcuate emargination, with dense and very small tubercles on the dorsal part. Elytra 2.6 times as long as wide, and 2.7 times longer than pronotum, elongate-oval, with acute apical angles, lateral margins almost straight, moderately densely tuberculate. Abdominal sterna without noticeable punctation, all ventrites sub-equal in length. Femora covered with fine pilosity; forefemora slightly shorter than pronotum, midfemora much longer and elongated, weakly clavate; hind femora slightly shorter and strongly clavate, widened at their medial last part. Tibiae about as wide as rostrum, with very dense and fine pubescence. Mid- and hind tarsi slightly longer than midtibiae; first tarsal segment triangular, 1.4 times longer than wide, wider at apex, second almost as long as wide at apex, third as long as the second.

DISCUSSION

All recent species of Belidae are nowadays restricted to the southern hemisphere (mainly in South America, Australia, New Guinea and certain parts

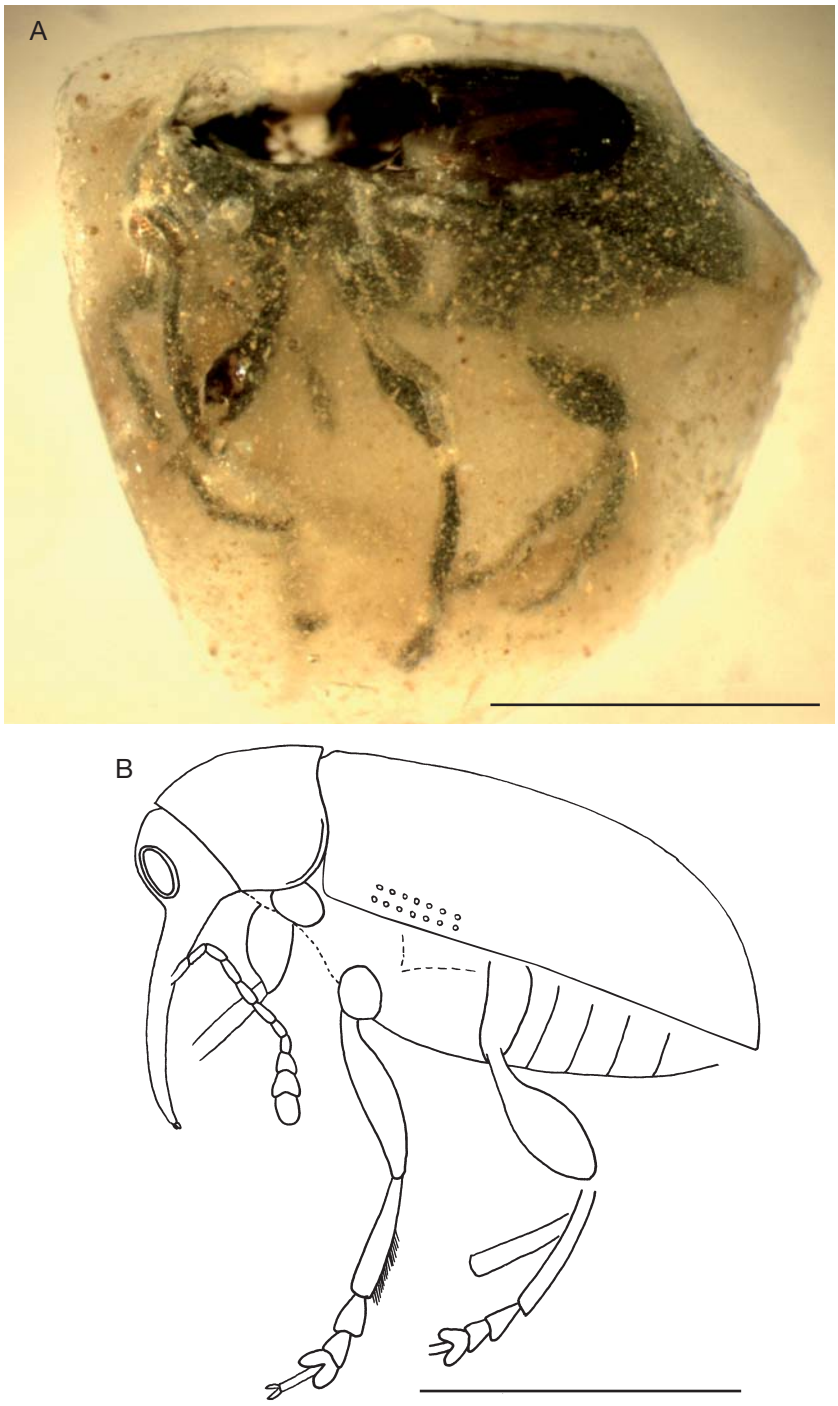

Fig. 1. — *Gratshevbelus erici* n. gen., n. sp., holotype ARC328.2: **A**, photograph; **B**, camera lucida drawing. Scale bars: 1 mm.

of Africa). Even so, the first record of belids is in the outcrop of Karatau, from the Upper Jurassic of Kazahstan (Arnoldi 1977), and they are unevenly represented in at least five outcrops from the Upper Jurassic to Lower Cretaceous of Asia, Europe and South America (Zherikhin & Gratshev 2004; Liu *et al*. 2006; Soriano *et al*. 2006), and until now, no belids have been recorded in Tertiary deposits. Thus, the most parsimonious hypothesis is that the belids originated in Laurasia, and then radiated to other latitudes, being restricted nowadays in certain places of the southern hemisphere. This phenomenon is known not only in this family, but also in other families such as Cupedidae Laporte, 1836 (e.g., genus *Tetraphalerus* Waterhouse, 1901, with Asian and European distributions during the Upper Jurassic-Lower Cretaceous, and recent representatives confined to certain parts of South America).

The absence of belids nowadays in the northern hemisphere may be explained by the radiation of "modern" families of weevils (e.g., Curculionoidea), and the increment of ecological pressure in ecosystems, and the decline of the "ancient" forms such as Belidae.

Acknowledgements
First of all, I would like to thank V. Perrichot and D. Néraudeau for the possibility to study the beetle specimens of the Lower Cretaceous French amber deposits. My gratitude also to A. G. Ponomarenko and Steeve Davis for the comments that helped to improve the quality of this paper. This study is a contribution to the "Acción Integrada Hispano-Francesa HF2004-0053" and a part of the projects of the Ministry of Education and Science of Spain: CGL2005-00046/BTE, and the Agence nationale de la Recherche (ANR) project AMBRACE no. BLAN07-1-184190.

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Submitted on 6 December 2007;
accepted on 5 February 2009.

APPENDIX

List of localities with representatives of Belidae.

Khetana. Left bank of Khetana river (tributary of Ul'ya river), upstream of mouth of Snezhny Creek, Okhotsky District, Khabarovsky region, NE Siberia, Russia; Lower Cretaceous, Middle Albian; Uchulikanskaya and Emanrinskaya Fms.
Auletomacer disruptus Zherikhin, 1993; *Belonotaris retardatus* Zherikhin, 1993; *Khetana decapitata* Zherikhin, 1993.

Santana do Carirí. South margin of Chapada do Araripe, NE Brazil; Lower Cretaceous, Aptian-Albian; Crato Fm.
Davidibelus cearensis Zherikhin & Gratshev, 2004.

Yixian. Daxinfangzi and Chaomidian villages, Chaoyang, 25 km SE of Beipiao city, Lingyuan Country, West Liaoning Province, China; Lower Cretaceous, Yixian Fm.
Microprobelus liuae Liu *et al*., 2006.

Montsec. Quarry near Rubies, Sta. Maria de Meià, Sierra del Montsec, Lleida Province, Spain; Lower Cretaceous, Barremian; Calcaires lithographiques à plantes et vertébrés de la Pedrera de Rubies Fm.
Montsecbelus (*Eobelus*) *solutus* Whalley & Jarzembowski, 1985; Zherihin & Gratshev 1995.

Karatau. Mikhailovka, Galkino, Tchokhaj, Kara-Bas-Tau, right bank of Kashkar-Ata River valley, outcrops near villages of Kitaevka and Uspenovka, Kara-Tau Range, Algabass District, Chimkent oblast, Kazakhstan; Upper Jurassic, ?Oxfordian; Karabastau Fm.
Archaeorrhynchus acutirostris Arnoldi, 1977; *A. latitarsis* Arnoldi, 1977; *A. paradoxopus* Arnoldi, 1977; *A. tenuicornis* Martynov, 1926; *Belonotaris lineatipunctatus* Arnoldi, 1977; *B. karatavicus* Arnoldi, 1977; *B. punctatissimus* Arnoldi, 1977; *Eobelus longipes* Arnoldi, 1977; *Nanophydes ovatus* Arnoldi, 1977; *Probelopsis acutiapex* Arnoldi, 1977; *Probelus curvispinus* Arnoldi, 1977; *P. longitarsus* Arnoldi, 1977; *P. tibialis* Arnoldi, 1977.