

New beetles (Insecta: Coleoptera) from the Berriasian Purbeck Limestone Group, Dorset, UK

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Abstract

Four new beetle species are described from the Lower Cretaceous Purbeck Limestone Group of southern England: *Mesogyrus anglicus* sp. nov. (Gyrinidae), *Coptoclavella purbeckensis* sp. nov. (Coptoclavidae), *Palaeodytes incompleta* sp. nov. (Dytiscidae) and *Cretorabus sulcatus* sp. nov. (Carabidae). The first three taxa were aquatic; the last is terrestrial but may have frequented the margins of water bodies.

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1. Introduction

The basal Cretaceous Purbeck Limestone Group consists predominantly of lagoonal sediments best exposed in eastern Dorset, UK. Fossil insects occur in many beds, usually in a fragmentary condition. Beetles are numerically the most abundant Purbeck insect order, being represented by several thousand specimens, the majority isolated elytra. Westwood (1854) described numerous taxa, most of which would benefit from re-examination. A single new genus has been described since (Gratshev et al., 1998), and several families figured without formal description by Coram et al. (1995) and Ponomarenko et al. (2000). This paper describes four new species belonging to the extant suborder Adephaga in the families Gyrinidae, Coptoclavidae, Dytiscidae and Carabidae, all

collected from the Purbeck type section at Durlston Bay (National Grid Reference SZ 035 773–SZ 040 786).

2. Palaeoecology

The Gyrinidae, Dytiscidae and Coptoclavidae are predatory aquatic families, the first two being still extant. Their fossil remains in the Purbeck occur in brackish-water deposits containing other aquatic insects including Heteroptera, Diptera and Trichoptera (Coram and Jarzembowski, 2002). The rarity and incompleteness of the gyrinid and dytiscid remains suggest that they were transported from other (probably fresher) habitats. The more completely preserved coptoclavids may have lived as adults in the depositional water body, although the absence of fossilised pre-imaginal stages suggests that they did not breed there; this situation is seen in other mid-Mesozoic lagoonal deposits, for example the Tithonian Solnhofen Limestone of Germany (Ponomarenko, 1985).

Extant carabids are terrestrial predators. Although relatively common as fossils in the Purbeck, their

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remains, in common with most other terrestrial insects, are almost always completely disarticulated, probably because the Purbeck depositional sites were usually some distance (several kilometres) from well-vegetated insect habitat (Coram, 2003). Some Recent carabids, however, frequent shorelines and the rare, more complete Purbeck carabid remains may represent individuals that lived on the wide and comparatively barren beaches and flats around the Purbeck water bodies.

3. Systematic palaeontology

The specimen repositories are Maidstone Museum and Bentlif Art Gallery, Maidstone, Kent (MNEMG) and Booth Museum of Natural History, Brighton, Sussex (BMB).

Class: Insecta L., 1758

Order: Coleoptera L., 1758

Family: Gyrinidae Latreille, 1810

Genus *Mesogyrus* Ponomarenko, 1973

Type species. *Mesogyrus striatus* Ponomarenko, 1973

Diagnosis. The genus is distinguished by the apically truncated elytra and impunctate striae.

Included species. In addition to the species described below: *M. striatus* Ponomarenko, 1973 from the Lower Cretaceous of Transbaikalia; *M. antiquus* Ponomarenko, 1973 from the Upper Jurassic of Kazakhstan; and *M. sibericus* Ponomarenko, 1985 from the Middle Jurassic of Siberia.

Mesogyrus anglicus sp. nov.

Fig. 1

2000 Gyrinid beetle, aff. *Mesogyrus*; Ponomarenko, Coram and Jarzembowski, p. 109, fig. 5.

Derivation of name. After England.

Material. Holotype MNEMG 2000.33; Clements' (1993) Bed DB175, Corbula beds, Durlston Formation; Durlston Bay, Swanage, Dorset; Upper Berriasian; collected by R.A. Coram.

Diagnosis. Distinguished by apical bend of third and fourth elytral striae (from suture). This character is unknown in any other gyrinids. The shape of the elytron is intermediate between *Mesogyrus* and *Cretotortor*, but the last is known only from the uppermost Cretaceous and Palaeocene.

Description. Medium size convex right elytron. Elytron twice as long as wide, apical part truncated obliquely. There are nine whole and one short scutellar

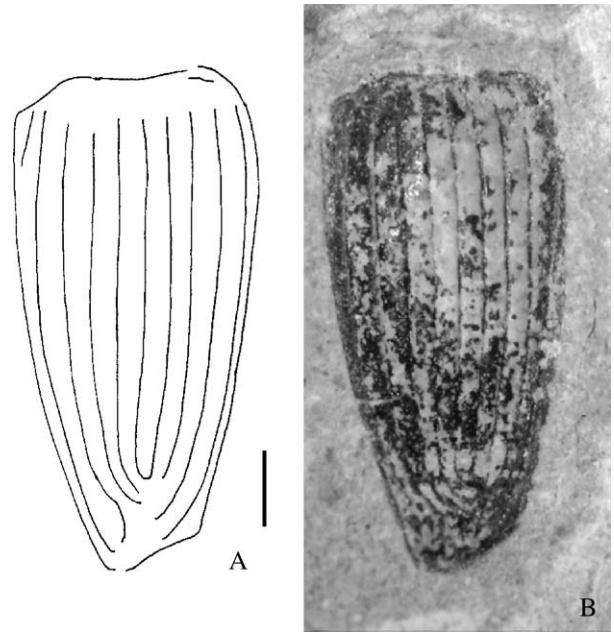


Fig. 1. A, B, *Mesogyrus anglicus* sp. nov., holotype MNEMG 2000.33; Durlston Bay, Upper Berriasian. Scale bars in all figures represent 1.0 mm.

elytral striae: the first two form a long apical loop, the fourth and third meet apically, the fifth meets with the sixth, the eighth and ninth striae bend across the elytron tip towards the sutural margin.

Dimensions. Length of elytron 6.7 mm, width of elytron 3.1 mm. Estimated total length of beetle about 10 mm.

Family: Coptoclavidae Ponomarenko, 1961

Genus *Coptoclavella* Ponomarenko, 1980

Type species. *Coptoclavella minor* Ponomarenko, 1980

Diagnosis. The incomplete specimens are assigned to the genus *Coptoclavella* on the basis of indirect characters only: the elongate-oval shape of the body, relatively small size, hind coxae with very big plates, wing venation visible through thin semi-transparent elytra. The same characters can be seen in *Amblycephalonius* Bode, 1953, from the Jurassic (Toarcian) of Germany, but this beetle has a much larger head.

Included species. In addition to the species described below: *C. elegans* Ponomarenko, 1980, *C. striata* Popov, 1986, *C. vittata* Popov, 1986 from the Lower Cretaceous of Mongolia; and *C. minor* Ponomarenko, 1980 from the Lower Cretaceous of Mongolia and Transbaikalia.

Coptoclavella purbeckensis sp. nov.

Figs. 2, 3



Fig. 2. *Coptoclavella purbeckensis* sp. nov., holotype MNEMG 2003.17; Durlston Bay, Upper Berriasian. A, line drawings of part and counterpart (elytral pigmentation omitted). B, photograph.

Derivation of name. From the Isle of Purbeck, Dorset.

Material. Holotype MNEMG 2003.17 (part and counterpart). Possibly also MNEMG 2000.32 (part and counterpart), beetle lacking head, prothorax and legs, and isolated elytra. Clements' Bed DB175, Corbula beds, Durlston Formation; Durlston Bay, Swanage, Dorset; Upper Berriasian; collected by R.A. Coram.

Diagnosis. The species is distinguished by its short and wide head.

Description. Head, body and incomplete legs of medium size beetle. Length of head half its width. Apodeme of eyes round. Pronotum broad, widest at base, narrowing anteriorly. Length of pronotum half its width. Anterior angles of pronotum acute, prolonged, posteriorly rounded. Middle coxae relatively large, separated. Metepisternae triangular and widened anteriorly, impinging on the middle coxal cavities. Metasternum wider than long. Hind coxae broad, with large coxal plates. Elytra three times as long as

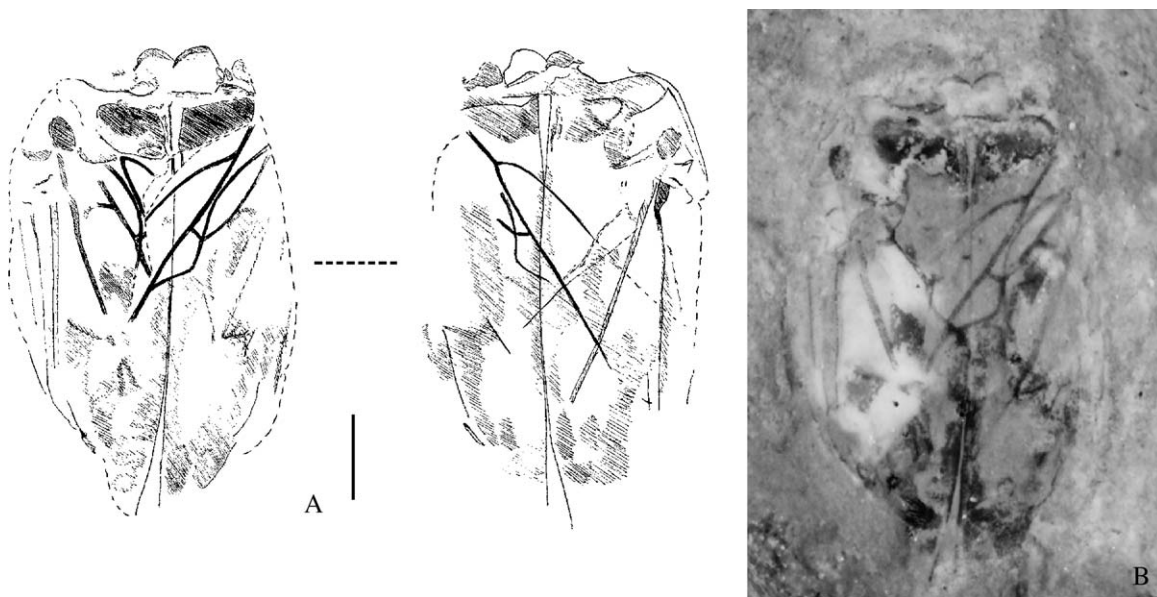


Fig. 3. Cf. *Coptoclavella purbeckensis* sp. nov., MNEMG 2000.32; Durlston Bay, Upper Berriasian. A, line drawings of part and counterpart. B, photograph.

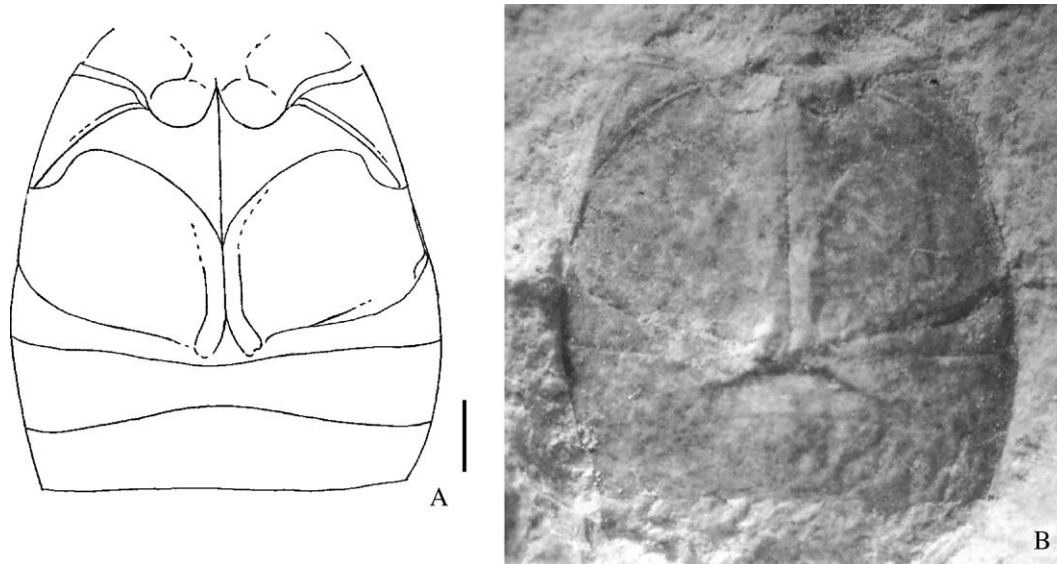


Fig. 4. A, B, *Palaeodytes incompleta* sp. nov., holotype MNEMG 2003.18; Durlston Bay, Upper Berriasian.

wide, smooth, with indications of dark pigment patches.

Dimensions. Length of beetle 7.1 mm, length of elytra 5.4 mm, width of elytra 1.7 mm.

Family: Dytiscidae Leach, 1815

Genus *Palaeodytes* Ponomarenko, 1987

Type species. *Palaeodytes sibiricus* Ponomarenko, 1987.

Diagnosis. Metaventricle lacking a transverse suture; front border of metacoxa roundly projected.

Included species. In addition to the species described below: *P. gutta* Ponomarenko, 1987 from the Upper Jurassic of Kazakhstan; and *P. sibiricus* Ponomarenko, 1987 from the Lower Cretaceous of Transbaikalia.

Palaeodytes incompleta sp. nov.

Fig. 4

Derivation of name. Refers to the incomplete state of the fossil.

Material. Holotype MNEMG 2003.18; Clements' Bed DB175, Corbula beds, Durlston Formation; Durlston Bay, Swanage, Dorset; Upper Berriasian; collected by R.A. Coram.

Diagnosis. Distinguished by tips of hind coxal plates not being appreciably widened, metepisternae deep and impinging between hind coxae and metepimera.

Description. Body of a medium size beetle lacking head, prothorax and legs. Middle coxae large, rounded,

separated. Metepisternae triangular and widened anteriorly, impinging on the middle coxal cavities. Metasternum two and a half times wider than long. Paracoxal suture absent. Hind coxae large, as long as wide, dividing thorax and abdomen. Coxal plates narrow, diverging and slightly widening before rounded apices, ten times narrower than coxae. Abdomen narrows from the base of the second segment.

Dimensions. Length as preserved 6.4 mm, estimated total length of beetle about 15 mm.

Family: Carabidae Latreille, 1802

Subfamily: Protorabinae Ponomarenko, 1977

Genus *Cretoxabus* Ponomarenko, 1977

Type species. *Cretoxabus capitatus* Ponomarenko, 1977

Diagnosis. Metepisternum meets the middle coxal cavity; hind coxal plates long and narrow.

Included species. In addition to the species described below: *C. capitatus* Ponomarenko, 1977 and *C. latus* Ponomarenko, 1977 from the Lower Cretaceous of Transbaikalia; and *C. orientalis* Ponomarenko, 1989 and *C. ovalis* Ponomarenko, 1989 from the Lower Cretaceous of Mongolia.

Cretoxabus sulcatus sp. nov.

Fig. 5

1995 Carabid beetle; Coram, Jarzembowski and Ross, p. 148, fig. 8.

Derivation of name. Latin, *sulcus*, furrow.

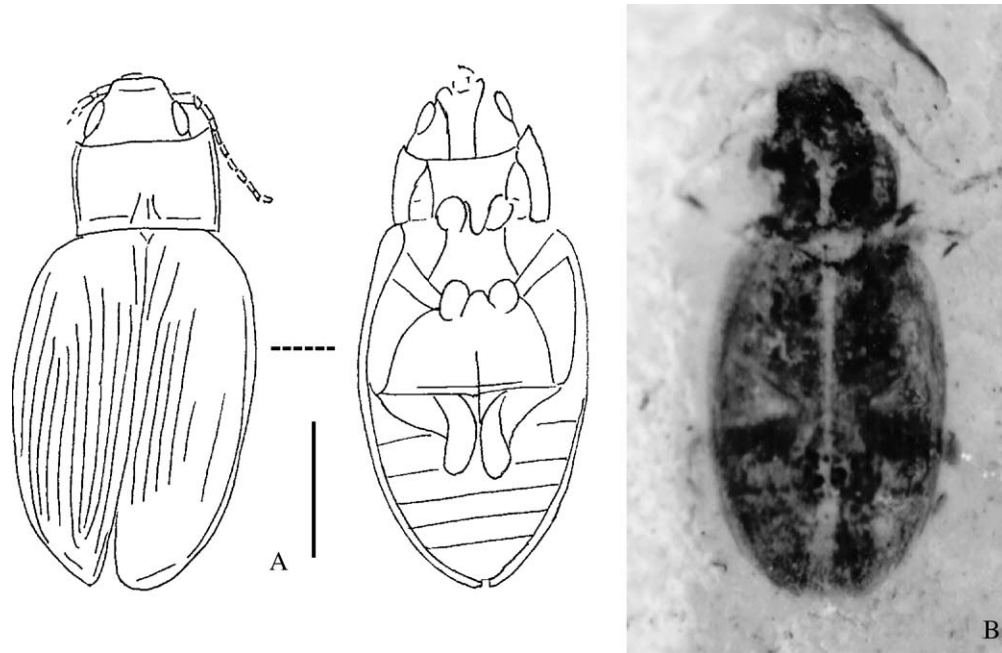


Fig. 5. *Creterabus sulcatus* sp. nov., holotype BMB 019612; Durlston Bay, Lower Berriasian. A, line drawings of dorsal and ventral anatomy (left and right, respectively). B, photograph.

Material. Holotype BMB 019612 and isolated elytra. Hard Cockle beds, Lulworth Formation; Durlston Bay, Swanage, Dorset; Lower Berriasian; collected by R.A. Coram.

Diagnosis. Elongate body; hind coxal plates with rounded apices; elytra with punctate furrows.

Description. Body of small, elongate beetle lacking most of legs. Length of head four-fifths that of its width. Mandibles short, blunt. Gular plate three times as long as wide. Antennae extend beyond base of pronotum. Scape wide, flagellar segments thin, subcylindrical. Pronotum broad, length two-thirds of width, maximum width in anterior third. Anterior angles of pronotum acute, prolonged; posterior angle rectangular. Anterior part of prosternum slightly longer than fore coxae; prosternal process same length as coxae. Fore coxae rounded. Mesosternum longer than middle coxae. Middle coxae large, separated. Metepisternae triangular and widened in front, impinging on the middle coxal cavities. Metasternum twice as wide as long, longitudinal and paracoxal sutures present. Paracoxal suture transverse. Hind coxae triangular, not dividing thorax and abdomen. Coxal plates narrow, half width of coxae, their apices rounded. Abdomen narrows from the base; basal and second sternites longer than others, the last is twice as long as the penultimate. Elytra three times as long as wide with thin, indistinct punctate striae.

Dimensions. Length of beetle 3.7 mm, length of elytra 2.5 mm; width of elytra 0.7 mm.

Acknowledgements

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