

A possible azhdarchid pterosaur (Pterosauria, Azhdarchidae) in the Durlston Formation (Early Cretaceous, Berriasian) of southern England

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ABSTRACT

A new specimen of pterosaurian metacarpal IV from the Early Cretaceous (Berriasian) Durlston Formation of Dorset, southern England, closely resembles those of the Chinese dsungaripterid *Dsungaripterus weii* Young, 1964 and the Central Asian azhdarchid *Azhdarcho lancicollis* Nessov, 1984. However, the new specimen lacks the thickened bony wall typical of *Dsungaripteridae* and is therefore regarded as azhdarchoid. An mclV with a markedly offset distal condyle with well-developed diaphyseal constriction behind the distal condyle and asymmetrical condylar margins may be an autapomorphy of *Dsungaripteridae* + *Azhdarchoidea*, while the same condition with bone thickening may typify *Dsungaripteridae*. The new specimen also provides osteological evidence supporting claims for large wing-spanned pterosaurs in the Berriasian of southern England based previously only on ichnological finds. The new specimen suggests a wingspan of between 2.9 and 3.7 m and represents the largest pterosaur from the Berriasian.

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1. Introduction

The Purbeck Group of southern England is well known for its vertebrate body fossils, and includes a diversity of fishes (Dineley and Metcalf, 1999), amphibians (Ensom, 1988; Ensom et al., 1991; McGowan and Ensom, 1997), mammals (Owen, 1854, 1871; Falconer, 1857, 1862; Willett, 1881; Bristow, 1884; Heap, 1957; Kielan-Jaworowska and Ensom, 1992), turtles (Barrett et al., 2002; Milner, 2004), lizards (Evans et al. 2012), crocodiles (Owen, 1855, 1879; Andrews, 1913; Joffe, 1967; Salisbury, 2002), theropod dinosaurs (Owen, 1853–1864; Milner, 2002), pterosaurs (Howse and Milner, 1995) and rare ichthyosaurs (Ensom et al., 2009). It has also yielded a significant number of vertebrate trackways, including those of theropod and ornithopod dinosaurs (Beckles, 1862; Ensom, 2002) and, relevant to this study, trackways interpreted as having been made by quadrupedal pterosaurs (Delair, 1963; Wright et al., 1997). Fragments of vertebrate eggs have also been detected (Ensom, 1997). In general, articulated and even partially articulated remains are rare, but isolated elements are often in a good state of preservation. There is an extensive literature on the vertebrate assemblage of the Purbeck Group and an excellent review of its geological context can be found on the regularly updated web site of Professor Ian West (West, 2012).

The new specimen described here is presently on display in the palaeontological museum of the Square and Compass public house, Worth Matravers, Dorset, BH19 3LF (landline telephone +44 192943 9229). Plaster replicas are deposited in the NHMUK, SMNK and the University of Portsmouth collection of the School of Earth and Environmental Sciences.

2. Materials, methods and context

The specimen described here is a right metacarpal IV of the wing digit of a pterodactyloid pterosaur preserved on a rectangular slab of shelly limestone and seen in dorsal view (this view is anterior *sensu* Wellnhofer, 1978, 1985, 1991). The distal end, including the terminal articulation, is preserved three dimensionally, but the diaphysis is somewhat crushed. The proximal end is missing, with perhaps as much as 50 mm lost, and indicated by a faint external mould of part of the missing portion seen only in low-angle lighting (Fig. 6). The bone has been prepared mechanically, but remains attached to the slab. A portion of the diaphysis came free from the slab during preparation and has been glued back using a cyanoacrylate adhesive.

Museum abbreviations used in the text are as follows: AMNH, American Museum of Natural History, New York; BSP, Bayerische Staatssammlung für Paläontologie und Geologie, Munich, Germany; GIN, Mongolian Academy of Sciences, Ulan Bataar, Mongolia; GMN, Geological Museum of Nanjing, Nanjing, China; GMV, National Geological Museum of China, Beijing, China; HGM, Henan

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Geological Museum, Zhengzhou; IVPP, Institute of Vertebrate Paleontology and Paleoanthropology, Beijing, China; JZMP, Jinzhou Museum of Paleontology, Jinzhou, China; MTM, Magyar Természettudományi Múzeum, Budapest, Hungary; NGMC, National Geological Museum of China, Beijing, China; NHMUK, The Natural History Museum, London, UK; PVL, Instituto Miguel Lillo, Universidad Nacional de Tucumán, Tucumán Province, Argentina; SMC, Sedgwick Museum, Cambridge, UK; SNMK, Staatliches Museum für Naturkunde, Karlsruhe, Germany; TM, Teylers Museum, Haarlem, Netherlands; TMM, Texas Memorial Museum, Austin, Texas, USA; YH, Yizhou Museum, Yixian, China; YPM, Yale Peabody Museum of Natural History, New Haven, USA; ZIN, Zoological Institute of the Russian Academy of Sciences, St Petersburg, Russia; ZMNH, Zhejiang Museum of Natural History, Hangzhou, China. A silicone rubber mould of the specimen was made and casts produced in hard plaster. These casts are now accessioned as SMNK 6658 and NHMUK PVR 36641.

2.1. Locality, geological context and age

The new specimen was collected by one of us (CN) from a cliff exposure at the north end of Durlston Bay, near Peveril Point

(Figs. 1–3) in east Dorset (National Grid Reference SZ 038784). Here a succession of mainly alternating shales and shelly limestones dips gently north forming a cliff that is highest to the south and descends to sea level at Peveril Point. The foreshore is a boulder-strewn beach and the cliffs are actively collapsing, making the locality somewhat dangerous. Access is difficult, but the best approach is from Peveril Point; note that it is possible to become trapped in places in Durlston Bay by some high tides. The site was documented in some detail by Benton and Spencer (1995) for reptiles and by Dineley and Metcalf (1999) for fishes.

The specimen was found at the top of a thinly bedded shelly limestone known locally as the Toad's Eye limestone (Fig. 2). This bed is part of the Stair Hole Member of the Durlston Formation, the youngest unit within the Purbeck Limestone Group, and corresponds to bed 186 of Clements (1993). Our stratigraphic nomenclature follows Westhead and Mather (1996). Most of the Purbeck Group in south Dorset is considered to be Berriasian in age on the basis of the charophyte assemblages (Feist et al., 1995), with only the basal few metres of the Lulworth Formation being of latest Jurassic age (Hunt, 2004).

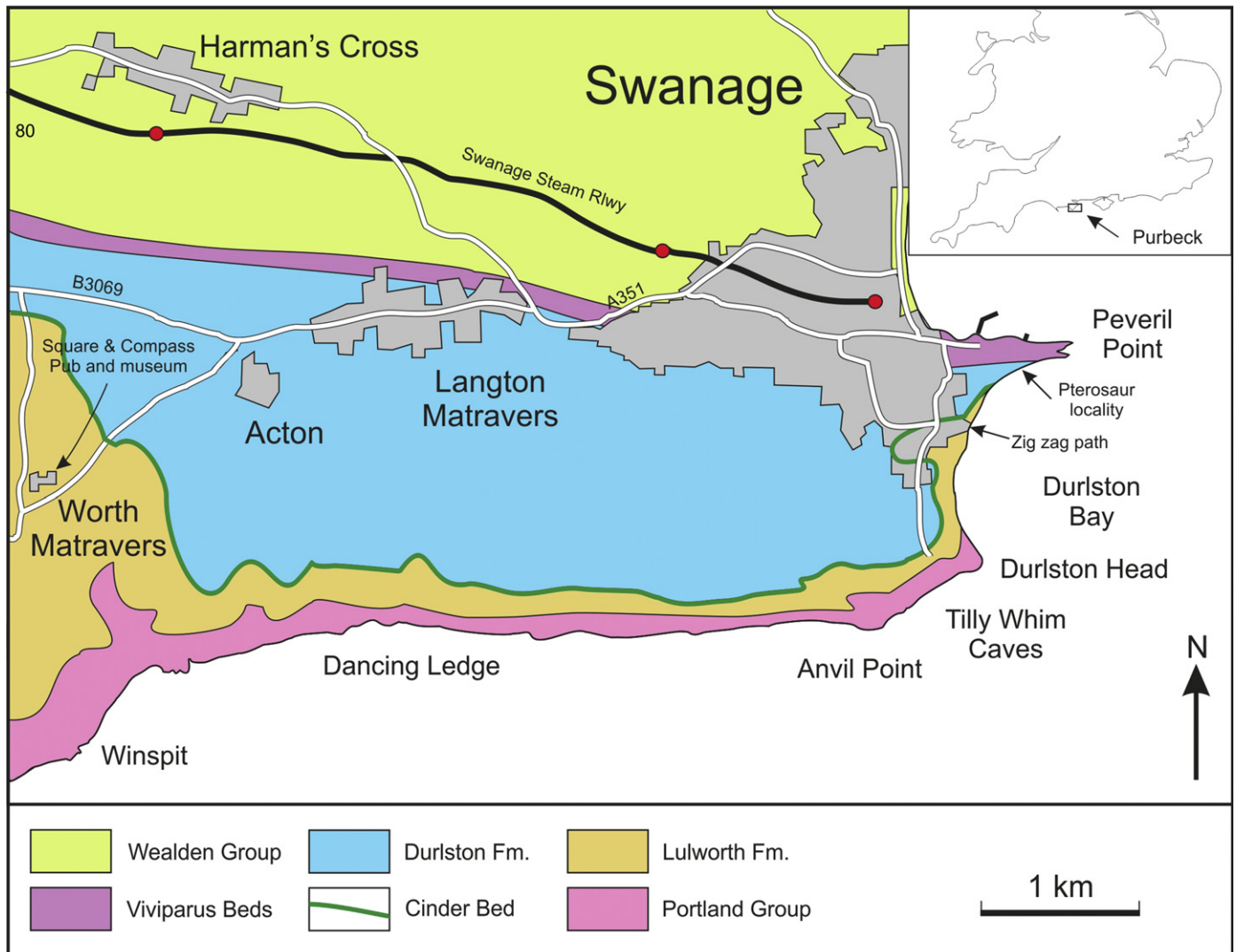


Fig. 1. Locality map with simplified geology showing the distribution of the Purbeck Group in the neighbourhood of Swanage and the discovery site of the new pterosaur metacarpal specimen.

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