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# Bugle Pit, Hartwell, Buckinghamshire

[SP 793 121]

## Highlights

Bugle Pit, near Aylesbury is the source of a small number of important reptile specimens. These include teeth of a variety of dinosaurs, which are particularly important since most other Late Jurassic sites in England are marine.

## Introduction

The Bugle Pit, Hartwell has produced teeth of megalosaur and sauropod dinosaurs and some other reptile species, and it has been the best source of dinosaur remains in the British Portlandian. The Bugle Pit is now filled in, but a new section was exposed a short distance to the south by the NCC in 1984 (Radley, 1991), which only shows the top of the Portland Stone and the Purbeck Beds, but it has potential to produce more finds after further excavation.

The Bugle Pit, named after the Bugle Horn Inn nearby, was first mentioned by Morris (1856). Geological sections have been published by at least 20 authors, including H.B. Woodward (1895, pp. 223–4), Arkell (1947a, p. 126), Barker (1966), Wimbledon (in Cope *et al.*, 1980b) and Radley (1991). The reptile remains were described by Hudlestone (1887), Lydekker (1893a) and A.S. Woodward (1895).

## Description

The section after Barker (1966) is as follows:

	Thickness (m)
Purbeck Limestone Formation	
<i>?anguiformis</i> Zone	
BP 19–21. Fine-grained limestone and grey marl	2.08
BP 10–18. Marls, grey and greenish and bands of pale earthy limestone; dark clay at base; fishes and ostracods in lower units	2.93
BP 9. Laminated, blue-hearted cementstone with plant, insect and fish remains along partings	0.23–0.25
Portland Stone	
<i>kerberus</i> Zone	
Creamy Limestones	
BP 8. Tough, highly bituminous, shaly marl with large oysters and other bivalve casts	0.20
BP 7. Hard, fine-grained limestone with a band of trigoniid casts at the base	0.30
BP 6. Manly shales and black shale with a layer of bivalves near the base	0.15–0.20
BP 5. Blue-hearted, marly limestone with large bivalves	0.76
BP 4. Brown clay with serpulids	0.08
BP 3. Blue-hearted, rather soft, manly limestone, trigoniids etc.	0.91
BP 2. Hard, blue-hearted limestone with oysters, bottom 0.07 m fossil casts	0.60
Crendon Sand	

Woodward (1895) and Arkell (1947a) continued the section down to the Upper Lydite Bed (now probably *glaucolithus* Zone), but these lower units have not been seen in Bugle Pit itself.

There are no records of the units from which the reptiles came, but the Purbeck facies seem to be the most likely source (Radley, 1991, p. 242): fishes occur in beds BP 9, 11a, 11b, 11c (H.B. Woodward, 1895; Barker, 1966). The ostracod record (Barker, 1966) indicates a predominance of freshwater and euryhaline conditions of deposition in beds BP 9–12, 14–21 (Purbeck Limestone Formation).

There is an old quarry at Stone [SP 783 121], close to Hartwell, and there may have been small pits in the grounds of Hartwell House. However, there is no evidence of other Purbeck quarries in the immediate district and it seems likely that any Purbeck or Portland fossils labelled 'Hartwell' came from the once extensive Bugle Pit.

## Fauna

The dinosaur teeth have been described by Lydekker (1893a) and Woodward (1895). These specimens were donated by their collector, J. Alston, to the BMNH. Several reptile specimens in BUCCM probably came from the Bugle Pit. Delair (pers. comm., 1982) has a list of many reptiles from Bugle Pit.

### Testudines: Cryptodira

'Turtle' BUCCM Lee Coll. 3948

### Archosauria: Dinosauria: Saurischia: Theropoda

*Megalosaurus* sp. BMNH R2566, R2567, R2821 (teeth)

### Archosauria: Dinosauria: Saurischia:

Sauropoda

*Pelorosaurus* sp. BMNH R2004, R2005, R2565 (teeth)

### Archosauria: Dinosauria: Ornithischia:

Ornithopoda

*Iguanodon* sp. BUCCM 467.22

### Archosauria: Dinosauria: Ornithischia: Stegosauria

?Stegosaur BUCCM 9.43

## Interpretation

The environment of deposition of the Portland Stone is essentially marine: the Creamy Limestones are marginal marine shelly limestones and mudstones that shallow upwards. The overlying Purbeck facies are restricted marine and non-marine marls, clays and fine-grained limestones, with evidence for two erosive episodes that resulted from emergence (Radley, 1991).

The turtle is represented by a poor scapula and is unidentifiable. It is labelled 'Purbeck Hartwell' and probably came from the Bugle Pit.

Hudleston (1887) recorded dinosaur bones from the Bugle Pit. Lydekker (1893a) described two sauropod teeth, a large crown with part of the root (55 mm long), and a smaller crown of similar appearance (25 mm long). The teeth are broad (35 and 15 mm respectively) and spatulate in shape. The slightly concave inner surface has rugose enamel and a mid-line ridge, and there is an offset ridge on the outer surface. Lydekker (1893a) compared these teeth with some very similar specimens from the Portlandian of Boulogne-sur-Mer. Lydekker (1890a, p. 241) had ascribed these to *Pelorosaurus humerocristatus* (Hulke, 1874), a species which had been based on a humerus from the Kimmeridge Clay of Smallmouth Sands, Weymouth. Earlier Lydekker (1888a, pp. 151–2; 1890a, p. 241) had ascribed a partial pubis, a fibula, a tibia, a phalanx and a caudal vertebra to this species. Lydekker's assignment of the Bugle Pit teeth to this species may have been the presence of similar limb bones and teeth in the Wealden (*Pelorosaurus conybeari* Mantell, 1850). A.S. Woodward (1895) reported one more sauropod tooth 'of the same animal'.

Two teeth from the Kimmeridgian of Portugal had been assigned to *P. humerocristatus*, but the assignment is doubtful (Steel, 1970, p. 70). Other similar teeth, now ascribed to species of *Pelorosaurus* (Steel, 1970, p. 70) include: *Oplosaurus armatus* Gervais, 1852 (= *Hoplosaurus armatus*, Lydekker, 1890a, p. 243) (BMNH R964; Wealden, Isle of Wight), *Ornithopsis hulkei* Seeley, 1870 (BMNH R751, R964; Lydekker, 1888a, pp. 146–8; Wealden, Isle of Wight), *Pelorosaurus conybeari* Mantell, 1850 (Lydekker, 1890a, pp. 240–1; Wealden, Kent); *Pelorosaurus (Iguanodon) precursor* (Sauvage, 1876) (Kimmeridgian of Wimille, near Boulogne-sur-Mer; 'Lusitanian' (Oxfordian–Kimmeridgian) of Ourem, Portugal).

The megalosaur teeth were described by A.S. Woodward (1895). Two of the specimens differ merely in size; both are high-crowned, compressed only on the posterior margin, which is clearly serrated, and without serrations on the anterior part, which is distinctively worn. The third specimen is shorter, broader and more laterally compressed. The tooth is less worn and serrations occur on both posterior and anterior borders, although only on the upper third of the latter. The teeth are 36, 30 and 31 mm long, respectively and 14, 12 and 16 mm broad. Woodward (1895) did not attempt to identify the species represented, and characterized them simply as 'megalosaurian'.

Ornithischian dinosaurs are represented by an *Iguanodon* toe bone (BUCCM 467.22) from 'Portland Stone of Mr Lee's pit, Hartwell', and a possible stegosaur (BUCCM 9.43) from 'Kimmeridge Clay of Bugle Pit, Hartwell'. The latter specimen (13 fragments of limb bones and other elements) cannot have the exact provenance stated. The Kimmeridgian is not represented in the Bugle Pit. The nearest site in the Hartwell Clay is Lockes' Pit, Hartwell [SP 805 125], over 1 km to the north-east.

### **Comparison with other localities**

Several localities in the Hartwell Clay (Upper Kimmeridgian, *pallasioides* Zone), have yielded tetrapod faunas that are comparable to those from Bugle Pit (e.g. *Megalosaurus*, Lydekker, 1893a; *Hoplosaurus*, Woodward, 1895a); these include Lockes Pit, Hartwell (1 km north-east of the Bugle Pit, filled in; basal Glauconitic Beds); Ward and Cannons, ?Beirton (extant) (basal Glauconite Beds, Portland facies well represented); and Websters and Cannon's (Hill's) Pit on Bierton Road, Aylesbury (overgrown).

In the course of discussion of the sauropod teeth, comparable specimens have been noted from the Kimmeridgian of Ourem, Portugal and of Wimille and Boulogne-sur-Mer, France. The Wimille (Mont-Rouge) quarries, with Late Portland (=Portland Stone) equivalents, termed 'Wealden' (decalcified Portland sands, or equivalent to Upper–Middle Purbeck?) yielded bones of sharks, bony fishes, the turtles *Plesiochelys* and *Tropidemys*, an elasmosaurid tooth, teeth of the crocodylians *Steneosaurus*, *Goniopholis*, *Theriosuchus* and *Bernissartia*, a pterosaur and isolated dinosaur teeth (theropod, sauropod, ornithopod and nodosaurids) in a recent dig (Cuny *et al.*, 1991). Others have come from the Wealden of the Isle of Wight and the Weald. The Bugle Pit specimens appear to be the only Portlandian examples of *Pelorosaurus* known, and one of only a few European sauropods of this age. Other sauropods of Kimmeridgian to Portlandian age come from the Morrison Formation of the western United States (Kimmeridgian–Portlandian); *Haplocanthosaurus*, *Brachiosaurus*, *Camarasaurus*, *Apatosaurus*, *Diplodocus*, *Barosaurus* (Steel, 1970).

'*Megalosaurus*' is known from the Purbeck of Durlston Bay (*M. (Nuthetes) destructor*, Owen, 1854) and Swindon, and the Kimmeridgian of several sites near Boulogne-sur-Mer and Cap de la Heve, in France, from Pembal, in Portugal, and Foxhangers, Wiltshire as well as the Portlandian of Boulogne-sur-Mer (*M. insignis* Deslongchamps, 1870) (Steel, 1970).

Other Portlandian carnosaur include *Elaphrosaurus* from the Morrison Formation.

In the English Portlandian, dinosaur remains are known sparsely from the Isle of Portland, Dorset (see above), source of an '*?Ornithopsis* sp.' tooth and possible megalosaur remains, and from Garsington, Oxfordshire, source of caudal vertebrae named *Cetiosaurus longus* by Owen (1841), and referred to by Phillips (1871, p. 390; OUM, specimens not found). Recent digs at Chicksgrove Quarry, Wiltshire have also produced a variety of dinosaurian remains and teeth of 12 crocodylian, dinosaurian and pterosaurian taxa (W.A. Wimbledon, pers. comet. to M.J.B., 1992).

## **Conclusions**

Bugle Pit, Hartwell has yielded a sparse, but important, dinosaur fauna. Portlandian dinosaur remains are rare in Britain and many are controversial or poorly identified. The sauropod teeth are some of the few recorded Portlandian sauropods from Europe, and they will be useful in comparisons with North American sauropods of the same age. The megalosaur and ornithischian teeth are also some of the few known from rocks of this age. Thus this small but significant reptile fauna and the potential for further discoveries with re-excavation gives the site its conservation value.

## **References**