# Furzy Cliff, Overcombe, Dorset

([SY 697 817]–[SY 703 819])

## Highlights

Furzy Cliff is Britain's best Oxfordian age reptile locality. It is the source of the unique specimen of the meat-eating dinosaur *Metriacanthosaurus,* as well as an ichthyosaur and a plesiosaur.

## Introduction

The Upper Oxford Clay exposed at Furzy Cliff, or Jordan Gordon) Cliff, Overcombe, has yielded sparse fossil reptile remains, but these are of considerable importance because of their age. A recent cliff fall has re-exposed large portions of the site, and the prospects for future finds are good (Figure 7.1). The fossil reptiles have been described by Huene (1923,1926), Walker (1964) and Cope (1974).

## Description

Buckman (1925) was the first to examine the stratigraphy of Furzy Cliff in detail, and he used it to distinguish one component of his three-fold division of the Upper Oxford Clay (Early Oxfordian) in south Dorset. This included: (1) clays with *Quenstedtoceras;* (2) clays with large *Gryphaea dilatata,* named the Jordan Cliff Beds; and (3) clays with reddish-brown nodules and large perisphinctids, named the Red Beds. Arkell (1947c) revised and amended the nomenclature, naming unit (1) Furzedown Clays, (2) Jordan Cliff Clays and (3) Red Nodule Beds. Buckman did not give thicknesses for the units and those of Arkell (1947c) and of Torrens (1969a) have since proved to be overestimates, particularly in the case of the Red Nodule Beds (Wright, 1986). In the summer of 1983 a major landslip at Furzy Cliff permitted the first accurate measured sections to be made (Wright, 1986). The Red Nodule Bed was found to be a thin unit in the middle of a distinctive clay sequence named by Wright (1986) the Bowleaze Clay Member (formerly the Red Beds). The revised section at Furzy Cliff (Wright, 1986) is:

| | Thickness (m) |
|---|---|
| Nothe Grit | |
| 11. Argillaceous sandstone | seen 1.5 |
| Bowleaze Clays | |
| 10. Pale and medium grey clay | *c*. 6 |
| 9. Red Nodule Bed | 0.35 |
| 8. Pale and medium grey clay | 0.40 |
| 7. Dark, carbonaceous clay with intraformational bored surfaces | 1.40 |
| 6. Pale and medium grey clay with bored surfaces, *Gryphaea* and perisphinctids | c. 1 |
| 5. Interbedded dark, carbonaceous and pale and medium grey clay with scattered nodules occurring toward the middle of the unit. *Gryphaea* and perisphinctids | *c.* 2 |
| 4. Pale and medium grey clay | *c*.3 |
| 3. Pale and medium grey clay containing perisphinctids | *c*. 0.15 |
| 2. Pale and medium grey clay with nodule-bearing horizon at the base | 1.10 |
| Jordan Cliff Clays | |
| 1. Pale and medium grey clays with *Gryphaea* | seen 10.5 |

The Jordan Cliff Clays (*c.* 10 m) are unbioturbated, extremely fine-grained, fissile, dark slaty-blue clays that weather to a lighter, greenish-grey or reddish-brown colour. Although the lowest clays are now obscured by new sea defences, they were described briefly by H.B. Woodward (1895) and Damon (1884). H.B. Woodward (1895, p. 16) noted the unit as 'beds of bluish-grey clay, with small hard cementstones' from below the coastguard station (i.e. western end of the section at about [SY 698 818]). Damon (1884, p. 29) noted 'thin stony layers' and a serpulid bed, 50–90 mm thick, within the clay unit. The clays exposed today contain numerous *Isognomon promytiloides.* They are succeeded by 8 m of a tough, blocky, silty clay with numerous *Gryphaea dilatata* encrusted with *Serpula* sp. In this unit, encrusted *Modiolus bipartitus* and cardioceratids are common.

The Bowleaze Clays (*c.* 14.5 m) are predominantly very fine-grained, but with frequent incursions of sandy clay. The base is marked by a persistent band of white, elliptical limestone nodules which are associated with coarse silt and fine sand. There are about 4 m of these very fine, pale-grey clays which contain 'nests' of *Lopha gregaria* and *Liostrea* sp. Above these, the lithology changes with the first of several inputs of dark, sandy clay. The Red Nodule Beds consist of two bands of nodules which occur in the cliff about 8 m above the base of the Bowleaze Clays. Their colour is an artefact of weathering in a zone 0.5 m below the soil surface. The nodules are typically found coated with a layer of iron oxide and were formerly known as 'kidney stones' (H.B. Woodward, 1895, p. 16), but when fresh they are pale buff-coloured, dense and sideritic, frequently with septarian cracks infilled with calcite and zinc blende. The nodules commonly enclose the remains of *Modiolus bipartitus, Modiola, Astarte* and *Pleuromya alduini.* The predominant lithology of the Red Nodule Beds, however, consists of fine grey clays with layers containing very large *Gryphaea dilatata* and some aggregations of *Lopha gregarea (Arkell,* 1947c, p. 34).

The Red Nodule Beds are succeeded by some 6 m of pale grey, very fine clay. An upwards coarsening trend is reversed at the top with the sands of the Nothe Grit resting on the clay with a very sharp junction. This is exposed only at Ham Cliff ([SY 712 817]). The highest clay is markedly calcareous, containing micrite nodules and numerous Foraminifera and small bryozoa.

Ammonites occur as flattened white impressions in the Jordan Cliff Clays and within the nodules of the Red Nodule Beds. Arkell (1933, p. 343) assigned all of these to the *praecordatum* Zone' (*?mariae* Zone in part). Later, Arkell (1941) revised the zonation of the Early Oxfordian and placed the Jordan Cliff Clays in the *mariae–cordatum* Zones (*scarburgense–bukowskii* Subzones) and the Red Nodule Beds (Bowleaze Clays) in the *costicardia* Subzone.

The reptile remains at Furzy Cliff appear to have come from the Jordan Cliff Clays. Cope (1974) specifies this unit as the source of some ichthyosaur and plesiosaur remains collected in 1972–3. There is some doubt about the stratigraphic position of *Megalosaurus parkeri* (i.e. *Metriacanthosaurus parkeri*), but it may also have come from the Jordan Cliff Clay. It is certainly from the Oxford Clay, as an oyster, *Gryphaea dilatata,* found adhering to one of the vertebrae, has been taken to indicate an Upper Oxford Clay (Early Oxfordian) age for the specimen (Walker, 1964, p. 117).

The ichthyosaur was preserved in a semi-articulated state. A series of 39 vertebrae, with associated neural spines and ribs, was excavated. However, the limbs, neck region and skull seem to have been lost. Several other ichthyosaur and plesiosaur vertebrae and teeth were found associated. The evidence suggests limited transport and winnowing, but the skeleton was clearly not excessively disturbed or the neural spines and ribs would have been lost. Huene (1926) gave no taphonomic information on the *Megalosaurus* specimen. The remains consist of elements of the pelvis and hind-limb region, and they are rather distorted and cracked.

## Fauna

**Archosauria: Dinosauria: Saurischia: Theropoda: Carnosauria**

*Metriacanthosaurus parkeri* (Huene, 1923) Type specimen: OUM J.12144

**Ichthyopterygia**

*Ophthalmosaurus* sp. repository?

**Sauropterygia: Plesiosauria**

'plesiosaur' repository?

## Interpretation

The remains of the carnivorous dinosaur (three dorsal vertebrae, four proximal caudal vertebrae, right ilium, fragments of right and left ischium, right and left pubis, right femur, upper part of right tibia) were collected together, probably in the 19th century. They were described as a new species of *Megalosaurus, M. parkeri* Huene (1923), characterized by the high, elongate neural spines on the dorsal vertebrae, the shape of the ilium and ischium, and the expansion of the pubic 'foot' (Huene, 1923, 1926). The femur was a slender bone with the lesser trochanter toward the top and the cnemial process bearing a strong upward projection. In these respects, *M. parkeri* differs from the typical Bathonian *Megalosaurus bucklandi.* Because of these differences, Walker (1964, pp. 109, 116–17) named

*M. parkeri* as the type species of the new genus, *Metriacanthosaurus.* The relationship of *Metriacanthosaurus* with other theropods has been problematic. Most workers (e.g. Walker, 1964; Steel, 1970) assign it to the *Megalosauridae,* but no other megalosaur bears the same enlarged neural spines. On the basis of the height of the neural spines, Huene (1926) suggested that *Metriacanthosaurus* could represent an early member of the Spinosauridae, and this assignment was discussed further in Walker (1964). It has since been realized that the development of expanded neural spines occurs in a range of unrelated tetrapod groups and can no longer be regarded as a viable phyletic character. Molnar (1990) was unable to find any characters that would allow *Metriacanthosaurus* to be classified further than Theropoda *inc. sed.*

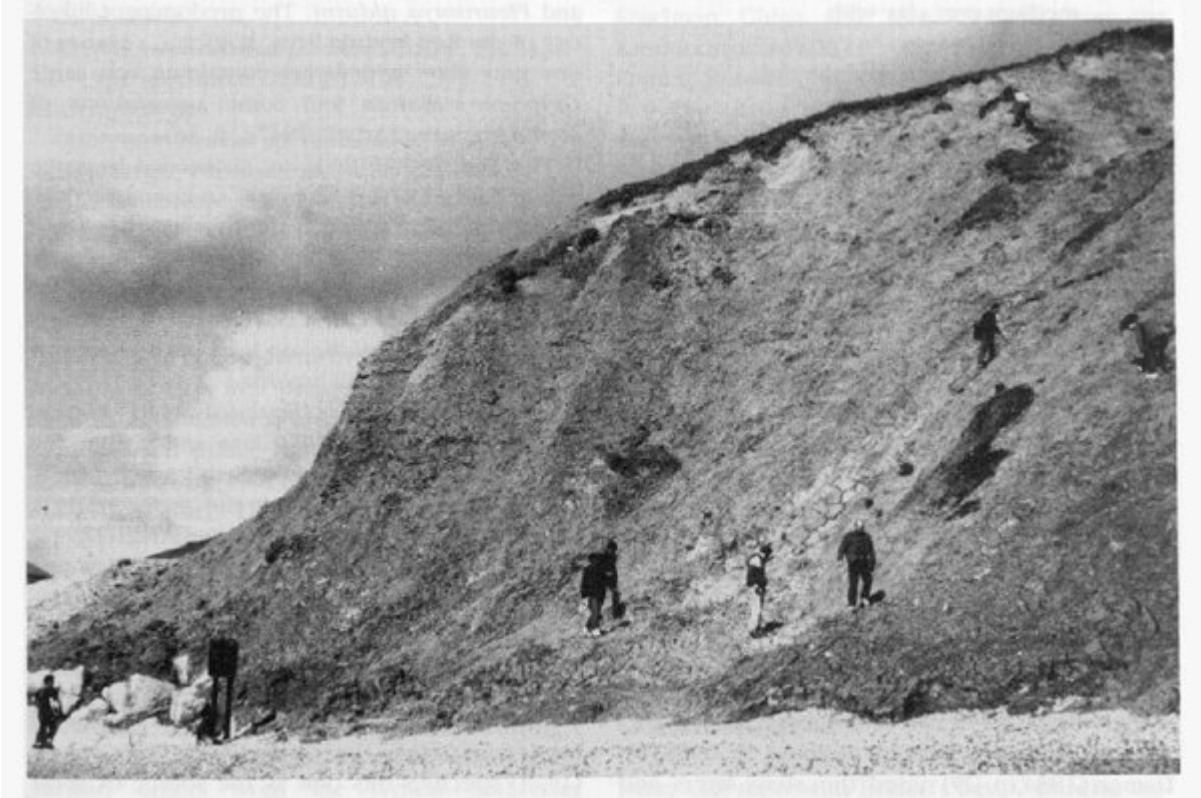
Other Late Jurassic carnosaurs include *Allosaurus, Antrodemus, Ceratosaurus* and *Dryptosaurus* from the Morrison Formation of North America (Kimmeridgian–Portlandian?), *Allosaurus, Ceratosaurus* and *Elaphrosaurus* from the Tendaguru beds of Tanzania (Late Kimmeridgian), *Yuangchuanosaurus* and *Szechuanosaurus* from the Late Jurassic of North Szechuan, China, and '*Megalosaurus*' from the Kimmeridgian and Portlandian of northern France, Portugal, Wiltshire and Dorset (Encombe Bay–Chapman's Pool site, see below). The only other Oxfordian carnosaur known is *Eustreptospondylus divesensis* Walker (1964) from the Vaches Noires, near Dives, Normandy (a cranium). *Megalosaurus nicaeensis* (Ambayrac, 1913) from the Oxfordian of Monaco turns out to be a pliosaur (Buffetaut, 1982). *Metriacanthosaurus parkeri* fills a gap in the phylogeny of the carnosaurs.

The ichthyosaur and plesiosaur remains from Furzy Cliff have only been recorded briefly (Cope, 1974), and they have not been described. The ichthyosaur consisted of 34 dorsal centra and 5 caudals, with neural spines and ribs. Plesiosaur remains were isolated vertebrae and possibly teeth. The ichthyosaur has tentatively been identified as *Ophthalmosaurus* sp., a genus common in the Late Jurassic.

## Conclusions

Furzy Cliff represents Britain's best Oxfordian reptile site. In view of the limited reptile sites of this age elsewhere, it is also one of the best in the world. The dinosaur *Metriacanthosaurus* is represented by good postcranial remains and occupies a unique position in carnosaur evolution. The ichthyosaur *Ophthalmosaurus* is the only British Oxfordian ichthyosaur known, and one of the few known from that stage worldwide. Thus, the small number of finds to date from Furzy Cliff are of great importance, and the site has potential for further discoveries, hence its conservation value.

**References**



*(Figure 7.1) The rapidly eroding exposure of Oxford Clay at Furzy Cliff, Overcombe. Fossil reptile bones came from the Jordan Cliff Clays, at the bottom of the sequence. (Photo: M.J. Benton.)*