
Yaverland, Sandown, Isle of Wight

[SZ 613 850]–[SZ 622 853]

Highlights

Yaverland is an important Early Cretaceous dinosaur site, especially as the location which yielded *Yaverlandia*, the oldest pachycephalosaur (bone-headed dinosaur) known. Both dinosaur bones and footprints are still found at Yaverland.

Introduction

The cliff section and beach at Yaverland are a well-known source of Wealden dinosaurs. Remains were reported as long ago as 1835 and finds are still being made. Although rather overshadowed by the Compton–Atherfield section on the western side of the Isle of Wight, Yaverland is an important supplementary source of reptiles and these include the unique pachycephalosaur *Yaverlandia* (Figure 8.16).

The section in the Wealden at Yaverland (Sandown Bay) has been described by Reid and Strahan (1889, p. 17) and White (1921, pp. 15–19). The beds lie on the northern limb of the Sandown Anticline, the hinge zone of which occurs at Sandown Fort. The reptiles have been described by Buckland (1829c, 1835b), Mantell (1846, 1854), Reid and Strahan (1889), Gibson (1858), White (1921) and Galton (1971c).

Description

A summary of White's (1921) section is given, with recent stratigraphic nomenclature from Daley and Stewart (1979) and Simpson (1985).

	Thickness (m)
Lower Greensand	
<i>Perna</i> Beds	
(bed 2) Calcareous sandstone	0.1
(bed 1) Thick, blue, sandy clay; Atherfield Bone Bed at base with a derived vertebrate fauna including <i>Hybodus</i> and <i>Lonchidon</i> (Patterson, 1966)	1.15
.....disconformity.....	
Vectis Formation (=Wealden Shales) Shales, grey or blue, with ostracods and bivalves interbedded with thin (0.12 m) beds of Shelly limestone and rare ironstones	c. 37
Sandstone, yellow and white (equivalent of the Barnes High Sandstone)	c. 2.4
Shales, grey with molluscs and ostracods with a 0.1 m band of clay ironstone in the middle	c. 10.5
Wessex Formation (=Wealden Marls)	
Marl, grey with coloured mottlings and irregular bands of large calcareous nodules in upper part	c. 3.0
Silt, pale greenish-grey; hard and vesicular in places, with one or more bands of rolled concretions; much pyritized carbonized wood, <i>Margaritifera</i> (some phosphatized), reptilian bones, scales of <i>Lepidotus</i> , etc.	0.45
Clays, green, red and variegated (behind the old sea-wall)	c. 6.0

Clays and marls, variegated, with bands of cross-bedded sand seen to 15.0

Reptile remains have been described from the shore and cliff. Buckland (1829c; 1835, pp. 425–8) noted isolated dinosaur bones 'in the iron sand which forms the shore, a little east of Sandown Fort, between high and low water'. The Sandown Fort noted here is not the current one, which was built in the 1870s, but an earlier structure some 500 m to the south-west (approximately [SZ 605 846]): there have been no exposures of bedrock at this site in living memory (A. Insole, pers. comm., 1993). This would place the site on the southern limb of the Sandown Anticline and within the Wessex Formation. Mantell (1846, p. 95) noted an *Iguanodon* tibia from the same site (also Mantell, 1847, pp. 137–8). Reid and Strahan (1889, p. 17) implied that Buckland's and Mantell's bones came from the conspicuous yellow and white sandstone in the Wealden Shales, and Buckland's (1835) reference to 'iron sand' could be interpreted in such a way. However, no finds have been made since in that unit, nor in any of the ironstones in the Vectis Formation (White, 1921, p. 18). It must be assumed that these early discoveries were not *in situ*, and that they were washed up on the beach (at about [SZ 620 853]). Gibson (1858) refers to this eastern end of the section as Buckland's site and notes that 'large vertebrae and other portions of bone are frequently found, but always much rolled and broken.'

Gibson (1858) reported an *Iguanodon* femur in a low cliff of 'Weald Clay' exposed by a storm 'a little to the west of Sandown Fort... lies immediately above the ferruginous sandstone in which Dr Buckland discovered the metacarpal bone. The clay-bed in which the bone was found is near the centre of the arch which... is formed by the Wealden in Sandown Bay, dipping slightly westward... about half-a-mile' from Buckland's beach site. Therefore, Gibson's find was on the western limb of the anticline at about [SZ 612 849], thus in the low cliff currently exposed, or possibly a portion now covered by the concrete sea-wall. Mantell (1854, pp. 98–9, 226) noted *Iguanodon* remains from the foot of a small cliff that forms the sea boundary of Yaverland Farm, but this farm no longer exists and the site is hard to identify.

White (1921, pp. 15–19) described the occurrence of reptiles in two silty plant debris beds within the Wessex Formation which are to be seen in the cliff 10–50 m west of the old sea-wall (now collapsed), thus at about [SZ 616 851]. He mentions bones and teeth of *Iguanodon* and carnivorous reptiles in the lower bed and from the top of a multiple plant debris bed unit, which is occasionally exposed on the beach east of the old wall, thus at about [SZ 617 852]; it includes a basal bone-rich lag deposit G. Radley, pers. comm.). The higher plant debris bed 'is rich in the remains of reptiles (chiefly *Iguanodon*, including *I. mantelli* Meyer, together with less common *Goniopobolis crassidens* Owen and turtle (*Plesiochelys?*), and is the principal source of the wave-washed bones usually to be seen on the shore between Yaverland sea-wall and Redcliff...'. This bed comes down to the beach about 70 yards east of the sea-wall', thus at about [SZ 619 852]. The type specimen of the pachycephalosaur *Yaverlandia* came 'from the Upper Silty Bed north of the sea wall below Yaverland Battery' (Galton, 1971c, p. 41). Numerous remains in IWCMS are labelled 'silty beds', 'upper silty bed' or 'lower silty bed', and finds are regularly made in these units in the cliff and on the beach.

Dinosaur footprints were found at Yaverland in early April 1979, a large series of iguanodont trackways exposed on the shore (Delair, 1989). Subsequently, several horizons have been found to contain footprints (Radley, 1993).

The bones from Yaverland are generally isolated and in reasonable condition if collected *in situ*, but often much abraded if picked from the beach. Few articulated elements have been collected, although J. Radley (pers. comm., 1993) notes occasional articulated vertebrae. The finds range in size from 10 mm crocodylian teeth to 1.5 m long dinosaur limb bones (Gibson, 1858).

Fauna

The main repositories for Yaverland material are the BMNH and IWCMS. Very few of the specimens have been described, and the names are taken from the museum labels. An estimate of the numbers of specimens of each form is given:

Numbers

Testudines: Cryptodira

Plesiochelys sp.

<i>Tretosternon bakewelli</i> (Mantell, 1833)	1
Archosauria: Crocodylia: Neosuchia	
<i>Goniopholis crassidens</i> Owen, 1841	11
<i>Suchosaurus cultridens</i> Owen, 1841	1
'crocodylian'	2
Archosauria: Dinosauria: Saurischia:	
Theropoda	
<i>Megalosaurus dunkeri</i> Koken, 1887	2
<i>Megalosaurus</i> sp.	6
Archosauria: Dinosauria: Saurischia:	
Sauropoda	
<i>Cetiosaurus brevis</i> Owen, 1842	1
<i>Pelorosaurus hulkei</i> (Seeley, 1870)	1
Archosauria: Dinosauria: Ornithischia: Ornithopoda:	
Iguanodontidae	
<i>Iguanodon bernissartensis</i> Boulenger, 1881	2
<i>Iguanodon mantelli</i> Meyer, 1832	1
<i>Iguanodon</i> sp.	c. 40
Archosauria: Dinosauria: Ornithischia:	
Pachycephalosauria:	
Pachycephalosauridae	
<i>Yaverlandia bitholos</i> Galton, 1971 Type specimen: IWCMS 1530	1
Archosauria: Dinosauria: Ornithischia: Ankylosauria:	
Nodosauridae	
<i>Polacanthus foxi</i> Hulke, 1882	2
<i>Polacanthus</i> sp.	3
Sauropterygia: Plesiosauria	
' <i>Plesiosaurus</i> sp.'	2

Interpretation

The range and relative numbers of reptiles recorded from Yaverland are similar to those from the Compton–Atherfield section. Turtles are not common, and consist of partial carapaces ascribed to the typical Wealden genera *Plesiochelys* and *Tretosternon*. Crocodylians are more abundant, with several finds of teeth, scutes and vertebrae of the aquatic metamesosuchians *Goniopholis* and *Suchosaurus*.

Among the dinosaurs, several limb bones and vertebrae of the carnivore *Megalosaurus*' have been collected, and the material is more extensive than that from the Compton–Atherfield section. However, the smaller 'coelurosaurs' do not appear to be represented. A couple of large limb bones in the BMNH have been ascribed to the sauropod genera *Cetiosaurus* and *Pelorosaurus*.

As in the Compton–Atherfield section, the most abundant remains are those of ornithopod dinosaurs. The commonest genus is *Iguanodon*, with numerous finds of limb bones, vertebrae, teeth and a partial jaw (IWCMS 3866). Several of these have been ascribed to species of *Iguanodon*, but the taxonomy of that genus is in some confusion (Norman and Weishampel, 1990). The most important specimen from Yaverland (Figure 8.16) is the type specimen of the pachycephalosaur *Yaverlandia bitholos* Galton, 1971. This has a thickened skull cap (14.2 mm thick, 45 mm long: original skull length c. 70 mm) which is a feature characteristic of the group. This may have been used as a battering ram in intraspecific competition (Galton, 1971c). A partial brain cast is preserved. *Yaverlandia* is the oldest member of the group and shows characters intermediate between hypsilophodontids and typical Late Cretaceous pachycephalosaurs (Galton, 1971c; Wall and Galton, 1979).

The ankylosaur *Polacanthus* is represented by several dermal spines and scutes, and there are two plesiosaur vertebrae (IWCMS 5059, 5108).

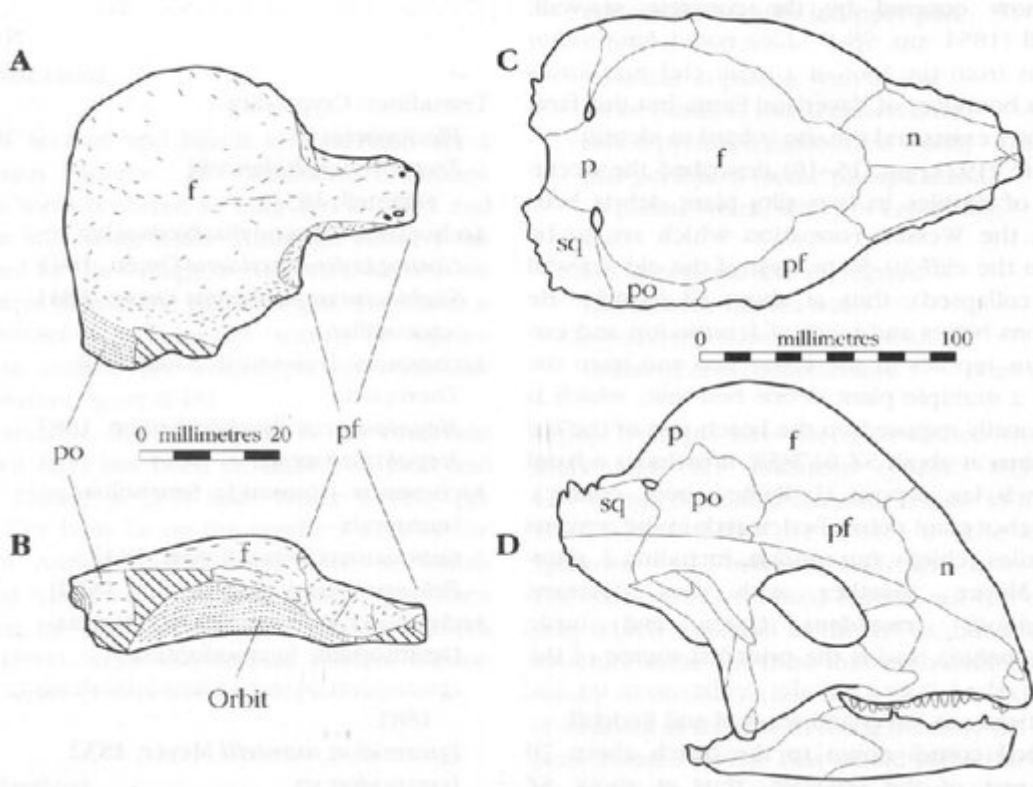
Comparison with other localities

The most productive comparable section is the coast between Compton Bay and Atherfield which exposes similar beds: it has yielded a similar fauna, although '*Megalosaurus*' is apparently more abundant at Yaverland. The west coast fauna includes all the Yaverland genera except the pachycephalosaur *Yaverlandia*, yielding material attributed to 11 genera. Pachycephalosauria are known elsewhere from the Late Cretaceous of North America (*Pachycephalosaurus*, *Stegoceras*, *Gravitholus*, *Ornatolithus*, *Stygimoloch*), Mongolia (*Tylocephale*, *Goyocephale*, *Prenocephale*, *Homocephale*), Madagascar (*Majungatholus*) and China (*Wannanosaurus*) (Maryanska, 1990). *Stenopelix* from the Early Cretaceous of Germany, formerly regarded as a pachycephalosaur, is probably something else (Wall and Galton, 1979), which makes *Yaverlandia* the earliest member of the group.

Conclusions

Yaverland is important as a supplementary site yielding the same fauna of dinosaurs, and other fossil reptiles, as the west coast Compton–Atherfield section. It is unique as the site of *Yaverlandia*, the oldest pachycephalosaur dinosaur known. Yaverland still frequently yields good dinosaur specimens and footprints, and the combination of these attributes gives its conservation value.

References



(Figure 8.16) The skull cap of the oldest pachycephalosaurid, *Yaverlandia bitholos* Galton, 1971, from the Early Cretaceous Wessex Formation of Yaverland, Isle of Wight, in (A) dorsal and (B) lateral views. Skull of the Late Cretaceous pachycephalosaurid *Stegoceras* in (C) dorsal and (D) lateral views, for comparison. Abbreviations: f, frontal; n, nasal; p, parietal; pf, postfrontal; po, postorbital; sq, squamosal. After Galton (1971c).