
Isle of Portland reptile sites

Highlights

The Isle of Portland is riddled with old quarries and cliffs that have been the source of a diverse array of fossil marine reptiles (Figure 7.9) and (Figure 7.10). The fossil turtles have proved to be particularly important, including some of the oldest known well preserved marine turtles.

Introduction

The latest Jurassic Portlandian limestone of the Isle of Portland has long been famous for its marine reptiles. Many skeletons and individual bones of these reptiles (Figure 7.11), plesiosaurs and ichthyosaurs were collected in the 19th century when the equally famous stone quarries were more active than today, but there have been some important finds in recent years. The island has yielded type specimens of five species of reptile, and it is the best source of latest Jurassic marine reptiles in the world. Recent fields from several quarries show its continuing potential.

The Portland Beds of the Isle of Portland has been described by Damon (1884, pp. 79–97), H.B. Woodward (1895, pp. 196–202), Strahan (1898, pp. 60–71), Arkell (1933, pp. 492–7; 1947c, pp. 118–22), Cope (*in* Torrens, 1969a, pp. A53–A57), Cope and Wimbledon (1973), and Wimbledon (*in* Cope *et al.*, 1980b, pp. 88–9). Portland reptiles have been described by Owen (1842b, 1869, 1884b), Lydekker (1889a, 1889b, 1890a), Gaffney (1975a, 1976), McGowan (1976) and Brown (1981), and summarized by Delair (1958, 1959, 1960, 1966, 1992).

Description

The sequence, based on Arkell (1947c) and Wimbledon (*in* Cope *et al.*, 1980b) is:

Purbeck Limestone Formation 'Lulworth Beds': algal limestone (caps) with dirt beds and plant remains, passing up into argillaceous and laminated limestones	c. 30
Portland Stone Formation	
Portland Freestone Member:	
Roach: cream-coloured oolite with moulds of bivalves, gastropods (northern half of island); Whit Bed Freestone: buff oolite; Curf and Chert: soft chalky micrite and micrite full of chert (northern half of island); Little Roach: Shelly oolitic limestone; Base Bed Freestone: soft, white oolitic limestone	
Cherty Beds: limestones, predominantly micrites, with nodules and beds of chert, with giant ammonites	15
Basal Shell Bed: hard micrite with a rich fauna (bivalves, gastropods, ammonites, echinoids, bryozoa, fish and reptiles)	2.7
Portland Clay	4–6
Portland Sand	
West Weare Sandstones: brown and grey dolomites and sandy cementstones	15
Cast Beds	1.3
<i>Exogyra</i> Bed: 'stiff marl/limestone packed with <i>Nanogyra nana</i>	2.5
Upper Black Nore Beds: black silts/silty clays with lines of light grey limestone nodules	12

Black Nore Sandstone: hard, black argillaceous sandstone with intensely hard concretions 2

Most specimen labels, and published descriptions, have little more locality and horizon data than 'Portland'. However, several authors have pointed to the Cherty Beds and the Basal Shell Bed as source horizons. Damon (1884, p. 86) noted 'Saurian remains' from the Cherty Beds of the Verne district (north-eastern part of the Isle) and a partial skeleton of a plesiosaur in the Museum of the Royal Engineer's Office at The Verne Works. Cox (1925) recorded the plesiosaur *Cimoliasaurus portlandicus* in the Basal Shell Bed. Savage (1958) noted a specimen of *C. portlandicus* 'probably from the Whit or Base Bed Freestone'. Centra, probably of ichthyosaurs, are not uncommon in the West Weare Sandstones at the top of the Portland Sand (W.A. Wimbledon, pers. comm. to M.J.B., 1992)

Several recently collected specimens have locality data. A centrum of *C. portlandicus* (DORCM G.177) is labelled 'Little Beach, NE of the Verne', thus a specimen that has probably fallen from The Verne. A further partial plesiosaur skeleton (DORCM G.181) is labelled 'below coastguard station, E. side, H. tide level — [SY 706 722] — coll. 1966–8'. Some bone fragments (BGS(GSM) Zm 7700–40) have an associated sheet with a geological section and the words 'bones and shells' inscribed against the (?) Basal Shell Bed and Cherry 'Series'. Delair (1966, p. 61) mentions these specimens as coming from the lower part of the Portland Stone, '2 or 3 feet above the Portland Sand'. Dr J.N. Carreck (pers. comm. to M.J.B., 1982) lists isolated discoveries of bones from the following horizons: a dinosaur vertebra from the Whit Bed at Parkfield Quarry (?=Perryfield Quarries, [SY 695 712], or disused quarries, unnamed on 6-inch OS map at [SY 692 714], near Park Road; a specimen in Portland Museum, noted by Delair (1992), parts of a plesiosaur femur from the Whit Bed at Bottom Coombe Quarry [SY 694 715], a goniopholid crocodylian tooth from the Skull Cap (Lower Purbeck) or top of the Portland Stone, a large part of a plesiosaur skeleton and a turtle cranium from the base Bed Freestone, and a large ?femur from the Lower Purbeck (Great Dirt Bed/Cap) of Wakeham Quarries [SY 698 713]. The present location of all but one of these specimens is unknown. Delair (1992) also notes 'characteristic megalosaurid metatarsals' on show in Portland Museum, from the Whit Bed of the Bath and Portland Stone Co.'s Quarry.

On the basis of these scraps of information, it may be concluded that most of the fossil reptiles from Portland came from the Portland Stone, and from a variety of localities. A selection of exposures is chosen for the GCR site since no particular quarry has proved to be the single main source.

Fauna

Fossil reptiles from Portland are preserved in several major collections. A list of species recorded is given, with repository numbers of type specimens. An indication is also noted of the number of specimens of each species preserved in major collections (especially BMNH, CAMSM, DORCM and OUM).

	Numbers
Testudines: Cryptodira	
<i>Plesiochelys planiceps</i> (Owen, 1842) Type specimen: OUM J.1582	3
<i>Pleurosternon portlandicum</i> Lydekker, 1889 Type specimen: BMNH 44807	1
<i>Portlandemys mcdowellii</i> Gaffney, 1975 Type specimen: BMNH R2914	4
Archosauria: Dinosauria: Saurischia:	
Theropoda	
'Megalosaurid'	2
Archosauria: Dinosauria: Saurischia:	
Sauropoda	
<i>Pelorosaurus</i> sp.	1
Sauropterygia: Plesiosauria:	
Elasmosauridae	

<i>Colymbosaurus portlandicus</i> (Owen, 1869) Type specimen:	33
BMNH 40640	
Sauropterygia: Plesiosauria: Pliosauridae	
? <i>Pliosaurus brachydeirus</i> Owen, 1841	2
Ichthyopterygia: Ichthyosauria	
<i>Macropterygius thyreospondylus</i> (Owen, 1840)	2

Interpretation

The turtle remains from Portland have proved to be of some interest recently. *Plesiochelys planiceps* (Owen, 1842) was based on a single cranium and partial carapace (Owen, 1842b, pp. 168–70). It was a relatively large animal (skull 90 mm long) with the temporal fossa completely roofed by postfrontal and parietal bones and a deep notch immediately behind the maxilla (Figure 7.11)A. Owen (1884b, vol. 2, p. 8, figs 1–2) figured the skull without further description. Lydekker (1889b, pp. 232–3) erected the new genus *Stegochelys* for this form. The type specimen was mentioned as lost by Lydekker (1889b) and Parsons and Williams (1961), but Delair (1958, p. 55) located it, and Gaffney (1975a, 1976) redescribed it as *Plesiochelys*. Parsons and Williams (1961) tentatively referred some further turtle skulls from the Isle of Portland to *P. planiceps*. Gaffney (1975a, 1976) further described these specimens, and named them *Portlandemys mcdowellii* (Figure 7.11)B). Gaffney (1975a, 1975b, 1976, 1979a, p. 281) ascribed the genera *Plesiochelys* and *Portlandemys* to the Plesiochelyidae, a family that he places in the Chelonioidae (living and extinct marine turtles).

The third Portland turtle is *Pleurosternon portlandicus* Lydekker, 1889b (pp. 215–16), a species based on a carapace which is only 250 mm long. Miñnarski (1976, p. 120) mentioned the species briefly and referred the family Pleurosternidae to Testudines *inc. sed.*

Dinosaurs from the Isle of Portland are represented by some metatarsals and a damaged vertebra of a 'megalosaurid' (Delair, 1992), and by a tooth named *Ornithopsis* sp. by Delair (1959, p. 83). *Ornithopsis* is currently ascribed to *Pelorosaurus* (Steel, 1970, p. 68).

Pliosaurus portlandicus Owen, 1869 (pp. 8–12) was described on the basis of a right hind paddle with a 370 mm long femur. Lydekker (1889a, pp. 227–30; 1890a, pp. 274–5) ascribed *P. portlandicus* to *Cimoliasaurus* and listed many specimens of vertebrae and limb bones. Brown (1981, pp. 314–17, 324) synonymized *C. portlandicus* with many other Late Jurassic plesiosaurs as *Colymbosaurus trochanterius* (Owen, 1840). Savage (1958) reported a recent find of a femur of *C. portlandicus*. Lydekker (1890a, pp. 271–2) and Delair (1959, p. 70) note the head of an ischium and the distal portion of a propodial (BMNH R1679, R.1680) from Portland as *Pliosaurus brachydeirus*, but Tarlo (1960), in a review of British Late Jurassic plesiosaurs, does not comment on these.

The ichthyosaur *Macropterygius thyreospondylus* is represented by a caudal vertebra from the 'Portland Oolite' (BMNH R1684; Delair, 1960, pp. 66–7). McGowan (1976) considered this species a *taxon dubium* because of the 'inadequate' type material, but it may be valid (A. Kirton, pers. comm. to M.J.B., 1982).

Comparison with other localities

Reptiles are relatively rare in the Portland Beds of Britain (listed near the beginning of the chapter). Of the turtles from the Isle of Portland, the genus *Plesiochelys* is known also from the Kimmeridge Clay of England, Switzerland, Bavaria and Hanover, the Portlandian (?) of eastern France, the Purbeck of Dorset, the 'Upper Jurassic' of China, and the Wealden of the Isle of Wight and Sussex (Lydekker, 1889b; Gaffney, 1975a; Miñnarski, 1976, pp. 55–7). *Portlandemys* is unique to the Isle of Portland. *Pleurosternon* is also known from the Purbeck Beds of Swanage (Lydekker, 1889b), and elsewhere in the Late Jurassic and Early Cretaceous of western Europe and Asia (?) (Miñnarski, 1976, p. 120).

Colymbosaurus portlandicus is unique to the Portlandian of England but, if synonymized as *C. trochanterius*, it is well known from many localities in the Kimmeridge Clay also (Brown, 1981). Delair (1966, pp. 66–7) regarded the Portland *M. thyreospondylus* as the only English Portlandian ichthyosaur, although there are some ichthyosaur vertebrae from Swindon (OUM J.1585–6; BGS(GSM) old number). *M. thyreospondylus* occurs in the Portlandian of the region of Boulogne (Huene, 1922, p. 91). The Portlandian fauna from the Isle of Portland is similar in many ways to the preceding

Kimmeridgian faunas, but overall species diversity seems reduced, and turtles are perhaps relatively a little more diverse.

Conclusions

The Isle of Portland has yielded the best faunas of marine Portlandian reptiles in the world. Other marine faunas of this age are known from southern England, but the range of material is less. Better known faunas from elsewhere in the world (e.g. Morrison Formation, USA; Tendaguru, Tanzania) are dominated by terrestrial forms such as dinosaurs. The turtles from Portland include good skull material, and have formed the basis of recent reviews of early turtle anatomy and taxonomy. The plesiosaur material is good, and appears to have closest affinities with Kimmeridgian species. The sites include the best sources for marine reptiles of latest Jurassic age anywhere in the world and, with their continuing potential for new finds, they therefore have high conservation value.

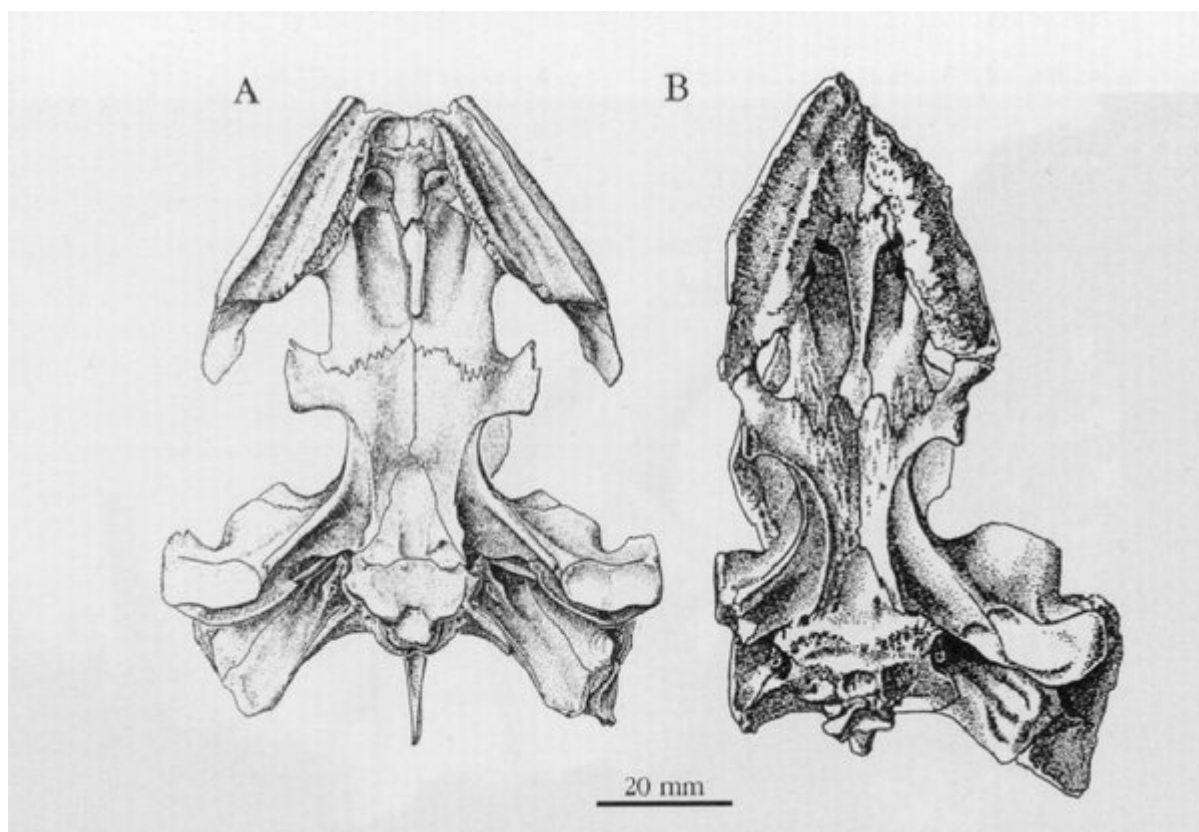
References



(Figure 7.9) Nicodemus Nob on the eastern side of the Isle of Portland, showing the partly overgrown quarried cliffline. Upper parts of the Portland sequence are exposed. (Photo: M.J. Benton.)



(Figure 7.10) Broadcroft Quarries on the Isle of Portland, showing large blocks quarried for building stone. Fossil reptiles have been found in most of the inland and cliffline quarries. (Photo: M.J. Benton.)



(Figure 7.11) Turtles from the Portlandian of the Isle of Portland. (A) *Pletochelys planiceps* (Owen, 1842), skull in partially restored ventral view; (B) *Portlandemys mcdowellii* Gaffney, 1975, partial skull in ventral view. In both cases, the toothless jaws are directed to the top, and the palate and braincase extend to the bottom. The top of both skulls is missing. After Gaffney (1975a).