Headon Hill (Alum Bay–Totland), Isle of Wight

[SZ 305 855]

Highlights

Headon Hill has produced a good fauna of Late Eocene reptiles, and it is especially important for the specimens of lizards and snakes. These include several specimens of the glass lizard *Ophisaurus,* the first record in Britain, as well as three species of snakes.

Introduction

The Late Eocene (Priabonian) Headon Hill Formation in their type area in the degraded coastal sections of Headon Hill, Isle of Wight (Figure 9.8), have produced in the recent past a good fauna of turtles, crocodilians, snakes and lizards (Figure 9.9). Large parts of the section are obscured by mud flows, but the relevant beds may easily be cleared for further excavation.

The Headon Hill Formation between Alum Bay and Totland has been described by Prestwich (1846), White (1921), Stinton (1971), Cray (1973), Daley and Edwards (1974), Daley and Insole (1984) and Insole and Daley (1985). Accounts of the reptilian faunas have been given by Cray (1973), Meszoely and Ford (1976) and Rage and Ford (1980), but there is as yet no complete overview.

Description

A generalized section of the Headon Hill Formation taken from the south-west corner of Headon Hill, based on Cray (1973) and Insole and Daley (1985), is:

	Thickness (m)
Cliff End Member (part of 'Upper Headon Beds')	
Clays and marls seen	to 6.6
Hatherwood Limestone Member (part of 'Upper Headon Beds')	
Limestones	2.8
Lignite (Lignite Bed)	0.7
Limestones	2.7
Linstone Chine Member (part of 'Upper Headon Beds'); white and grey sands (*Microchoerus* Bed at base)	0.8
Colwell Bay Member ('Middle Headon Beds')	
Blue-green clays and sands	2.0
Limnaea Limestone	0.2
Blue, green and brown sandy clays (*Venus* Bed)	c. 4.4
Sands, clays and lignites (*Neritina* Bed)	2.5
Totland Bay Member ('Lower Headon Beds')	
Limnaea limestone (How Ledge Limestone)	c. 2.0
Marls, clays, sands and lignites	4.6
Limnaea limestone	0.4
Green clays and pale sands	4.4
Limnaea limestone	0.8
Blue and green clays	1.0
Limnaea limestone	0.25

Green sandy clays	0.7
Green clays	seen 1.1

Cray (1973, p. 24) mentions fragments of turtle bones and, more rarely, broken mammalian remains from a limestone immediately below the Lignite Bed, a horizon outcropping about a third of the way up the vertical cliff formed by the limestone on the south-west seaward face of Headon Hill. The limestone (which may also overlie the Lignite Bed in places) is very variable lithologically, and several subdivisions were recognized. The reptile-bearing lithology is a soft, impure, orange-coloured, marly limestone, rich in the shells of *Galba* sp. However, reptile debris, including dermal scutes of turtles (*'Emys'* sp.) and teeth of the crocodilian *Diplocynodon,* also occurs sporadically throughout the Lignite Bed and appears to come from all the lithologies, being represented both in friable lignite and in the shell marls (Cray, 1973, p. 25).

In the early 1970s large collections of reptiles (particularly squamates) and amphibians were obtained by Mr R.L.E. Ford from units in the Totland Bay Member, in particular from Bed HH2 (Bosma, 1974, fig. 9) beneath a unit of hard limestone named the 'How Ledge Limestone', from a series of green-grey clays. Two localities have yielded herpetofaunas from this stratum: in the undercliff at Headon Hill and in Totland Bay. The How Ledge Limestone occurs along the coast between Hatherwood Point and How Ledge, and it appears that the reptiles occur patchily beneath the entire length of the outcrop. The fossils are all represented by disarticulated, and frequently abraded and fragmented, elements, which indicate considerable predepositional disturbance.

Fauna

The main collections of fossil reptiles from Headon Hill are curated in the BMNH as well as the Museum National d'Histoire Naturelle (MNHN) Paris and the Stuttgarter Museum für Paläontologie (Ford collection). The collections include many mammal and amphibian taxa, as well as reptiles. Amphibians include palaeobatrachid and discoglossid frogs ((Figure 9.9)A.

Testudines: Cryptodira:

Emydidae

'Emys' sp.

Archosauria: Crocodylia: Neosuchia:

Eusuchia

Diplocynodon sp.

Crocodilus sp.

Lepidosauria: Squamata:

Sarnia

Scincomorph indet.

Necrosaurus sp.

Ophisaurus sp.

Glyptosaurine indet.

Lepidosauria: Squamata: Serpentes

Paleryx rhombifer Owen, 1850

Vectophis wardi Rage and Ford, 1980 Type specimen: MNHN CGB 27

cf. *Dunnophis*

Interpretation

The Headon Hill Formation falls in the Headonian European mammal age and is equated with the upper part of this age, dated as late Late Eocene (Priabonian) by Curry *et al.* (1978). The environments are interpreted as floodplain and lagoonal, as for Hordle (q.v.), and the vertebrates are associated with closed, subtropical forests (Hooker, 1992). The squamates from the HH2 bed are associated with abundant amphibian remains, including three anurans (Discoglossidae indet., Palaeobatrachinae indet. and cf. *Eopelobates*) and rare salamanders such as 'cf. *Megalotriton'* (Rage and Ford, 1980).

The turtle '*Emys'* is represented by numerous thin unornamented scutes and appendicular bones. This genus may almost certainly be attributed to the well-known Eocene genus *Ocadia,* of which two forms have been noted from the Totland Bay Member by Moody (1980a, p. 24). A large number of isolated teeth have been collected from various parts of the section at Headon Hill; these are referred to the crocodilians *Diplocynodon* and *Crocodilus.*

The lizards from Headon Hill include members of the Necrosauridae (*Necrosaurus*), Scincomorpha and Anguidae (glyptosaurine, *Ophisaurus*), all of which are known from the Hordle Cliff section (see above). The faunal list from the HH2 horizon at Headon Hill is smaller than that from the Totland Bay Member at Hordle, lacking the gekkonid, cordylid and the lacertid *Plesiolacerta lydekkeri.*

The Scincomorpha are represented by several remains of dentary bones, but these are not entirely diagnostic. The dentaries possess a narrow meckelian groove that is shallow and restricted to the lower surface of the dentary anteriorly. The cylindrical teeth show pleurodont implantation, and (viewed laterally) are high relative to the average height of the dentary.

Ophisaurus (the glass lizard) is the most abundant lizard present, being represented by numerous distinctive remains of osteoscutes (or osteoderms) and a few isolated dorsal vertebra (Meszoely and Ford, 1976; Rage and Ford, 1980; (Figure 9.9)B. The osteoscutes are flattened structures from the trunk and tail, bearing a smooth anterior 'gliding' surface and a flattened face with an ornament of irregularly branching grooves and ridges. Many of the osteoscutes, particularly those of the tail, carry a prominent median ridge. The osteoscutes and vertebrae of *Ophisaurus* show little morphological variation, and it has been hard to divide the genus into species (Rage and Ford, 1980). Meszoely and Ford (1976) suggested that the Headon Beds form was conspecific with *Ophisaurus hallensis* (Kuhn, 1940) from the Geiseltal deposits (Mid Eocene) near Halle, Germany, based on its European occurrence and Late Eocene age. This view was tentatively accepted by Rage and Ford (1980).

The anguine subfamily Glyptosaurinae is represented by two partly fragmented dorsal vertebrae and a caudal vertebra. These are larger than those of *Ophisaurus* and may be distinguished by the slightly concave ventral surface of the centra (a feature characteristic of limbed Anguidae). The necrosaurid *Necrosaurus is* represented by a single elongate posterior caudal vertebra, showing no fused haemapophyses, but two articular facets for the chevron and a groove on the ventral surface.

Of the snakes, the boid *Paleryx rhombifer* ((Figure 9.9)C, tropidophid cf. *Dunnophis* and caenophid *Vectophis wardi are* all represented by isolated remains of vertebrae. *Paleryx rhombifer* (represented by approximately 20 vertebrae) was regarded as congeneric with *Paleopython* from the Eocene of France by Lydekker (1888c), but Rage and Ford (1980) have argued that the two forms are distinct.

A small snake, represented by a number of isolated dorsal vertebrae, is referred by Rage and Ford (1980) to cf. *Dunnophis.* The genus is based on limited and damaged vertebral material from the Early Eocene of France and Belgium

(Rage, 1984), and its precise relationships have been hard to establish. Over the years, this genus has been assigned to Serpentes *incertae sedis* or the Boidae (in particular the Tropidopheidae). These views have been disputed, but Rage and Ford (1980) suggested that the Isle of Wight form might provide a good morphological connection between 'typical' *Dunnophis* and the Boidae.

Vectophis wardi is a frequent element in the fauna, being represented by five vertebrae from Totland Bay and by about 60 vertebrae on Headon Hill ((Figure 9.9)D. This is a small alethinophidian snake with a distinctive vertebral morphology. The type specimen (MNHN CGB 27), collected from Totland Bay, consists of a single mid-trunk vertebra which carries a tall neural spine, a feature shared by several specimens from Hordle Cliff, which have consequently been referred to the species (Milner *et al.,* 1982, p. 152). Other features of the genus include a vaulted neural arch, robust neural spine, narrow centrum, mid and posterior trunk vertebrae which lack a hypophysis, a distinct and rather sharp haemal keel, grooves lying on either side of the haemal keel, absence of long prezygapophysial processes, and caudal vertebrae with pleurapophyses and haemapophyses. On the basis of these characters, Rage and Ford (1980) consider *Vectophis* as perhaps belonging to the Colubroidea, and as possibly a primitive member of this superfamily.

Comparison with other localities

Geographically and stratigraphically, the nearest comparable units to the Totland Bay Member at Headon Hill are the same stratigraphic unit at Hordle Cliff ([SZ 253 925]–[SZ 287 915]; see above), and the Fishboume Member (Osborne Beds') at Fishboume [SZ 551 927]. In the 'Osborne Beds' shared faunal elements include *Ophisaurus* sp., *Paleryx rhombifer* (represented by one rounded and worn trunk vertebra) and cf. *Dunnophis.* The Erycinae cf. *Calamagras* and Erycinae unidentif. (Rage and Ford, 1980), present in these beds, do not occur in the Totland Bay Member. All of the reptiles recorded from Headon Hill are known from the directly correlative sequence at Hordle, but there are many genera known from Hordle that are absent on the Isle of Wight (see above), possibly the result of taphonomic differences (Milner *et al.,* 1982).

A dentary referred to a glyptosaurine lizard has been obtained elsewhere on the Isle of Wight, from the Bembridge Marls Member of the Bouldnor Formation (Early Oligocene) (BMNH R8716) (R. Estes, pers. comm. to Rage and Ford, 1980). Large-limbed Anguidae are represented in the Late Eocene of France by cranial osteoderms and other elements, named *Placosaurus rugosus* (Gervais, 1848–52), and also from Germany, where *Placotherium waltheri* (Weigelt, 1929) is known from deposits of Mid Eocene age. The status of these species, based mainly on external morphology of the osteoderms, is not clear and, although clearly belonging to the Glyptosaurinae, both forms are regarded by Sullivan (1979, pp. 43–4) as *nomina dubia.* In North America glyptosaurine lizards are represented by more complete remains bearing similar osteoderms, and numerous genera have been named, particularly from the Eocene and Oligocene (Sullivan, 1979; Estes, 1983).

The discovery of the anguid *Ophisaurus* from the Isle of Wight, extends the range of this genus from the Mid and Late Eocene of central Europe, to the British Isles. The genus is still extant and is confined to the eastern section of continental Europe.

Necrosaurus is known from the Late Eocene of France (*Necrosaurus cayluxi* Filhol, 1873) and from the Mid Eocene of Germany and latest Eocene and Early Oligocene of France (*N. eucarinatus* Kuhn, 1940). The genus is also known from the Paleocene of France and from the Early Oligocene of Belgium (Estes, 1983).

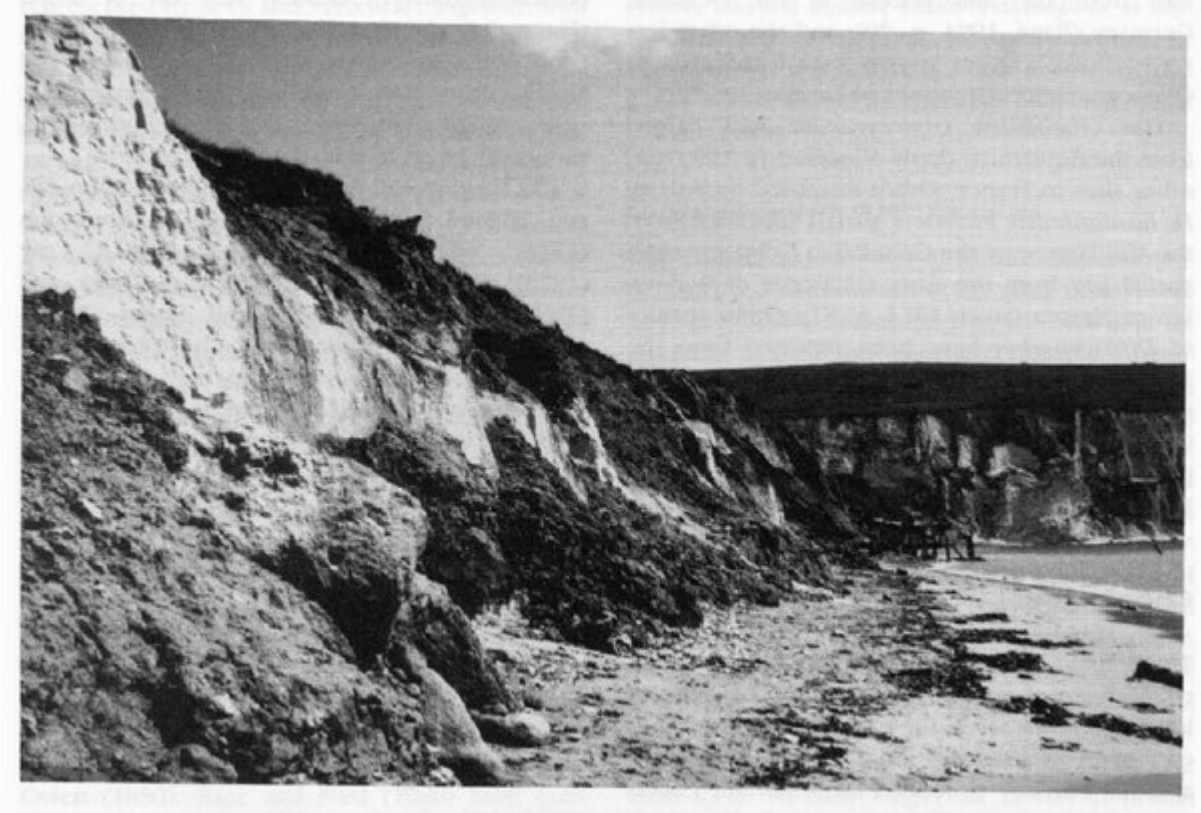
The snake *Dunnophis* is reported from the Early Eocene of France and Belgium, the Mid and Late Eocene of North America, the Late Eocene of France and the Early Oligocene of Belgium (Rage, 1984). As noted above, the closely related Totland Bay Member form cf. *Dunnophis,* may be phylogenetically intermediate between *Dunnophis* and the Tropidophlidae; in this sense, it is confined to the British Early Eocene.

Conclusions

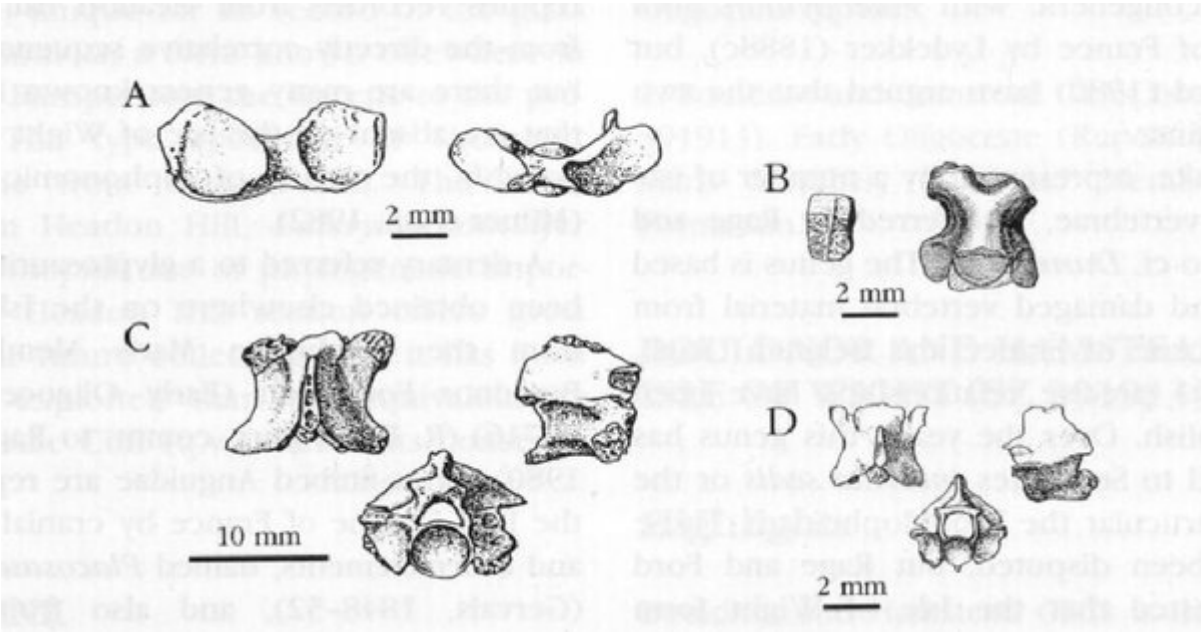
Headon Hill is an important reptile site of Late Eocene age, unique for its record of the glass lizard *Ophisaurus,* a form known elsewhere in continental Europe from the Eocene to the present day. The type specimen of *Vectophis wardi* came

from Headon Hill. The other snakes from Headon Hill, *Paleryx rhombifer* and cf. *Dunnophis* are of phylogenetic importance. The Headon Hill section offers great potential for future collecting, and it has been much less exploited than the equivalent-age units at Hordle Cliff (q.v.), hence its conservation value.

References



(Figure 9.8) Alum Cliff, at the southern end of the Headon Beds outcrop on Headon Hill, Isle of Wight. (Photo: M.J. Benton.)



(Figure 9.9) Typical reptiles and amphibians of the Late Eocene Lower Headon Beds of Headon Hill and Totland Bay. (A) A palaeobatrachid frog, fragmentary atlas; (B) the limbless lizard Ophisaurus sp., scute and trunk vertebra in ventral view; (C) the snake Paleryx rhombifer Owen, 1850, mid-trunk vertebra in dorsal, lateral, and anterior views; (D) the snake Vectophis wardi Rage and Ford, 1980, mid-trunk vertebra in dorsal, lateral and anterior views. (A), (C) and (D) After Rage and Ford (1980); (B) after Meszoely and Ford (1976).