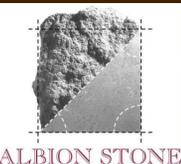


# The turtle genus *Hylaeochelys* from the Portland Stone Formation of Dorset

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## Background

*Hylaeochelys* is a shell-based genus of pancryptodire turtle known from many specimens from the Lower Cretaceous of southern England. There are, at present, no valid records from elsewhere. The material has been treated as two species, *H. belli* from the Wealden of Sussex and *H. latiscutata* from the Purbeck Limestone of Dorset and but recent work by Pérez-García (2012) indicates that they are indistinguishable. The absence of associated cranial material has delayed the placement of *Hylaeochelys* in analyses of pancryptodire relationships.

## Discovery and Preparation

The new specimen was found in July 2010 by Diane Godden in a recently extracted block of limestone at Fancy Beach Quarry, Portland. A 16-20 tonne block had fractured into two halves with the specimen exposed on both faces of the fracture. The bone was stabilised with Paraloid B72 and then MG arranged for the blocks to be transported to Albion Stone's yard where they were reduced by use of stone saws. The resulting smaller blocks were then reunited by David Costin who prepared the specimen from the dorsal side to produce the exposure seen here. The specimen will ultimately be housed at Portland Museum.

## Stratigraphy, Palaeoenvironment and Taphonomy

The turtle was found in the upper part of the Whitbed close to the junction with the overlying Roach, within the Portland Freestone Member of the Portland Stone Formation. It is thus Upper Tithonian, Upper Jurassic in age and within 2 million years of the J-K boundary. The Portland Freestone Member is a shallow-water coastal formation representing algal reefs and lagoons. The reptiles found in this Member include forms of marine origin (plesiosaurs, ichthyosaurs, steneosaurids and metriorhynchids) and occasional elements of transported terrestrial or freshwater forms (dinosaurs and goniopholidids). The Cretaceous material of *Hylaeochelys* is found in freshwater assemblages, so it is likely that this specimen represents a freshwater animal washed down river and into the sea. It is possible that much of the limb skeleton was lost during this transport phase. The carcass apparently came to rest in a dip in the algal reef and partly disintegrated *in situ*, the mandible remaining close to the carapace. The surface of the carapace elements is no longer pristine suggesting that the keratinous scutes had worn off and that some decay-induced bone solution had begun prior to burial.



## Taxonomic Identity

The specimen comprises much of a carapace, one hyoplastron, a mandible and one limb element. Grooves representing the epidermal scute margins are visible on the carapace. Four features diagnose it as a specimen of the shell-taxon *Hylaeochelys*.

- 1) The vertebral scutes were extremely wide and extended halfway along the costals (see right).
- 2) The extremely narrow neural bones in the mid-posterior carapace (see right).
- 3) The presence of a plastral fontanelle (from outline of isolated hyoplastron).
- 4) Delayed ossification of the costals such that they have not fully overgrown the ribs in a 250 mm carapace.



Following the recent review by Pérez-García, later *Hylaeochelys* material from the Purbeck and Wealden appears to be indistinguishable, with *H. belli* as the senior binomen. The Portland specimen differs from all specimens of *H. belli* examined, in that the nuchal bone has a straight anterior edge and there is no nuchal concavity; also the first neural is an almost square rhomboid. In *H. belli*, the nuchal anterior edge is concave and the first neural is elongate, like the posterior neurals. For these reasons, we believe a new species can be created for this early *Hylaeochelys*.

In the course of this study, a second Portland *Hylaeochelys* specimen was located at the Natural History Museum, London. It had been reported by Lydekker as a postcranium of the skull-taxon *Stegochelys planiceps*, although there was no firm association. Acid-preparation in the 1950's had revealed its *Hylaeochelys* features, but this had gone unreported.

Pérez-García, A. (2012). High diversity of pancryptodiran turtles in the Lower Cretaceous of Europe. *Cretaceous Research* 36, 67-82.

## Significance

*Hylaeochelys* was previously known only from the Lower Cretaceous Purbeck and Wealden of England, so this is the first Jurassic specimen, and hence the earliest representative of this genus. It is also the first specimen to have associated cranial material, albeit only the mandible, and raises the possibility of relating *Hylaeochelys* to one of the contemporary pancryptodire skull-taxa from the Portland Stone Formation. These are *Stegochelys planiceps* Owen and *Portlandemys mcdowellii* Gaffney. The narrow symphysis and the orientation of the dentary-surangular suture in the new Portland specimen are consistent with the condition in *Stegochelys* and quite unlike the condition in *Portlandemys* (see left for symphysis). These two mandibular features are not an adequate basis for synonymising *Stegochelys* and *Hylaeochelys*, which would involve some complex problems of stability versus priority, but it does raise this as a significant possibility, particularly as the two taxa appear in close proximity in some recent analyses.