Ham Cliff, Redcliff Point, Dorset

[SY 713 817]

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Introduction

The coastal exposure of the Oxford Clay Formation at Ham Cliff, at the east end of Weymouth Bay in Dorset, spans the Callovian–Oxfordian stage boundary (Figure 2.9). Other exposures of the Upper Callovian and Lower Oxfordian substages on the Dorset coast tend to be masked by slumping or superficial deposits, or are on a flat foreshore where no proper succession can be deduced (see Shipmoor Point–Butterstreet Cove and Tidmoor Point–East Fleet Coast GCR site report, this volume). At Ham Cliff, a good section can generally be exposed with minimal digging and, as a natural coastal exposure, it may be considered to be essentially permanent. The site has been known for a long time but it was not until coastal erosion in the 1990s improved the exposure that the relatively expanded and ammonitiferous stage boundary beds were fully appreciated (Chapman, 1999).

Description

The site has been noted by Arkell (1947a) and Cope (1969) but the most recent and fullest account is that of Callomon and Cope (1995) on which the following details, including bed numbers, are based. The measured section is in the cliff but Bed 1, at the base, extends downwards for up to a metre into the beach below high-water mark (Figure 2.10).

	Thickness (m)
Oxford Clay Formation	
5: Clay, dark, slightly fissile, richly fossiliferous with abundant ammonites, including macroconch and microconch *Quenstedtoceras* cf. *woodhamense* Arkell at base, *Q. mariae* (d'Orbigny) and *Q. woodhamense* at 0.7 m above base, and typical *Cardioceras scarburgense* (Young and Bird) with common *Gryphaea dilatata* J. Sowerby at 1.5 m above base; ammonites crushed but with body chambers preserved in yellowish-brown slightly phosphatized marlstone	up to 11.5
4: Clay, dark, slightly fissile, very sparsely fossiliferous with scattered ammonites (*Quenstedtoceras* cf. *paucicostatum* (Lange)); fairly persistent bands of brown, ferruginous mudstone at 1.8 and 2.2 m above base; in upper part of bed, ammonites crushed and with phosphatized body chambers; tenacious in upper 0.3 m	4.5
3: Pyritic shell-detrital bed forming persistent, but not always prominent, marker; locally with lenticular, brown ironstone	0.10
2: Clay, slightly pyritic, weathering more flaky; sparsely fossiliferous with *Quenstedtoceras lamberti* (J. Sowerby) often with uncrushed pyritic inner whorls; thin ironstone in lenses near sharp base	0.75

1: Clay, pale-grey, fairly tough, non-laminated, calcareous; occasional thin (0.01–0.03 m), lenticular layers of brown ferruginous mudstone or ironstone at or near top; shell-plaster of crushed white ammonites at top forming slight ledge and marker; common *Quenstedtoceras praelamberti Douvillé* at 0.75 m below cliff base with *Q.* (*Eboraciceras*) sp. and *Euaspidoceras* sp. up to 0.50 m below cliff base; scattered *Q. praelamberti* above but becoming abundant in top 0.3 m with profuse *Q. lamberti sensu stricto* and *Q. flexicostatum* (Phillips), fairly common *Kosmoceras* sp., occasional *Hecticoceras* sp., *Alligaticeras* sp. and *Peltoceras* sp.	seen to *c.* 3.0

Interpretation

The ammonite faunas of beds 1–4 indicate the Upper Callovian Lamberti Zone and Subzone (including the *praelamberti, lamberti* and *paucicostatum* biohorizons). The older Henrici Subzone of the Lamberti Zone is not reached. The ammonites of Bed 5 indicate the Lower Oxfordian Mariae Zone. The boundary between these two zones is usually indicated by the transition from ammonites of the group of *Q. lamberti* to those of the *Q. mariae* group. Callomon and Cope (1995) described this as a 'matter of some delicacy and possibly to some degree arbitrary' when the faunal successions are seemingly continuous as at Ham Cliff. In the Midlands, the zone and stage boundary coincides with the top of the Lamberti Limestone, a condensed 'event horizon' that also marks the boundary between the Stewartby and Weymouth members of the Oxford Clay Formation (the Middle and Upper Oxford Clay of traditional usage). The Stewartby Member is a predominantly pale- to medium-grey, commonly smooth-textured, variably silty, calcareous, generally rather poorly fossiliferous, blocky mudstone with ammonites and other macrofauna usually preserved as pyritic internal moulds (see Crookhill Brickpit GCR site report, this volume). The Weymouth Member is a predominantly pale-grey, blocky, smooth-textured, calcareous mudstone, generally only slightly silty but with thin dark-grey, carbonaceous beds with striking interburrowing at some levels as well as thin calcareous siltstones; although generally poorly fossiliferous, large *Gryphaea* are characteristic and the ammonite fauna is usually pyritized and occasionally associated with sideritic mudstone nodules (Cox *et al.,* 1992). At Ham Cliff, where the succession is relatively expanded, the two members cannot be differentiated on the basis of lithology alone and there appears to be no detectable lithological change or marker bed comparable with the Lamberti Limestone such as is developed elsewhere.

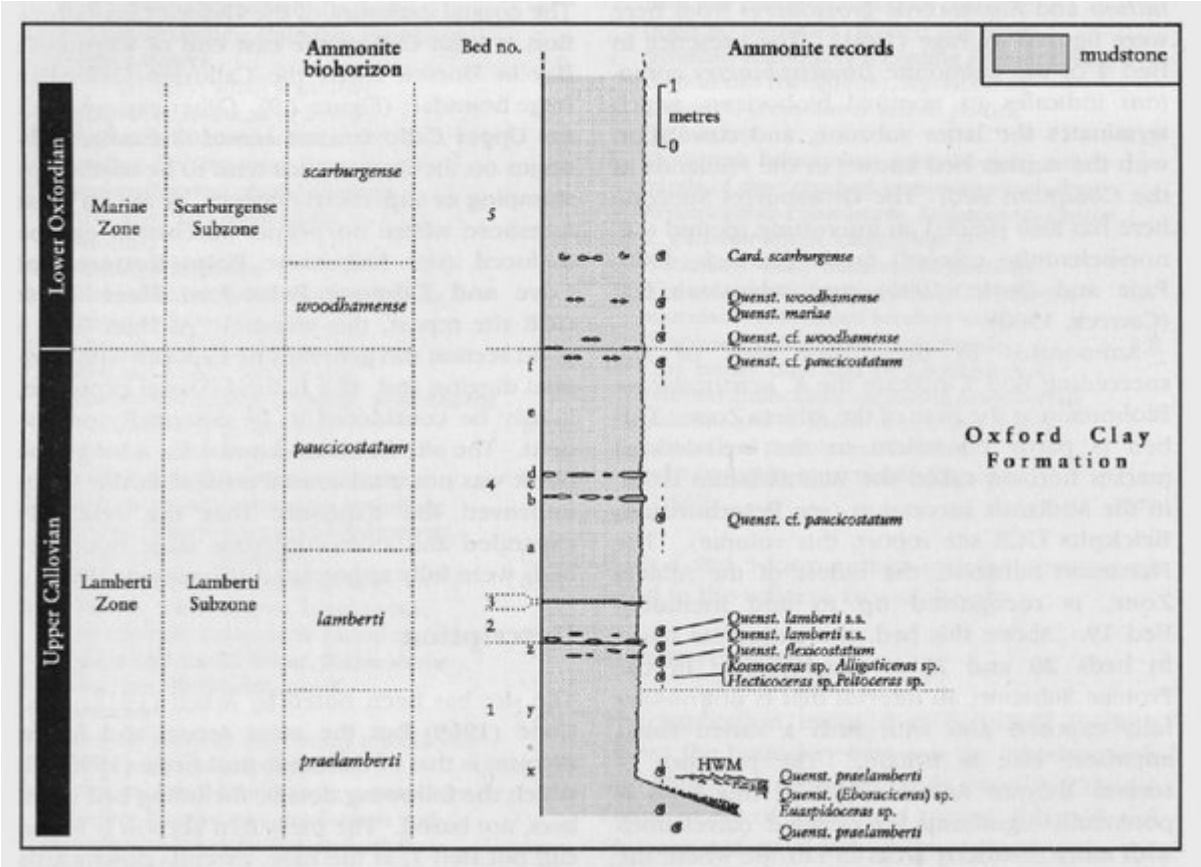
The *praelamberti, lamberti* and *paucicostatum* biohorizons are now widely recognized in Europe (Thierry *et al.,* 1997). The *paucicostatum Biohorizon* is of particular importance in the definition of the Callovian–Oxfordian stage boundary: It was first recognized as a separate faunal biohorizon by Marchand (1979) who referred the species to the genus *Cardioceras* but Callomon and Cope (1995) considered that the morphological affinities seemed closer to *Q. lamberti.* Whatever the generic assignment, the *paucicostatum Biohorizon is* now taken as the youngest and final part of the Callovian Stage throughout much of north-west Europe (Fortwengler and Marchand, 1994). On the Yorkshire coast, which had previously been considered as the best area for a British reference section for the Callovian–Oxfordian stage boundary (see Osgodby Point GCR report, this volume), the boundary succession is much thinner than at Ham Cliff; for example, the *paucicostatum* Biohorizon is only 0.15 m thick compared with *c.* 4.2 m at Ham Cliff.

Conclusions

The succession at Ham Cliff is in ammonitiferous clay facies without major non-sequence and may justifiably be considered as potentially the most important, and certainly the most complete, Callovian–Oxfordian stage boundary section in Britain. The facies is more favourable than that at comparable sections elsewhere in Europe for the recovery of microfossils as well as for chemostratigraphy and magnetostratigraphy. The section is thus a most important one for international correlation of the base of the Oxfordian Stage.

References

(Figure 2.9) General view of Ham Cliff from Redcliff Point. The Callovian–Oxfordian stage boundary lies in the grey clays of the Oxford Clay Formation on the right of the picture. The steep cliff is in the lower part of the Corallian Group. (Photo: K.N. Page.))



(Figure 2.10) Graphic section of the Callovian–Oxfordian stage boundary beds at Ham Cliff. (After Callomon and Cope, 1995, fig. 21.) For lithologies, see text.)