
Flat Holm, Bristol Channel

[ST 218 650]–[ST 223 646]

Introduction

The Flat Holm GCR site lies in the Severn Estuary, 10 km south of Cardiff and 10 km west of Sand Bay, north of Weston-super-Mare. The locality includes the south- and west-facing cliffs of the island [ST 218 650]–[ST 223 646]. The shoreline sections reveal excellent exposures of the Gully Oolite, Caswell Bay Mudstone and Birnbeck Limestone (Chadian–Arundian). The site is particularly important as the type locality for the Flat Holm Limestone Member of the Birnbeck Limestone; a distinctive facies of interbedded bioclastic limestones and thinly bedded dolomitic limestones and shales that is unique to the Island. Details of the site geology are provided by Whittaker and Green (1983) and Weedon (1987).

Description

Flat Holm consists entirely of Dinantian strata that are folded and faulted such that the total stratigraphical thickness seen is less than 100 m. The oldest unit is the Gully Oolite (Chadian), the top of which is seen at Lighthouse Point at the south-eastern end of the site and in the core of an anticline on the west coast, north of Bottleswell Point. It comprises massive, pale-coloured, cross-bedded oolites capped by a particularly well-developed palaeokarst and calcrete (Spalton, 1982) (Figure 9.44). The Caswell Bay Mudstone is seen north of Bottleswell Point where it consists of 4.5 m of well-bedded, laminated and fenestrate dolomitic carbonate mudstones. Thin-walled bivalves and gastropods have been recorded from near the base and crinoidal debris is apparent near the top of the unit (Whittaker and Green, 1983).

The Flat Holm Limestone Member is best seen in southerly dipping sections north of Bottleswell Point and south of Lighthouse Point. A detailed description of the succession has been published by Whittaker and Green (1983). The member is 30 m thick and comprises six alternations of thickly bedded bioclastic and oolitic limestones alternating with thinly bedded dolomites and mudstones (Figure 9.45) and (Figure 9.46). The latter are in units 0.5–1.5 m thick and are lettered A to F from base to top by Whittaker and Green (1983). The intervening bioclastic units range from 1 m to 9 m in thickness. A coral bed, containing *Siphonophyllia caninia* sp. (?*caninoides* group) and *S. garwoodi*, occurs 10.5 m above the base. The higher part of the Birnbeck Limestone can be seen at the northwestern end of the site where it comprises bioclastic and oolitic limestones with *Palaeosmilia purchisoni* and *Delepinea carinata* (Whittaker and Green, 1983).

Interpretation

The palaeosol at the top of the Gully Oolite has been compared with that at the top of the equivalent Caswell Bay Oolite in Gower (the Heatherslade Bed of George, 1978b) by Spalton (1982) and Whittaker and Green (1983). Although the Caswell Bay Mudstone has often been referred to as Chadian age (e.g. George *et al.*, 1976), Riding and Wright (1981) have made a sedimentological case for including it in the Arundian Stage (also see (Figure 9.2)). The Birnbeck Limestone (including the Flat Holm Limestone Member) is of Arundian age on the basis of its coral faunas (Whittaker and Green, 1983). The Birnbeck Limestone on Flat Holm differs from that on the mainland in the presence of the six intercalations of 'lagoonal' facies, resembling the Caswell Bay Mudstone beneath, in the normal marine limestone succession. Whittaker and Green (1983) indicate that detailed correlation of the Flat Holm succession with that of Weston-super-Mare is not possible, although it is probable that coral bands at a similar stratigraphical level in both successions are equivalent.

Conclusions

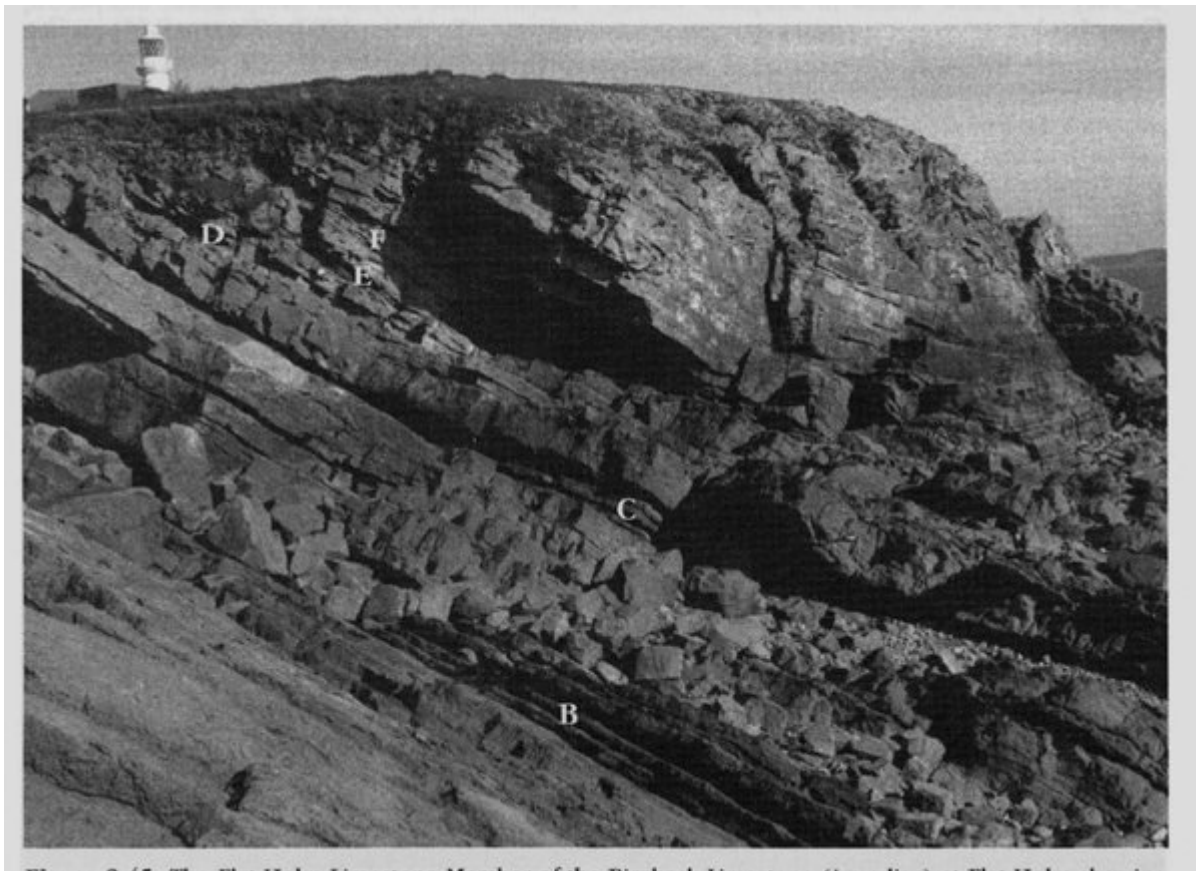
The value of the Flat Holm site lies in the exposure of the Flat Holm Limestone Member of the Birnbeck Limestone with its unique intercalation of lagoonal and normal marine deposits. The site is therefore of critical importance to the

understanding of Lower Carboniferous palaeo-environments and palaeogeography, as well as to future sedimentological research.

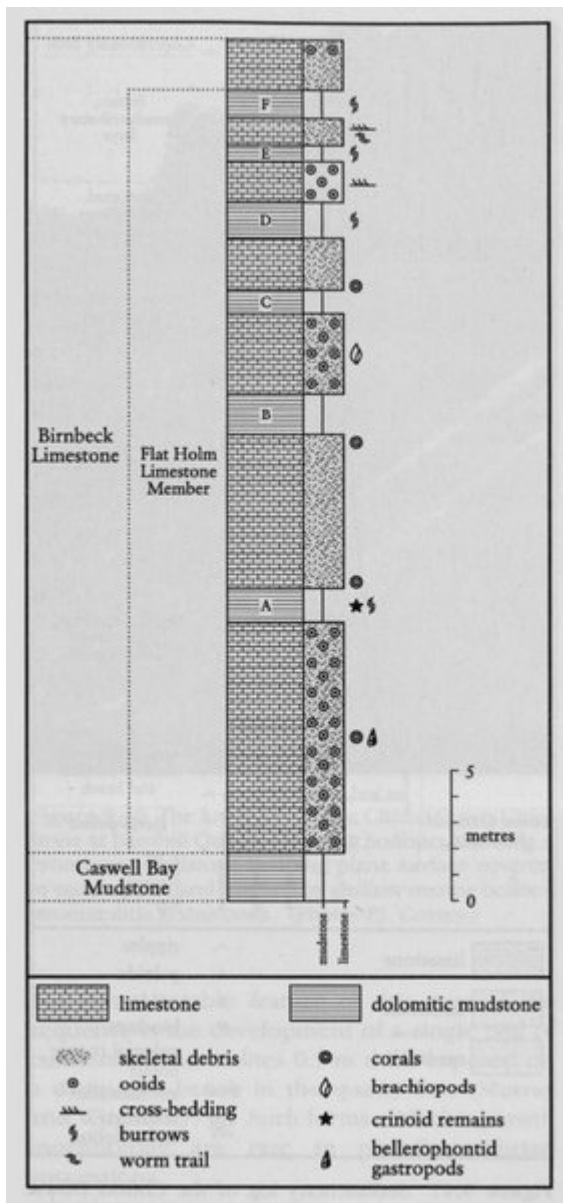
References



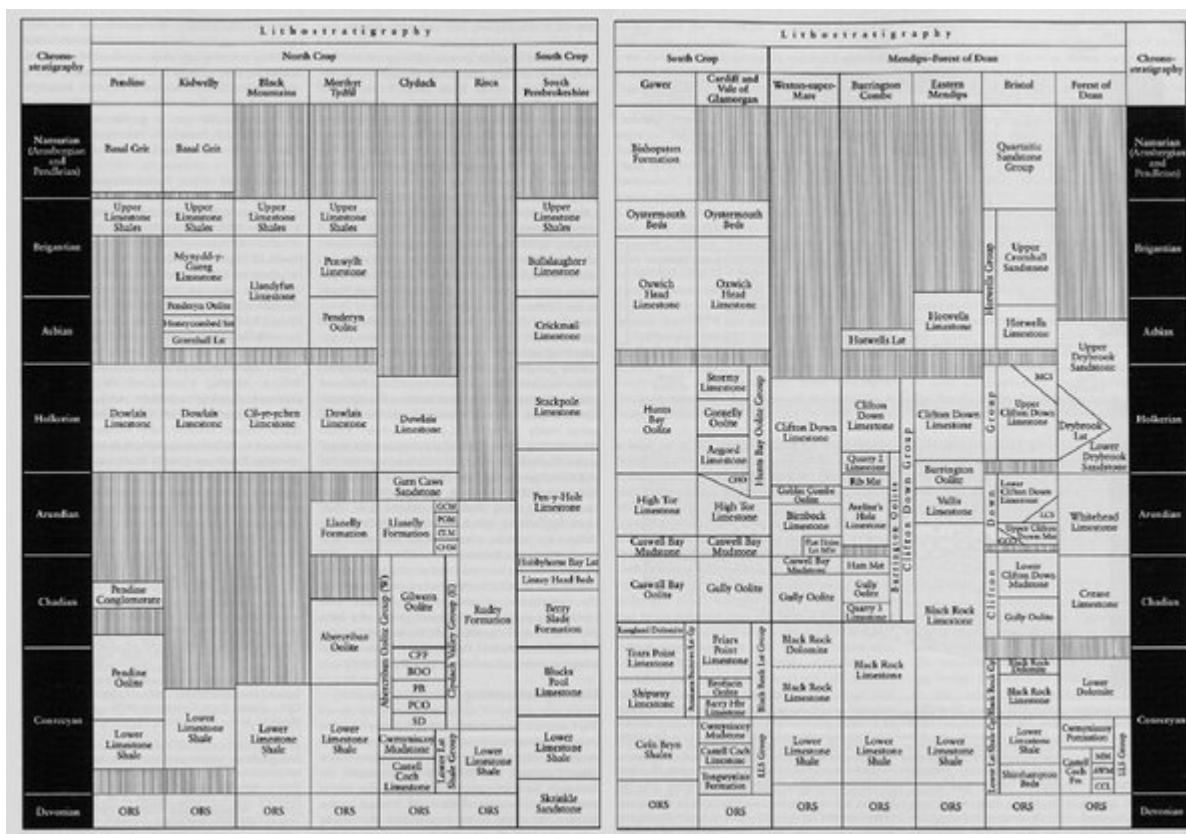
(Figure 9.44) Rhizocrction fabrics in a calcrete palacosol at the top of the Gully Oolite (Chadian) on Flat Holm. (Photo: P.J. Cossey.)



(Figure 9.45) The Flat Holm Limestone Member of the Birnbeck Limestone (Arundian) at Flat Holm showing the development of the thinly bedded dolomitic mudstone units B, C, D, E and F referred to in the text. (Photo: P.J. Cossey.)



(Figure 9.46) Simplified sedimentary log of the Flat Holm Limestone Member of the Birnbeck Limestone (Arundian) at Flat Holm. Note the intercalation of six thinly bedded dolomitic mudstone units (A-F) in a succession of bioclastic and oolitic limestones. After information in Whittaker and Green (1983).



(Figure 9.2) Simplified stratigraphical chart illustrating the most widely used lithostratigraphical terms for the Lower Carboniferous sequences in South Wales, the Forest of Dean, Bristol and the Mendips. (SD — Sychnant Dolomite; PCO — Pwll y Cwm Oolite; PB — Pantydarren Beds; BOO — Blaen Onnen Oolite; CFF — Coed Ffyddlwn Formation; CHM — Clydach Halt Member; CLM — Cheltenham Limestone Member; POM — Penllwyn Oolite Member; GCM — Gilwern Clay Member; LIS — Lower Limestone Shale; CHO — Cefnyrhendy Oolite; CCL — Castell Coch Limestone; AWM — Astridge Wood Member; MM — Mitcheldean Member; GCO — Goblin Combe Oolite; LCS — Lower Cromhall Sandstone; MCS — Middle Cromhall Sandstone.) Areas of vertical ruling indicate non-sequences. Not to scale. Based on information from and after Welch and Trotter (1961), Green and Welch (1965), Institute of Geological Sciences (1973, 1977c), George et al. (1976), Wright (1982b), Whittaker and Green (1983), Burchette (1987), Waters and Lawrence (1987), Barclay et al. (1988), Scott (1988), Barclay (1989), Wilson et al. (1990) and Kellaway and Welch (1993).