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# Fairy Call Beck, North Yorkshire

[SE 712 904]

K.N. Page

## Introduction

South-westwards from Fairystones Bridge towards Hutton-le-Hole, near the southern boundary of the North Yorks Moors National Park north of Kirkbymoorside, stream sections in Fairy Call Beck reveal an intermittently exposed but virtually complete Callovian succession including fossiliferous sections in the Cornbrash, Cayton Clay and Osgodby formations. The Redcliff Rock Member of the Osgodby Formation is of particular note here, being distinct from its development in eastern areas of the Cleveland Basin (see Gristhorpe Bay, Yons Nab and Red Cliff-Cunstone Nab GCR site report, this volume).

## Description

The sections were described by Wright (1977, 1978) on which the following notes are largely based.

The Cornbrash Formation (c. 0.70 m thick) is well exposed in the stream bed immediately north of Fairystones Bridge (Figure 5.23). Its basal bed is a thin (0.15 m) flaggy and shelly siltstone resting on white clay of the Scalby Formation and passing upwards into silty limestone. *Meleagrinnella* and serpulids are recorded. The overlying 0.55 m of hard limestone with bivalves (including *Lopha marshii* (J. Sowerby)) forms a ledge in the stream bed. It has recently yielded the brachiopod *Microthyridina* cf. *sublagenalis* (Davidson) and the ammonite *Macrocephalites* cf. *terebratus* (Phillips) (macro-conch). Immediately above the Cornbrash Formation, traces of grey, silty shale with occasional small, round, calcareous nodules represent the Cayton Clay Formation of which c. 0.4 m is seen.

Intermittent exposures of the overlying Osgodby and Oxford Clay formations are present in the banks of Fairy Call Beck southwestwards from Fairystones Bridge. A composite section is given below. Bed notation for the Redcliff Rock and Langdale members follows Wright (1968, 1978).

	Thickness (m)
<b>Oxford Clay Formation</b>	
Shale, grey, silty	'several seen'
<b>Osgodby Formation</b>	
<b>Hackness Rock Member</b>	
Shale, sandy, calcareous; <i>Quenstedtoceras</i> aff. <i>brasili</i> (Douvillé)	0.6
Sandstone, calcareous and limestone, sandy; bivalves (including <i>Chlamys</i> ) and belemnites	1.23
<b>Langdale Member</b>	
$\gamma_3$ : Sandstone, massive, fine grained, bioturbated	c. 8.2
$\gamma_2$ : Sandstone, flaggy, passing down into sandy shale	c. 4.2
<b>Redcliff Rock Member</b>	
$\beta_3$ : Sandstone, fine grained, well bedded; <i>Camptonectes</i> and belemnites	c. 1.0
$\beta_2$ : Sandstone, fine- to medium-grained with scattered, or sometimes concentrations of, berthierine ooids; very fossiliferous towards top; <i>Chlamys</i> , <i>Liostrea</i> , <i>Meleagrinnella</i> , belemnites and occasional <i>Keplerites</i> ( <i>Gowericeras</i> )	c. 1.6

$\beta_{1d}$ : Sandstone, mainly massive, fine- to medium-grained, with large calcareous concretions in lower part; fossils in upper part including bivalves ('*Astarte*', *Camptonectes*, *Gervillella*, *Liostrea*, *Meleagrinnella*, *Myophorella*) and belemnites c. 6.7

$\beta_{1c}$ : Sandstone, fine grained with clay laminae and partings 5.0

$\beta_{1b}$ : Sandstone, tough, laminated, fine- to medium-grained; moulds of large belemnites; *Liostrea*, *Meleagrinnella* 0.38

$\beta_{1a}$ : Sandstone, soft, muddy, fine grained seen to 0.9

## Interpretation

The sections in Fairy Call Beck probably represent the most continuously exposed Callovian succession in the western Cleveland Basin and are important reference sections for regional correlation. The succession shows significant differences from that of the eastern Cleveland Basin, and attempts at correlation between the two areas often remain inconclusive.

Wright (1977) considered that the Cornbrash Formation was not easily proved to be either  $\alpha_1$  or  $\alpha_3$  of the standard subdivisions recognized in the Scarborough district coastal sections (see Gristhorpe Bay, Yons Nab and Red Cliff–Cunstone Nab GCR site report, this volume) but he preferred to classify them as  $\alpha_3$ , which he believed overlapped  $\alpha_1$  in this area. The more recent ammonite and brachiopod records reported above indicate the *Terebratus* Subzone of the Lower Callovian *Herveyi* Zone.

The exposures of the Redcliff Rock Member were taken by Wright (1978) as a standard for the correlation of subdivisions within  $\beta_1$  in the western Cleveland Basin (Figure 5.24). The presence of common belemnites in  $\beta_2$  is unusual for this stratigraphical level in Britain, as are the large guards in  $\beta_{1b}$ , but these may have been concentrated by sedimentological processes. The record of occasional *Kepplerites* (*Gowericeras*) sp. probably indicates the *Curtilobus* Subzone of the Lower Callovian *Koenigi* Zone as in the eastern part of the Cleveland Basin; however, this needs confirmation based on a reexamination of the few recovered ammonites. According to Wright (1978), the overall general pattern of sedimentation in the Redcliff Rock Member consists of the establishment of fully marine conditions early on ( $\beta_{1b}$ ) followed by brackish-water marine conditions ( $\beta_{1c}$ ) and a gradual increase in marine influence through  $\beta_{1d}$  and  $\beta_2$ .

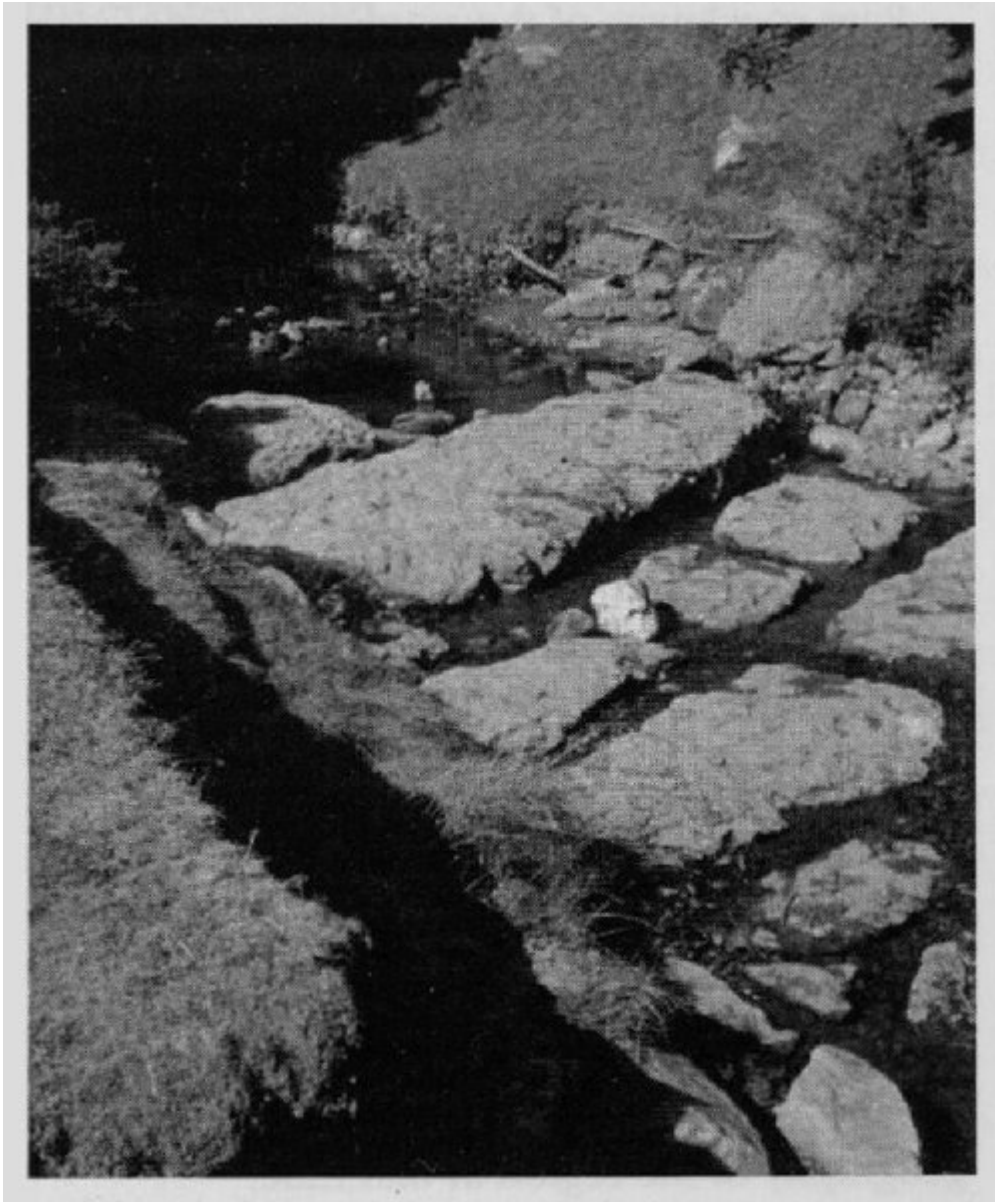
Fossils are very rare in the Langdale Member and no age-diagnostic form appears to have been recovered. Age assignments are therefore speculative although part, at least, of the member is likely to be of Mid Callovian age. Wright's (1978) record of *Quenstedtoceras* aff. *brasili* in the Hackness Rock Member suggests the *Lamberti* Zone and a Late Callovian age. The latter member is non-oidal, unlike its more easterly correlatives; this decrease in, or disappearance of, ooids westwards is also seen in  $\beta_2$  of the Redcliff Rock Member, and is a consequence of increasing distance from the sources of ooid production (to the north and northeast)

The basal Langdale Member ( $\gamma_2$ ) in Fairy Call Beck represents a transgressive phase ( $\gamma_1$  is absent), and the nature of the sediments is compatible with those fringing a delta, which would possibly have been sited to the northwest of Fairystones Bridge (Wright, 1978). The Hackness Rock Member indicates a period of reduced sedimentation with condensed sequences, prior to rapid subsidence and deposition of the Oxford Clay Formation of presumed Early Oxfordian age.

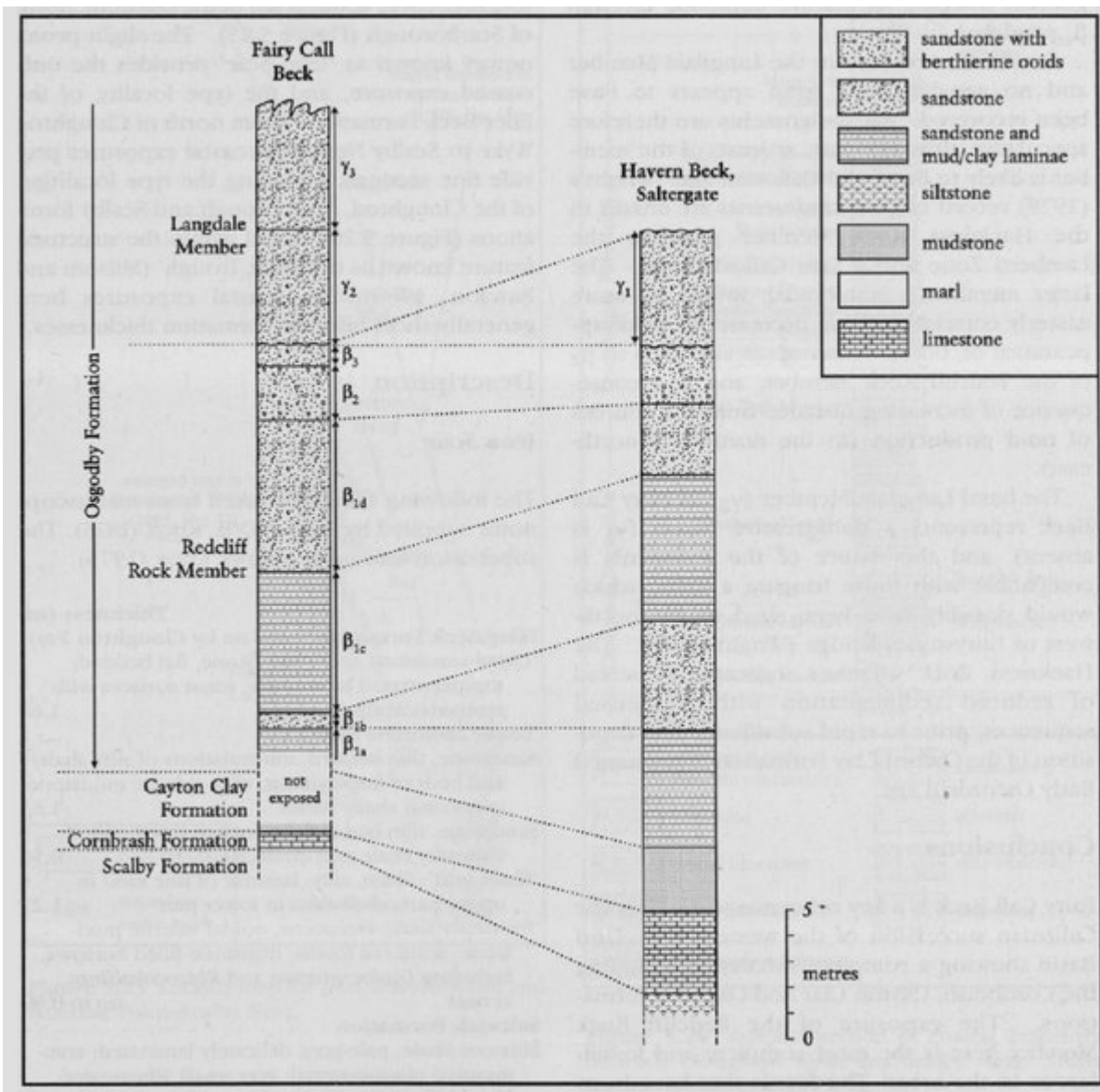
## Conclusions

Fairy Call Beck is a key reference section for the Callovian succession of the western Cleveland Basin showing a complete succession including the Cornbrash, Cayton Clay and Osgodby formations. The exposure of the Redcliff Rock Member here is the most complete and fossiliferous in the area. The fossils that have been recorded aid regional stratigraphical correlation as well as palaeoenvironmental analysis.

## References



*(Figure 5.23) Stream-bed exposure of the Cornbrash Formation in Fairy Call Beck near Fairystones Bridge. (Photo: K.N. Page.)(Figure 5.25) Locality map for Iron Scar–Hundale and Hundale Point–Scalby Ness.)*



(Figure 5.24) Correlation between the sections at Fairy Call Beck and Havern Beck. (After Wright, 1978, fig. 2.)