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# Hudson's Cross Crag, Newton Dale, North Yorkshire

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## Introduction

Hudson's Cross Crag (or Newtondale Crag), above Talbot Wood in Newton Dale, north of Pickering, North Yorkshire, provide a key section in the Osgodby Formation of the central Cleveland Basin, as well as the underlying Cornbrash and Scalby formations, the latter of Bathonian age. There are differences between the Osgodby Formation, as developed here, and the type succession on the coast to the east (see Gristhorpe Bay, Yons Nab and Red Cliff–Cunstone Nab GCR site report, this volume). The GCR site is the gully in which a section representative of the Redcliff Rock Member, which forms the crags lining both sides of the valley over a distance of more than 3.2 km, was recorded by Wright (1968); although these impressive exposures are unrivalled, they are mainly inaccessible.

## Description

Exposures of the Cornbrash Formation are relatively good but similar in detail to those at Havern Beck (see GCR site report, this volume) including the presence of  $\alpha_0$ , which is here reduced to a thickness of 1.08 m. At the base of the Cornbrash Formation, burrows filled with sandy mudstone extend 0.05–0.10 m into the underlying Scalby Formation.

About 21 m of the overlying Osgodby Formation are exposed although the base and top of this formation are not seen in the crags; the section (based on Wright, 1968) is as follows.

	Thickness (m)
<b>Osgodby Formation</b>	
<b>Langdale Member</b>	
$\gamma_1$ : Sandstone, fine- to medium-grained, flaggy in part	seen to c. 4.9
<b>Redcliff Rock Member</b>	
$\beta_2$ : Sandstone, yellowish-weathering, fine grained; berthierine ooids, nests of small bivalves; <i>Kepplerites</i> ( <i>Gowericeras</i> ) and <i>Proplanulites</i>	c. 2.4
$\beta_1$ : Sandstone, hard, fine-grained, pale; burrows and ripple marks; bivalves (including <i>Chlamys</i> , <i>Liostrea</i> and <i>Meleagrinnella braamburiensis</i> (Phillips)) in upper part	c. 13.4

## Interpretation

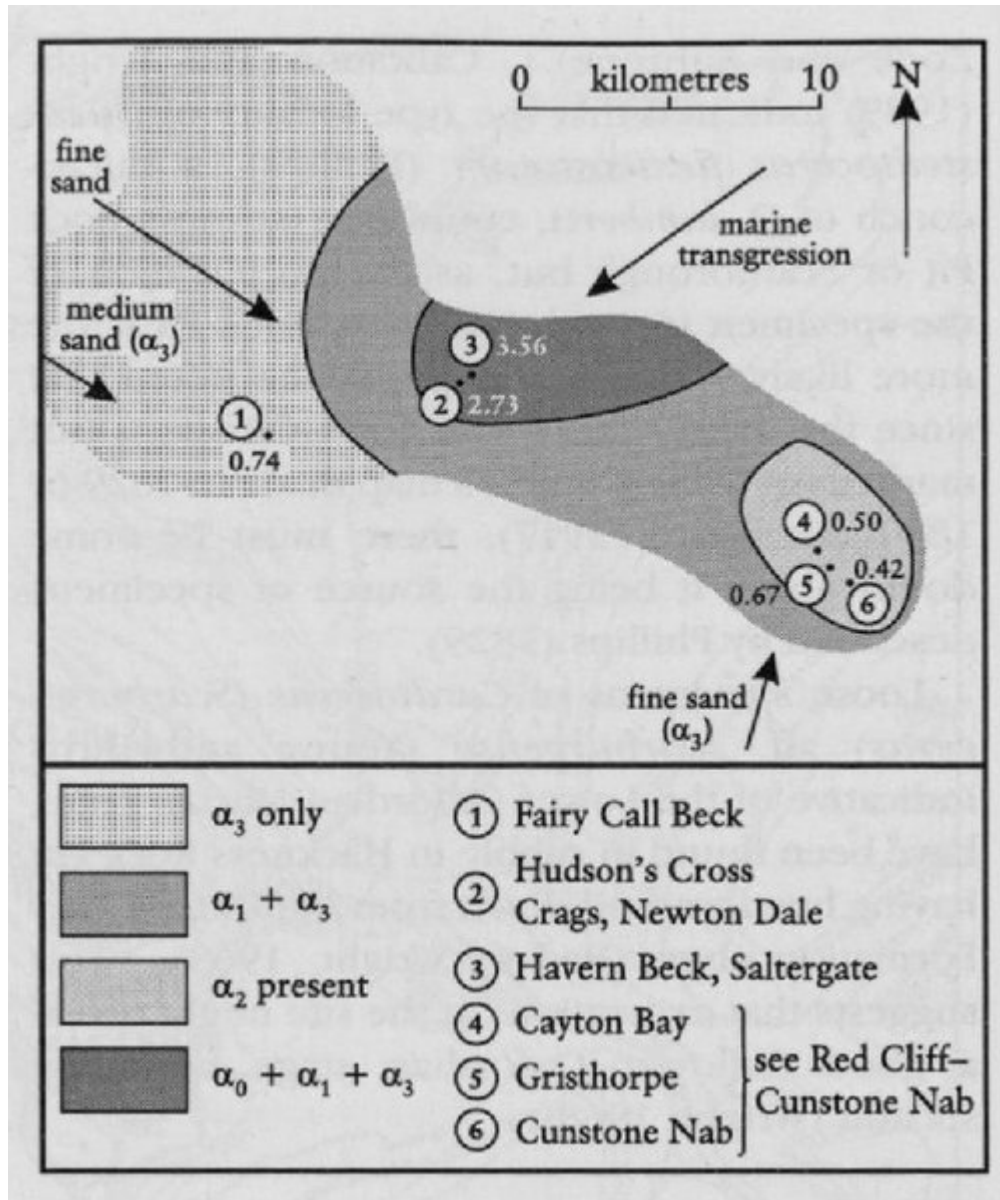
The lower boundary of the Cornbrash Formation with the underlying Scalby Formation has been investigated by Riding and Wright (1989). Their palynological evidence indicates that the Scalby Formation is Bathonian in age; the Cornbrash–Scalby formational boundary is therefore the Bathonian–Callovian stage boundary. Riding and Wright (1989) suggested that the sediments of the Scalby Formation were compacted or lithified, slightly uplifted, eroded and burrowed before the Cornbrash Formation was deposited, and that there was a steady marine transgression across this erosion surface under low-energy conditions. Comparison with the section at Havern Beck (see GCR site report this volume) suggests a westward spread of marine influence (see (Figure 5.22)).

Rare specimens of the ammonites *Kepplerites* (*Gowericeras*) and *Proplanulites* in  $\beta_2$  of the Redcliff Rock Member are presumed, as elsewhere, to indicate the Curtilobus Subzone of the Lower Callovian Koenigi Zone.

## Conclusions

Hudson's Cross Crags include a key inland section in the Osgodby Formation of the Cleveland Basin. The site is of particular importance in geographically linking the more complexly developed  $\beta_1$  subdivision of western areas of the Cleveland Basin (e.g. Fairy Call Beck, see GCR site report, this volume) with the simpler succession of the Scarborough district (see Gristhorpe Bay, Yons Nab and Red Cliff–Cunstone Nab GCR site report, this volume). Together with Havern Beck, Hudson's Cross Crags provides an important Callovian reference sequence for this intermediate area, and evidence for the palaeogeography of the region at that time.

## References



(Figure 5.22) Simplified distribution map of the subdivisions of the Cornbrash Formation in the Cleveland Basin showing thicknesses (in metres) at the GCR sites. (After Wright, 1977, fig. 3.)