
Harewood Grange

Highlights

Harewood Grange has the most complete sequence through the Yeadonian Stage in the Central Province of northern England. It includes diverse assemblages of marine fossils and plant microfossils, together with an important non-marine bivalve assemblage.

Introduction

This site is a section along Hipper Sick stream [SK 312 682], a tributary of the River Hipper, 100 m NE of Harewood Grange, 8 km WNW of Chesterfield, Derbyshire. It shows an essentially continuous section through the Yeadonian of the Central Province. An account of the geology is given by Smith (1967) and Smith *et al.* (1967), and Neves (1961) has studied the palynology.

Description

Lithostratigraphy

The complete sequence here is about 50 m thick. The lower part consists of medium-grained ferruginous and calcareous sandstones, called the Redmire Flags Formation. This is a relatively localized development of deltaic sandstones, known only from this part of Derbyshire. A little to the north, it becomes a more massive unit, possibly representing the channel deposits of the delta, but in these more southerly outcrops it consists of soft, flaggy sandstones, widely used as a walling-stone. They probably represent shallow water sands, although they are rooted and contain plant fragments, and so must have been fully emergent.

The overlying 40 m are medium to dark grey shales with siltstone ribs and occasional ferruginous nodules. There are also two bands of black shale, representing marine bands. At the very top of this interval, the shales are lacustrine.

Above these shales are about 3 m of micaceous, siltstones and fine-grained sandstones, of the Rough Rock Formation. It is clearly a very condensed development of the formation, and it totally dies out only a few hundred metres to the south-west.

There follows a gap of about 3 m in the section. It is probably where the Pot Clay Coal occurs, as the next exposed part of the sequence are dark marine shales of the Subcrenatum Marine Band. This is in turn followed by Westphalian sandstones of the Crawshaw Sandstone Formation.

Biostratigraphy

Marine bands

The lowest marine band in this section is an interval of black shales immediately overlying the Redmire Flags. It has yielded the goniatites *Cancelloceras crencellatum* Bisat and *Agastrioceras carinatum* (Frech), and the bivalve *Posidonia* aff. *insignis* (Jackson). Although the index ammonoid has not been found, it is assumed that this is the Cancellatum Marine Band (Smith *et al.*, 1967), and thus marks the base of the Yeadonian Stage.

Some 10 m higher is the Cumbriense Marine Band. In addition to the index ammonoid, it has yielded *Aviculopecten* aff. *losseni* (von Koenen), *Caneyella multirugata* (Jackson) and palaeoniscid fish scales.

At the very top of the section, above the Rough Rock, is the Subcrenatum Marine Band, also known locally as the Pot Clay Marine Band. It has yielded *Gastrioceras subcrenatum* (Frech), *Anthracoeratites* sp., *Homoceratoides* sp.,

Posidonia insignis (Jackson), *P. cf. gibsoni* Salter, *Dunbarella papyraceae* (Sowerby) and *Caneyella multirugata* (Jackson), together with mollusc spat, conodonts and fish scales (Smith *et al.*, 1967). It marks the top of the Yeadonian Stage, and thereby the junction between the Namurian and Westphalian series.

Non-marine bivalves

These are only known at this locality from immediately below the Rough Rock. The assemblage includes *Anthraconaia angulosa* Pastiels, *Carbonicola exporrecta* Eagar, *C. cf. protea* Wright, *C. cf. rhomboidalis* Hind and *Naiadites* sp. The first two species in particular are characteristic upper Namurian elements.

Palynology

Neves (1961) stated that he prepared palynological samples from the Cancellatum, Cumbriense and Subcrenatum marine bands here, as well as the lacustrine shale containing non-marine bivalves, and he has referred to it as his Locality 12. However, he did not specify the taxa found at each horizon, except for those for which this is the type locality. They are:

1. *Acanthotriletes? pilus*, *Secarisporites lobatus*, *Stenozonotriletes triangulus* and *Convolutispora laminosa* from the Cancellatum Marine Band; and
2. *Ahrenisporites beeleyenii*, *Triquitites nodosus*, *Cirratiradites ornatus*, *Knoxisporites semiradiatus*, *Punctatisporites pseudopunctatus*, *Ibrahimisporites brevispinosus* and *I. magnificus* from the lacustrine band.

Interpretation

This is the best exposed sequence through the Yeadonian Stage in the Central Province of northern England. It not only shows the lower part of the stage containing the Cancellatum and Cumbriense marine bands, as can also be seen at Yeadon and Orchard Farm, but also shows the higher strata including the *Carbonicola exporrecta* lacustrine band, the Rough Rock, and eventually up into the Subcrenatum Marine Band. The Cancellatum Marine Band in particular is not as well developed here as at other localities, but nowhere else can the rest of the stage be so clearly seen. It thus represents the stratigraphically highest of the sequence of sites selected to demonstrate the basinal shale deposits of the Millstone Grit of the Central Province.

The site has also proved important for developing a palynological zonation for the upper Namurian, principally through the work of Neves (1961). The Cancellatum and *C. exporrecta* bands in particular have yielded diverse and well preserved pollen/spore assemblages, including the types of many species (see above).

Conclusions

Harewood Grange shows the most complete sequence of rocks of Yeadonian age (just over 316 million years old) in northern England. It yields abundant fossils, particularly of marine animals such as the ammonoids, and of non-marine bivalves. The site has also proved important for fossil pollen and spores.

[References](#)