Jockie's Syke

Highlights

Jockie's Syke is the best available locality for *Lobatopteris micromiltoni* Zone plant macrofossils in Britain.

Introduction

Exposures in this small stream [NY 424 756] (also known as Baxton Gill) that runs into Liddel Water, 8 km north-east of Longtown, Cumbria, show upper Westphalian red beds in the Canonbie Coalfield. The geology has been described by Peach and Horne (1903), Barrett and Richey (1945) and Day (1970). Plant macrofossils from here have been dealt with by Kidston (1903a, 1903b).

Description

Lithostratigraphy

There is no published log for the section and the full thickness has not been determined. The exposed strata are red and purple sandstones alternating with red mudstones and shales. They belong to the 'Red Sandstone Group' of Peach and Horne (1903), and which have been renamed here the Canonbie Red Sandstone Formation.

Biostratigraphy

Non-marine bivalves

Day (1970) recorded *Anthraconauta phillipsi* (Williamson) and *A. tenuis* (Davies and Trueman) from the shales here, and Weir *in* Trueman and Weir (1960, pl. 32, fig. 25) figured an example of the latter. This suggests the *A. tenuis* Zone, which ranges from the topmost Bolsovian to the Cantabrian.

Plant macrofossils

The most complete description of these fossils is by Kidston (1903b). He had specimens from four distinct locations within the site, although no significant difference between the assemblages can be discerned. The only figured specimens are of the lycophyte stem *Lepidodendron fusiforme* (Corda) Unger, which is of little biostratigraphical significance. However, he also records a number of other taxa that are more significant biostratigraphically. There has been no detailed revision of this assemblage in recent years, other than the comments provided by Cleal and Thomas (1995 — *Palaeozoic Palaeobotany of Great Britain* GCR volume). Following the latter comments, the assemblage probably includes *Annularia stellata* (Sternberg) Wood, *Cyathocarpus* aff. *arborescens* (Brongniart) Weiss, *Neuropteris ovata* Hoffmann, *N. flexuosa* Sternberg, *Macroneuropteris scheuchzeri* (Hoffmann) Cleal *et al., Alethopteris ambigua* Lesquereux and *A. grandinioides* Kessler. If this interpretation of Kidston's assemblage is correct, it appears to belong to the *Lobatopteris micromiltoni* Subzone (lower *L. vestita* Zone in the classification of Cleal, 1991). This indicates the middle Westphalian D.

Other groups

In addition to the above, Day (1970) recorded the estheriid species: *Anomalonema defretinae* (Novojilov), and the ostracods *Carbonita salteriana* (Jones) and *C. pungens* (Jones and Kirkby). Calver *in* Day (1970) claims that the first of these is characteristic of the *A. tenuis* bivalve zone.

Also mentioned from here are the shark egg-capsule *Palaeoxyris* sp., and the insect wing *Mylacris similis* Handlirsch.

Interpretation

This is the most important exposure of the red beds that form the upper part of the Coal Measures in the Canonbie Coalfield. There are other exposures of these strata, in particular along the Liddel Water near its junction with Archerbeck. However, Jockie's Syke is the only place where biostratigraphically significant plant fossils occur. and which fix the beds as middle Westphalian D. It demonstrates that the Canonbie Red Sandstone Formation is not merely a lateral equivalent of the Whitehaven Sandstone, which occurs at the top of the Coal Measures in the nearby Cumberland Coalfield (see Saltom Bay), since the latter is Bolsovian. It is also stratigraphically different from the upper Westphalian D red beds of the English Midlands, known as the Keele Formation.

Gibsone (1861), in the earliest account of the coalfield, claimed that these red beds were Permian. Binney (1863), in contrast, thought that they were at least partly Upper Carboniferous, based on the presence of *Spirorbis* in some thin bands of limestone, but such evidence is far from conclusive. Not until the discovery of the plant fossils was their position as Upper Carboniferous finally confirmed (Kidston, 1903a, 1903b).

Plant macrofossils of this age are rare in Britain. Only in South Wales are there reliable records of *L. micromiltoni* Subzone plant macrofossils, from the Swansea Member in the western part of the main coalfield, and these were all collected from underground exposures (Cleal, 1978). Throughout the rest of Britain, strata of this age are missing, at least partly due to the effects of Leonian tectonics.

Conclusions

Jockie's Syke is the best British site for plant fossils of the *Lobatopteris micromiltoni* Zone. Plant fossils of this age (about 310 million years old) have proved to be of considerable value in establishing detailed stratigraphical correlations.

References