Jockie's Syke

Highlights

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

Introduction

Late Westphalian plant fossils can be found in this small stream (Figure 6.22), a tributary of Liddel Water, near Longtown, Cumbria [NY 424 756]. They were first collected from here in 1879 by A. Macconochie of the Geological Survey and were briefly mentioned by Kidston (1894b). Further collecting was done by Macconochie and Kidston in 1902, and their results were published by Kidston (1903a, b). There has been no subsequent work on the palaeobotany here, apart from an illustration of one of Kidston's alethopterids by Crookall (1955), and some passing comments made by Crookall (1969) and Wagner (1968).

Description

Stratigraphy

The plant fossils occur in red mudstones within the Red Sandstone Group of the Canonbie Coalfield (*sensu* Peach and Horne, 1903) (Figure 6.23). According to Ramsbottom *et al.* (1978), this part of the sequence contains *an Anthraconauta tenuis* Zone fauna, which indicates an age no older than latest Bolsovian (Cleal, 1984a). The plant fossils appear to belong to the *Lobatopteris micromiltoni* Zone, indicating a middle Westphalian D age (Cleal, 1978, 1984b). The beds probably represent floodplain deposits within a fluvial plain environment.

Palaeobotany

The plants are preserved as fossil impressions in a red mudstone. They were reported by Kidston (1903a, b) from four distinct locations within the site. In the absence of details as to their relative stratigraphical distributions, however, the following is a combined list of species from all four:

Lycopsida:

Lepidodendron fusiforme (Corda) Corda

Lepidostrobophyllum sp.

Stigmaria ficoides (Sternberg) Brongniart

Equisetopsida:

Calamites undulatus Sternberg

C. carinatus Sternberg

Calamites sp.

Asterophyllites equisetiformis Brongniart

Annularia stellata (Sternberg) Wood

Filicopsida:

Cyathocarpus aff. *arborescens* (Brongniart) Weiss

Cyathocarpus sp.

Cycadopsida:

Neuropteris ovata Hoffmann

N. flexuosa Sternberg

Macroneuropteris scheuchzeri (Hoffmann) Cleal *et al.*

Alethopteris ambigua Lesquereux *?*

A. grandinioides Kessler

Alethopteris sp.

Interpretation

The above species list points strongly to the assemblage belonging to the *Lobatopteris micro-miltoni* Subzone of Cleal (1991) (previously regarded as a separate zone by Cleal, 1984b); *Cyathocarpus* aff. *arborescens* does not extend below the base of this zone, and there is no evidence of the species that characterize the base of the overlying *Lobatopteris vestita* Zone: *Lobatopteris vestita* (Lesquereux) Wagner, *Polymorphopteris polymorpha* (Brongniart) Wagner and *Dicksonites plueckenetii* (Sternberg) Sterzel. This indicates that the strata exposed at Jockie's Syke are mid-Westphalian D in age.

Kidston (1903b) recorded specimens from here as *Calamites ramosus* Artis, but Kidston and Jongmans (1917) showed that this was a later synonym of *C. carinatus.* Crookall (1969) specifically lists the Jockie's Syke specimens within the synonymy of the latter species and notes that, in Britain, *C. carinatus* is particularly common in the upper Bolsovian and Westphalian D. Kidston (1903b) also lists *Calamites undulatus,* now generally recognized as a preservational form of a number of different calamite species.

Kidston (1903b) also recorded *Annularia radiata* (Brongniart) Sternberg, which he regarded as the foliage borne by *Calamites ramosus* (syn. *C. carinatus*). However, *A. radiata*-type foliage rarely occurs this high stratigraphically, and in any case is a fairly artificial concept (Walton, 1936). In view of its association here with *Annularia stellata,* whose smaller leaves can often resemble *A. radiata,* the record has been deleted from the list.

The brief comments by Kidston (1903b) on the pecopteroid species appear to confirm that they belong to one of the *Cyathocarpus* species with small pinnules, such as *C. arborescens.* Unfortunately, however, he did not figure any specimens, either at that time or in his later monographic treatment of the British pecopteroid species (Kidston, 1924, 1925). In view of the complications surrounding this difficult group of species (Barthel, 1980), the identification of the Jockie's Syke material has been left open.

Kidston's (1903b) records of neuropteroid taxa, although unillustrated, are of easily recognized species which occur commonly in the Westphalian D of Britain.

Kidston's (1903b) record of *Alethopteris aquilina* (Brongniart) Göppert was transferred to *Alethopteris davreuxii* var. *friedelii* Bertrand by Crookall (1955). However, *A. friedelii* Bertrand is a later synonym of *Alethopteris grandinii* (Brongniart) Göppert (Wagner, 1968; Cleal, 1984b) and has nothing to do with *A. davreuxii* (Brongniart) Zeiller. Wagner (1968) instead transferred Kidston's specimen (which had been figured by Crookall, 1955, pl. 10 fig. 2) to *Alethopteris ambigua.* This is a rare species in Britain, which according to Wagner is otherwise only known from the late Westphalian D of the Bristol and Somerset Coalfield.

Crookall (1955) questioned Kidston's (1903b) record of *Alethopteris serlii* (Brongniart) Göppert, and placed the specimens in *Alethopteris grandinii.* Crookall's own interpretation of *A. grandinii* is clearly flawed, however, since the two species that he illustrated under that name (neither from Jockie's Syke) belong to *Alethopteris grandinioides* and *Alethopteris quadrata* Wagner (Wagner, 1968). From Crookall's comments on the Jockie's Syke specimens, it is likely that they in fact belong to *A. grandinioides,* a relatively common species in the Westphalian D of Britain.

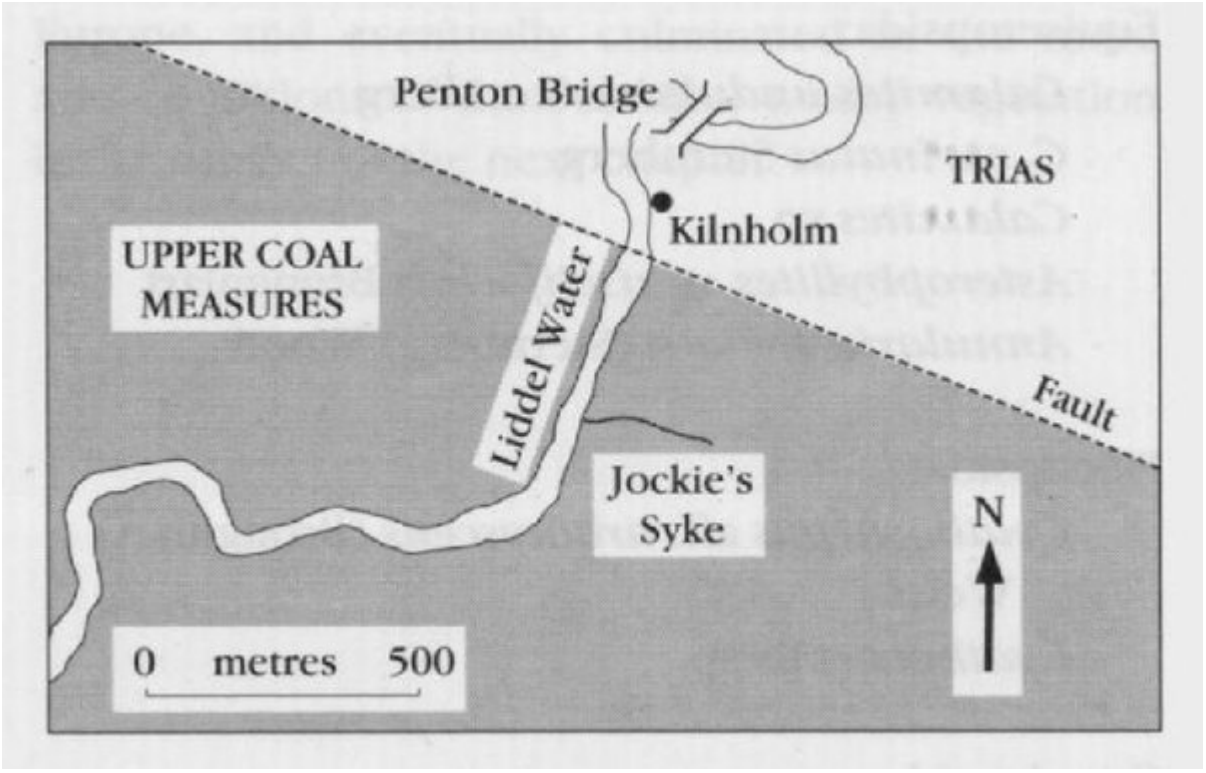
Plant fossils of this age are rare in Britain. In southern Britain, there are few strata of this age, due to the effects of the Leonian folding phase. Only in South Wales are there reliable records of *L. micromiltoni* Zone plant fossils, from the Swansea Beds in the western part of the main coalfield, and these were all collected from underground workings (Cleal, 1978). In North Wales and the English Midlands, strata of this age are either missing or occur as the Etruria facies, in which plants are not normally preserved. In most of northern England and Scotland, there is little evidence of coeval strata.

In the rest of Europe, this zone is also very rare. Sedimentation appears to have ceased in the early Westphalian D throughout most of the paralic basin that stretches from northern France through Germany to Poland. In the Iberian Peninsula, the effects of the Leonian folding, mentioned above, again seem to have disrupted the non-marine stratigraphical record at this level. The only undoubted record of the zone comes from the intra-montane basin of Saar-Lorraine, and this is based on material collected from underground mine workings (Cleal, 1984b; Laveine, 1989). It is evident, therefore, that Jockie's Syke is one of the very few sites in Europe yielding plant fossils of this age.

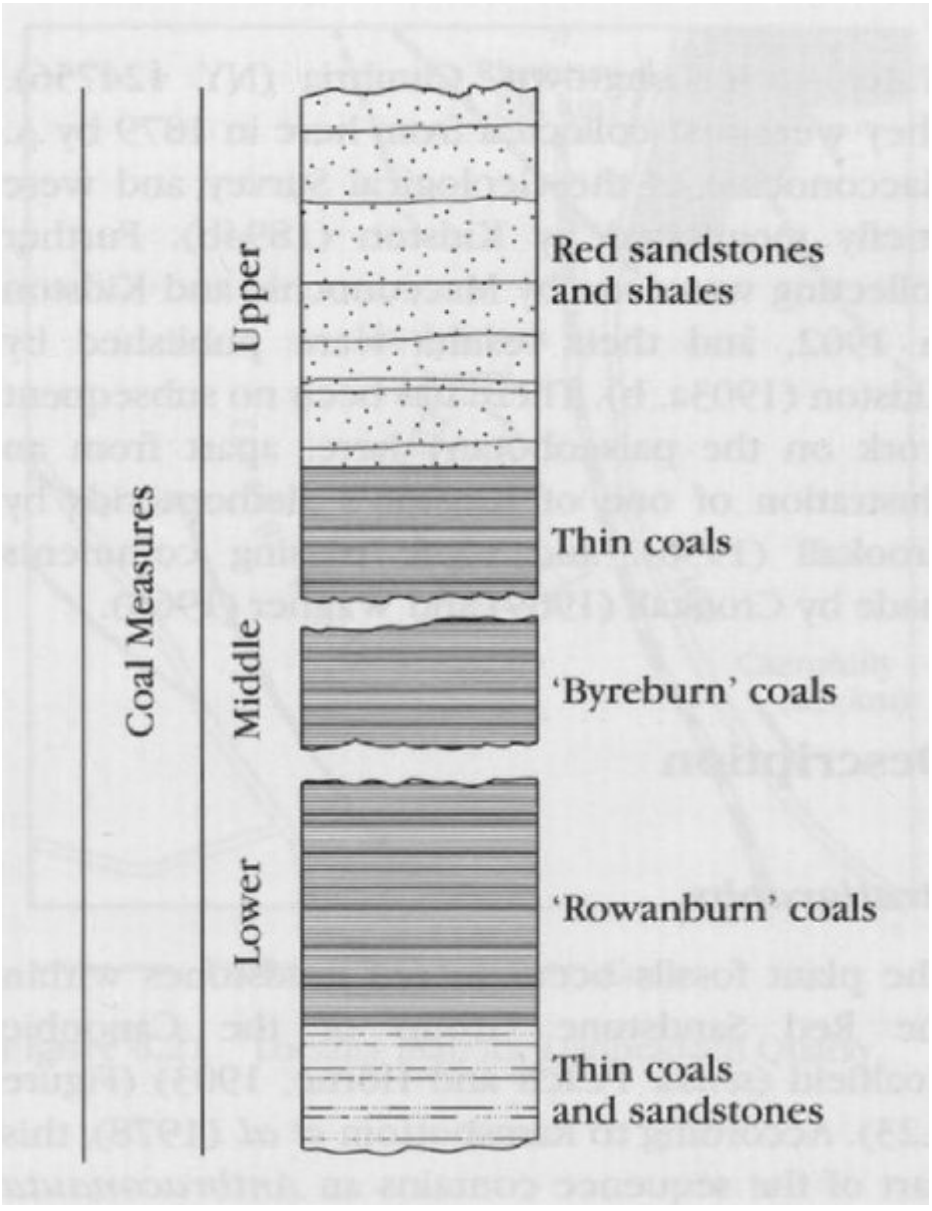
Conclusion

Jockie's Syke is one of the few sites in Europe, and the only one in Britain, to yield this particular assemblage of plant fossils from the Upper Coal Measures, rocks deposited as sediments about 300 million years before the present. Two species are found here (*Alethopteris ambigua* and *Cyathocarpus* aff. *arborescens*) which do not occur in older floras; their appearance represents the start of the gradual change from the typical Coal Measures vegetation represented by the British fossil floras, to the later (Stephanian) vegetation, more typically found in central and southern Europe. This vegetational change was probably triggered by topographic and possible climatic changes, which in turn were the result of the collision between two major continental plates (Gondwana and Laurussia). These large-scale environmental changes brought an end to the swamp-forest vegetation that had typified Coal Measures (Westphalian) times across northern Europe, and eventually culminated in the more arid conditions of the Permian, whose vegetation is the subject of the next chapter.

References



(Figure 6.22) Geological map showing the area near Jockie's Syke. Based on Peach and Horne (1903, plate 1)



(Figure 6.23) Stratigraphical succession in the Canonbie Coalfield. Based on Peach and Horne (1903, plate 4).