
Nostell Priory Brickpit

Highlights

Nostell Priory Brickpit has yielded one of the best documented plant fossil assemblages in Britain belonging to the *Paripteris linguaefolia* Zone (indicating the Bolsovian). It is particularly significant for cordaites and is the type locality for two species of cordaite cone (Figure 6.20).

Introduction

This brickpit [SE 430 170], between Ackworth Moor Top and Crofton, about 8 km south-east of Wakefield, is cut in Westphalian shales. Plant fossils were first discovered in these rocks by James Wright in the early 1930s and were described in detail by Barker (*in* Barker and Whittle, 1944). Cordaite cones were subsequently re-described by Crookall (1970).

Description

Stratigraphy

Barker and Whittle (1944) describe the bed containing the plant fossils as 5.5 metres of 'laminated mudstones', overlying the Shafton Marine Band. They are thus of early Bolsovian age. Barker and Whittle interpret these beds as 'estuarine'.

Palaeobotany

The fossils are preserved as adpressions. The following species have been described:

Lycopsida:

Lepidodendron cf. *simile* Kidston

Lepidodendron sp.

Bothrodendron punctatum Lindley and Hutton

Stigmaria ficoides (Sternberg) Brongniart

Flemingites sp.

Equisetopsida:

Calamites suckowii Brongniart

Annularia radiata Brongniart

A. sphenophylloides (Zenker) Gutbier

Asterophyllites equisetiformis Brongniart

A. grandis (Sternberg) Geinitz

Palaeostachya ettingshausenii Kidston

Calamostachys sp.

Myriophyllites gracilis Artis

Pinnularia columnaris (Artis) Zeiller

Sphenophyllum emarginatum Brongniart

S. majus Bronn

Filicopsida:

Lobopteris miltoni (Artis) Wagner

Crossotheca cf. *crepinii* Zeiller

cf. *Renaultia* sp.

Cycadopsida:

Alethopteris lonchitica Sternberg

Laveineopteris loshii (Brongniart) Cleal, Shute and Zodrow

Cyclopteris sp.

Lagenostomopsida:

Mariopteris sauveurii (Brongniart) Zeiller

cf. *Karinopteris robusta* (Danzé-Corsin) Boersma

Rhodea wrightii Barker

Carpolithus reticulatus Sternberg

C. minimus Sternberg

Cordaitea:

Cordaitea borassifolius (Sternberg) Unger

Cordaitanthus flagellibracteatus Barker

C. nostellensis Barker

Cordaicarpus ventricosus Grand'Eury

Samaropsis orbicularis Ettingshausen

S. pyriformis Barker

Interpretation

The presence together of *Asterophyllites grandis*, *Annularia sphenophylloides* and *Sphenophyllum emarginatum* clearly points to this assemblage belonging to the middle *Paripteris linguaefolia* Zone of Wagner (1984), or the *Laveineopteris rarinervis* Subzone of Cleal (1991). This is compatible with its position above the Shafton Marine Band, which is in about the middle Bolsovian.

Lycopsida

Those uncovered here to date are generally unexceptional, comprising mainly leafy shoots and stigmarian rooting structures. However, Barker reported an incomplete strobilus and some associated megaspores, which might reward further study. Barker identified it as *Lepidostrobis variabilis* Lindley and Hutton, and Crookall (1966) transferred it to *Lepidostrobis ornatus* Brongniart. In view of the reported association of megaspores, however, the strobilus is more likely to be a species of *Flemingites* (Brack-Hanes and Thomas, 1983).

Equisetopsida

There is rather more variety in the calamitid equisetopsids. At least one species of *Annularia* and two of *Asterophyllites* have been reported. Barker has also described specimens of *Annularia radiata* Brongniart. However, the illustrated specimen shows leaves which are too slender and parallel-sided and may instead belong to *Asterophyllites equisetiformis*.

Also, a number of calamitid strobili have been reported from here. The most abundant was described by Barker as *Palaeostachya ettingshausenii*, and the figured specimen seems to confirm the identification (compare with similar specimens figured by Crookall, 1969). A single specimen of a much more slender strobilus was described by Barker as *Calamostachys* ?sp. nov. Since he did not illustrate this specimen, it is difficult to judge, but the dimensions given in his description suggest a comparison with *Calamostachys ramosa* Weiss.

A number of species of sphenophyll foliage were listed by Barker, but were only poorly described and illustrated. In view of the more recent work on the variation of leaf form in different parts of the sphenophyll plant (e.g. Storch, 1966; Batenburg, 1977), the identity of the Nostell Priory specimens must be regarded as tentative.

Filicopsida

At Nostell Priory, ferns are relatively uncommon, which is typical of middle Westphalian palaeoequatorial assemblages. The most abundant is the marattialean *Lobatopteris miltoni*, a species recently reviewed by Shute and Cleal (1989). In addition, Barker reported a single example of *Crossotheca*. He compared it with *C. boulayi* Zeiller, but Brousmiche (1982) has demonstrated that this is merely part of the range of morphological variability within *C. crepinii*. Although many palaeobotanists (e.g. Taylor and Millay, 1981) still regard *Crossotheca* as a lagenostomean pteridosperm fructification (following Kidston, 1923d), Dame (1955, 1956) and Brousmiche (1982) have shown that it was a fern.

Cycadopsida

The dominant pteridosperm is an alethopterid. Its identification as *A. lonchitica* is based on the authority of Barker, but he did not illustrate any specimens. As pointed out by Wagner (1968, 1984), however, this species is widely misidentified, and records from the middle Westphalian often refer to *Alethopteris urophylla* (Brongniart) von Roehl.

Neuropteroid foliage is represented here by *Laveineopteris loshii*. Barker identified it as *Neuropteris heterophylla* (Brongniart) Sternberg, a species which has frequently been confused with *L. loshii* (see Laveine, 1967; Cleal and Shute, 1991, 1992). It is perhaps significant that it is associated here with cyclopterid pinnules, which occur in the lower part of the *L. loshii* frond but not of the *N. heterophylla* frond. There is no direct evidence of *N. heterophylla* in the Nostell Priory assemblage. A single fragment was also identified by Barker as *Neuropteris* cf. *obliqua* (Brongniart) Zeiller, although there seems little reason for separating it from the *L. loshii*.

Lagenostomopsida

Two types of mariopteroid frond were reported (Barker in Barker and Whittle, 1944). One was identified as *Mariopteris sauveurii*, which, from the illustrations, appears to be correctly identified. The second was stated to be specifically identical with *Mariopteris* sp. D of Kidston (1925), which Danzé-Corsin (1953) formally named *Mariopteris robusta*, and which Boersma (1972) assigned to the form-genus *Karinopteris*. There is indeed an apparent comparison with Kidston's

figured specimens, especially with the one selected by Boersma as the lectotype of *K robusta*, but additional material from Nostell Priory will be needed before this rare species (otherwise only known from a few specimens from South Wales, Nord-Pas-de-Calais, the Ruhr and the Donets) can be unequivocally recorded from here.

The specimen figured by Barker under the new name *Rhodea wrightii* appears to be a small type of *Palmatopteris*. In the absence of more complete material, however, it is difficult to assess this species.

Pinopsida

Barker reports a number of excellently preserved cordaite fossils, including some large leaf fragments and isolated seeds. Of most interest, however, was the discovery of a male and a number of female cones, which were made the types of *Cordaitanthus nostellensis* and *C. flagellibrac-teatus*, respectively. The latter is particularly distinctive, having very slender, elongate bracts, quite unlike those of any other described species. Both species are known only from this locality.

General remarks

Adpression floras dominated by pteridosperms, cordaites and equisetopsids are relatively uncommon in the upper Duckmantian and lower Bolsovian of Britain. In South Wales, for instance, conditions seem to have become rather wetter and less favourable for the development of this type of vegetation (Davies, 1929; Dix, 1934); lycopsid-dominated vegetation instead seems to have been the norm. In much of the English Midlands, most strata of this age are in the Etruria red-bed facies, which seem to have been unfavourable for the preservation of plant fossils (Besly and Turner, 1983). There is some evidence of a similar assemblage from the Bradford Four Feet Seam in the Lancashire Coalfield (Kidston, 1892, 1894b), but illustrations of the fossils have never been published and the identifications have not been revised in nearly a hundred years. There is very little evidence of plant fossils from coeval strata in northernmost England or Scotland (Jongmans, 1940).

This seems to follow the same pattern seen in most of the paralic coalfields of the palaeoequatorial belt, where assemblages of plant fossils, similar to those at Nostell, are only sporadically found (see Wagner, 1984 for a review of the available evidence). This may reflect the greater marine influence on the delta at this time (Guion and Fielding, 1988), which would allow relatively few river levees to develop. In those relatively few situations where the levees did develop, however, they supported a pteridosperm/cordaite/equisete-dominated type of vegetation, such as found at Nostell.

In addition to their relative scarcity value, sites in the English Pennines, such as Nostell, have the advantage over most of these other areas because the fossils often still retain their cuticles, which can provide important information about the affinities of the plants (e.g. Cleal and Shute, 1991, 1992). The best comparison from this point of view is with the intramontane basins of central Europe, such as with the Sulzbach Formation in Saar-Lorraine (Laveine, 1989) and the Radnice Member of Central Bohemia (Wagner, 1977), where cuticles are often preserved. As pointed out by Gothan (1954), however, the composition of species found in these intra-montane basins is different from that of the paralic belt. Nostell Priory Brickpit is thus of considerable importance for studying the vegetation of the paralic belt of coalfields.

Conclusion

Nostell Priory Brickpit has yielded some of the best documented plant fossils from middle Westphalian rocks in Britain, about 305 million years old. The assemblage consists mainly of primitive and now extinct seed plants with fern-like fronds (pteridosperms) and horsetails, that were typical of the river, levée-bank vegetation growing within the swamp-forests of the time. The site is also important for another group of primitive and now extinct seed plants, the cordaites, which were related to the conifers, but had large, palm-like leaves. The flora here is a typical example of the so-called Coal Measures flora, representing the height of development of the tropical swamp-forests in Late Palaeozoic times, and which generated the thick, economically important coals of the northern and central European coalfields.

[References](#)



(Figure 6.20) Nostell Priory Brickpit. Working quarry, as seen in 1985. The beds are associated with the lower Bolsovian Shafton Marine Band. (Photo: C.J. Cleal.)