Cattybrook Claypit

Highlights

Cattybrook Claypit has yielded the best plant fossil assemblage from the upper *Lyginopteris hoeninghausii* Zone in Britain. It is of particular interest as having yielded exceptionally large examples of *Karinopteris acuta* and *Sphenophyllum cuneifolium.*

Introduction

This Westphalian site is in part of the brickworks at Almondsbury near Bristol [ST 592 833]. Brick-making clays have been worked here since the 1860s and the geology of the site was discussed by Smith and Reynolds (1929). Plant fossils from the Upper Carboniferous were first recorded by Moore and Trueman (1942), whose list of identifications were repeated by Welch and Trotter (1961). The only systematic account of the assemblage, however, is by Cleal and Thomas (1988).

There are two discrete pits at Cattybrook (Figure 6.16): the Golden Quarry, from which much of the earlier information was derived, and the Red Quarry, which was the basis of the Cleal and Thomas (1988) study (the names derive from the colour of the bricks after firing). The Golden Quarry described by Smith and Reynolds (1929) is now seriously overgrown.

Description

Stratigraphy

The Coal Measures exposed near Almondsbury are part of the Ridgeway Thrust Zone, a Variscan structural feature which has caused considerable distortion to the strata. They are often referred to as part of the Severn or Avonmouth Coalfield (e.g. Welch and Trotter, 1961), but they are in fact more properly regarded as part of the Bristol–Somerset Coalfield (Cleal and Thomas, 1988).

The most recent account of the geology of the Red Quarry, including a lithological log, is by Cleal and Thomas (1988). The 85 metre thick sequence consists of coals, seat earths and mudstones (Figure 6.17), which probably represent 'flood-plain' deposits formed in the middle or upper regions of a fluvial delta. There are also sandstone bodies, at least one of which contains large pieces of plant fossil, and which may be crevasse-channel deposits. The biostratigraphical evidence (mainly from the plant fossils) discussed by Cleal and Thomas suggests that the sequence belongs to the topmost Langsettian.

Palaeobotany

The plant fossils here are preserved as adpressions. Those from the mudstones are fragmentary, but often retain carbonized tissue (i.e. compressions). The fossils from the sandstone bodies are impressions. The following taxa have been described:

Lycopsida:

Lepidodendron aculeatum Sternberg

L lycopodioides Sternberg

Lepidostrobophyllum sp.

Sigillaria scutellata Brongniart

Equisetopsida:

Calamites carinatus Sternberg (Figure 6.18)

Asterophyllites equisetiformis Brongniart

Annularia cf. *radiata* (Brongniart) Sternberg

Calamostachys paniculata Weiss (Figure 6.18)

Sphenophyllum cuneifolium (Sternberg) Zeiller

Filicopsida:

Pecopteris plumosa (Artis) Brongniart

Corynepteris angustissima (Sternberg) Ne'mejc

Renaultia cf. *schatzlarensis* (Stur) *sensu* Brousmiche

R. cf. *crepinii* (Stur) Kidston

Cycadopsida:

Laveineopteris loshii (Brongniart) Cleal, Shute and Zodrow

L tenuifolia (Sternberg) Cleal, Shute and Zodrow

Cyclopteris orbicularis Brongniart

Paripteris pseudogigantea (Potonié) Gothan

Alethopteris decurrens (Artis) Zeiller

A. cf. *lancifolia* Wagner

Lonchopteris rugosa Brongniart

Lagenostomopsida:

Karinopteris acuta (Brongniart) Boersma (Figure 6.19)

Eusphenopteris cf. *neuropteroides* (Boulay) Novik

Palmatopteris geniculata (Germar and Kaulfuss) Potonié

Pinopsida:

Cordaites principalis (Germar) Geinitz

Cordattanthus sp.

Cordaicarpon cf. *cordai* Geinitz

Interpretation

The Cattybrook assemblage is typical for the *L. loshii* Subzone, being dominated by *Laveineopteris loshii, Karinopteris acuta* and *Sphenophyllum cuneifolium.* It differs from assemblages from the underlying *Neuralethopteris jongmansii* Subzone (e.g. from Nant Llech — see p. 204) in the absence of *Lyginopteris* and *Neuralethopteris.* Both these form-genera tend to be rare in the *L. loshii* Subzone, a point which was recognized by Dix (1934) and was one of the arguments used by Cleal (1991) to justify separating the two subzones of the *L. hoeninghausii* Zone.

Crookall (1955) states that *Lonchopteris* is usually rare in Britain, although it can be locally abundant. Cattybrook is one of those few localities where it is relatively abundant. Its distribution is generally very uneven, being abundant in certain coalfields in Europe (e.g. Upper Silesia), but absent from North America except for the Maritime Provinces of Canada. It is perhaps significant that the *Lonchopteris* specimens from Cattybrook were found in the crevasse-channel sandstone, rather than the mudstones that yielded most of the other taxa.

Another Cattybrook taxon that is otherwise rare to Britain is *Alethopteris lancifolia.* Only one other specimen is known from Britain, from the Duckmantian of Yorkshire (Crookall, 1955, pl. 5, fig. 1 — see Wagner, 1961).

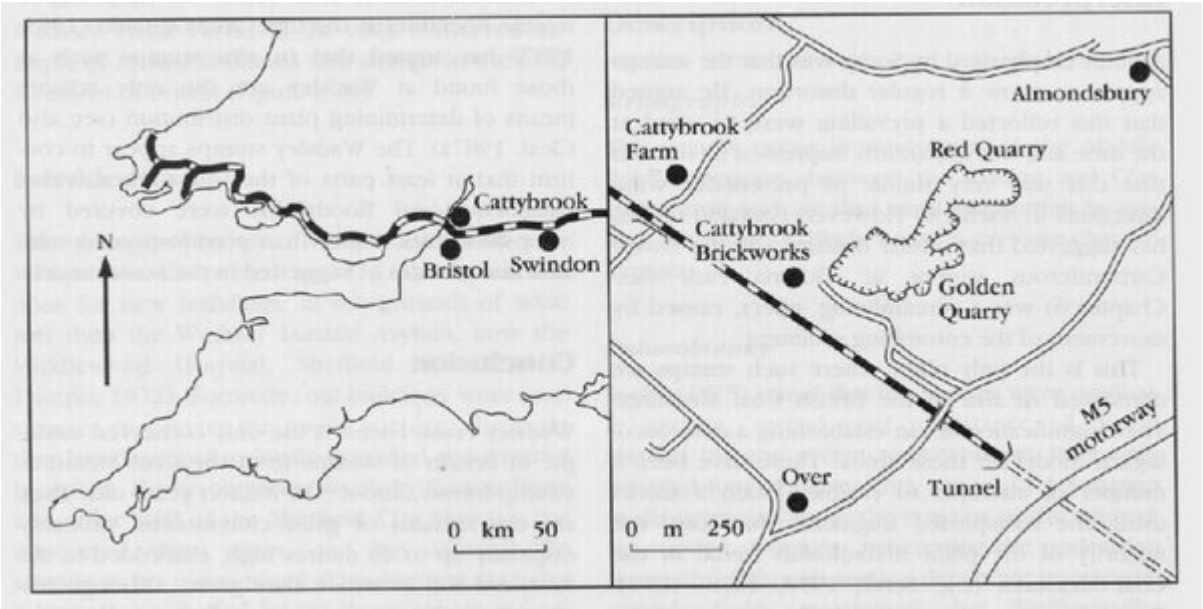
Perhaps of most interest at Cattybrook, however, is the presence of large specimens of *Karinopteris acuta* and *Sphenophyllum cuneifolium* (up to 0.5 metres across) in the crevasse-channel sandstones. Being preserved in sandstone, they do not show fine surface details (e.g. nervation) particularly well. Nevertheless, being probably preserved not far from their position of growth, they provide valuable information as to the growth habit of these plants. Cleal and Thomas (1988) argued that the specimens from here suggest that *K. acuta* was a liana-like plant, and that *S. cuneifolium* was a ground-creeper, adding support to similar suggestions based on material from elsewhere by Batenburg (1977) and Scott (1978).

This is the best available site in Britain for plant fossils of the upper *Lyginopteris hoeninghausii* Zone of Wagner (1984), and referred to as the *Laveineopteris loshii* Subzone of Cleal (1991). Similar upper Langsettian assemblages are known throughout the palaeoequatorial belt, from eastern North America to the Caucasus (evidence reviewed by Wagner, 1984), but mainly from underground or temporary workings. In Britain, the best documented assemblage of similar age is the so-called Ravenhead 'flora' collected from Thatto Heath railway cutting in the Lancashire Coalfield (Kidston 1889d; Cleal, 1979). This has many taxa in common with the Cattybrook assemblage, although it has a rather higher preponderance of ferns. However, the Thatto Heath exposure no longer yields plant fossils. Dix (1934) lists species from a number of similar assemblages from South Wales, and which she assigns to her 'Flora' D, but they are nearly all from underground mines. No published systematic account exists for these Welsh assemblages. According to the evidence reviewed by Jongmans (1940) comparable assemblages have been reported from the North Wales, South Staffordshire, Yorkshire and Central Scottish coalfields, but these are again nearly all from underground mines, and taxonomic analyses have never been published.

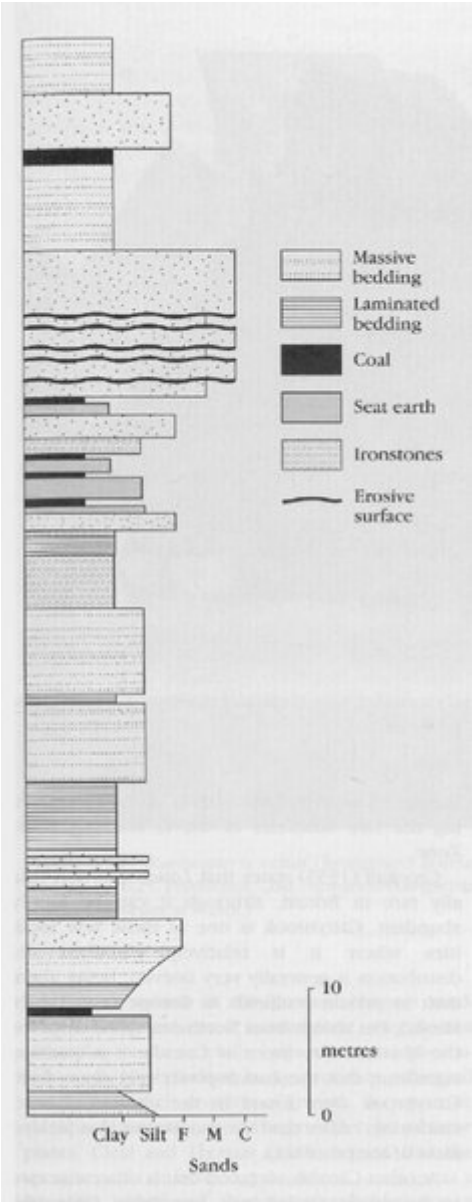
Conclusion

Cattybrook Claypit has yielded the best plant fossils in Britain representing the vegetation from a time known as the late Langsettian, about 310 million years ago (part of the Carboniferous Period). It was the time when the tropical swamp-forests, of which these plants were a part, were starting to reach their maximum development. It marks a clear change from the plant fossils found lower in the Langsettian (such as at Nant Llech — see p. 204), which probably represented a less densely forested setting, more like that evinced by the plant beds in the underlying Millstone Grit. Of particular interest at Cattybrook is the existence of a sandstone, thought to have formed as a river deposit near a levee-bank on which many of these plants lived, and into which large pieces of the plants fell and were buried. This has provided a useful insight into the growth form of some of them, such as the horsetail *Sphenophyllum,* which seems to have been a ground-creeper, and the seed plant *Karinopteris,* which was a liana. Also, Cattybrook has yielded some of the largest known examples of the seed plant frond *Lonchopteris,* which is one of the very earliest examples of a leaf with mesh-veining, as now developed in most dicotyledonous flowering plants.

References

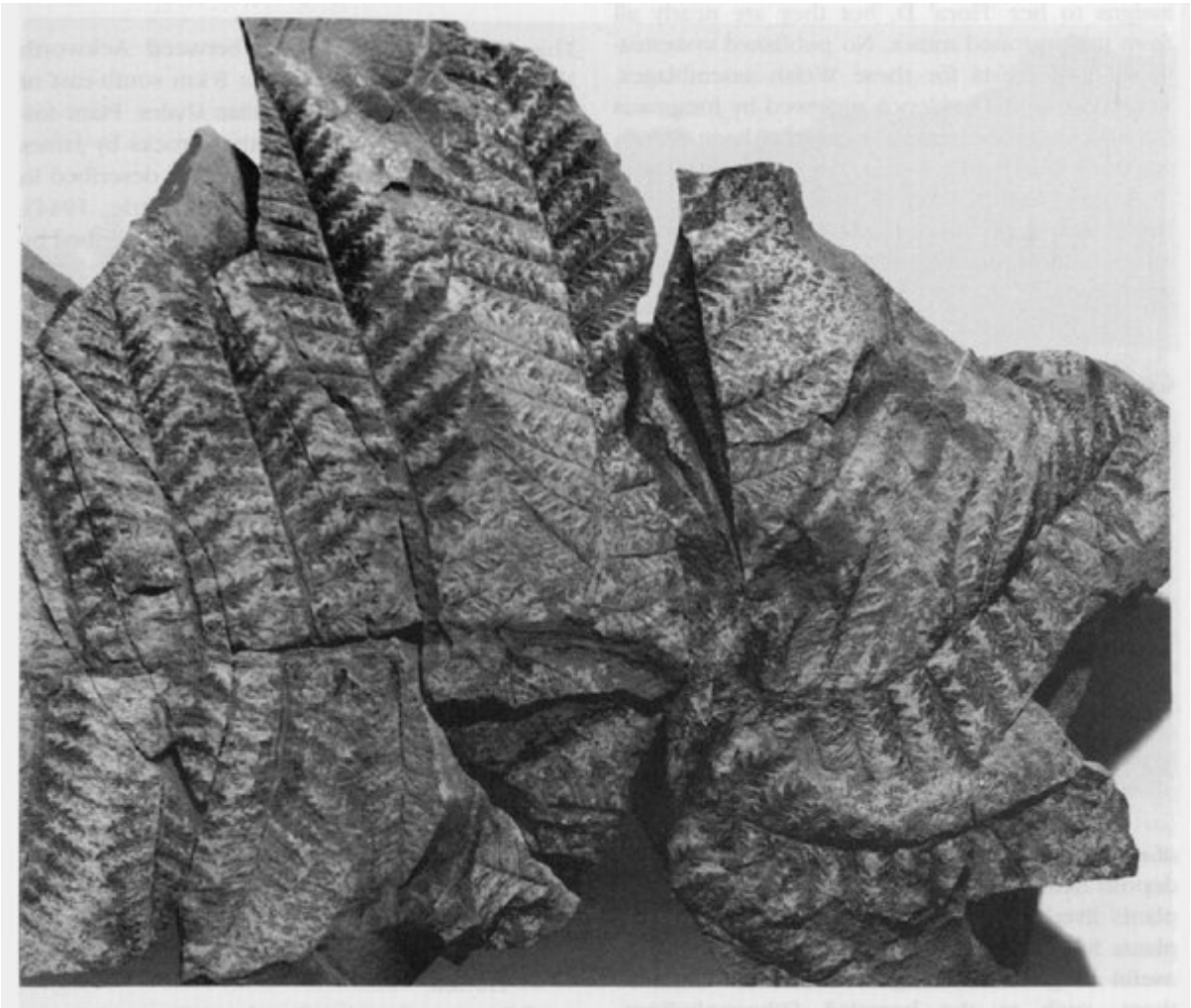


(Figure 6.16) Locality maps for Cattybrook Claypit. Based on Cleal and Thomas (1988, figure 1).



(Figure 6.17) Stratigraphical section through part of the lower Productive Coal Formation (upper Langsettian) at Cattybrook Claypit. Based on Cleal and Thomas (1988, figure 2).

(Figure 6.18) Calamites carinatus Sternberg and Calamostachys paniculata Weiss. Stem and cones of giant equisetopsids; National Museum of Wales, specimen 86.101G54. Productive Coal Formation (Langsettian), Cattybrook Claypit. x 1. (Photo: Photographic Studio, National Museum of Wales.)



(Figure 6.19) Karinopteris actua (Brongniart) Boersma. Pteridosperm frond; National Museum of Wales, specimen 86.101G25. Productive Coal Formation (Langsettian), Cattybrook Claypit. x 0.5. (Photo: Photographic Studio, National Museum of Wales.)