
Plaistow Quarry

Highlights

Plaistow Quarry yields the best *Rhacophyton* Zone plant fossils in Britain, and includes the oldest evidence of seed plants in this country.

Introduction

Plant fossils have been known from the Upper Devonian Baggy Formation of north Devon since the mid-nineteenth century (e.g. Williams, 1838; Hall, 1867; see Arber and Goode, 1915 for a more complete historical account). They have been recorded from a number of localities (see Hall, 1867 for the most complete list) but the most abundant are found at Plaistow Quarry (also known as Sloy Quarry), 4 km, north of Barnstaple, Devon [SS 568 373]. The only detailed account of the assemblage is that given by Arber and Goode (1915), although Fairon-Demaret and Scheckler (1987) have recently commented on one of the species.

Description

Stratigraphy

The Baggy Formation consists of a mixture of shallow marine and deltaic non-marine strata (Goldring, 1971), the plant fossils usually occurring in the latter (Figure 4.38) and (Figure 4.39). There has been some disagreement as to the chronostratigraphical position of the formation (Goldring, 1970, 1971; House *et al.*, 1977). In terms of the currently accepted Devonian-Carboniferous boundary (Paproth, 1980), however, it is probably upper Famennian (Fairon-Demaret, 1986a).

Palaeobotany

The plant fossils are impressions, sometimes iron stained, found in thin and impersistent mudstone lenses. The following species are known:

Lycopsida: *Knorria* sp.

Equisetopsida:

?*Archaeocalamites radiatus* (Brongniart) Stur

Lagenostomopsida(?):

Sphenopteridium rigidum (Ludwig) Potonié

Interpretation

The most interesting aspect of the Baggy Beds assemblage is the presence of probable gymnosperms, the oldest evidence of such plants known from Britain. At Plaistow Quarry, they are represented by *Sphenopteridium* frond fragments (Figure 4.40). At Croyde Hoe Quarry at Baggy Point (some 15 km to the west), similar foliage was found in association with cupulate structures identified by Arber and Goode as *Xenotheca* (see also Rogers, 1926). These have recently been reinvestigated and found to contain ovules with an open, lobate integument, thus confirming that they were gymnospermous fructifications (Fairon-Demaret and Scheckler, 1987; Rothwell and Scheckler, 1988). They are similar in general morphology to other primitive cupulate structures (e.g. *Moresnetia* of Stockmans, 1948; *Elkinsia* Rothwell *et al.*, 1989) but Fairon-Demaret and Scheckler argued that they are generically distinct. Also found at Croyde Hoe are

fragmentary sporangial clusters identified by Arber and Goode as *Telangium* (syn. *Telangiopsis* Eggert and Taylor). These are extremely small specimens, but appear to compare with the lyginopterid sporangial clusters described by Eggert and Taylor (1971).

Also found at Croyde Hoe is pinnate foliage with more swollen lobes, described by Arber and Goode (1915) as *Sphenopteris* sp. There is a comparison with certain species of *Triphyllopteris* (Read and Mamay, 1964) and *Eusphenopteris foliolata* (Stur) (van Amerom, 1975), although neither of these usually range below the Toumaisian. Since Arber and Goode's material is very fragmentary, their original identification as and Pilton formations in North Devon. Based on Hall (1867) and Etheridge (1867) record Scrutton (1978, figure 6). *Adiantites hibernicus* Forbes (syn. *Archaeopteris hibernica*) from Plaistow Quarry. Arber and Goode (1915) attempted to verify the records, but could find neither the original specimens, nor any new ones from the locality. It may be significant that small fragments of Arber and Goode's *Sphenopteris* sp. bear a passing resemblance to *Archaeopteris*.

Specimens from Plaistow Quarry, identified by Arber and Goode (1915) as *Knorria*, were regarded by them as decorticated axes of arborescent lycopsids. Alternatively, they may be examples of more primitive lycopsids without leaf-scars. The specimens clearly need reappraisal.

Arber and Goode (1915) mention ribbed axes from here. These possibly represent internodes of *Archaeocalamites radiatus*. No evidence of nodes was found to confirm the identification, however, and Arber and Goode suggested that they might be poorly preserved lycopsid axes.

The presence of *Sphenopteridium* and *Xenotheca* in the Baggly Formation indicates the *Rhacophyton* Zone of Banks (1980), and supports a late Famennian age. Although of limited composition, this formation nevertheless has the most diverse *Rhacophyton* Zone assemblage known from the British Isles. The nearest comparison is with fossils found in the Lower Limestone Shale along the Taff Gorge near Cardiff (Evans and Cox, 1956; Gayer *et al*, 1973), which includes cf. *Xenotheca devonica* Arber and Goode and another type of cupulate fructification, *Telangiopsis* sp., but which has no recorded specimens of megaphyllous foliage. The best documented assemblages of this age are from Kiltorcan in Ireland (Chaloner, 1968) and the lost site of Prestonhaugh in southern Scotland (Miller, 1857; Crookall, 1939; Long, 1973), but these are restricted mainly to *Archaeopteris* and *Cyclostigma*. From outside of the British Isles, the best known assemblages are from Belgium (Stockmans, 1948) and Bear Island near Spitsbergen (Schweitzer, 1967, 1969), which are significantly more diverse. Typically, such assemblages include (in addition to the form-genera mentioned above) *Protolepidodendropsis*, *Sublepidodendron*, *Pseudobornia*, *Sphenophyllum* and *Aneurophyton*.

Amongst the Baggly Formation sites that have been reported to yield plant fossils, Plaistow Quarry now yields the best material. The Croyde Hoe Quarry, from where Arber and Goode (1915) obtained much of their material, including the fertile pteridospermous organs, is no longer available. This site may thus be regarded as of national significance for understanding the vegetation in this country towards the end of the Devonian Period, as it evolves into the more advanced floras found in the Carboniferous.

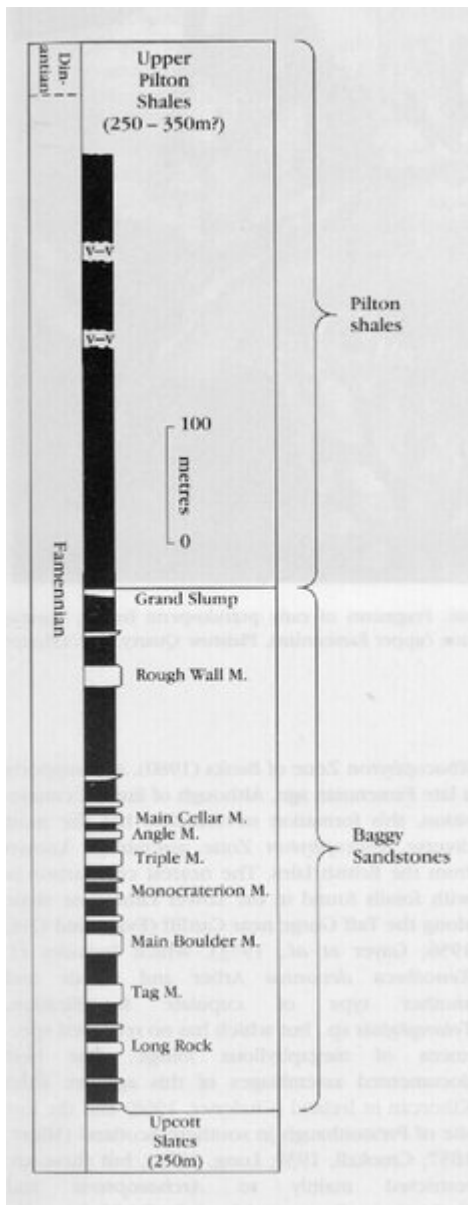
Conclusion

Plaistow Quarry is the best site in Britain for Upper Devonian plant fossils, some 360 million years old, which are otherwise very poorly represented in this country. The site is particularly important in providing at least some reflection of the vegetation growing in the tropical belt towards the end of the Devonian. It is transitional between the more primitive Devonian vegetation, dominated by zosterophylls, trimerophytes and progymnosperms, and the more modern-looking Carboniferous vegetation, which is dominated by ferns, club-mosses, horsetails and seed plants. This particular site has yielded the earliest horsetail and seed plant remains known from this country.

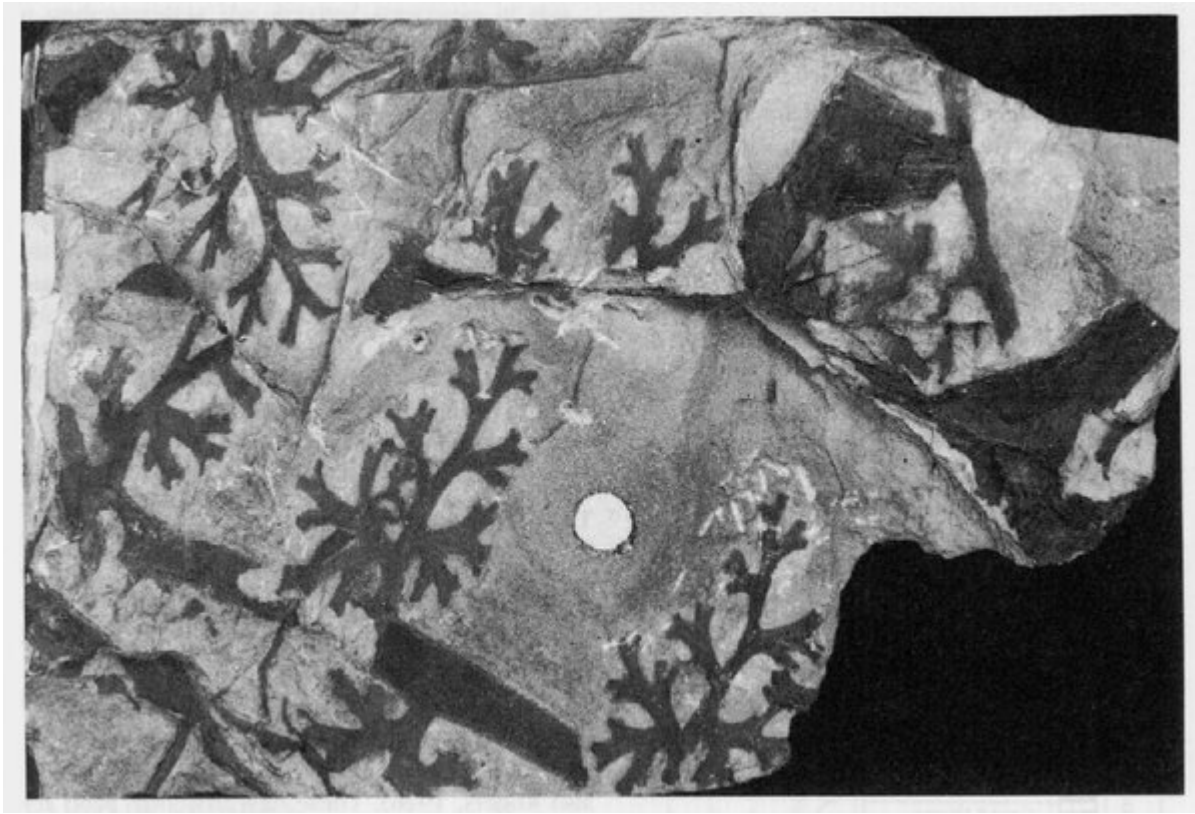
[References](#)

Devonian		
Lower	Ged- innian	
	Siegenian	
	Emsian	Lynton Beds
Middle	Eifelian	Hangman Grits
	Givetian	Jenny Start or Roadwater Limestone Beds
Upper	Frasnian	Ilfracombe
	Famennian	Morte Slates
		Pickwell Down Beds
		Upcott Beds
		Baggy Beds
		Lower Pilton Beds

(Figure 4.38) Devonian stratigraphy of North Devon, showing position of the Baggy Beds.



(Figure 4.39) Details of the stratigraphy of the Baggy *Sphenopteris* sp. should probably be retained.



(Figure 4.40) *Sphenopteridium rigidum* (Ludwig) Potonié. Fragments of early pteridosperm fronds; Natural History Museum, London, specimen V.3562. Baggy Formation (upper Famennian), Plaistow Quarry. x 2. (Photo: Photographic Studio, Natural History Museum, London.)