
Pen-y-Glog Quarry

Highlights

Pen-y-Glog Quarry has yielded the oldest, well-preserved *Prototaxites*–*Pachythea* assemblage in Great Britain, and the oldest preserved as petrifications from anywhere in the world (Figure 3.6). It has also yielded a number of other enigmatic plant fossils, including *Berwynia carruthersii* Hicks. The assemblage provides a valuable insight into mid-Silurian floras, and into the nature of early land vegetation.

Introduction

This quarry [SJ 107 422], which lies on the north side of the River Dee valley, near Corwen, Clwyd, has yielded some of the oldest plant fossils in Great Britain. The fossils were described by Hicks (1881, 1882) and Dawson (1882). More recently, some poorly preserved material has been discussed by Burgess and Edwards (1988).

Description

There is no detailed stratigraphical section published for this locality. Approximately 30 metres of the Pen-y-Glog Slate Formation is overlain by 15 metres of the Pen-y-Glog Grit Formation (together, the Pen-y-Glog Group). The geological distribution of the two facies-associations is shown in (Figure 3.7). The Pen-y-Glog Slate consists of uniform dark grey shales, and has yielded a typical off-shore marine graptolite fauna of the *Cyrtograptus murchisoni* Zone (Elles, 1900). The Pen-y-Glog Grit consists of alternating coarse sandstones (with plant fossils), siltstones and shales, which have been interpreted as turbidites in the Denbigh trough (Cummins, 1957), and which contain a *Monograptus riccartonensis* Zone fauna (Elles, 1900). The biostratigraphical evidence suggested is clearly indicative of a lower Sheinwoodian (early Wenlock) age.

The best preserved specimens are petrifications from the sandstones, and include *Prototaxites hicksii* (Etheridge) Dawson and *Pachythea* sp., together with some enigmatic spherical bodies. The underlying shales have yielded *Berwynia carruthersii* Hicks.

Interpretation

Other than some spores and cuticle fragments (Burgess, 1991; Burgess and Richardson, 1991), Pen-y-Glog has yielded the oldest known evidence of land plants. The best evidence is in the form of small fragments of *Prototaxites hicksii*, no more than 50 mm long. They show little of the gross morphology, but internal structure can be clearly seen in thin section (Hicks, 1881, pl. 25). It conforms with that normally associated with *Prototaxites*, consisting of wide and narrow sets of tubes, except the former are rather smaller and denser than in most other species (12–22 µm in diameter and c. 2500 tubes per cm² in cross-section). Barber (1892) suggested that it might be the same as *Prototaxites storrei* (Barber) Dawson, found in South Wales, but the smaller, denser tubes in the Pen-y-Glog specimens may indicate that they are different. According to Burgess and Edwards (1988), the thicker tubes may be internally thickened, in which case they would belong to their new form-genus *Nematasketum*. However, they were unable to confirm this in freshly collected material, and were unable to examine the original type specimens, and so made no formal proposal of transference. They are probably the oldest *Prototaxites*-typespecimens found in Great Britain to date. Arber (1904a) makes passing comments to other occurrences in North Wales but, without further information about the localities, their age cannot be determined. The previously mentioned *P. storrei* specimens described from Rumney Quarry near Cardiff (Barber, 1892) are from the upper Wenlock (*Cyrtograptus lundgreni* Zone) and are thus younger. From outside of Great Britain, there is only one reliable record from older strata, from the lower Llandovery of Virginia, USA (Pratt *et al.*, 1978), but this was based on tubes macerated from compression fossils. The records from the Ordovician of the Sahara (Arbey, 1973; Koeniguer, 1975) were based on compressions showing no internal structure to confirm the identification.

Associated with the *Prototaxites* are small spheres of *Pachytheca*. Hicks (1881) was able to describe some of their internal structure, but his illustrations are rather diagrammatic and the microscope slides are now lost. Barber (1889) reported examining the slides, however, and stated that the preservation was poor. He confirmed that they were *Pachytheca*, but could not place them in a particular species.

These are amongst the oldest specimens of *Pachytheca* found in Great Britain. The only slightly older specimen is from the lower Wenlock Buildwas Beds of Shropshire and is poorly preserved (Andrew, 1925). There are, however, several records of *Pachytheca* from slightly younger strata in the Wenlock Series of Wales and the Welsh Borders (Harris, 1884; Hooker, 1889; Barber, 1889, 1891; Thiselton-Dyer, 1891; Storrie, 1892; Seward, 1895; Strahan and Cantrill, 1912). Ritchie (1963) mentioned *Pachytheca* from possible Wenlock strata in Scotland, but did not illustrate the specimens. The exact age of these specimens is open to question.

A larger spherical body has come from the Pen-y-Glog sandstones (British Geological Survey collections, specimen no. ZL 363); it is not well-preserved, but is larger (c. 8 mm in diameter) than the *Pachytheca* spheres found here, and does not show the characteristic two-layered structure of that genus. In a letter (dated 19th February 1946) kept with the specimen, W.H. Lang wrote that there was little doubt that it was a plant, but that it could not be identified beyond 'sphaerical body *incerta sedis*'.

The species from the sandstones are all of uncertain affinity, but both *Prototaxites* and *Pachytheca* are widely believed to be land plants. Their presence in mid-basinal marine sediments may be due to the sandstones being turbidites, the plant fragments having been transported into the deeper parts of the Welsh Basin by turbidity currents from a landmass, probably somewhere to the south.

Berwynia carruthersii Hicks (Figure 3.8) represents parallel-sided, sometimes branching axes, preserved as anthracitic coal (Hicks, 1882). Many have a rugose surface, which Hicks interpreted as spirally arranged leaf bases, but it is too irregular for this to be likely. Also visible are zones along the margins of the axes, which show a rather finer patterning. However, this and the irregular rugose patterning are probably just a taphonomic effect. In the absence of any internal structure being preserved, it is impossible to be certain as to what group of plants *Berwynia* belongs.

Hicks (1882) described some other enigmatic fragments from the Pen-y-Glog shales as *Parka*, but they are too poorly preserved for this to be confirmed.

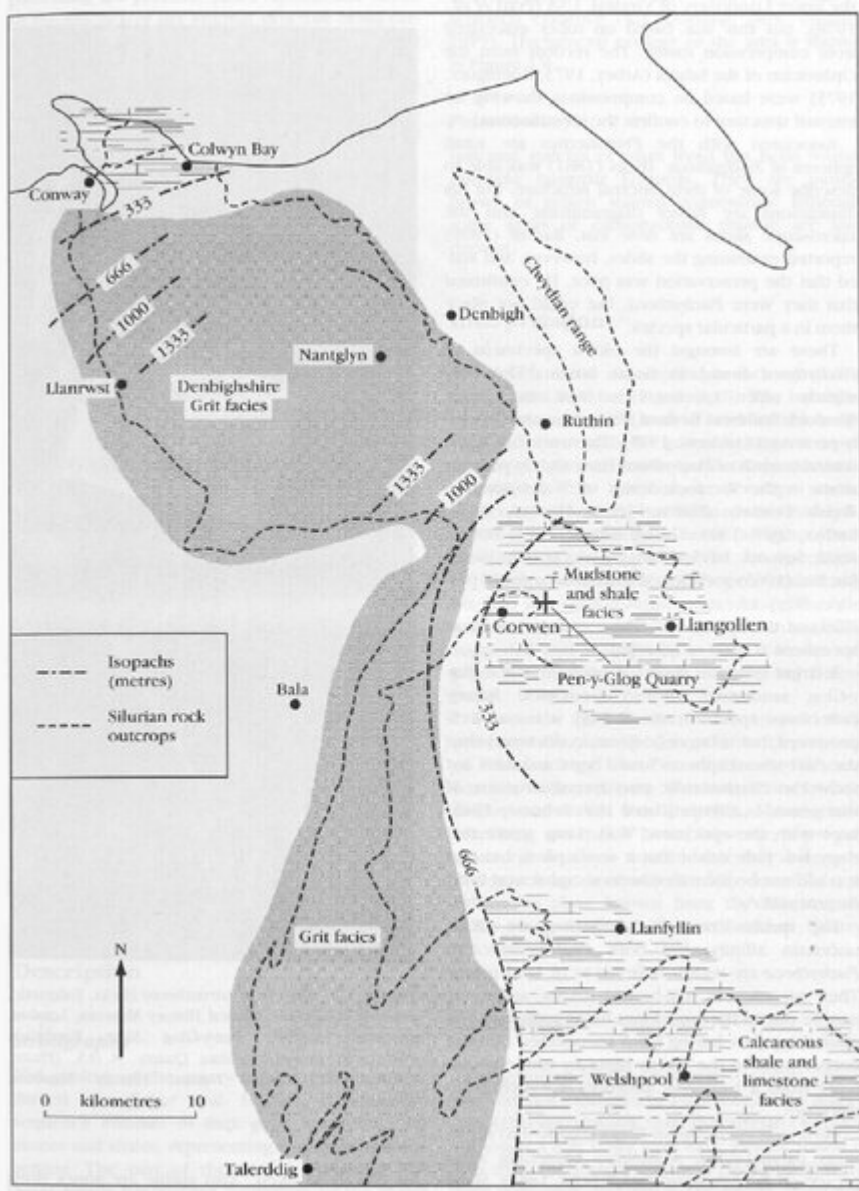
Conclusion

Other than some spores, Pen-y-Glog has yielded the oldest evidence of land vegetation in Britain, about 427 million years old. The fossils are also the oldest-known land plant fossils in the world that show details of cell structure, but are not closely related to anything living today.

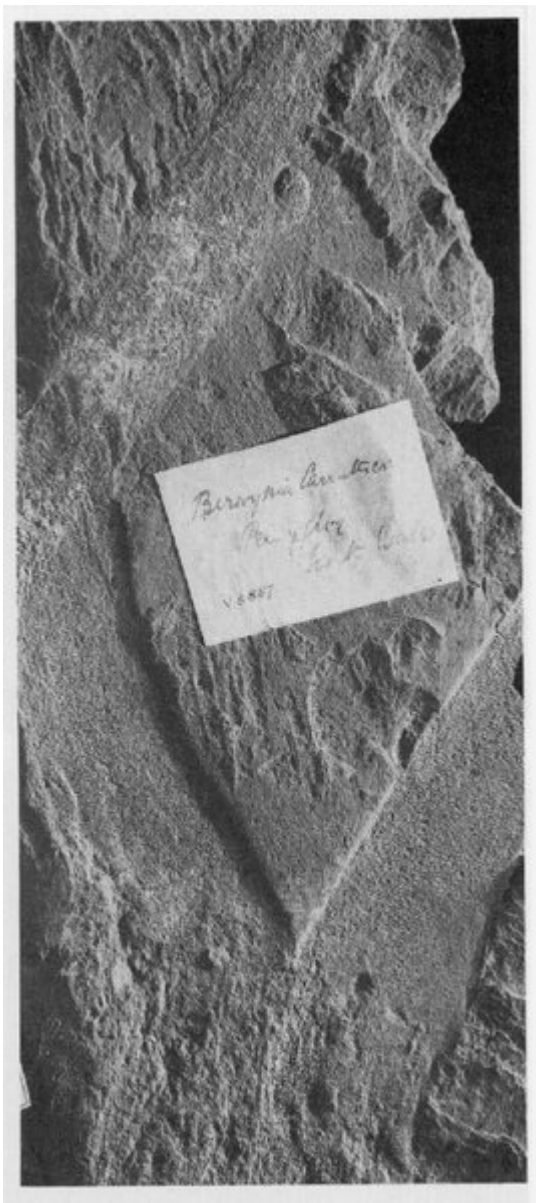
[References](#)



(Figure 3.6) Pen-y-Glog Slate Quarry. Cleaved Pen-y-Glog Slates in the lower part of the quarry face, that have yielded Berwynia. These are overlain by turbidites of the Pen-y-Glog Grits, that contain Prototaxites. (Photo: C.J. Cleal.)



(Figure 3.7) Distribution of grit and shale facies in the Wenlock of North Wales, showing the position of Pen-y-Glog Slate Quarry. Based on Smith and George (1961, figure 20).



(Figure 3.8) *Berwynia carruthersii* Hicks. Enigmatic, possibly algal plant; Natural History Museum, London, specimen V.5887. Pen-y-Glog Slate Formation (Wenlock), Pen-y-Glog Slate Quarry. x 0.5. (Photo: Photographic Studio, Natural History Museum, London.)