
Targrove Quarry

Highlights

Targrove Quarry has yielded the most diverse assemblage of fertile rhyniophytoid specimens known from anywhere in the world, and is the type locality for *Cooksonia hemisphaerica* Lang. It has yielded exceptionally preserved examples of *Nematasketum diversiforme* Burgess and Edwards, and one of the earliest known examples of *in situ* tracheids in slender axes.

Introduction

This Gedinnian-age locality is a small sandstone quarry in the grounds of Downton Hall, near Ludlow, Shropshire [SO 525 780] and is Locality 105 in Ball and Dineley (1961). The first plant fossils were recorded by Marston (1870), who interpreted what were *Parka* specimens as eurypterid egg-packets. More specimens were described by Lang (1937), who also illustrated *Cooksonia* and *Nematothallus* material. However, the most complete accounts are by Edwards and Fanning (1985) and Fanning *et al.* (1992).

Description

Stratigraphy

Lang (1937) stated that this exposure was in the upper Downton Group, but Ball and Dineley (1961) map it as c. 60 metres above the main *Psammosteus* limestone, thus placing it in the lower Ditton Group. On the basis of the spores and fish fossils found here, the sequence is Gedinnian in age (Richardson *in* Edwards and Fanning, 1985). There is no comprehensive account of the geology of the exposure, but Edwards and Fanning state that the sediments are typical of the distal alluvial facies of the Old Red Sandstone (Allen, 1979).

Palaeobotany

The plant fossils are preserved as coalified compressions. The following species have been found to date:

Phaeophycophyta(?):

Nematasketum diversiforme Burgess and Edwards

Nematothallus pseudovasculosa Lang

Chlorophycophyta(?):

Parka decipiens Fleming

Pachytheca cf. *sphaerica* Hooker

Rhyniophytoids:

Cooksonia hemisphaerica Lang

C. pertoni Lang

C. cambrensis Edwards

C. cf. *caledonica* Edwards

Salopella marcensis Fanning, Edwards and Richardson,

Tortilicaulis transwalliensis Edwards

Uskiella reticulata Fanning, Edwards and Richardson

cf. *U. reticulata*

Tarrantia salopensis Fanning, Edwards and Richardson

Zosterophyllopsida:

Zosterophyllum cf. *fertile* Leclercq

There is also a number of unnamed rhyniophytoid fructifications described from here by Edwards and Fanning (1985), and Fanning *et al.* (1992).

Interpretation

This site yielded some of the specimens used by Lang (1937) in his description of *Nematothallus*. They show that it had a pseudoparenchymatous structure surrounded by a cuticle. Lang (1945) and Edwards and Rose (1984) suggested that there was an outer epidermal layer, but the Targrove Quarry specimens do not seem to show this. Lang (1937) also noted some cutinized spores in the Targrove Quarry specimens, although no evidence of the fruiting bodies was found.

Lang (1937) implied that *Prototaxites* occurs here, but he neither figured nor described any specimens. It is also listed by Edwards and Fanning (1985). Burgess and Edwards (1988) subsequently identified the Targrove specimens as *Nematasketum diversiforme* Burgess and Edwards, although again none from here is figured. This species and genus are briefly discussed further in Chapter 3, in the section dealing with Perton Lane.

The most significant vascular plant found here, at least from a stratigraphical standpoint, is *Zosterophyllum*. The record is based on one specimen showing the characteristic branching pattern of the form-genus, and a poorly-preserved fertile spike, neither of which has been figured (Edwards and Fanning, 1985). Its presence indicates that the flora belongs to the *Zosterophyllum* Zone of Banks (1980), and thus is probably Early Devonian in age.

Far commoner at Targrove Quarry are rhyniophytoid species. Lang (1937) initially described only *Cooksonia hemisphaerica* Lang from here, for which it is the type locality. Further collecting, however, has yielded a much wider variety of fertile rhyniophytoid specimens, which have been assigned to various other species of *Cooksonia*, as well as *Salopella*, *Tortilicaulis*, *Uskiella* and *Tarrantia* (Fanning *et al.*, 1992). There were also numerous other forms of sporangia described by Edwards and Fanning, including ellipsoidal and bifurcating types, which belong to so far undescribed form-genera. Thus it comprises by far the most diverse assemblage of fertile rhyniophytoid taxa known from anywhere in the world.

Lang (1937) was also able to demonstrate *in situ* tracheids in a slender axis from here. This was the first direct evidence of vascular tissue in these very early land plants and, until the discovery of similar specimens in the Silurian of Capel Horeb, was the oldest known evidence of *in situ* tracheids in the fossil record. Since the only fertile rhyniophytoid reported from here by Lang was *C. hemisphaerica* Lang, he concluded that *Cooksonia* must have been a vascular plant. However, the discovery by Edwards and Fanning of a much more diverse rhyniophytoid assemblage here must now cause this argument to be doubted, since it is impossible at this stage to be certain which of the species had vascular tissue and which (if any) had not.

Similar *Zosterophyllum* Zone assemblages have been reported from Caldys Island, Dyfed (Lang, 1937) and Newton Dingle, Shropshire (Edwards and Richardson, 1974), although this is not as diverse. A comparable flora comes from the Arbuthnott Group of Scotland, such as found at Turin Hill (see below), but that flora is dominated by zosterophylls and has only subsidiary rhyniophytoid elements. From outside of Britain, *Zosterophyllum* Zone floras have been described

from Belgium (Leclercq, 1942), Spitsbergen (Hoeg, 1942) and Czechoslovakia (Obrhel, 1968), but they differ from the Targrove Quarry assemblage by the presence of *Taenioocrada* and the more restricted rhyniophytoid composition. The assemblage from Kuznetsk in Siberia described by (Stepanov, 1975), although sharing a number of genera with the Targrove Quarry assemblage, also contains several enigmatic endemics such as *Juliphyton*, *Uksunaiphyton*, *Pseudosafania* and *Salairia*, all of unknown affinities.

The assemblage of plant fossils found at Targrove Quarry is thus unique in both a national and international sense. It is transitional between the more primitive Silurian assemblages such as are found at Perton Lane and Freshwater East (see Chapter 3) and the slightly more advanced floras of Turin Hill (see below). It is thus of key importance for understanding the earliest phases in the diversification of land vegetation in the earliest part of the Devonian.

Conclusion

Nowhere else in the world has yielded such a diverse assemblage of rhyniophytoid plants than Targrove Quarry. They are thought to represent the most primitive type of land plants. The rhyniophytoids first appeared about 425 million years ago in the Silurian (see previous chapter) and flourished in the earliest Devonian, such as represented by the Targrove fossils. After some 35 million years, they declined and became extinct, as more advanced plants evolved to take advantage of the land habitats. The Targrove fossils are about 410 million years old and thus represent the acme of this highly significant group of plants which, although of only very simple form, represent a key phase in the evolution of land vegetation.

References