Perton Lane

Highlights

Perton Lane is a classic site for P■ídolí Series plant fossils, being the first to be subject to a detailed palaeobotanical investigation. It is the type locality for *Cooksonia,* widely regarded as the most primitive known vascular plant, and the only known locality for *Caia* and the enigmatic *Actinophyllum.*

Introduction

This small roadside exposure of Ludlow and P■ídolí shales in the village of Stoke Edith, Hereford and Worcester [SO 598 403] is one of the classic sites for British Silurian palaeobotany. There has been some confusion over the name of the site, since it has been referred to as Perton Quarry (e.g. by Lang, 1937). As pointed out by Edwards *et al.* (1979), however, Perton Quarry is a large exposure of middle Ludlow limestones, *c.* 300 metres south of the Perton Lane Section, and the latter name is now generally used for the fossil-bearing outcrop.

Plant fossils from here were first recorded by Phillips (1848) and Phillips and Salter (1848), who described what may be algal fertile structures. Slender, branching axes were described by Brodie (1869, 1871) and were compared by Carruthers (*in* Brodie, 1871) with *Psilophyton.* Plant fossils from here have also been briefly discussed by Barber (1889), Richardson (1907), Stamp (1923) and Straw (1926). Until recently, the most complete account of the assemblage was by Lang (1937). Subsequently, however, there have been significant contributions by Fanning (1987), Fanning *et al.* (1990, 1991) and Burgess and Edwards (1988).

Description

Stratigraphy

The geology of this site is covered by Brodie (1871), Straw (1926), Squirrell and Tucker (1960, 1967) and Edwards *et al.* (1979). The sequence consists of Ludfordian (upper Ludlow) Upper Perton Formation, overlain by P■ídolí Rushall Formation. The Rushall Formation, which yields the plant fossils, belongs to interval I.1 in King's (1925) lithostratigraphy. It consists mainly of buff to light grey mudstones with thin sandstone bands, and probably represents littoral deposits.

Palaeobotany

The plant fossils from here are preserved as coati-fled compressions. The following species have been found to date:

Phaeophycophyta(?):

Nematothallus pseudovasculosa Lang

Nematasketum diversiforme Burgess and Edwards

Chlorophycophyta(?):

Pachytheca sp.

Rhyniophytoids:

Cooksonia pertoni Lang

Pertonella daclylethra Fanning, Edwards and Richardson

Caia langii Fanning, Edwards and Richardson

Salopella sp.

Hostinella sp.

Uncertain affinities:

Actinophyllum sp.

Interpretation

This is the type locality for *Cooksonia pertoni,* which is the type species for the form-genus (Figure 3.16). It is widely believed to be the most primitive known vascular plant. It is difficult to envisage an upright land plant with a simpler morphology, with its thin, isotomously forked aerial shoots, no leaves or other macroscopic emergence, and terminally-borne sporangia lacking a dehisence structure. Specimens from elsewhere (locality details not yet published) have shown evidence of stomata and peripheral supporting tissue around the axes (Edwards *et al.,* 1986) and, most recently, a vascular strand (Edwards *et al.,* 1992).

Evidence from *in situ* spores suggests that at least three species of plant bore *C. pertoni*-type sporangia (Edwards *et al.,* 1986). However, the shape of the sporangia is morphologically indistinguishable in all three and so the name C *pertoni* may be retained as a form-species for such structures.

Two further species of rhyniophytoid have been described recently by Fanning *et al.* (1990, 1991), both of which are characterized by prominent spines. *Pertonella dactylethra* is morphologically very similar to *C. pertoni,* except for the spinose sporangia. *Caia langii,* on the other hand, has significantly more elongate sporongia, rather resembling *Horneophyton* from Rhynie. Fanning *et al.* gave various suggestions as to possible functions for the spines: (a) they increased the photosynthetic area near the sporangia, where there would be considerable energy-demands; (b) they protected the sporangia from predation; and (c) they trapped moisture, helping to protect the developing sporangia from desiccation.

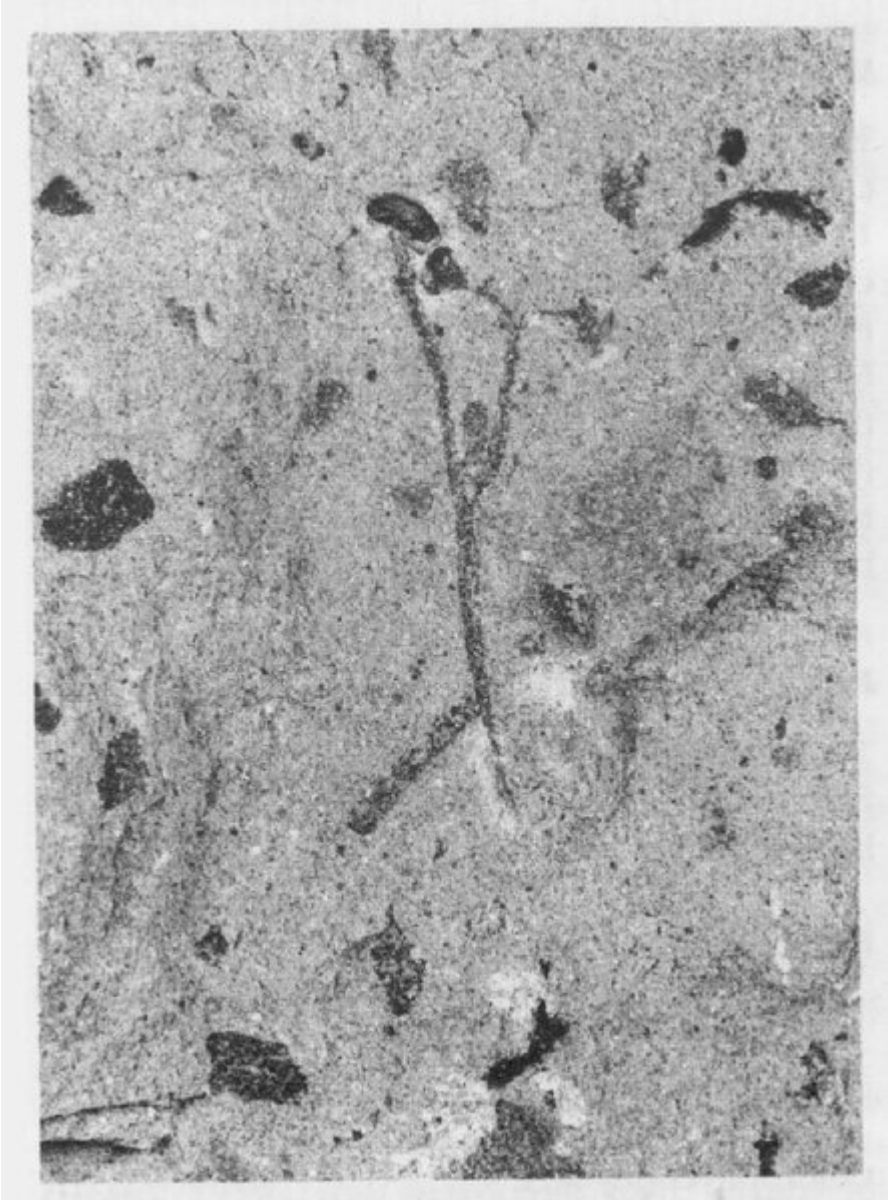
Fossils of uncertain affinity but given the coral-related name *Actinophyllum* are known only from this exposure. Phillips (1848) compared the genus with the fertile structures of the extant dasyclad alga *Acetabularia* but, as it is only known from isolated specimens, the point is difficult to confirm. Straw (1926), who has provided the best photographic record of these fossils, discussed the possibility of it being a coral, but finally came to the conclusion that Phillips' suggestion was more likely to be correct.

Lang (1937) described some poorly preserved specimens from this locality as *Prototaxites,* but better material has since been obtained by Burgess and Edwards (1988). These new specimens differ from *Prototaxites* principally in the presence of internally differentially-thickened tubes. The functional significance of this feature is still unclear. However, it was regarded as sufficiently different from *Prototaxites* to justify the establishment of a new genus and species, *Nematasketum diversiforme* (holotype from Lye Stream near Morville, Shropshire).

Conclusion

Perton Lane is the classic locality for the study of the earliest land vegetation, living *c.* 410–420 Ma, and is where W.H. Lang made many of his pioneering discoveries in the 1930s. It is the type locality for *Cooksonia,* which is widely regarded as the archetypal primitive land plant, and is central to any discussion on the earliest evolutionary history of the vascular plants. It is also the only known locality for *Caia,* which has very unusual spiny reproductive organs.

References



(Figure 3.16) Cooksonia pertoni Lang. A fertile specimen from the type locality of this important early land plant; Natural History Museum, London, specimen V.58009. Rushall Formation (P■ídolí), Perton Lane. x 3. (Photo: Photographic Studio, Natural History Museum, London.)