
Weak Law

Highlights

Weak Law yields a potentially significant plant petrification assemblage of Early Carboniferous age. Stems of the form-genus *Pitus* are particularly well preserved, and show evidence of attachment of young fronds.

Introduction

Following his work on the plant petrifications from Pettycur (p. 141), W.T. Gordon extended his investigations to cover similar volcanoclastic deposits in SE Scotland. In 1914, Gordon made his first major discovery, Weak Law, on the coast between Gullane and North Berwick [NT 499 858]. To investigate further the assemblage, the British Association for the Advancement of Science set up a committee to organize an excavation of the site, employing explosives, but the intervention of the 1914–1918 war prevented Gordon from going ahead (Kidston *et al.*, 1917). The only detailed descriptions of plant fossils from here have been Gordon's (1935a) account of the *Pitus* species, and a description of a *Lyginorachis* by Galtier and Scott (1986a). However, a more detailed investigation is currently in progress by A.C. Scott and his colleagues.

Description

Stratigraphy

In the virtual absence of any biostratigraphical data, it is impossible to estimate the chronostratigraphical position of the site, beyond it being Lower Carboniferous. Kidston *et al.* (1917) argued that it was probably homotaxial with the Pettycur deposits (see below), now known to be Asbian, but the evidence on which this was based was limited. According to Gordon (1935a), the plants probably grew on the side of an active volcano, were killed by a violent eruption and buried by the resulting ash flow. The ash may well have had a high moisture content, and the resulting colloidal solution caused the plants to become permineralized.

Palaeobotany

The assemblage here consists exclusively of petrifications, including the following:

Lycopsida:

Lepidodendron sp.

Stigmaria sp.

Filicopsida:

Botryopteris sp.

Bensonites sp.

Lagenostomopsida:

Pitus primaeva Witham

Pitus dayi Gordon

Pitus rotunda Gordon

Interpretation

Gordon (1935a) described three species of *Pitus* from here, although Long (1979a) has questioned the validity of the distinction. They differ in details of wood structure, particularly the width of the medullary rays. *P. dayi* Gordon was found with spirally-attached leaf-bases, which Gordon interpreted as phyllodes, similar to those found in extant araucarias. However, Long (1979a) suggested that they are more likely the petioles of juvenile, unexpanded fronds, of the *Lyginopteris*-type (see also Beck, 1960).

Of passing interest is the discovery of a *P. primaeva* Witham specimen in the hearth of a nearby Neolithic dwelling (Gordon, 1935b). The fossil resembles closely a piece of drift wood, which must have disappointed its original discoverer on attempting to burn it! This must represent one of the earliest examples of a palaeobotanical discovery.

A single specimen was the basis of Galtier and Scott's (1986a) description of the pteridosperm frond *Lyginorachis gordonii*, which shows a trifurcate petiole. The two lateral racheis probably produced the two foliar halves of a bipartite frond, and the median rachis bore fertile structures (either cupules or pollen-organs). It is essentially similar in structure to other *Lyginorachis* species (Calder, 1935; Long, 1963), as well as *Pitus dayi* Gordon and *Calathopteris heterophylla* Long (1976), but differs in the details of the vascular configuration and the relative positions of the racheis.

Most of the assemblage has not been described in detail, and so a full comparison with other localities cannot be given. However, the reported presence of *Bensonites*, which usually occurs in the upper Visean (such as at Pettycur — see p. 148), contrasts with the abundant *Pitus* stems, which are characteristically Tournaisian and lower Visean (as at Lennel Braes, Whiteadder, Kingwater — see elsewhere in this chapter). The site clearly has potential for further significant palaeobotanical discoveries, which will help unravel the history of Early Carboniferous vegetation in this country.

Conclusion

Weak Law is one of a series of sites showing Lower Carboniferous rocks in southern Scotland, which yield anatomically-preserved plant fossils, about 350 million years old. Nowhere else in the world has so many sites of this age yielding such well preserved fossils. This particular site is so far mainly known for well-preserved stems of early seed plants (known as *Pitus*) in which the position of attachment of young fronds can be recognized. However, the potential of this site has yet to be fully realized.

[References](#)