Sloagar

Highlights

Sloagar provides the best example of a *Svalbardia* Zone flora in Britain. It is also the type locality for *Svalbardia scotica* Chaloner, the only known species of this form-genus known from Britain (Figure 4.35).

Introduction

Plant fossils are abundant throughout the Old Red Sandstone of Shetland but have been studied little by palaeobotanists. Stems known as 'corduroy plant' occur extensively and have been noted by *Hooker* (*in* Tufnell, 1853), Miller (1857), Murchison (1859), Gibson (1877) and Peach (1877), and *Thursophyton* and *Hostinella* axes have been recorded by Mykura (1972) and Mykura and Pheimister (1976). In none of these cases, however, were the specimens described. During the early twentieth century, W.H. Lang made an extensive collection of Shetland plant fossils (now stored in the Natural History Museum) but the results of his work were never published. The only sites to have been subject to any detailed work are those yielding *Svalbardia* (Chaloner, 1972; Allen and Marshall, 1986), the most prolific of which is this one high in the Middle Devonian on the coast of Fair Isle, Shetland Islands ([HZ 228 726]; see (Figure 4.36)).

Description

Stratigraphy

The sequence at Sloagar has been described by Mykura (1972), Marshall and Allen (1982) and Allen and Marshall (1986). It consists of alternating lacustrine shales and sandstones of the North Gavel Formation (Figure 4.37). Palynological evidence indicates a late Givetian age (Marshall and Allen, 1982), which is also supported by the plant fossils, which belong to the *Svalbardia* Zone of Banks (1980).

Palaeobotany

The shales here have yielded heavily carbonized compressions of just one species, *Svalbardia scotica* Chaloner. The sandstones contain casts and adpressions of wide axes known as 'corduroy plant', which may have been the stems of the *Svalbardia* plant.

Interpretation

Other than this locality, *Svalbardia scotica* has only otherwise been recorded from Voe of Cullingsburgh and Leebotten on Shetland (Allen and Marshall, 1986). It consists of 20 mm wide, ribbed axes with ?spirally attached, subsidiary axes. Mostly wedge-shaped, digitate leaves are attached probably spirally to both orders of axes. Associated with the vegetative shoots are fertile axes bearing sporophylls, again probably in a spiral arrangement. The sporophylls bear 8–12 fusiform sporangia on their adaxial surface.

These fructifications associated with *Svalbardia* are very similar to those of the Upper Devonian *Archaeopteris,* and the two form-genera were traditionally distinguished only by the more deeply digitate leaves of the former. Scheckler (1978) argued that *Svalbardia* was merely a developmental stage of *Archaeopteris,* but Matten (1981) has maintained that it is a morphological and evolutionary precursor of the latter. Marshall and Allen (1986) concluded that the evidence for separating the form-genera was doubtful, although they provisionally retained the name *Svalbardia* for the Shetland material until a more thorough analysis had been made of all the species. Whatever the taxonomic results of such an analysis, the *Svalbardia*-typespecies will hold an important evolutionary position between the more primitive progymnosperms which did not have dorsiventral, laminate leaves (e.g. *Protopteridium* from Bay of Skaill) and the more typical *Archaeopteris* species with flattened, fully laminate leaves.

As to the specimens recorded from Sloagar by Mykura (1972), ?aff. *Zosterophyllum* and *Hostinella* sp. are probably conspecific with *S. scotica* Chaloner.

The early records of *Calamites* from Shetland have subsequently been referred to as 'corduroy plant' (Finlay, 1926). They are axes up to 150 mm wide, which occasionally show monopodial branching (Allen and Marshall, 1986). They are characterized by uninterrupted longitudinal ribs (hence, their original assignment to *Calamites*), *similar* to those found on the *S. scotica* axes, with which they are often associated. Allen and Marshall (1986) concluded that the 'corduroy plant' may well represent the main stem that bore *Svalbardia,* although evidence of attachment has yet to be found. If correct, this would call into question Scheckler's (1978) view that *Svalbardia* was a developmental form of *Archaeopteris.*

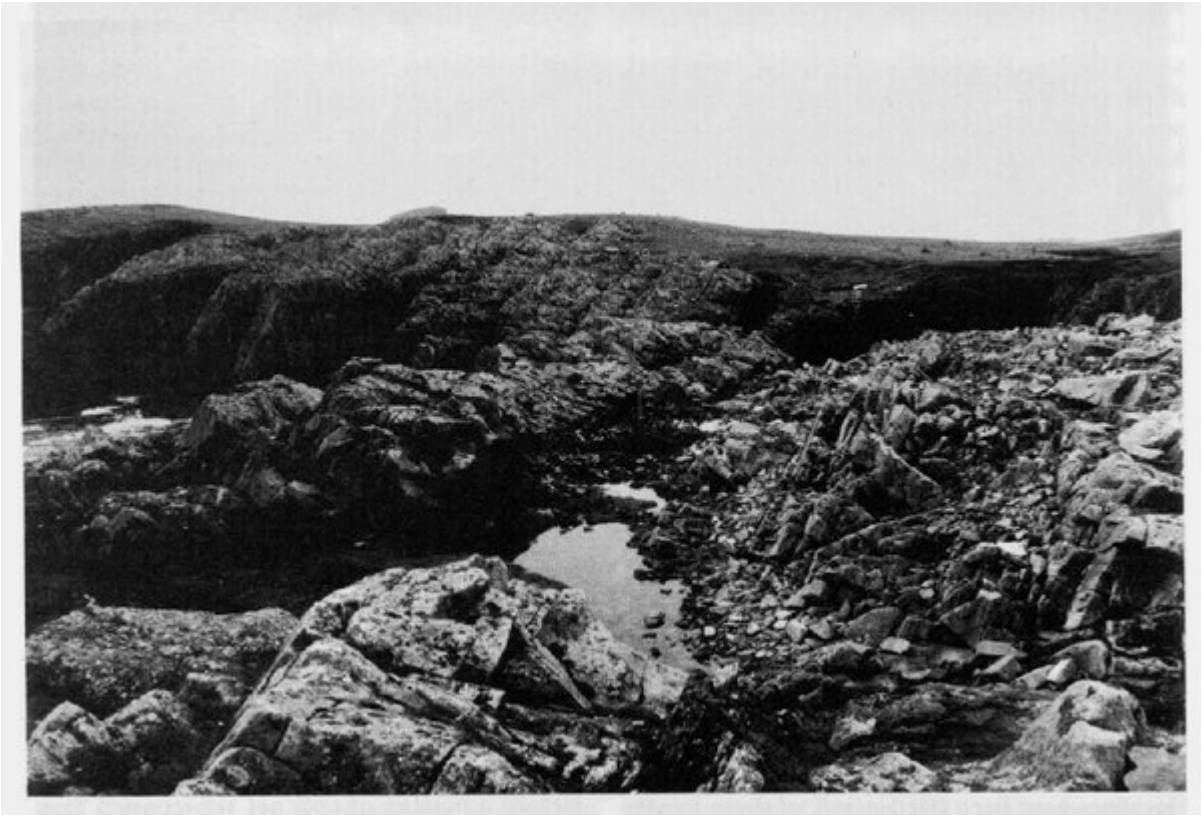
Mykura (1972) recorded cf. *Prototaxites* sp. from Sloagar. This would be of considerable interest as the youngest record of this group of enigmatic, non-vascular plants from Britain. However, it is possible that they refer simply to axes of 'corduroy plant'.

Although yielding only one species, Sloagar is of considerable palaeobotanical importance. It has yielded the best specimens for showing the overall morphology of the *Svalbardia* plant, as well as some well-preserved fructifications and foliage. It is second only to Spitsbergen and New York State for understanding the detailed structures of this phylogenetically important progymnosperm.

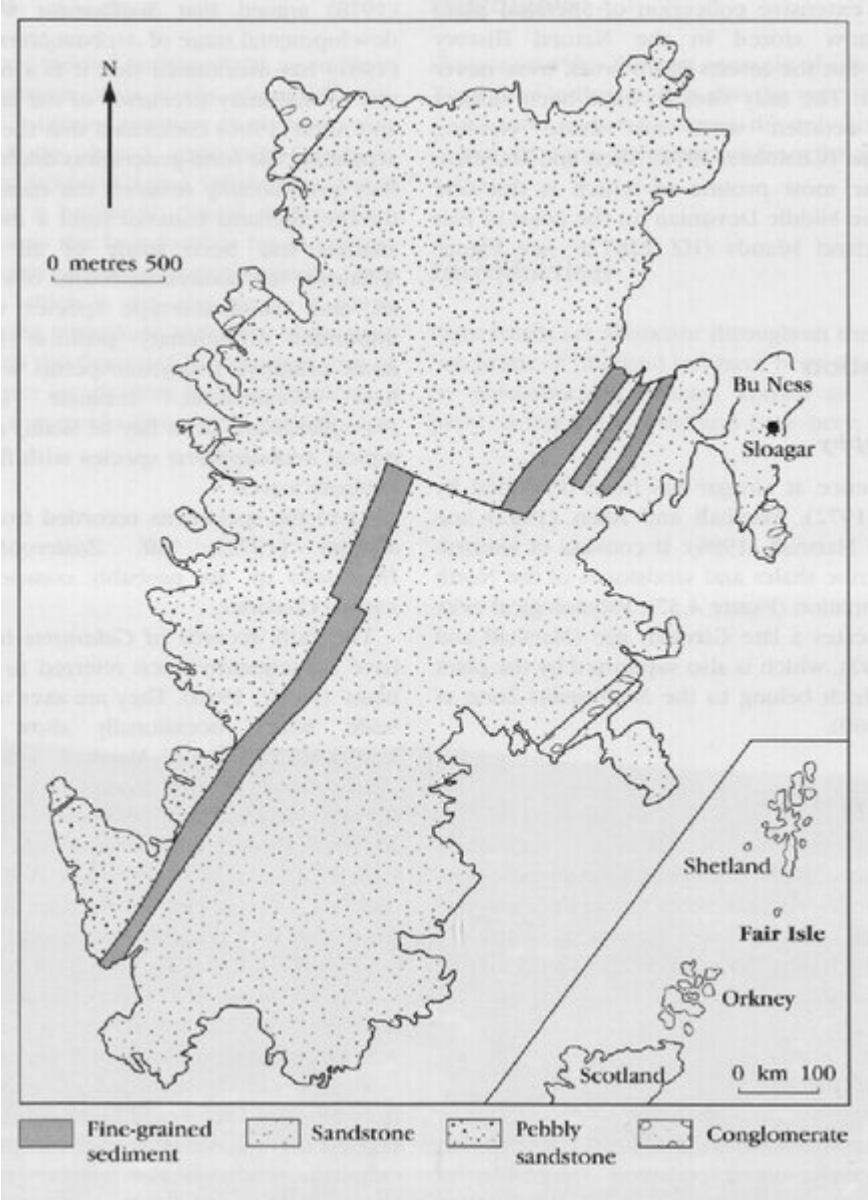
Conclusion

Sloagar has yielded the only species of the progymnosperm *Svalbardia* known from Britain. This plant, which lived about 375–380 Ma, had typically progymnosperm-like sporangia, and flattened, deeply-digitate leaves. This foliage suggests that *Svalbardia* holds an intermediate evolutionary position between the primitive progymnosperm *Protopteridium* which did not have flattened leaves (see Bay of Skaill, above) and the more advanced and 'typical' progymnosperm *Archaeopteris,* which had flattened, more fully laminate leaves. The Sloagar specimens are of great importance for charting the evolutionary history of the progymnosperms, which eventually gave rise to the seed plants and flowering plants.

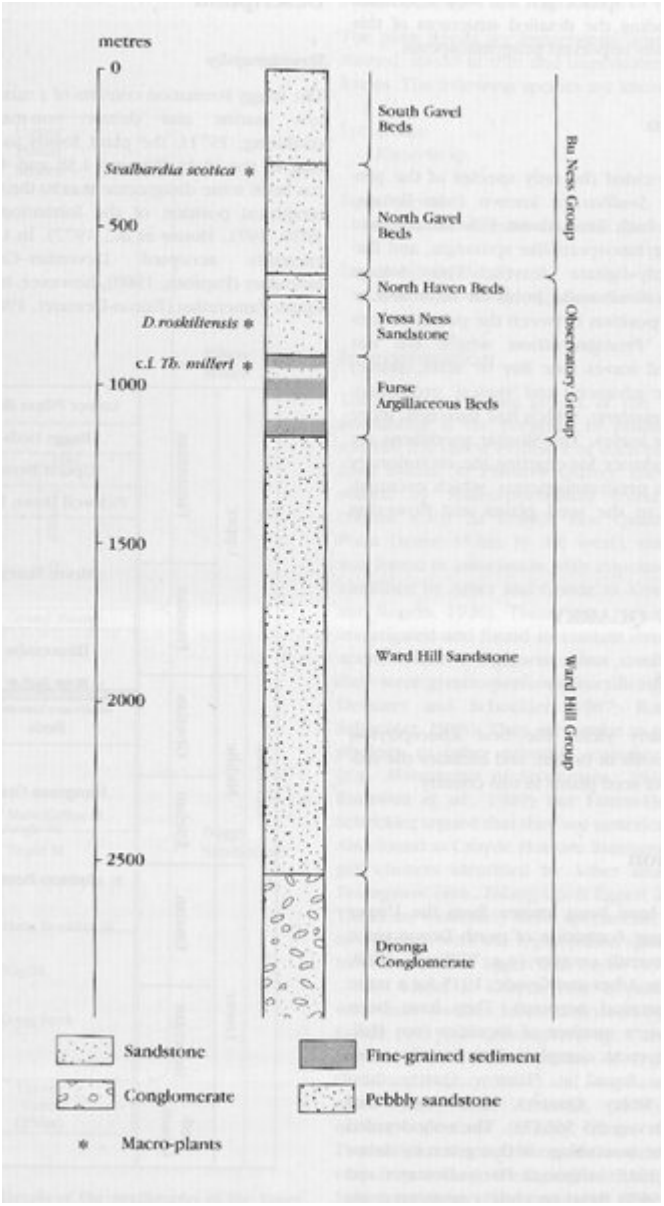
References



(Figure 4.35) Sloagar. Steeply-dipping Givetian lacustrine beds of the North Gavel Formation. Plant fossils occur in the shales in the middle of the picture. (Photo: C.J. Cleal.)



(Figure 4.36) Geological map of Fair Isle, showing position of Givetian palaeobotanical site at Sloagar. Based on Marshall and Allen (1982, text-figure 1).



(Figure 4.37) Stratigraphical section of the Middle Devonian of Fair Isle, showing the main plant fossil-bearing horizons. Based on Marshall and Allen (1982, text-figure 2).