List of plates

Lòn Lèanachain

Loch Maree Islands

Inshriach

Rothiemurchus

Maps

Summary

1. The peat stratigraphy of seven bog woodland sites was surveyed. The sites were located across a bioclimatic gradient from the west Highlands through Speyside to the Black Isle. All of the sites bar one were characterised by pine. Lòn Lèanachain contained a birch wood.

2. Tree growth at every site was established on genuine mire peat and did not represent tree growth on mineral substrates masked by superficial cover of fresh *Sphagnum*, or trees restricted to peripheral mineral ground transitions to mires.

3. All sites except Mar Lodge were considered to fall within the compass of the definition of 'bog woodland' adopted for the survey. The latter was excepted because it appeared to represents invasive colonisation of desiccating peats by trees, rather than a stable bog-wood system.

4. The sites exhibited marked stratigraphical variation. A common feature of many of the eastern Highland sites was the disturbed nature of the upper peat stratigraphy. Monadh Mor, Pitmaduthy and Inshriach appear to exhibit the most extensive and systematic disturbance to the peat stratigraphy, probably from ancient peat cutting. It is therefore possible that many of the bog woodlands, or parts of them, are therefore comparatively recent in origin (i.e. <150 years old). The Western Highland sites of Loch Maree islands and Lòn Lèanachain appeared to be the exceptions, as here no truncation to the peat stratigraphy was detectable.

5. Although evidence for peat cutting was absent at Lòn Lèanachain, there is circumstantial evidence that a combination of past grazing pressures and burning may have formerly discouraged birch growth in the peripheral areas of the bog. It is possible that the recent relaxation of such pressures might have allowed the establishment of the modern bog woodland. Evidence that burning had affected the vegetation in the past was also present in most of the sites examined.

6. The Rothiemurchus peatland sites might also represent areas which are returning to some kind of wooded equilibrium after centuries of intense grazing pressure and burning (as well as some peat cutting), following recent changes in management practice.

2. Introduction

Background to the current study

Up until now, the focus of 'bog woodland' survey in the UK has been entirely directed towards description of the vegetation communities, together with, occasionally, other ecological parameters such as water chemistry (McHaffie et al 2000). No account, however, has hitherto been taken of the peat stratigraphy occurring on the sites. Nevertheless, this is potentially a very important attribute when assessing any mire system. Mires, uniquely amongst plant communities, preserve a physical record of their history in the form of their 'peat archives', and peat stratigraphy can reveal a great deal about the conditions leading to the formation of present-day surface vegetation - including bog woodland. Such information is clearly helpful in assessing both the 'naturalness' and past dynamics of such systems, as well as giving information on other factors such as anthropogenic disturbance (e.g. whether burning has affected the mires). A more prosaic, though no less important aspect of such work is the charting of peat depths underlying putative bog woodland sites. It is sometimes possible for wet woodland to give the superficial appearance of being rooted on deep peatland, when in fact trees may actually be growing on mineral substrate just a few tens of centimetres below the surface. Re-flooded, terrestrialising peat cuttings can occasionally deceive in this way and it was considered useful to survey the peat substrates of a range of Scottish 'bog woodland' sites in order to establish their true deep peat credentials.

Seven mire sites identified by previous workers as 'bog woodland' were selected for detailed stratigraphical analysis; namely Lòn Lèanachain, the Loch Maree Islands, Inshriach, Rothiemurchus, Mar Lodge, Monadh Mor & Pitmaduthy (Map A, p.5). The sites were selected in order to encompass a climatic gradient from the hyperoceanic west (Lon Leanachan, Lochaber; Loch Maree, Wester Ross) through the Cairngorms (Rothiemurchus, Inshriach, Mar Lodge) to the north-east (Monadh Mor and Pitmaduthy, Invernesshire). With the exception of Lòn Lèanachain, all the sites have been selected as candidate Special Area of Conservations (cSAC).

3. Methods

Field stratigraphy

Vegetation communities present at each mire were assessed by traversing the sites, noting dominant species. General descriptions are included in the site descriptions where appropriate. Peat stratigraphy was rapidly assessed using a 30mm bore gouge auger and recording the sediments in the field. Peat humification (degree of decomposition) was recorded in the field using the 10-point scale of Troels-Smith (1955) ranging from 0 -the least to 10-the most. (0 = not humified: plant remains are not decomposed at all, 10 = well humified: individual plant remains are not recognisable). The humification value gives a crude measure of the comparative 'dryness' of the mire surface and growth rate of peat at the time the specific peat layer it refers to was formed (i.e. the higher the value, the more decomposed, the 'drier and slower growing the mire). The information is displayed in a series of tables in each site report.

An optical level was used for determination of relative surface levels of core positions where practicable. This information was then used to draw a series of stratigraphic sections through each major mire system surveyed. Different peat types are represented by different colour codes in each peat column. A key accompanying the diagrams explains the colour codes. Lines are used to link stratigraphical units between individuals cores where appropriate.

Macrofossil analysis

Field descriptions of stratigraphic elements were occasionally complemented by more detailed analysis in the laboratory from core samples. These were examined using a stereozoom microscope and helped to check and add detail to field determinations of material.

Cores were sub-sampled into blocks of ca. 25ml volume at varying intervals depending on the site investigated and marked variation in stratigraphy noted in the field. Sample volumes were measured by water displacement and samples were disaggregated by soaking in water for a minimum of 24 hours. Dispersed samples were washed through a sieve with a mesh size of 500 microns. Material retained from sieving and was systematically examined for plant macrofossil content low power stereozoom microscope (x6-40 magnification). Plant material was identified using a reference collection and the keys of Beijerinck (1974), Berggren (1969, 1981), Grosse-Brauckmann (1972), Jessen (1955) and Katz, Katz, and Kipani (1965).

The results are presented as a series of histograms indicating frequencies of vegetative remains per unit volume and seeds from each level sampled. In the diagrams and descriptions the word "seed" is used to describe both fruits and seeds in order to simplify the presentation. The results display relative abundance of plant remains assessed on a semi-quantitative five-point scale *viz*:

1= rare
2=occasional
3=frequent
4=very frequent
5=abundant

where:

Rare - vegetative material occurring only once or one seed.

Occasional - vegetative material occurring only a few times or 2-5 seeds.

Frequent - vegetative material occurring regularly or seeds 5-20.

Very frequent - vegetative material occurring in every portion of the sample examined or seeds 20+.

Abundant - vegetative material occurring in field of view all the time and dominating the sample, or 40+ seeds.

These frequency attributes are denoted in the macrofossil diagrams by a series of histogram bars, viz:

 Rare

 Occasional

 Frequent

 Very frequent

 Abundant