Morrone

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Highlights

The sediments preserved in a topographic depression on the flanks of Morrone contain a wealth of palaeoecological information. Analysis of pollen and plant macrofossils, supported by radiocarbon dating, has allowed detailed reconstruction of vegetational history and environmental change during the Lateglacial and Holocene in an area of outstanding importance today for its arctic–alpine and northern–montane communities.

Introduction

The Morrone site [NO 135 900] is situated at about 420 m OD on the north-facing slope of Morrone, a hill lying immediately to the south of the village of Braemar, on Deeside. The Morrone Birkwoods National Nature Reserve contains a complex of sub-alpine woodlands, scrub, flushes, mires, grasslands, tall herb and upland heath communities (Huntley, 1976; Ratcliffe, 1977; Huntley and Birks, 1979a, 1979b). The Quaternary interest at the site arises principally from the presence within the woodland area of a series of small, shallow, infilled basins which contain Lateglacial and Holocene sediments. Stratigraphic, pollen and plant macrofossil studies, and radiocarbon dating have been carried out upon a core from the deepest of these basins (Huntley, 1976 and unpublished data). These studies have revealed the history of the site since Lateglacial Interstadial times, and the plant macrofossil record for the Lateglacial period is particularly rich, allowing detailed palaeovegetation and pal-aeoenvironmental reconstructions to be made. The altitude of the site and its relative proximity to Loch Lomond Readvance ice limits, coupled to the known quality of the palaeoecological record that it preserves, make it unique in Scotland.

Description

The basin from which the core used in the palaeoecological studies was collected is located on a relatively gently sloping, till-covered area of the lower slopes of the hill. A small stream flows into the basin at its south-west corner, and there is also general seepage along the western side from a neighbouring basin some 350 m to the south-west. Another small stream drains from the basin on its eastern side.

Although it is primarily surrounded by heathland communities, birch woodland stands approach to within less than 300 m. The surface of the basin itself supports a soligenous mire community, and the inflow stream drains from gravel flushes and soligenous mires within the woodland area upslope of the site.

The core studied extends to a depth of 4.0 m, at which point the corer struck either bedrock or a large rock within the till. The sediments were described in detail by Huntley (1976) and comprise a sequence of organic silty mud, silts, silty muds, silts and fine sands, and gyttja (Figure 9.15).

Huntley (1976) also included a loss-in-weight upon ignition profile for the core which emphasizes the marked difference between the upper 1.5 m or so of often highly organic sediments and the predominantly minerogenic sediments of the remainder of the core.

Ten radiocarbon age determinations have been made on 0.05 m thick samples from the core (Q–1287 to Q–1291, Q–1344 and Q–2316 to Q–2319) (Figure 9.15).

The radiocarbon dates show that the lower 2.5 m or so of the core accumulated during the Lateglacial, with the first sediment accumulating in the basin about 12,600 BP. The dates Q–2319, Q–2316 and Q–1289 are indistinguishable at approximately 9800 BP, indicating a brief time of very rapid sediment accumulation during the early Holocene. In contrast, during the period between 9700 BP and 6600 BP only about 0.17 m of sediment accumulated, a very slow rate

of accumulation. Although the uppermost part of the core contains a dating reversal, the results none the less indicate relatively rapid sedimentation once again during the last three to four millenia.

An absolute pollen stratigraphic study was performed on the core, and both relative pollen diagrams and diagrams of absolute pollen accumulation rates were prepared (Huntley, 1976). The relative pollen diagram (Figure 9.15) was divided into four local pollen assemblage zones (Huntley, 1976), using the results of numerical zonation techniques (Gordon and Birks, 1972) as a guide.

Interpretation

During the time represented by the first zone (MOR–1) dwarf-shrub heaths and grasslands were the predominant local vegetation types, although some scrub *of Juniperus* and *Salix* and even local stands of *Betula* were probably also present. A variety of pollen taxa together indicate the presence also of open, unstable soil areas. The evidence from the second zone (MOR–2) indicates a similar mosaic of vegetation including dwarf-shrub heaths, grasslands, scrub and occasional local stands of *Betula,* but with an increased representation of arctic–alpine and northern-montane taxa and of low-growing herbs, including taxa indicative of open soil areas. The coarse minerogenic sediments at this time, coupled to the evidence of more extensive open soil areas, combine to indicate severe environmental conditions. The environment subsequently stabilized during the third zone (MOR–3), with aquatic taxa becoming abundant in the small lake, increasingly organic sediment accumulating, and the development of extensive *Juniperus* scrub towards the end of the time represented. A vegetational mosaic continues to be present, none the less, although during this period the areas of open soil diminish. Major vegetational changes occurred at the time of the change to the fourth zone (MOR–4); *Pinus* forests became extensive on Deeside and surrounded the stands of *Betula* woodland, with their *Juniperus* under-storey, at Morrone. These latter woodlands seem none the less to have persisted, perhaps favoured by the areas of better soils associated with the outcrop of calcareous rock and the base-rich tills at this site.

Although to a large extent the plant macrofossils at the site simply support the interpretation of the vegetational history based upon the pollen record, the macrofossil evidence adds an extra dimension to the palaeovegetational and palaeoenvironmental reconstruction, as well as documenting in much greater taxonomic detail the history of the flora of Morrone, especially during the Lateglacial. The identification of bryophyte macrofossils also provides information about a group of plants that leave no useful pollen and spore record, and yet are important, often dominant, components of many upland and arctic plant communities.

The macrofossil record is notable for its extreme species richness, and for the large numbers of arctic–alpine taxa represented. Most noteworthy perhaps are several taxa that are today absent from the British Isles but are found in Scandinavia (for example, *Papaver radicatum* and *Meesia tristicha*). However, the abundant remains of *Polytrichum norvegicum* throughout much of the Lateglacial indicate the presence of long-lying snow patches near to the site, an inference which could not be reached from the pollen data alone, and complete shoots of *Saxifraga oppositifolia* and rosettes of S. *cespitosa* demonstrate that both species were growing in close proximity to the site and give a clearer picture of the nature of the open-soil communities of dwarf herbs present. The wealth of ecological detail provided by the macrofossil records allows an unrivalled picture to be assembled of the Lateglacial vegetation at the site.

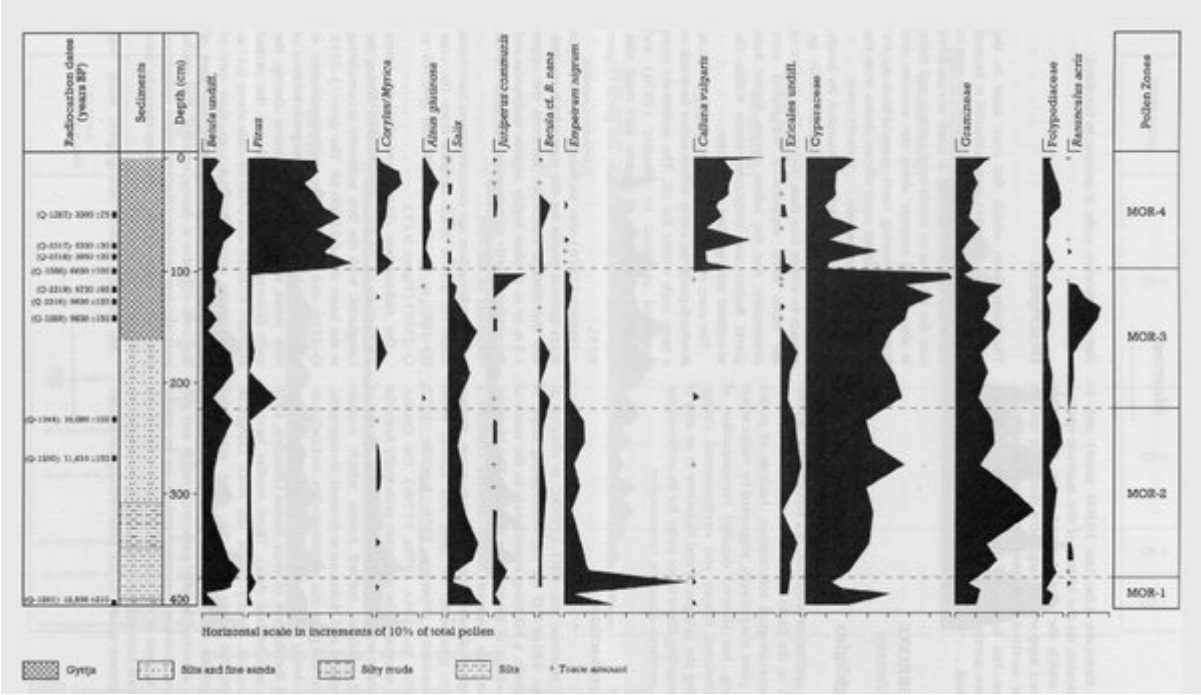
Together, the pollen and macrofossil records show that this site, noted today for its rich flora and the abundance of arctic–alpine and northern-montane taxa that it supports, has had a long history of such floristic wealth and biogeographic character.

This site is of regional importance because of the radiocarbon-dated pollen and macrofossil records that are available from it and which are unmatched in terms of altitude and timespan of record within the region. The wealth of data that it has furnished, and the detailed vegetational history which has been reconstructed from these data combine to give the site national importance. The modern Morrone Birkwoods are unique within the British Isles, and share their closest ecological affinities with the sub-arctic birchwoods of Scandinavia. The pollen analytical and macrofossil evidence have documented the occurrence of non-British taxa at the site throughout the Lateglacial and the Holocene. The unusual modern vegetation of the area can therefore be understood in terms of the development of the local vegetational communities during the last 12,500 years.

Conclusion

The plant fossil contents of the deposits on the lower slopes of Morrone Hill and within the Morrone Birkwoods National Nature Reserve are of great importance for studies of vegetational history. Analyses of the distribution of pollen and larger plant remains in vertical sediment profiles, together with radiocarbon dating, have provided palaeoecological data of considerable value and have allowed the history of a nationally unique area of vegetation to be elucidated in great detail. The site is exceptional for the wealth of information on vegetational and environmental changes during the Lateglacial (about 13,000–10,00 years ago) that is available from the larger plant fossil remains.

References



(Figure 9.15) Morrone: relative pollen diagram showing selected taxa as percentages of total pollen (from Huntley, 1976).