Red Moss

[SD 634 100]

Potential GCR site

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Introduction

Holocene sediments are ubiquitous around the British Isles, and so designating a type site or locality serves little purpose; nevertheless it is testimony to the significance of Red Moss that the site was proposed as a potential Holocene type locality for England (Hibbert *et al.,* 1971; Jones and Keen, 1993). The basal sediments at Red Moss are of Late Devensian Age and have yielded a coleopteran fauna that identifies the sequence of environmental and climatic changes across the Late Devensian–Holocene transition (Ashworth, 1972). The pollen stratigraphy and radiocarbon chronology uncovered from Red Moss is critical for understanding the early to mid-Holocene vegetation history of lowland Lancashire (Hibbert *et al.,* 1971). Research at Red Moss was one of the earliest and most comprehensive attempts to radiocarbon date the sequence of vegetation changes during the early Holocene. Red Moss was one of a group of sites used to test the correlation of pollen assemblage zones across north-west Europe (Hibbert and Switsur, 1976).

Description

Red Moss is located on the outskirts of Horwich in south-east Lancashire. Construction of the M61 motorway has damaged the western flank and deepest tracts of the Red Moss, a railway complex impinges on the eastern flanks of the mire and there is a history of peat cutting at the site. The present-day flora does not resemble that of an intact raised mire, but is dominated by grasses and occasional clumps of *Callum* and *Erica.* Sediment accumulation initiated in a hollow on the watershed of the Croal and Douglas rivers. Hibbert *et al.* (1971) and Ashworth (1972) described and sampled the stratigraphy in the north-western and deepest tract of Red Moss and 18 radiocarbon dates were obtained, providing one of the best-dated sediment successions in the British Isles (Hibbert *et al.* 1971; Ashworth, 1972). Coleopteran fauna within the Late-glacial sediments also have attracted the attention of researchers, identifying the decline of temperatures after the thermal maximum of the Windermere Interstadial into the Loch Lomond Stadial and the subsequent climatic amelioration into the Holocene (Ashworth, 1972; Coope, 1977). Hibbert *et al.* (1971) investigated the pollen stratigraphy, identifying the sequence of vegetation changes after the Loch Lomond Stadial and extending into the Bronze Age, but the upper 1.5 m of sediment were not analysed.

Interpretation

Ashworth (1972) assessed the palaeoecological record of the basal sediments (385–310 cm) at Red Moss, identifying a sequence of climatic and environmental changes during the Late-glacial. He identified over 150 insect species in the Red Moss sediments, of which 26 have sufficiently limited ranges for climatic interpretation. The lowest organic sediments yielded a ^{14}C date of 12 160 ± 140 years BP, which is within the thermal maximum of the Late Windermere Interstadial (Coope, 1977; Lowe *et al.,* 1994a, b). The fossil coleopteran record extends from the basal sediments up to a further ^{14}C date of 9586 ± 200 years BP (Hibbert *et al.,* 1971; Ashworth, 1972). The coleopteran stratigraphy is divided into three assemblages, derived using the abundance of the 26 stenotopic species (Figure 8.21). The basal assemblage (385–360 cm) contains a fauna indicative of open exposed wet mossy habitats, with some species identifying a limited cover of *Salix* and *Betula* scrub or woodland, and is ^{14}C dated to between 12 160 ± 140 years BP and 10 850 ± 120 years BP Eurythermal species and a few species that currently have a clearly northern Scandinavian and montane distribution dominate, and so it is difficult to estimate the climatic regime. Nevertheless, Ashworth (1972) suggested that the period experienced average July temperatures of around 14°C and average January temperatures of around 0°C.

Assemblage 2 (360–335 cm) contains a substantially reduced fauna dominated by northern species that indicate a rapid deterioration of the climate, which is dated to between 10 850 ± 120 years BP and 9798 ± 200 BP Species inhabited pools of water and areas of patchy vegetation dominated by bryophytes and sedges. Ashworth (1972) suggested average July temperatures fell by 1–3°C and average January temperatures fell by 12°C. Assemblage 3 (335–310 cm) contains a more extensive fauna containing species that either live in wood or require trees and shrubs for shade, and indicative of a marshy woodland. Between 9798 ± 200 years BP and 9586 ± 200 years BP the Red Moss region experienced average July temperatures of around 16°C and average January temperatures of around 5°C (Ashworth, 1972). Across the boundary between assemblage 2 and 3 sediment accumulation rates at Red Moss indicate that average July temperatures rose from 10°C to 16°C within 350–400 years (Hibbert *et al.,* 1971; Ashworth, 1972).

Hibbert *et al.* (1971) produced a pollen diagram covering the stratigraphy between 330 and 0 cm, which is subdivided into six assemblages zones (Figure 8.22). Basal pollen zones A and B overlap with coleopteran assemblage 3, identifying a landscape dominated by *Betula, Pinus, Salix* and *Juniperus* woodland or initially scrub woodland. The Late-glacial pollen and coleopteran sequence at Red Moss conforms, with and contributes to, the established sequence of climatic and environmental changes during this period (Lowe *et al.,* 1994a, b). The Red Moss sequence starts within the thermal maximum of the Late-glacial interstadial, and the Late-glacial stadial is clearly identified by the coleopteran data. The Late-glacial stadial dates conform to the isotope sequence derived from Greenland ice cores (Grootes *et al.,* 1993). Both coleopteran assemblage zone 3 and pollen zone A reflect the amelioration of climate after the Late-glacial stadial and the beginning of the Holocene *c.* 10 000 years BP.

The pollen stratigraphy identifies the sequence of woodland colonization in lowland Lancashire, with 16 radiocarbon dates securing the vegetation sequence for the early to mid-Holocene. *Betula* dominates zone b, with *Pinus, Populus, Salix,Juniperus* and herbaceous pollen declining from the levels in zone a. The expansion of *Betula* is dated to 9798 ± 200 years BP Zone c begins where *Corylus avellana* and *Pinus* replace *Betula* and is dated to 8790 ± 170 years BP and 8880 ± 170 years BP *Ulmus* and *Quercus* appear for the first time within zone C. *Pinus* frequencies increase further and *Betula* pollen declines at the beginning of zone d, which is dated to 8196 ± 150 years BP *Corylus avellana* pollen is also very abundant in zone d, and *Ulmus* is more abundant than *Quercus.* The beginning of zone e is characterized by the rapid rise of *Alnus* and increased frequencies of *Quercus,* which is dated to 7107 ± 120 years BP *Tilia* pollen frequencies also increase after 6880 ± 100 years BR Paralleling the expansion of thermophilous trees there are equivalent declines in the shade-intolerant *Betula* and herbaceous pollen taxa, reflecting closure of the forest canopy. *Calluna vulgaris* pollen becomes more abundant around 7450 ± 150 years BP, which supports the stratigraphical evidence for expansion of local raised mire communities dominated by *Calluna vulgaris* and *Eriophorum vaginatum.*

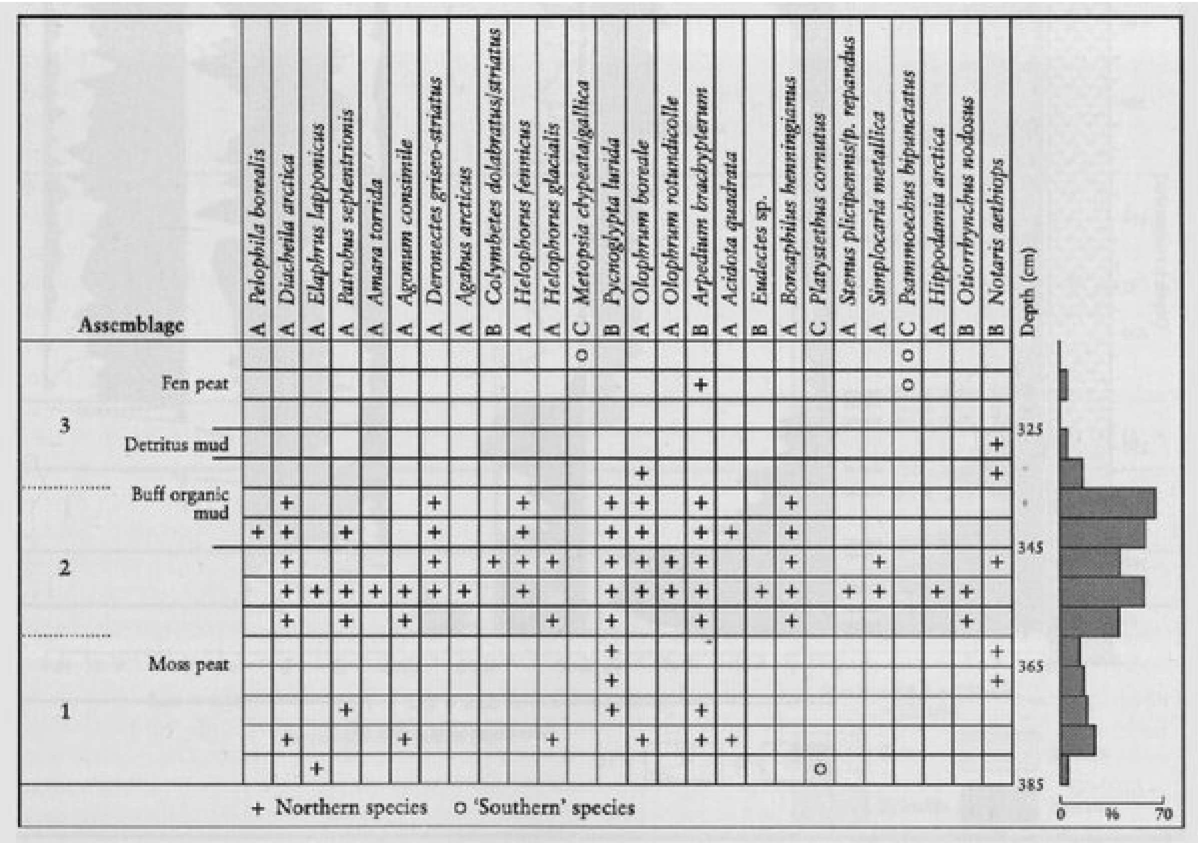
Quercus, Ulmus and *Alnus* dominate the pollen stratigraphy until the base of zone f, which is marked by a sharp decline in *Ulmus* pollen frequencies. Four closely spaced ^{14}C dates provide a consistent picture of the timing of the Elm Decline, with a specific date of 5010 ± 80 years BP Thinning of the forest canopy allows the limited expansion of *Plantago lanceolata, Artemisia* and *Filipendula,* but other tree species soon close this opportunity. *Fraxinus* is the last of the deciduous trees to appear in the Red Moss pollen stratigraphy, increasing *c.* 5399 ± 100 years BP *Quercus, Alnus* and *Corylus avellana* are the dominant arboreal trees and shrubs throughout most of zone F, although *Betula, Ulmus, Tilia* and *Fraxinus* also are significant components of the mid-Holocene mixed deciduous forest of lowland Lancashire. In the upper 30–40 cm of the pollen diagram there is a minor reduction in arboreal pollen frequencies and equivalent increases of Poaceae, *Plantago lanceolata, Artemisia, Urtica* and Ranunculaceae. These changes probably reflect anthropogenic activity and limited woodland clearances, but unfortunately the upper metre of the pollen diagram is not ^{14}C dated. A further 1.5 m of sediment above the pollen profile analysed by Hibbert *et al.* (1971) was not analysed for pollen content, and so Red Moss has contributed no information about vegetation changes during the middle to late Holocene.

Correlation of changes in the vegetation history recorded at Red Moss with sequences across north-west Europe was one of the research objectives of Hibbert *et al.* (1971), with the intention that the sequence could provide a secure series of chronozones for the country. Considerable regional variation has existed in the British vegetation throughout the Holocene to the extent that no one site was ever likely to provide a type palaeoecology, but this does not denude the value of research at Red Moss. Correlation of the well-dated early Holocene sequence from Red Moss with a network of sites demonstrates that the expansion of certain tree species is clearly diachronous across Great Britain and north-west Europe. Red Moss yields an important pollen record and has contributed to various syntheses of the British vegetation history (Godwin, 1975; Pennington, 1974) and palaeovegetation maps generated for the Holocene Epoch (Huntley and Birks, 1983).

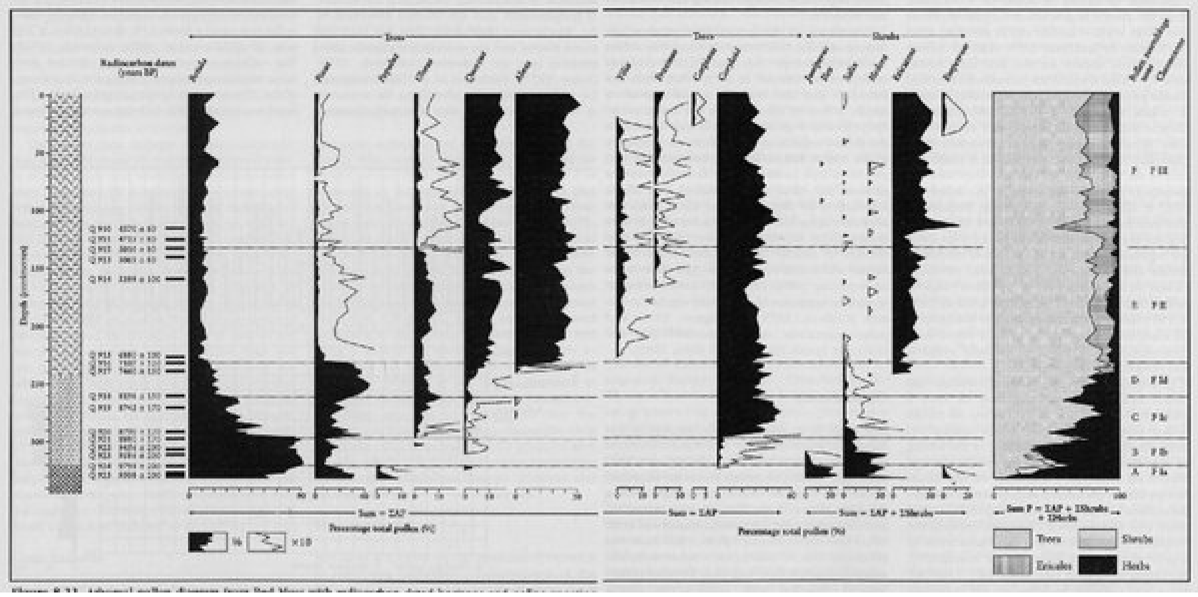
Conclusions

Red Moss is an important site because it has yielded a significant and well-dated record of vegetation change between c. 14 000 and 5000 years ago. Fossil Coleoptera reveal the sequence of climatic and environmental changes during the later stages of the Late-glacial interstadial, and throughout the Late-glacial stadial and transition into the Holocene Epoch. Red Moss has produced one of Lancashire's most complete and best-dated pollen diagrams. Detailed pollen records coupled with radiocarbon dating demonstrate the sequence of woodland colonization during early Holocene times. Today Red Moss is in a poor condition and little resembles a lowland raised mire.

References



(Figure 8.21) Distribution of coleopteran species at Red Moss and percentage frequency of northern species (after Ashworth et al., 1972).



(Figure 8.22) Arboreal pollen diagram from Red Moss with radiocarbon dated horizons and pollen zonation scheme (after Hibbert et al., 1971). See (Figure 8.1) for key to the stratigraphical log.