Traeth Mawr

Highlights

This site shows a unique pollen record which stretches through the Devensian late-glacial with evidence for marked climatic fluctuations during the Allerrod. Its long record is important for the calibration of pollen records in the floors of the Brecon cirques.

Introduction

Traeth Mawr is a pollen site important for reconstructing environmental history since the Late Devensian glaciation in South Wales. The bog at Traeth Mawr occupies a critical location for establishing the age of moraines and protalus ramparts in the Brecon Beacons to the south. The pollen record shows that the deposits are of Devensian late-glacial and early Holocene age. The site has been studied by Walker (1980, 1982a, 1984), following a preliminary pollen study at the site by Moore (*in* Lewis 1970b).

Description

Traeth Mawr [SN 967 257] occupies an area of about 1krn^2 in a large depression on the plateau of Mynydd Illtydd. Few areas of open-water still remain and the bog is drained by two streams flowing north-west into Cwm Camlais and finally into the Usk. Walker (1982a) recorded 5m of infill comprising:

8 Poorly humified sedge peat

7 Humified peat

6 Fine peat grading down into brown amorphous organic mud

5 Organic mud with silt and clay lenses

4 Clay mud

3 Red homogenous silt and clay

2 Very fine brown organic mud with occasional silt and clay bands

1 Red silt and clay with some rhythmic bedding

This sequence is shown in simplified form in (Figure 19), with the identified pollen assemblage zones and three radiocarbon dates.

Interpretation

Traeth Mawr was first investigated by J J Moore (*in* Lewis 1970b). Moore produced a pollen zonation which he interpreted as showing detailed evidence for vegetation changes in Pollen Zone I. He considered the data showed the presence of a British analogue of the Bølling Interstadial and claimed that at Traeth Mawr this event could further be divided into three minor oscillations. The interpretation and zonation of this diagram, however, has since been questioned (Ellis-Gruffydd 1972, 1977), and in view of the site's critical position adjacent to the cirque moraines of the Brecon Beacons, and because it is the only known Devensian late-glacial site from this part of South Wales, a re-investigation was carried out by Walker (1980, 1982a).

Walker's (1982a) pollen and radiocarbon analyses indicated the following sequence of palaeoecological and inferred geomorphological events. The lower red silts and clays (bed 1) are virtually barren of pollen and, in counting the rhythmites, Walker estimated that this inorganic sedimentation could have taken as little as 100 years in a proglacial environment, during wastage of the Late Devensian ice-sheet. Towards the end of this phase, patches of grass, sedges, pioneer herbs and dwarf shrubs probably existed around the site. The overall palaeoecological interpretation of this period, however, is a bleak hostile landscape with an open, generally pioneer-type vegetation, and perhaps disturbed soils.

The cessation of mineral inwash to the basin and the start of organic sedimentation (bed 2) was dated to 11,660 ± 140 BP (SRR-1562), a date which Walker considered too young by approximately 1000 years, certainly in comparison with other sites in upland Britain (for instance, Clogwynygarreg —see Ince 1981). After the change, the pollen indicates that the open-habitat conditions gave way to a landscape with shrubs and copses, dominated at first by juniper and willow, and later by birch. These stands were interspersed with tall herb communities and open-grassland. Thermophilous taxa such as *Filipendula,* also indicate an improvement in the thermal conditions. Improved soil stability is reflected in a reduced number of degraded pollen grains in the samples.

The remaining pollen assemblages representing this phase of largely organic sedimentation, however, pose problems of interpretation. Variations in the pollen percentages and concentration, and corresponding fluctuations in lithology are also apparent, with clay bands present in the organic sequence (bed 2). Walker considered it unlikely that local variations in the flowering of plants, or the influence of local site factors could account for the observed fluctuations. Rather, he suggested that they were probably indicative of major landscape changes around the basin caused by climatic conditions during the Allerød (Devensian late-glacial interstadial). The 'interstadial' record was therefore seen as a progression of three phases of vegetation development interspersed with two periods of climatic deterioration, in which woody taxa declined and more open conditions prevailed.

The change from gyttja (bed 2) to silt and clay (bed 3) is isolated to 10,620 ± 100 BP (SRR-1561). The latter phase of inorganic sedimentation represents the Younger Dryas when glaciers and snow patches occupied many cirques in upland Wales, including a number in the Brecon Beacons (Walker 1982b). During this period, the landscape around Traeth Mawr may well have resembled tundra; with few woody plants, and an open-vegetation with alpine communities and taxa characteristic of disturbed soils. The evidence of soil instability is consistent with the sediments of this phase having been deposited by solifluction and inwashing from a landscape with a reduced plant cover (Walker 1982a).

A reversion to organic sedimentation (bed 4 upwards), dated at 9,970 ± 115 BP (SRR-1560), denotes the onset of milder conditions in the Holocene. During this period, the tundra communities of the Younger Dryas were gradually displaced by more stable grassland with dwarf shrubs and heathland communities, although some soil instability may have persisted as witnessed by occasional silt and clay bands in the basin deposits. However, as thermal conditions improved, juniper began to colonise rapidly, and copses of willow and birch became established, culminating in the formation of a predominantly birch woodland. This latter development appears to have shaded out juniper, which finally disappeared with the arrival of *Corylus.* The later pollen zones reflect the establishment of a birch-hazel woodland and the arrival of the mixed forest genera with *Quercus and Populus.* By this time, open-water conditions in the basin may virtually have ended (Walker 1982a).

Traeth Mawr contains a record of Devensian late-glacial and early Holocene environmental changes in South Wales. Most Devensian late-glacial pollen profiles from Wales show an early phase of open habitats with pioneer vegetation, succeeded by more stable conditions accompanied by a change from inorganic to organic sedimentation. Renewed inwash or solifluction of sediments, together with a pollen record indicating more severe tundra-like conditions, then characterise the change from interstadial conditions to the Younger Dryas. Both at Nant Ffrancon (Burrows 1974, 1975) and Cors Geuallt (Crabtree 1969, 1970, 1972) there is evidence for a more complex sequence, and at these sites it has been speculated that the equivalent of the Continental Bølling Interstadial may be present. However, Walker (1982a) observed that at Nant Ffrancon there were no pollen data to support Burrows' macrofossil evidence, and at Cors Geuallt there was also controversy about the status of the Bølling horizon (Moore 1975b). Traeth Mawr is therefore the only pollen profile so far described in Wales where there is unequivocal evidence for fluctuating climatic conditions within the Devensian late-glacial interstadial.

It is relevant to note that the radiocarbon dates for the Younger Dryas at Traeth Mawr are somewhat younger than at comparable sites in Scotland and North Wales. Walker speculated that this might have been caused by southward movement of the ocean surface water Polar Front, but further radiometric data are required to confirm this. Indeed, this situation appears paradoxical since it is logical that more southerly areas of Britain would have been free from Younger Dryas ice at an earlier stage.

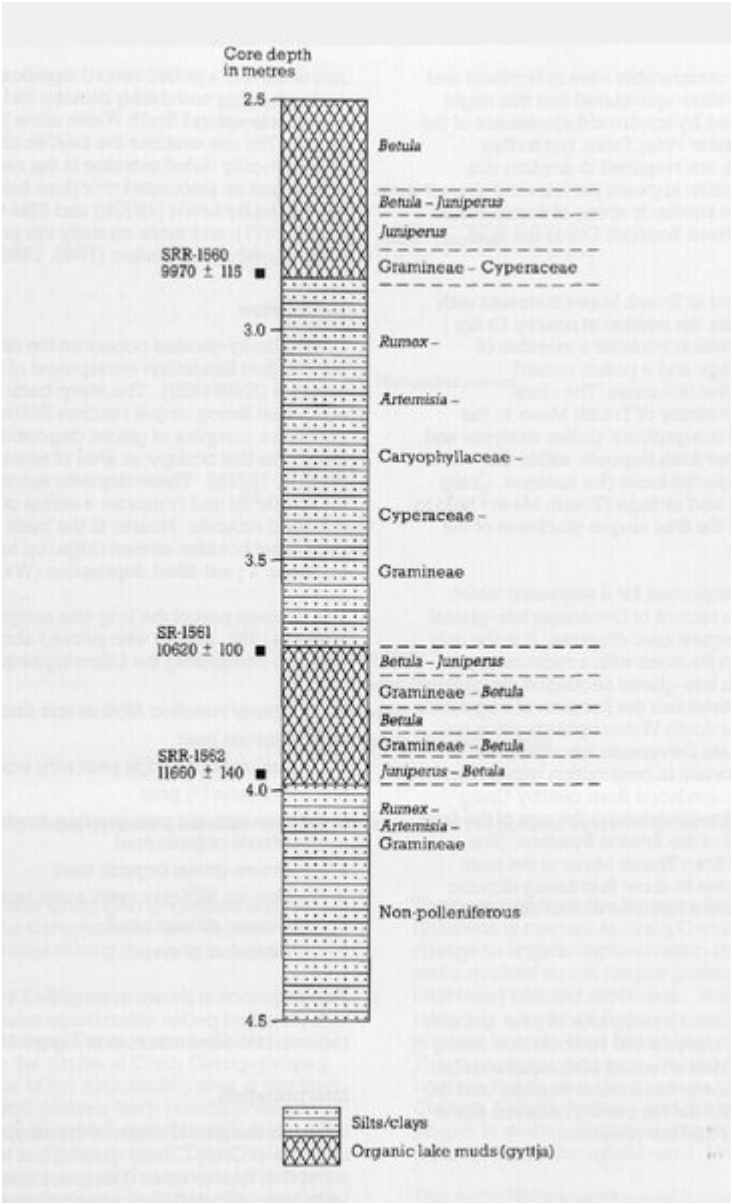
The pollen record at Traeth Mawr contrasts with that obtained from the section at nearby Craig Cerrig-gleisiad which contains a moraine of Younger Dryas age and a pollen record commencing in the Holocene. The close geographical proximity of Traeth Mawr to the Brecon Beacons is significant: pollen analyses and radiocarbon dates from deposits within the Younger Dryas glacial limits (for instance, Craig Cerrig-gleisiad) and outside (Traeth Mawr) help to place the age of the final cirque glaciation of the Brecon Beacons.

Traeth Mawr is important for a sequence which contains a pollen record of Devensian late-glacial and Holocene vegetational changes. It is the only site in the Brecon Beacons with a radiocarbon dated Devensian late-glacial sequence. Its pollen record helps to establish the patterns of vegetation succession in the South Wales uplands since the wastage of the Late Devensian ice-sheet, and is particularly important in conjunction with pollen and radiocarbon evidence from nearby Craig Cerrig-gleisiad for establishing the age of the final cirque glaciation of the Brecon Beacons. The pollen evidence from Traeth Mawr is the most reliable from Wales to show fluctuating climatic conditions within the Late Devensian late-glacial interstadial.

Conclusions

Traeth Mawr contains a sequence of peat and clay deposits. Pollen analysis and radiocarbon dating of these have provided a record of climatic change which is applicable to the Brecon Beacons and the rest of south Wales for the period between about 14,000 years ago and the present.

References



(Figure 19) Traeth Mawr: a summary of pollen, lithological and radiocarbon evidence (from Walker 1984)