Valley Bog

[NY 763 331]

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Introduction

Valley Bog is situated on the Moor House National Nature Reserve and the Moor House and Cross Fell SSSI in the northern Pennines, in Cumbria. The bog is the upper and larger of two bogs that are situated in a channel at 549 m OD.

To the north, east and west of Valley Bog there are glacial deposits, which form part of a series of moraines (Chambers, 1978). The southern edge of the bog is bordered by House Hill, a shale and sandstone, bedrock ridge. Much of the surrounding region is mantled by blanket peat up to 3.5 m deep. Johnson and Dunham (1963) have shown that in the early Flandrian a small lake formed in this hollow and it was not until the Boreal period that peat began to form.

It is an important site for reconstructing the vegetation history and environmental change in the northern Pennine uplands and the ^{14}C dated profile from the bog provides important regional comparisons with the adjacent Cumbrian (Walker, 1966b) and Durham lowlands (Chambers, 1974, 1978; Bartley *et al.,* 1976) and from the Upper Teesdale region (Turner *et al.,* 1973; Squires, 1978).

Description

Johnson and Dunham (1963) published a pollen diagram from this site, which although not ^{14}C dated, showed important characteristics. These included a late pine pollen maximum, a slow rise in alder values and a double elm decline. Chambers (1974, 1978) constructed a new pollen stratigraphy, which was given chronostratigraphical control by eight ^{14}C dates (Figure 8.6). Four cores were collected from the bog centre, one was used to provide a pollen diagram and the other three cores were used to provide added material for the dating. The stratigraphy is illustrated in (Table 8.3) and four pollen zones, VB I–VB IV, were described.

Zone VB I is characterized by relatively high birch and pine pollen values. Elm, oak and hazel pollen is present in abundance but alder in only small amounts. Several herb pollen taxa are represented but it is cyperaceous pollen that contributes most to the high herb pollen values.

(Table 8.3) Stratigraphy at Valley Bog (after Chambers, 1978)

Depth (cm)	Stratigraphy
0–50	Not sampled
50–75	Sedge peat of low humification (H4) with some *Calluna* remains
75–100	Sedge peat of low humification-(H3) with some *Calluna*
100–150	Sedge peat of low humification (H4) with abundant pieces of *Calluna*
150–200	Slightly muddy sedge peat of medium humification (H5–6) with *Calluna*
200–250	Slightly muddy sedge peat of low humification (H3–4) with *Betula* wood
250–290	Slightly muddy sedge peat of low humification (H5–6) with less *Betula*
290–525	Slightly muddy sedge peat of low humification (HS-6) with abundant pieces of *Betula* wood

525–580	Bryophyte peat of low humification (H3) composed mainly of *Paludella squarrosa* together with some *Eriophorum* sedge remains
580–600	Sedge peat of low humification (H3–4) with some *Eriophorum*

Zone VBII is marked by a fall of birch pollen and an increase in oak. Alder and pine values are higher, with those of pine recording a peak in the middle of the zone. Two levels, 512.5–517.5 cm, with high pine pollen percentages, and 502.5–507.5 cm, with low percentages, are dated at 6779 ± 75 years BP and 6714 ± 75 years BP

Zone VB III is marked by a rise of alder pollen as pine declines. Between 415 and 430 cm, elm percentages fall in an unsteady way as hazel frequencies rise. Several of the herb pollen curves exhibit slight peaks and it is also at this point that several of the herbaceous curves become for the first time more or less continuous. Bracken values show a distinct increase. Levels 421–426 cm and 426–431 cm have been dated at 5950 ± 60 years BP and 5945 ± 50 years BP respectively.

Zone VB IV is defined by the elm decline. Bracken spore values rise and there is an overall increase in herb pollen percentages. Two dates of 4596 ± 60 years BP and 4794 ± 55 years BP for levels 302.5–307.5 cm and 312.5–317.7 cm span the elm decline. Above the elm decline, grass pollen values rise to a maximum of 180% of the tree pollen sum in the middle of subzone VB–IVa. At this level several of the herb pollen frequencies increase, for example plantain, cereals and *Potentilla.* Associated with this there is a marked rise in birch pollen values and just above this point the heather curve shows an even more pronounced rise.

Interpretation

By the start of pollen assemblage zone VB I birch, pine, elm, oak and hazel all grew near Valley Bog. To back this up birch wood has been found in the basal layers of older peats in other parts of the reserve (Johnson and Dunham, 1963). These woodlands probably showed a mosaic pattern of the different trees, with pine and hazel on the better drained soils, birch dominating the wetter hollows and elm and oak growing on the more steeply sloping terrain. The high herbaceous pollen values indicate that these woodlands did not form a closed tree canopy. There would have been open grassland with some blanket peat in places where woodland did not occur.

The base of the Valley Bog pollen diagram must be around 7500 to 8000 years BP and during the next 700–1200 years the composition of the woods changed as birch was replaced by oak and some pine. Pine reached its highest value at level 512.5–517.5 cm, which is dated to 6779 ± 75 years BP This level has alder values around 10% of the tree pollen sum and alder probably had replaced some of the existing birch that had flourished in the wetter areas. Its migration followed the floor of the sheltered Tees valley (Turner *et al.,* 1973). However, alder was not present in any great abundance, which contrasts with other sites in northern England such as Neasham Fen, where alder expanded soon after 6972 ± 90 years BP and Red Moss (Hibbert *et al.,* 1971). Hence this date at Valley Bog adds to the evidence that in certain upland areas alder expansion was considerably delayed (Smith and Pitcher, 1973).

Between 415 and 430 cm the pollen curves show marked fluctuations, with elm values declining in an unsteady manner as those of hazel rise. Several of the herb frequencies increase and there is an overall rise in herb species numbers. The two ^{14}C dates of 5950 ± 60 years BP and 5945 ± 50 years BP place this event in the Atlantic period, and it is suggested that this vegetational shift was brought about by the activity of Mesolithic hunters (Chambers, 1978). Mesolithic flint and flake tools have been found on the reserve by Johnson and Dunham (1963), which supports this idea. A few of the artefacts were found in association with the horn sheaths of cattle and the relatively open vegetation cover would have provided suitable grazing for cattle and opportunities for hunting. In contrast, at this time much of lowland northern England was covered in dense forest, which was not ideal for either activity.

At Valley Bog the elm decline is dated to 4794 ± 55 years BP (Chambers, 1978), which is much later than in lowland Durham (Bartley *et al.,* 1976), so the decline is not likely to have been influenced by a deterioration of the climate, such as increased cold or wetness, which would have been felt first in the uplands. It seems much easier to correlate such a

decline with the spread of a new human population from the lowlands to the uplands as the decline is not a synchronous horizon on the upland and lowland pollen diagrams.

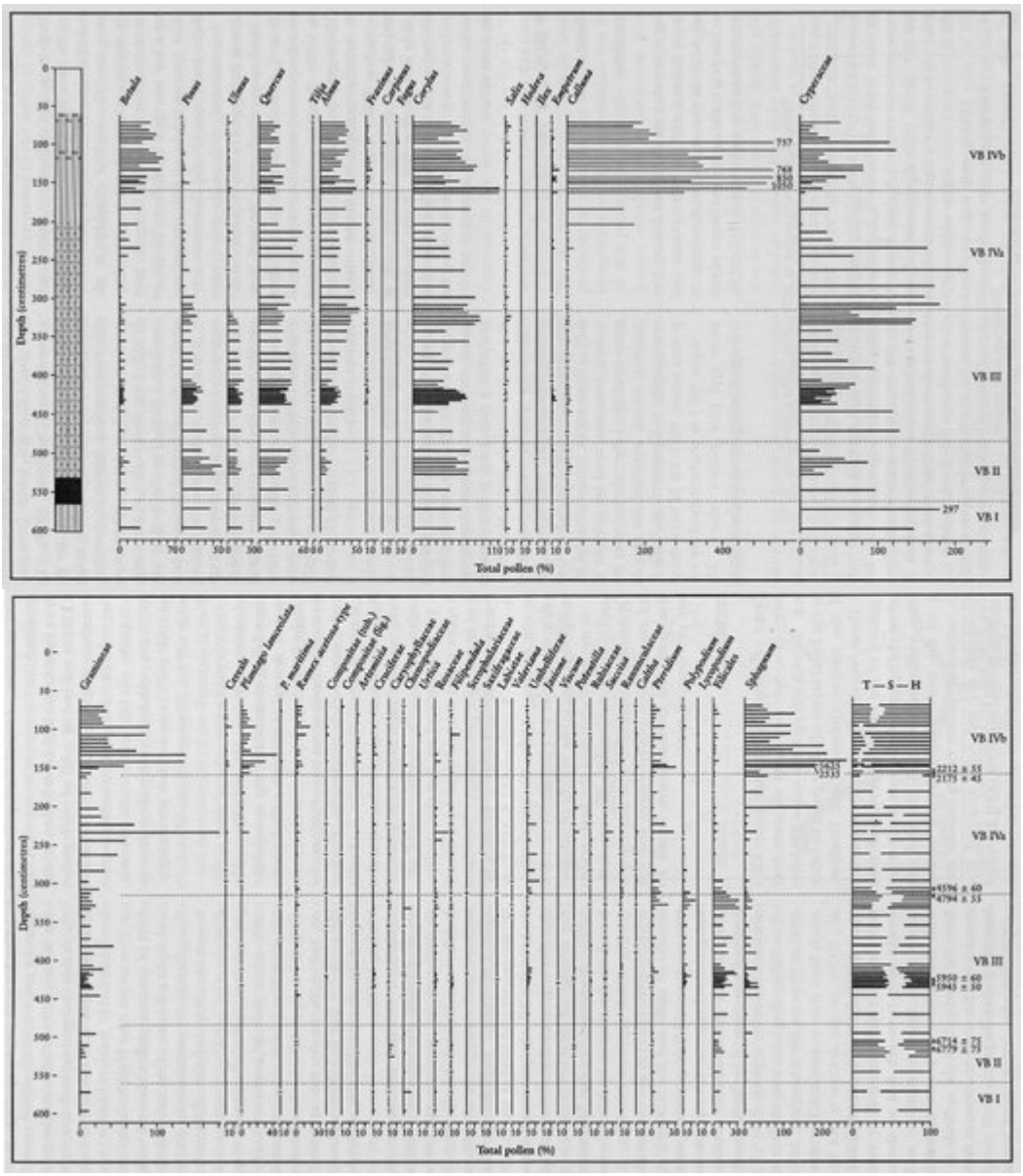
After the elm decline there was a period of woodland clearance, which is indicated by high Graminae and plantain values. The opening of the tree canopy began around 3300 years ago and it is suggested that Bronze Age people used the clearings for animal grazing and that the few cereal grains were blown in from lowland areas (Chambers, 1978). Similar clearances were found by Turner *et al.* (1973) in the Cow Green area of Upper Teesdale. The intensity of forest clearance declined with time and the indications from Valley Bog are that once the grazing pressure was removed birch quickly took over.

Towards the pollen diagram top the values for heather rise sharply, but because the peat changes from one without heather to one with it is difficult to determine whether the heather pollen curve reflects a local change on the growing bog surface, or the spread of blanket peat over the areas around Valley Bog. If the pollen curve reflects the spread of blanket peat it would seem that humans and their animals probably accelerated the process of soil deterioration (Moore, 1973), especially as blanket peat certainly grew on the reserve at the time (Johnson and Dunham, 1963) and humans may well have been responsible for the spread of such peat on to the more waterlogged areas. The major deforestation phase begins in subzone VB IVb and was more pronounced and lasted for a longer time than in the Bronze Age clearances. Two levels dated at 2212 ± 55 years BP and 2175 ± 45 years BP indicate a late Iron Age date for this phase.

Conclusions

This site is important in that it documents the vegetational changes that occurred in the upland northern Pennine landscape in the Flandrian and provides a detailed chronostratigraphical framework for such change. It serves as a useful comparison for vegetational changes in the Cumbrian and Durham lowlands and the adjacent Upper Teesdale region.

References



(Figure 8.6) Pollen Diagram from Valley Bog (after Chambers, 1978). See (Figure 8.1) for key to the stratigraphical log. (Figure continued on opposite page.) Pollen Diagram from Valley Bog (after Chambers, 1978).

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