Neasham Fen

[NZ 331 115]

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Introduction

Neasham Fen is a small, almost circular, infilled kettlehole, 5.2 km south-east of Darlington. East of the fen a narrow ridge of higher land above 45.7 m OD lies between it and the River Tees meanders. The site provides an important record of Flandrian vegetation history and environmental change, supported by ^{14}C dating. It is a valuable reference location for the north-east England lowlands and allows wider comparisons of vegetation development with the pollen sites from Upper Teesdale and the northern Pennines.

Description

A core for pollen analysis was collected near the centre of the fen by Bartley *et al.* (1976) and the stratigraphy is illustrated in (Figure 8.14). The pollen diagram is shown in (Figure 8.15) and was divided into five pollen zones by Bartley *et al.* (1976), where values are expressed as percentages of the total tree pollen.

I Characterized by high birch pollen together with some willow, grasses and Cyperaceae. Pine and hazel pollen percentages are low.

II Hazel frequencies rise sharply to reach values of 1020% of the tree pollen sum. Level 590–595 cm, the first with high hazel values, is dated to 9082 ± 90 years BP Elm pollen values also are high and level 580–585 cm, the first with elm, is dated to 8829 ± 120 years BP Birch pollen falls as values for oak rise through this zone. The top of the zone is dated to 8202 ± 95 years BP

III Oak values are higher, whereas those of hazel decline regularly. Elm is less abundant than before and alder pollen is present in small amounts for the first time.

IV Alder values increase as birch frequencies fall, ash and lime are present, although not in great abundance. The lowest level of this zone (410–415 cm) has been dated to 6962 ± 90 years BP.

V This zone begins with the elm decline dated at 5468 ± 80 years BP (335–340 cm) and has been divided on the basis of the herbaceous pollen curves into subzones NF Va–f:

V(a) Grass percentages are still low but there is occasional plantain, mugwort, Umbelliferae and Rosaceae pollen.

V(b) Overall an increase in the number of herb pollen taxa and individual herb frequencies. In the middle of this subzone level 245–250 cm, with plantain, *Rumex acetosella,* cereal, Cruciferae, mugwort, Chenopodiaceae and Umbelliferae pollen, is dated at 3242 ± 70 years BP. Lime pollen disappears soon after the start of the zone as birch values rise.

V(c) Characterized by a decrease in the number of herbaceous pollen taxa recorded and a decline in the frequency of each.

V(d) Herb pollen values rise again and four levels have been dated (Bartley *et al.,* 1976), the youngest at 140–145 cm at 2488 ± 70 years BP.

V(e) There is an overall decrease of herb pollen percentages.

V(f) All of the herb frequencies increase dramatically, with ribwort plantain, cereal and Rosaceae reaching relatively high values. Level 55–60 cm is dated at 1213 ± 60 years BP.

Interpretation

In the earliest part of the Flandrian, in the Pre-Boreal and Boreal periods between 10 300 and *c.* 7000 years BP), there is a complete dominance of birch in the pollen record, reflecting birch woodland in the lowlands. By about 9000 years BP birch values drop and elm rises to almost equal amounts, but the zone is dominated by hazel pollen. By 8200 years BP hazel values fell considerably and the forest seems to have been a mixture of oak and elm with birch and hazel. The start of the Atlantic period (*c.* 7000 to *c.* 5000 years BP) is marked by the rise of alder and the first appearance of lime. Ash appears towards the end of the period. There appears to be no evidence of Mesolithic people as there was in the Teesdale uplands, which probably reflects the denser woodland and swampy conditions in the Tees valley. The elm decline is dated to 5468 ± 80 years BP and in lowland Durham it is similar or slightly younger (Bartley *et al.*,1976), whereas at Valley Bog on Moor House (see GCR site report, this chapter) it is dated to 4794 ± 55 years BP (Chambers, 1974). Hence the latter site is not likely to have been influenced by a deterioration in climate such as increased cold or wetness, which would have been felt first in the uplands. It seems much more likely that the elm decline in lowland Durham was caused by a spread of new human culture from the lowlands to the uplands.

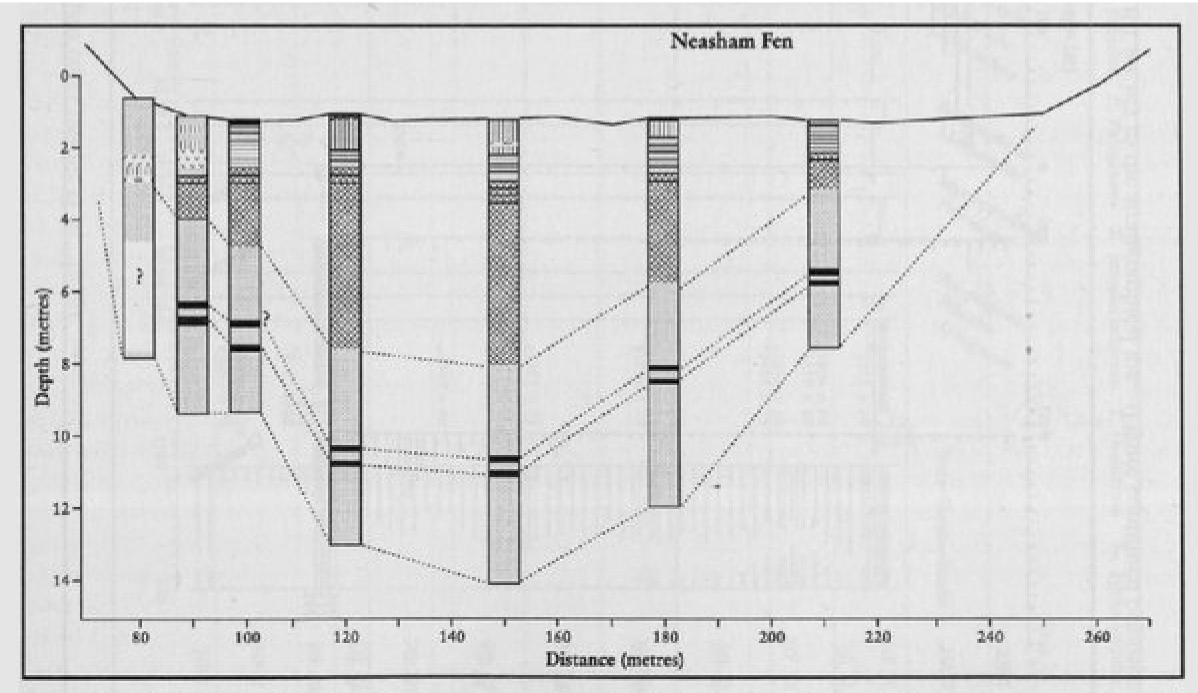
After the elm decline there is evidence for forest clearance and agriculture using *Plantago lanceolata* and *Rumex acetosella* for pasture and *Plantago major–media* and cereal for arable cultivation. By 3500 years BP lime had disappeared completely, oak values had declined slightly and birch values had risen. Cereal first appeared at 3242 years BP The pollen diagram suggested that the clearances were only of moderate intensity, whereas other lowland Durham diagrams, such as Hutton Henry and Bishop Middleham, had much greater clearances. At around 3360 years BP, for example, tree pollen values were reduced to about 10% at Bishop Middleham, whereas at Neasham it was about 50%. The former site is on the Magnesian Limestone and it seems likely that it was completely cleared of trees and used for grassland and arable in the Middle Bronze age. However, after about 3300 years BP at Neasham Fen, *P. lanceolata* pollen disappears and there is an increase in birch and ash. This indicates a recession of agriculture and colonization of the clearings by these light-demanding trees. However, the largest clearance phase occurred about 2800 years BP in subzone Nd towards the end of the Bronze age, when the pollen types indicate similar farming techniques and this was again followed by a recession phase when forests regenerated to some extent. The advance of the Romans into the area in the first century AD stimulated agriculture at Hutton Henry and Thorpe Bulmer but not so at Neasham Fen. At Neasham the subzone Vf shows dramatically reduced tree pollen values associated with increases in arable weed pollen. For the first time around AD 737 large areas of forest in the area around the fen had been destroyed for arable as well as pasture land.

Bartley *et al.* (1976) drew attention to the striking difference in the pattern of vegetation change between the sites in the lowlands of south and east Durham. The basic difference is between the poorly drained soils of the Tees lowlands, as illustrated by Neasham Fen, and the well-drained soils of the East Durham Plateau, as illustrated by Hutton Henry and Thorpe Bulmer. Bishop Middleham owes its special features to the close proximity of the Magnesian Limestone and well-drained sands and gravels. This shows that there has been soil control on the vegetation throughout the Flandrian, whereby the best-drained soils and possibly the most fertile were cleared very early (3400 years BP) but the badly drained soils, as at Neasham, did not reach a similar stage until about AD 700.

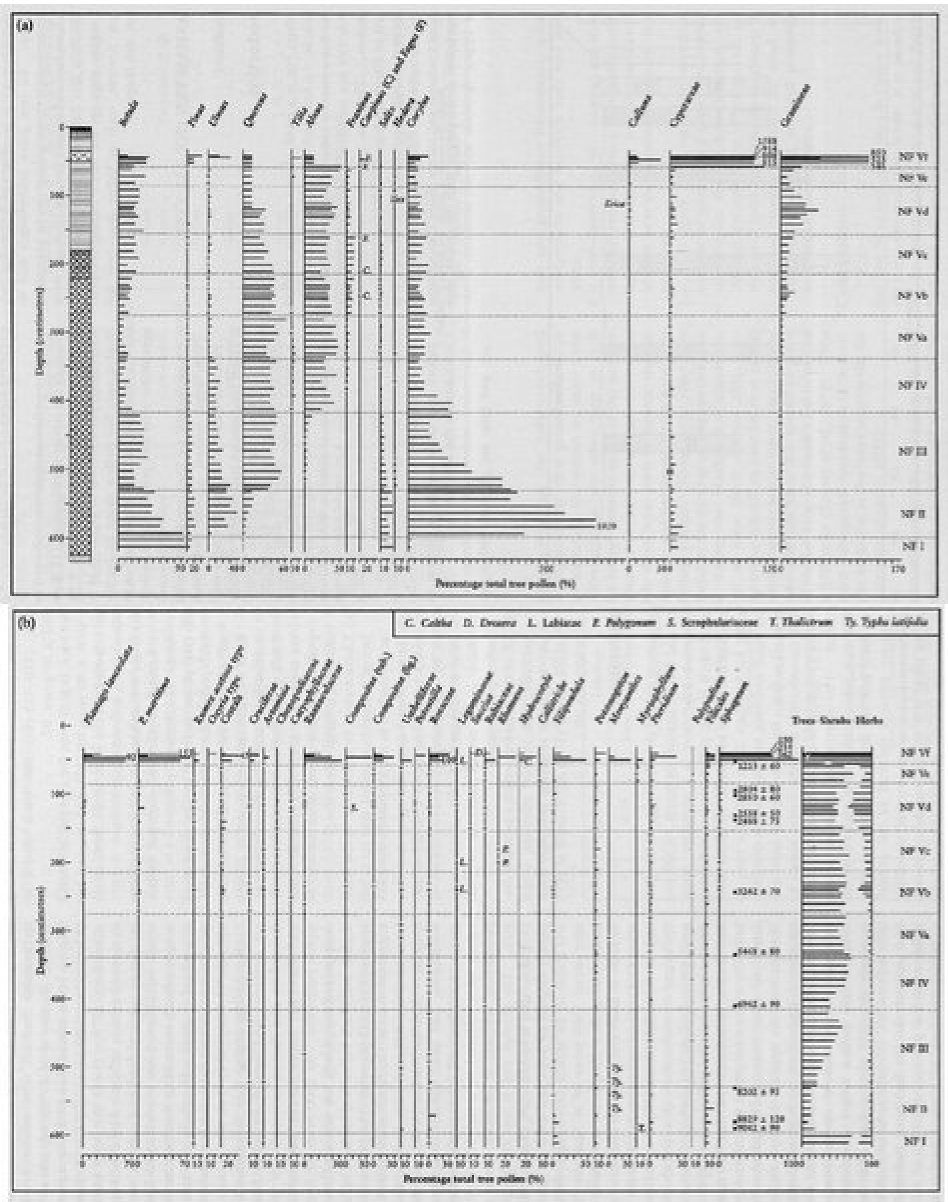
Conclusions

Evidence from this site in the middle Tees lowlands has enabled a detailed Flandrian vegetation record to be reconstructed, which has been ^{14}C dated. It has proved useful to compare the Neasham pollen record and the influence by humans on this record in both other areas of lowland Durham, as on the Magnesian Limestone Plateau and in the northern Pennines and Upper Teesdale.

References



(Figure 8.14) Stratigraphy at Neasham Fen (after Bartley et al., 1976). See (Figure 8.1) for key to the stratigraphical log.



(Figure 8.15) Pollen diagram from Neasham Fen (after Bartley et al., 1976). See (Figure 8.1) for key to the stratigraphical log.