Blacklane Brook

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Highlights

A reference site for Holocene vegetational history on Dartmoor, Blacklane Brook provides exceptionally detailed evidence for a *pre-Ulmus* (*elm*)decline in forest cover, attributed to the activities of Mesolithic people.

Introduction

Relatively few detailed studies have been carried out on the peats of South-West England, and Blacklane Brook preserves one of the most extensive Holocene vegetational records yet known from the region. First studied in detail by Simmons (1964a), the site has become a cornerstone for studies of Holocene vegetational and environmental history (e.g. Simmons, 1962, 1964b; Smith, 1970; Stephens, 1973; Caseldine and Maguire, 1981, 1986; Cullingford, 1982; Simmons *et al.,* 1987; Caseldine and Hatton, 1996; West *et al.,* 1996). Recent accounts of the site's pollen stratigraphy and plant macrofossils were given by Simmons *et al.* (1983) and Maguire and Caseldine (1985), respectively.

Description

The Blacklane Brook pollen site [SX 627 686] lies on southern Dartmoor at *c.* 457 m OD, and consists of a series of shallow peat sections exposed along this tributary of the southward-flowing River Erme (Figure 4.18). The site lies in an area covered mostly by blanket peat. Simmons (1964a) originally described a peat section some 1.2 m deep, but a more complete 2.2 m-deep section was later described by Simmons *et al.* (1983). The following stratigraphy is reconstructed here using data from two separate, but overlapping, monoliths (Simmons *et al.,* 1983).

7. Red-brown, fibrous *Eriophorum* peat, becoming increasingly humified towards base (0–110 cm)

6. Dark brown, well-humified amorphous peat (110–174 cm) with wood fragments at 142 cm and 169 cm

5. Wood layer of *Salix* and *Betula* (174–182 cm)

4. Dark brown amorphous peat with scattered wood fragments (182–202 cm)

3. Dark brown, pseudo-fibrous laminated peat with occasional lighter bands of more fibrous peat (202–217 cm)

2. Dark well-humified peat with increasing mineral matter with depth (217–222 cm)

1. Grey-brown silty clay with granite gravel (below 222 cm)

Three radiocarbon age determinations (HAR–4460 to HAR-4462) were obtained from materials within the section (Simmons *et al.,* 1983).

Interpretation

The original pollen spectrum (Simmons, 1964a) was thought to cover the period from the end of the Devensian late-glacial to the opening of the Sub-Boreal or Pollen Zone VIIb of Godwin's scheme. A phase of open-country conditions dominated by shrubs, birch and pine (corresponding to Godwin Pollen Zone IV) gave way to a phase characterized by the immigration of trees, particularly *Corylus,* which displaced the open-ground species (= Pollen Zone V and early and mid-Zone VI). Finally, the pollen record showed a rapid 'clearance' phase followed by the stabilization but not regeneration of many taxa (= late Zone VI and early Zone VIIb; Simmons, 1964a; Simmons *et al.,* 1983). The

main characteristics of the clearance phase were: 1. a slight reduction in the frequency of *Quercus* pollen; 2. the appearance of *Fraxinus* and *Prunus–Sorbus* type pollen; 3. a fall in *Corylus/Myrica* pollen; followed by 4. a peak in grass pollen and fern spores. This clearance was judged to have taken place late in Pollen Zone VI, well before the Neolithic, leading to the speculation, now more widely accepted, that woodland clearance had been initiated in this area by Mesolithic people.

From the evidence presented by Simmons (1964a), Simmons *et al.* (1983) and Maguire and Caseldine (1985), the following updated sequence of vegetational, climatic and environmental changes can be interpreted from the peat sections at Blacklane Brook. The pollen record here commences in the early Holocene at an estimated 10 200 BP: it has been divided into six local pollen assemblage zones (BLB1-BLB6) from which the mire's history and local forest development can be reconstructed (Simmons *et al.,* 1983). From the pollen contained in beds 1 and 2, the initial vegetation of the site and local area (pollen assemblage zone BLB1) appears to have been predominantly dry grassland or meadowland, with perhaps some localized willow and birch, *Empetrum* heath and juniper scrub. The succeeding pollen assemblage zone BLB2 (occurring in most of bed 3) indicates the continuation of fairly open vegetation, but with a persistence of local birch and willow stands and juniper scrub. The site itself consisted of a sedge and *Sphagnum* mire at this time. Local pollen zone BLB3 (upper bed 3; lower bed 4), dominated by birch and grasses, shows a distinct shift with the mire changing from sedge- to grass-dominated. At the same time, birch and oak woodlands also became established within the pollen catchment, perhaps at lower elevations, on drier sites or even on the hillsides around the mire. Simmons *et al.* interpreted this evidence as indicating a change to more acid conditions prior to the development of blanket peat.

Pollen zone BLB4 (upper bed 4; bed 5; lower bed 6) indicates vegetation succession to the deciduous forest stage (mid-Holocene). Although dominated by shrub pollen, this *Quercus–Corylus/Myrica* zone suggests that forest covered much of the local area, perhaps encroaching locally on the site. However, pollen suggestive of open communities persists throughout the zone, and it is possible that the immediate environs remained as a bog, with perhaps some willow carr (Simmons *et al.,* 1983). A radiocarbon date of 7660 ± 140 BP (HAR–4462) from the lowest part of bed 6 gives a minimum age for the layer of *Salix* and *Betula* wood beneath (bed 5).

Although not radically different to its predecessor in its tree pollen content, it is within the same context of deciduous forest cover in zone BLB5 (bed 6) that human modification to the vegetation can first be detected. The distinguishing feature of this zone is the onset at *c.* 7660 radiocarbon years of higher pollen and spore frequencies usually associated with the opening of the forest: *Pteridium* spores, and the pollen of Rosaceae and that of a number of herbaceous types are all found within the early part of this zone. These floral changes are also accompanied by increased amounts of charcoal within the sediment profile. A radiocarbon date of 6010 ± 90 BP (HAR– 4461) within zone BLB5 marks the rise of *Alnus.* The evidence from this pollen zone was interpreted by Simmons *et al.* as indicating the activities of Mesolithic people, and their use of fire to create grassy clearings (see below).

Local pollen assemblage zone BLB6 (upper bed 6; bed 7) (*Quercus–Alnus–Corylus* and *Myrica–Calluna*) reveals a decline in human pressure upon the local forest cover, although the maintenance of a weak herbaceous flora indicates some contemporary human activity. There is no direct evidence for agriculture and no prehistoric remains have yet been discovered from the site or its immediate environs (Simmons *et al.,* 1983). An important feature in this part of the Blacklane pollen record is the 'elm decline' dated to *c.* 4260 ± 90 BP (HAR–4460), and occurring right at the beginning of local pollen assemblage BLB6. Another is the development of a distinctive weed flora including *Plantago lanceolata,* interpreted as evidence for Neolithic activity (Simmons *et al., 1983*): *as* in the previous zones, there is no direct evidence for agricultural activity, for example, cereal growing. During this biozone, soil acidity rose and bog growth probably continued.

Relatively few sites have yet been studied in this region for their Holocene (and Devensian late-glacial) pollen biostratigraphy. Blacklane Brook not only provides a key record of Holocene vegetation changes on Dartmoor but, in addition, forms a vital element in a national network of pollen sites which shows major regional variations in the vegetational history of the British Isles. In common with other sites in southern Britain, Blacklane Brook reveals that the periglacial conditions of the Younger Dryas (= Loch Lomond Stadial) were replaced at *c.* 10 000 BP by the gradually ameliorating climate which marks the onset of the Holocene and the progressive development of vegetation to mixed deciduous forest by mid-Holocene times. The record from this site provides important details of this succession, from the

colonization of open heathland to the deciduous forest stage, and gives important insights regarding the composition of the forest and the height of the regional tree line. There seems little doubt that *Quercus* sp. was the dominant tree in the forest: its early arrival relative to other trees is a characteristic feature of pollen diagrams from South-West and south-central England (Conolly *et al.,* 1950; Seagrief, 1959, 1960; Simmons, 1964a).

The occurrence of wood remains (*Salix, Betula* and *Sorbus aucuparia* (rowan)) in the peat of bed 5 at Blacklane Brook is significant (Simmons, 1964a; Simmons *et al.,* 1983; Maguire and Caseldine, 1985). This, together with pollen evidence from elsewhere on Dartmoor, enabled Simmons (1962, 1964a, 1969) to estimate that the tree-line lay in the range between 427–457 m. This led him to argue that all of upland Dartmoor had been wooded during the so-called 'forest maximum' (Simmons, 1964a), a possible exception being the very exposed summits which may have remained bare, with waterlogged hollows and only thinly dotted with birch or oak-hazel scrub (Simmons, 1969). With the exception of some sites in Wales (Taylor, 1980) and on Bodmin Moor (Brown, 1977), this is one of the lowest published tree-line estimates in Britain for the period. Nowhere else is the tree-line fixed below 650 m; even in the Cairngorms and the Lake District it is reputed to have exceeded 760 m (Maguire and Caseldine, 1985). This has led to the suggestion that all of Dartmoor was in fact wooded at the time of maximum forest development, although, from macrofossil evidence alone, it is only certain that trees actually grew up to altitudes between *c.* 497 and 547 m OD (Maguire and Caseldine, 1985).

Equally significant is the record from Blacklane Brook of the role of prehistoric people in modifying the regional vegetation cover. Although many examples of forest clearance by Mesolithic people in the British Isles have now been reported (e.g. Dimbleby, 1962, 1963; Smith, 1970; Jacobi *et al.,* 1976; Mellars, 1976; Simmons, 1979; Simmons and Innes, 1981), and the evidence from Blacklane Brook shown to be by no means unique even on Dartmoor (Caseldine and Maguire, 1981; Hatton, 1991; Caseldine and Hatton, 1993), the sections here are important for they provided the first firm scientific basis for connecting small-scale fluctuations in the local pollen record with the activities of Mesolithic people: this was at a time when little such evidence had been adduced elsewhere (e.g. Dimbleby, 1962). The importance of the early pollen biostratigraphical work at Blacklane Brook (Simmons, 1964a) in this context has been enhanced by additional and more detailed pollen and macrofossil work and by the application of radiocarbon dating methods (Simmons *et al.,* 1983; Maguire and Caseldine, 1985).

The relative responsibility of climatic change and Mesolithic humans to account for these small-scale fluctuations in the pollen record has not been unequivocally determined (Cullingford, 1982). However, it is now widely accepted that Mesolithic alterations did occur to the woodland fringe areas (Caseldine and Maguire, 1986; Hatton, 1991; Caseldine and Hatton, 1993, 1996). There is no evidence at Blacklane Brook to support repeated burning of the area, as occurred in the southern Pennines and the North York Moors (cf. Jacobi *et al.,* 1976; Simmons and limes, 1981). However, there is no reason why such local clearances were not effected by the use of fire to maintain open ground and scrub in a predominantly mature forest landscape: there is evidence (see above) that some areas of Dartmoor remained unwooded even at the peak of forest development. Alternatively, the Blacklane Brook evidence may suggest clearance as a reaction to the rapid encroachment of forest which perhaps was less rich in necessary animal food resources than the more open and ecotonal systems which it replaced (Simmons *et al.,* 1983).

The appearance of a 'weed flora' subsequent to the 'elm decline' at *c.* 4260 BP, and perhaps after a temporary cessation of pressure on the local forests, was taken by Simmons (1964a) to be consistent with the archaeological picture of a very sparse Neolithic occupation of Dartmoor. However, the quality of evidence for the elm decline on Dartmoor is very poor (Caseldine and Hatton, 1996) and the interactions between early Neolithic activity and climatic/vegetational change are still poorly understood (Fleming, 1988; Caseldine and Hatton, 1996).

Conclusion

Blacklane Brook provides an important radiocarbon-dated record of vegetational and climatic changes on Dartmoor during the Holocene. This record charts the development of vegetation from the early Holocene colonization by open grassland and heathland through until the attainment of a mixed deciduous woodland dominated by oak in mid-Holocene times: the latter forest may indeed have spread to all but the most exposed summits of Dartmoor, and the wood remains from Blacklane Brook have long centred in a controversy regarding the height of the regional tree-line. Fluctuations in the

pollen record thereafter provide crucial evidence for determining the relative effects of climatic change and anthropogenic activities on regional vegetation development: from the Blacklane Brook evidence, there seems little doubt that Mesolithic inhabitants were having an important impact on the forest cover, perhaps even as early as the eighth millennium BP. The details and precise durations of these anthropogenic activities have yet to be determined, and Blacklane Brook will undoubtedly play a key role in resolving many of the outstanding questions. Although elsewhere there is much evidence to suggest that Neolithic people had a much greater impact on the forest cover, Blacklane Brook shows no direct evidence of cereal cultivation or other agricultural practices at this time. This has been used to support the view that Dartmoor may have been only sparsely populated by Neolithic people. The pollen biostratigraphic evidence from this site complements that from Black Ridge Brook on northern Dartmoor, where an extensively radiocarbon-calibrated profile provides particularly detailed evidence of changing conditions at the Devensian/Holocene transition.

References

(Figure 4.18) Blacklane Brook pollen site, southern Dartmoor. (Photo: S. Campbell.)