POLLEN ANALYSES AND HISTORIC LANDSCAPE CHANGE AT ASHENTROOL, MENSTRIE GLEN

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Introduction

Menstrie Glen, a small valley at the western end of the Ochils, preserves an extensive relict farming landscape of medieval and later date. Combined archaeological survey by the Royal Commission on the Ancient and Historical Monuments of Scotland and documentary searches by John Harrison (RCAHMS forthcoming) have illuminated the history of farming and settlement of the glen over the last *circa* 500 years. This brief report summarises the history of the vegetation and land use change as seen by a set of detailed, though tentatively dated, pollen analyses of a small peat deposit at Ashentrool, in the northern part of the survey area (Figure 1). The analyses provide insights into the landscape history of this part of Menstrie Glen over about the last 300 years, which complement those drawn from the archaeological and documentary survey.

The Site, Methods of Analysis and Presentation of Results

Ashentrool (NGR NN 827 004) is in the upper reaches of Menstrie Glen. The site sampled is a small peat deposit, some 200 m in diameter and 1.78 m deep at the point sampled, lying on a broad terrace at 315 m OD on the western flank of Loss Hill (Figure 1). The peat deposit formed initially in a small pond, though when is not known, dammed behind a rock-bar that is being cut through by a small west-flowing stream. Immediately adjacent to the peat deposit relict cultivation remains are visible, occupying areas of well-drained brown forest soils of the Balrownie Association, and later 'herring-bone' drainage ditches can be seen on the shallow hill and valley-floor peat.

The topmost 60 cm of peat were sampled with a 100 cm closed-chamber Russian corer, transported in clean plastic guttering to the laboratory, and stored at 4°C. Twenty-two sub-samples were prepared for analysis by standard chemical techniques (Moore *et al.*, 1991). Stained residues from this treatment were counted to sums of at least 300 land pollen grains (Figure 2) on an Olympus CH2 binocular microscope at magnification x400, and x1000 for critical determinations and size measurements. Only selected taxa recorded at more than two horizons are presented in Figure 2; full counts are available in Waldron (1997). Pollen taxa were identified from standard keys and reference collections. Pollen types in Figure 2 are those of Moore *et al.* (1991). Data are drawn as percentages of total land pollen (tlp), *i.e.*, for pollen types thought to derive from dryland surfaces, or tlp+group for pollen types and spores not seen as of terrestrial origin.

Dating of events is currently based on the occurrence of spruce (*Picea*) pollen in contiguous peat samples above a depth of 6 cm below the surface. It

is assumed that this pollen originates from one or all of three coniferous plantations within 2 km of the site. The largest of these was planted between 1948 and 1954, and, allowing 15 years for abundant pollen production, the appearance of spruce at 6 cm is assigned a tentative age of AD 1965. Ages prior to this in the core are extrapolated on a linear peat accumulation rate of 5 yr cm^{-1} or 0.2 cm yr^{-1}. The basal sample at 52 cm is given an age of AD 1725. Dates quoted in the following sections are rounded to the decade and should be treated as indicative rather than absolute.

Interpretation and Discussion

From the earliest times depicted in the pollen diagram, the landscape around Ashentrool was being exploited for agriculture. Between about 1725 (52 cm) and 1800 (36 cm) there are very high percentages of cereal pollen and, although light microscopy cannot distinguish between oats (*Avena*) and wheat (*Triticum*), it is very likely that in this upland setting the pollen record represents oats. Cereal pollen grains do not disperse far, and the values recorded here in excess of 15 % total land pollen represent a substantial area given over to crops, almost certainly from the cultivated ground adjacent to the peat deposit (Figure 1). Associated weed taxa from the fields may include species of fat hen (*Chenopodiaceae*) and the daisy family (*Compositae*). It is interesting that this area of well-drained soils, at over 300 m OD, was being cultivated throughout the 18th century, and comparable patterns have been identified in Southern Scotland (Tipping, 1998). This arable capability of the uplands of Scotland supports the view that the widespread change from arable to pastoral landuse that occurred during the 18th and 19th centuries was driven by economic, social and technological changes, rather than caused by repeated crop failure through climate-induced stresses during the 'little ice age' (Parry, 1978).

Grazing was also a significant landuse in the 18th century. Proportions of wild grass pollen (*Gramineae* <8μm anl-D; Figure 2) are high, as are those of grassland herbs associated with grazing, such as ribwort plantain (*Plantago lanceolata*) and species of tormentil (*Potentilla*), bedstraws (*Galium*), buttercups (*Ranunculus*) and docks (*Rumex*). Ling (*Calluna*) heath had not been a significant component of the vegetation around the pollen site in the last 300 years, and any form of woodland was equally uncommon. It is likely that only limited numbers of scrubby alder (*Alnus* cf. *A. glutinosa*), birch (*Betula*) and hazel (*Corylus/Myrica*) trees existed near the peat bog. No original or primary woodland survived into the later historic period.

After about 1800 (36 cm) it is likely that cultivation of oats ceased in the locality, although there are sporadic occurrences of single grains of *Avena/Triticum* and associated weed taxa above 40 cm. Pasture replaced the ploughland, but the transition to a pasture-dominated landscape was neither direct nor straightforward. For a short period, possibly around 90 years from 1800 (36-20 cm), the proportions of alder and birch pollen increased. This may represent an increasing population of trees, but this is not certain given the

lifespan of these trees and the short period represented. Surviving trees may have simply increased pollen production. The trees themselves probably colonised damp areas, perhaps on the peat of the valley floor itself. Willow (*Salix*) is often associated with wetlands, and the pollen becomes increasingly common after 1800, despite willow being a very low pollen producer.

The reduction of percentages of wild grasses in this phase need not represent a significant loss of pasture to woodland. These wetland trees may have formed a screen between the dry slopes that formerly supported cereal crops and the sampling site, so that their proximity to the pollen site over-represents their spatial importance. However, for a time grazing may not have been sufficiently intense to suppress the trees from flowering, or possibly seedling regeneration. The woodland may have been fenced, preventing animals from browsing on the trees. Alternatively the valley floor may have become wetter and perhaps too treacherous for animals. Sedges (*Cyperaceae*) increased after about 1850 (28 cm) and this may have been a response to the 19th century drainage ditches in the wetter hill peat (John Harrison, pers. comm.).

The woodland was removed, possibly quite abruptly at around 1900 (20 cm). The expansion of grass pollen (*Gramineae* <8μm anl-D) during the 20th century probably represents grazed pasture. This pasture maintains much of its earlier, but admittedly limited species diversity, and all associated grassland herb taxa recorded in the 18th century are also present in the near-surface samples. The maintenance of some species diversity here contrasts with intensive sheep-grazing lands in the Scottish Borders, where the present grasslands have been heavily over-grazed in the last 250 years (Tipping, 2000).

Summary

The pollen sequence at Ashentrool is poorly dated, but appears to indicate two contrasting types of agricultural activity over the last 300 years. Cereal cultivation, probably of oats, was a major component of the landuse prior to about 1800. Replacement of cultivated fields by pasture appears to have been sudden, with former fields being turned over to grazing. The brief establishment of scrubby fen woodland at this change in landuse is difficult to interpret, but need not represent any dereliction or abandonment of the land at this site, perhaps representing no more than a discrete stand of trees on an area of wet ground. In broad terms this confirms the pattern of major landuse change in the second half of the 18th century revealed by the archaeological and historical work in Menstrie Glen, as landowners removed their tenants and established the large sheep farms that dominate the Ochils today.

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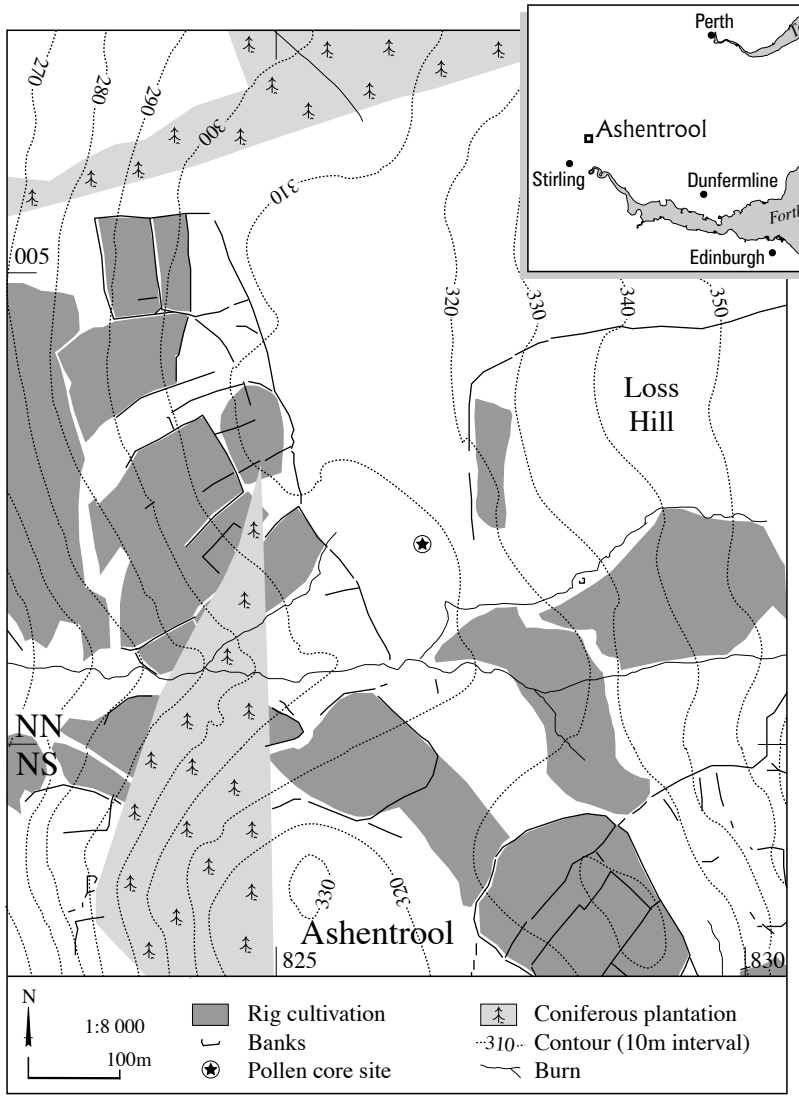

Figure 1 Location of sample site and plan of adjacent archaeological features.

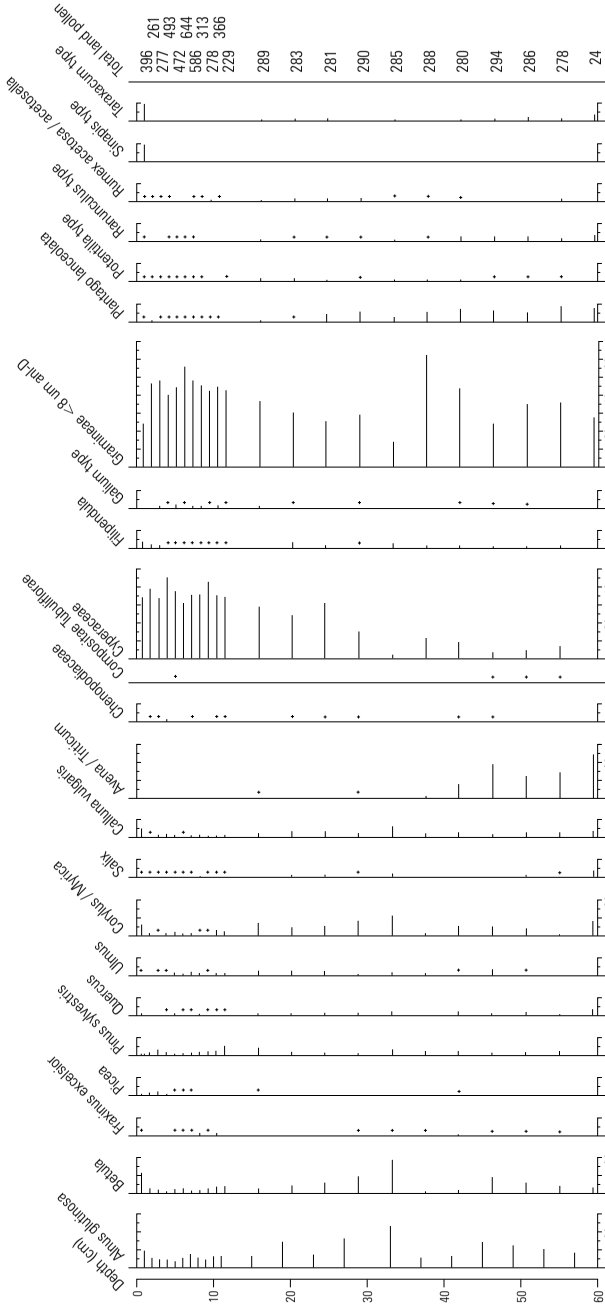

Figure 2 Pollen diagram of selected taxa at Ashentrool.