# Palaeoenvironmental reconstruction for a Bronze Age barrow at Beacon Hill, Mendip, based on pollen evidence.

*Southern face of Trench 4, Beacon Hill barrow: position of upper monolith tin used to collect sediments for pollen analysis. September 2008.*

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## 1. Introduction

The focus of this report is a Bronze Age barrow located at Beacon Hill, 2km north of Shepton Mallet (ST 638459). Deposits of palaeoenvironmental potential were discovered during archaeological excavations of the barrow and an initial assessment confirmed viable quantities of fossil pollen (Woodland, 2008). Higher resolution sampling was recommended to reconstruct the palaeoenvironmental setting for barrow construction.

Extended excavations of Trench 4 by the Beacon Hill Society during September 2008 exposed a sequence of turfs in the south face (TR-4008) that had been stacked to construct the barrow (Figure 1). An organic-rich buried soil, representing the pre-barrow land surface was exposed at the base of this, and the north face of the trench (TR-4010). Sampling for pollen analysis was therefore targeted to reconstruct:

- the pre-barrow landscape
- the palaeoenvironmental context of the turfs used to construct the barrow

This report presents the results of the pollen analysis. In addition, it attempts to reconstruct the contemporaneous landscape setting of the barrow.

## 2. Methods

Sampling for pollen analysis was conducted in September 2008 during the excavation of Trench 4. Two samples of the pre-barrow land surface were collected; one from the buried soil at the base (1.31m) of the north face (TR-4010) and one from the base (1.26m) of the south face, beneath the stacked turfs. The stacked turf sequence (TR-4008) in the south face of the trench (Figure 2) was sampled, using monolith tins to permit the collection of a large volume of material (especially important in minerogenic deposits which may be less fossiliferous than organic counterparts) and to preserve the structural integrity of the turf stack.

### *2.1 Stratigraphy*

Repeated sequences of organic-rich sands and minerogenic sands were encountered in the turf stack to a depth of 1.28 m. The layers were clearest between 0.50 m and 0.84 m depth (Figure 2 and Figure 3). This represents three stacked turfs that were targeted for higher-resolution pollen analysis. Detailed stratigraphic records were made using the Troels-Smith (1955) classification scheme, which is a consistent and formal framework for describing the physical components of a sediment. A summary is shown alongside the pollen diagrams in Figure 3, and stratigraphic detail of the sampled monolith is provided in Appendix I.

### *2.1 Pollen Analysis*

In addition to the two pre-barrow samples, 12 subsamples from the turf stack were analysed for pollen. Sampling was targeted towards the organic and minerogenic layers of the three stacked turfs (at 0.53m, 0.54m, 0.57m, 0.58m, 0.59m for turf 3; 0.61m, 0.62m, 0.65m, 0.67m for turf 2; 0.74m, 0.77m, 0.82m for turf 1). For the organic-rich sediments (0.53m, 0.61m and 0.74m) pollen preparation followed standard techniques including potassium hydroxide (KOH) digestion, hydrofluoric acid (HF) treatment and acetylation (Moore *et al*., 1991). The remaining minerogenic samples, however, required prolonged HF treatment to generate a concentrate that was sufficiently clear for pollen to be identified and counted. At least 200 total land pollen grains (TLP) excluding aquatics and spores were counted for each sample.

## 3. Results

The organic-rich layers in the turfs contained abundant, well-preserved pollen; the minerogenic layers yielded lower pollen counts, and more than one slide was traversed for each sample to ensure a sufficient count was achieved. The buried soil sample from 1.30m was particularly poor, yielding insufficient grains on which to base a palaeoenvironmental interpretation. The sample from 1.26m is therefore used to set the pre-barrow landscape context.

Approximately 15% of the pollen grains and spores in the samples were damaged, but this did not appear to be species-related. For example, *Corylus avellana*-type, *Alnus* and *Betula* are particularly susceptible to corrosion (principally by microbial attack in a dry environment) yet (despite some corrosion of *Alnus* grains) there were abundant well preserved grains from these species. Some thinning of Gramineae grains was apparent, probably caused by dessication in an aerobic environment; additionally some grains had been mechanically damaged (either broken or crumpled). Damage to grains was more common in the minerogenic samples, probably due to the lack of anaerobic conditions during and after deposition. This was especially so for the buried soil at 1.30m depth.

The results of the pollen counts are presented in a series of pollen diagrams (Figure 3) produced using TILIA (Grimm, 1991) and TGView (Grimm, 2004). A stratigraphic column is also included in these figures.

## 4. Interpretation

### *4.1 Pre-barrow landscape*

The pre-barrow landscape was characterised by mixed deciduous woodland. Attendant species such as *Polypodium* (Polypody fern) indicate a moist, humid environment typical of sheltered woodland. A small ericaceous heathland was also nearby.

*Alnus* and *Salix* may be derived from lower-lying ground to the south of Beacon Hill, but may also be from the more immediate vicinity; drainage is poor on the relatively impermeable Old Red Sandstone that underlies Beacon Hill and pockets of wet woodland may have persisted here. The ecological compatability of the taxa suggests that *Alnus* formed the canopy, with *Salix* as the understory.

*Tilia* (lime) is known to prefer fine-textured clay soils over limestone (Clapham *et al.*, 1981) and it would have been well-suited to the soils developed in the drift deposits overlying limestone in the local region. The *Fraxinus* (ash) pollen probably derives from the same location; *Fraxinus* prefers soils of high base status such as those forming over calcareous parent material (Clapham *et al*., 1981).

*Quercus* (oak) is characteristic of acid soils and was probably growing on the Old Red Sandstone in the immediate vicinity of the barrow. Modern ecological studies show that oak requires open ground in which to regenerate and requires grazing animals to maintain these open areas, regenerating in the thorny scrub which protects it from browsing (BTCV, 2007). If left unmanaged, *Quercus* will eventually be suppressed by species such as *Tilia* except on poor soils or exposed sites. *Rumex* (dock) supports the notion of disturbance activities in the area (Behre, 1986) favourable to the persistence of *Quercus*. The lack of cereal pollen recovered suggests that this disturbance was pastoral rather than arable.

The pollen assemblage for this sample is dominated by *Corylus avellana*-type, but it is difficult to attribute a sole cause for this high count. It may be due to the proximity of the pollen source (*Corylus avellana* is commonly found in the understorey of damp oakwoods; Rodwell 1991), or due to the tendency for this taxa to produce large amounts of pollen which may be carried from more distant locations (*Corylus*, together with *Tilia, Alnus* and *Betula*, is one of the larger pollen producers in deciduous woodland; Moore *et al*., 1991). It may also be an indication of disturbance, to which *Corylus* reacts favourably (see section 4.2)

There are no pollen records from the Mendip plateau with which to directly compare to Beacon Hill, due largely to the lack of preserving locations on the limestone. Some inferences can be drawn from the pollen records for the nearby Somerset Levels and Moors, since they probably contain a component that was blown down from the Mendip plateau. Palynological summaries by Beckett and Hibbert (1978; 1979, and modified by Wilkinson and Straker, 2008) provide a regional framework for Beacon Hill (Table 1), with characteristics similar to the pre-barrow Beacon Hill assemblage, especially in zone D. The pre-barrow assemblage at Beacon Hill may be tentatively placed within the Early Bronze Age, although radiocarbon dates would be required to confirm this.

| Zone | Start | End | Characteristics | Notes |
|---|---|---|---|---|
| A | 4350 BC | 3450 BC | Elm, oak, lime | Very few herbs – closed woodland |
| B | 3450 BC | 2900 BC | Oak | Elm decline and expansion of herbs |
| C | 2900 BC | 2550 BC | Elm, oak | Elm recovers, herbs reduced |
| D | 2550 BC | 1950 BC | Oak, hazel | Second elm decline, hazel fills in, few herbs |
| E | 1950 BC | 1700 BC | Hazel | Oak and elm also plentiful, very few herbs |

**Table 1:** Neolithic and Early Bronze Age vegetation changes in the dryland areas surrounding the Somerset Levels (Wilkinson and Straker, 2008, p.71).

### *4.2 Palaeoenvironmental context of the barrow turfs*

The turfs in the barrow are likely to have been cut and stacked before emplacement of the pottery funerary urn. Given the date of the urn contents (3310 +/- 35BP) the turfs probably represent the Early Bronze Age landscape. The pollen spectra for all three turfs are very similar (Figure 3), which indicates that they are contemporaneous.

The minerogenic subsoil for the three turfs contains pollen from a relatively open landscape in which *Corylus* scrub is dominant and canopy tree species (*Alnus*, *Tilia*, *Quercus* and *Fraxinus*) are relatively sparse. Thick *Corylus* scrub may have created suitably shaded and damp conditions for *Polypodium*, which is an important component of the assemblage. Abundances of Gramineae pollen and Ericaceae spores are relatively balanced, suggesting a mixture of grassland and heathland, and herbs such as *Ranunculus* type and *Plantago lanceolata* are also indicative of open conditions.

By the time the turfs were cut, heathland and *Corylus* scrub were important components of the landscape. The organic topsoil for all three turfs is dominated by *Corylus avellana*-type and Ericaceae, with secondary contributions from *Alnus*, Poaceae and *Polypodium*. Anthropogenic disturbance is indicated by the ruderals *Rumex* and *Plantago lanceolata*. *Plantago lanceolata* produces large amounts of pollen and it is viewed as a reliable indicator of open areas, waste ground or pasture in pollen diagrams (University of London, 2001).

Heathland is strongly associated with human activity (Gimingham, 1992), especially woodland clearance and the use of fire. Although charcoal was not encountered in the pollen samples, the presence of ruderals and the strong Ericaceous signature suggest that disturbance events were favouring the persistence of heathland in the vicinity. *Corylus* may also have benefitted from local disturbances. The productivity of *Corylus* is stimulated by fire (Moore, 2000) and by coppicing – it produces pollen from the second year onwards after cutting (Rackham, 1990). The preservation of hazel rods in the wooden trackways of the Somerset Levels (Beckett and Hibbert, 1979) shows that it was favoured for coppice locally, and it may have been managed in a similar way in the vicinity of Beacon Hill.

## 5. Archive

All cores sampled during fieldwork, together with photographs and associated material, are currently stored by The University of the West of England BS16 1QY.

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**Figure 1**: Trench 4 excavated in September 2008 showing location of monolith sample (0.22-0.72m) in south face. Distance from top of monolith to top of exposure is 0.22m, comprising disturbed soil.


**Figure 2**: Detail of monolith sample in south face of Trench 4 showing stacked turfs sampled for pollen analysis. Depths for the topsoil of the three turfs: Turf 3 (0.53m); Turf 2 (0.61m); Turf 1 (0.72m).

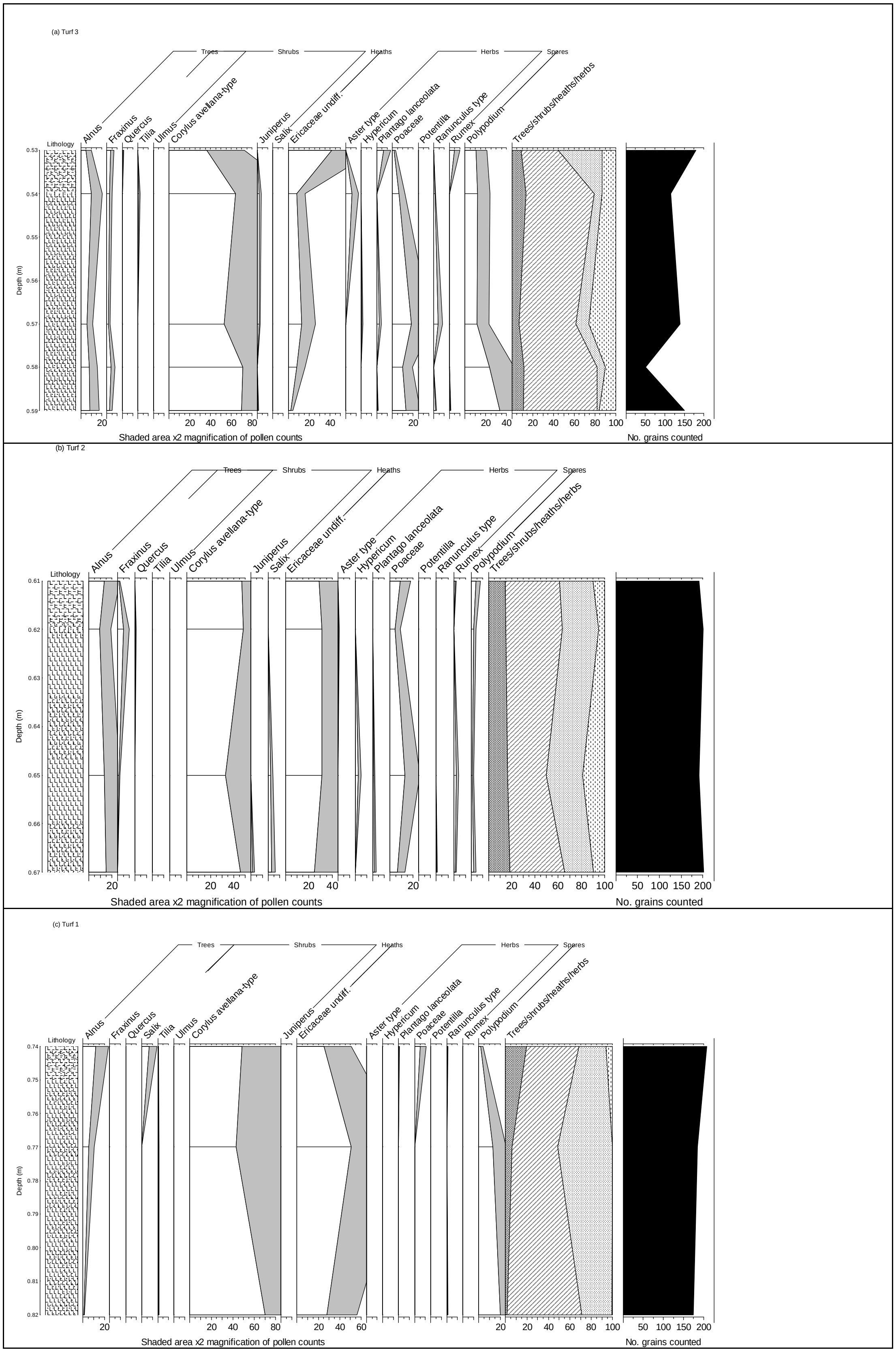


**Figure 3:** Pollen diagrams for the stacked turfs, south face of Trench 4, Beacon Hill barrow. Except for number of grains counted, all figures are percent abundances.

# Appendix

| Degree of Darkness | |
|---|---|
| nig.4 | black |
| nig.3 | |
| nig.2 | |
| nig.1 | |
| nig.0 | white |

| Degree of Stratification | |
|---|---|
| strf.4 | well stratified |
| strf.3 | |
| strf.2 | |
| strf.1 | |
| strf.0 | no stratification |

| Degree of Elasticity | |
|---|---|
| elas.4 | very elastic |
| elas.3 | |
| elas.2 | |
| elas.1 | |
| elas.0 | no elasticity |

| Degree of Dryness | |
|---|---|
| sicc.4 | very dry |
| sicc.3 | |
| sicc.2 | |
| sicc.1 | |
| sicc.0 | water |

| | Sharpness of Upper Boundary |
|---|---|
| lim.4 | < 0.5mm |
| lim.3 | < 1.0 & > 0.5mm |
| lim.2 | < 2.0 & > 1.0mm |
| lim.1 | < 10.0 & > 2.0mm |
| lim.0 | > 10.0mm |

| | | | |
|---|---|---|---|
| | *Sh* | *Substantia humosa* | Humous substance, homogeneous microscopic structure |
| *I Turfa* | *Tb* | *T. bryophytica* | Mosses +/- humous substance |
| | *Tl* | *T. lignosa* | Stumps, roots, intertwined rootlets, of ligneous plants |
| | *Th* | *T. herbacea* | Roots, intertwined rootlets, rhizomes of herbaceous plants |
| *II Detritus* | *Dl* | *D. lignosus* | Fragments of ligneous plants >2mm |
| | *Dh* | *D. herbosus* | Fragments of herbaceous plants >2mm |
| | *Dg* | *D. granosus* | Fragments of ligneous and herbaceous plants <2mm >0.1mm |
| *III Limus* | *Lf* | *L. ferrugineus* | Rust, non-hardened. Particles <0.1mm |
| *IV Argilla* | *As* | *A.steatodes* | Particles of clay |
| | *Ag* | *A. granosa* | Particles of silt |
| *V Grana* | *Ga* | *G. arenosa* | Mineral particles 0.6 to 0.2mm |
| | *Gs* | *G. saburralia* | Mineral particles 2.0 to 0.6mm |
| | *Gg(min)* | *G. glareosa minora* | Mineral particles 6.0 to 2.0mm |
| | *Gg(maj)* | *G. glareosa majora* | Mineral particles 20.0 to 6.0mm |
| | *Ptm* | *Particulae testae molloscorum* | Fragments of calcareous shells |

**Table 2:** Physical and sedimentary properties of deposits described by Troels-Smith (1955). Source: Hill and Joliffe, 2007.

**Table 3: Stratigraphy of turfs recovered for pollen analysis, Trench 4.**
**For explanation of Troels-Smith notation, see Table 2.**

| Depth (m) | Stratigraphy | |
|---|---|---|
| 0.53-0.54 | Black, organic-rich soil.<br>Nig.4; strf.0; elas.0; sicc.2; lim.3.<br>Sh1; Ag 2; Ga1. | Turf 3 |
| 0.54-0.55 | Light brown minerogenic sandy soil.<br>Nig.2; strf.1; elas.1; sicc.2; lim.3.<br>Ag 3; Ga1. | |
| 0.57-0.58 | | |
| 0.58-0.59 | | |
| 0.59-0.60 | | |
| 0.61-0.62 | Black, organic-rich soil.<br>Nig.4; strf.0; elas.1; sicc.2; lim.3.<br>Sh1; Ag 2; Ga1. | Turf 2 |
| 0.62-0.63 | Light brown minerogenic sandy soil.<br>Nig.2; strf.1; elas.1; sicc.2; lim.3.<br>Ag 3; Ga1. | |
| 0.65-0.67 | | |
| 0.67-0.68 | | |
| 0.74-0.75 | Black, organic-rich soil.<br>Nig.4; strf.1; elas.0; sicc.2; lim.3.<br>Sh1; Ag 2; Ga1. | Turf 1 |
| 0.77-0.78 | Light brown minerogenic sandy soil.<br>Nig.2; strf.1; elas.1; sicc.2; lim.3.<br>Ag 3; Ga1. | |
| 0.82-0.83 | | |
| | | |