

# Smelting & Smithing

## Medieval Charcoal for Ironworking at Myers Wood, West Yorkshire

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### Background to the Project

The site is located in Myers Wood to the south of the Storthes Hall Campus, University of Huddersfield, West Yorkshire (NGR SE186125).

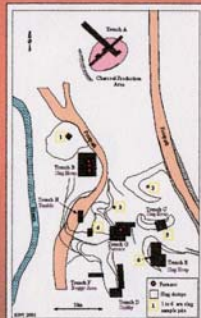
This Medieval iron-working site is in a modern, mixed-deciduous and conifer wood, and consists of a series of slag heaps that break the natural slope of the land. Initial investigations into the primary documentary sources suggest that the site may have belonged to the Cistercian house of Roche Abbey. Fieldwalking and geophysical survey identified several furnaces, the extent of the slag heaps (waste products from smelting), a rectangular feature, and a charcoal production area.

Excavations were conducted during September 2002 and April 2003 by a combined team from the Department of Archaeological Sciences at The University of Bradford, and members of The Huddersfield and District Archaeological Society. This work revealed a charcoal production or storage area, the disturbed remains of at least four furnaces, and a smithy area.

A provisional archaeomagnetic date of the 12<sup>th</sup> to 13<sup>th</sup> century is supported by relative dates from the pottery.

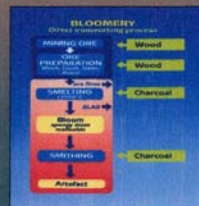


The current woodland at Myers Wood is predominantly mixed-deciduous with a conifer presence on the higher slopes (Photo: D. Chertton)



Site plan of the Myers Wood 2002 and 2003 excavations. The charcoal production area is to the north of the site, away from the smelting and smithy areas (From Vernon 2003).

### Fuels



Four furnaces have been located at the site and are the remains of iron-smelting using the direct process bloomery. This produces a bloom which has to be worked further by a smith to produce trade bar iron.

Smelting requires high temperatures and reducing conditions which are produced by burning charcoal. Smithing requires control of the temperature but does not require reducing conditions. Smelting, in particular, consumes large quantities of charcoal (50kg+ to produce 10kg of iron).

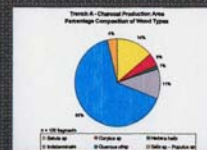
### Aims of the Research

To characterise the charcoals found in (1) the charcoal production area, (2) associated with iron smelting, and (3) in the smithy area, in terms of (1) their taxonomic composition and (2) the age structure of the woods, in order to investigate:

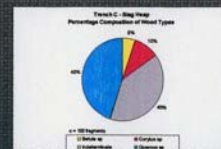
- the local ecology of the Medieval ironworking site
- fuelwood selection: were different charcoals being used for smelting and smithing?
- woodland management: is there a pattern in the age distribution of the roundwood which could be interpreted as coppicing?

### Preliminary Results

The analysis of the archaeological charcoal from three distinct areas (the charcoal production area, the slag heap, and the smithy) demonstrates specific wood types may be associated with a particular stage in the ironworking process.



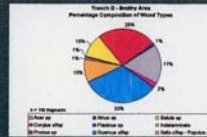
The preliminary data reveal a similarity between the wood types identified from Trench A – the charcoal production area, and Trench C – the slag heap. This result suggests that the charcoal produced at the northern end of the site was used to fuel the furnaces at Myers Wood.



The high percentage of indeterminate wood types (40%) from Trench C (the slag heap) may reflect the use of the fuelwood in an initial smelt, and the subsequent re-cycling of the slag and charcoal matrix to maximise production and resources.

A high level of distortion and destruction of the anatomical features of the archaeological charcoal was recorded for the indeterminate data set from the slag heap. This result suggests that the charcoal has been degraded structurally by the iron smelting process.

The charcoal from Trench D - the smithy area, has revealed a wider variety of wood types, in comparison to the charcoal production area, this suggests that the smiths may have been less selective of their charcoal than were the smelters; or that the charcoal was not produced on site, but was imported specifically for smithing or through necessity due to a shortage of fuelwood for smithing.



### Observations and Discussion

The analysis of archaeological charcoal from the Myers Wood site has revealed:

- The different characteristics of charcoals and their taxonomic composition at specific process locations.
- The age structure of the woods using growth rings and the circumference of the charcoal fragments to show the absence of mature timber, and the dominance of immature roundwood.
- Data demonstrates a typical growth pattern that is comparable with cyclical woodland management – coppicing.
- The deterioration of archaeological charcoal due to anatomical distortion caused by secondary processing – i.e. smelting.



Trench A cuts through the 5m diameter of the charcoal production area, revealing the compacted humus and charcoal overlying the natural ground surface (Photo: D. Chertton)

The mean of the typical growth patterns for Quercus, all other wood types, and indeterminate wood types, shows that the charcoal from Myers Wood area made from immature wood, with Quercus being cut on a longer cycle than all other wood types.

Trench	Quercus (yr)	All other wood types	Indeterminate
Charcoal Production Area	11	11	11
Slag heap	11	11	11
Smithy	11	11	11

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