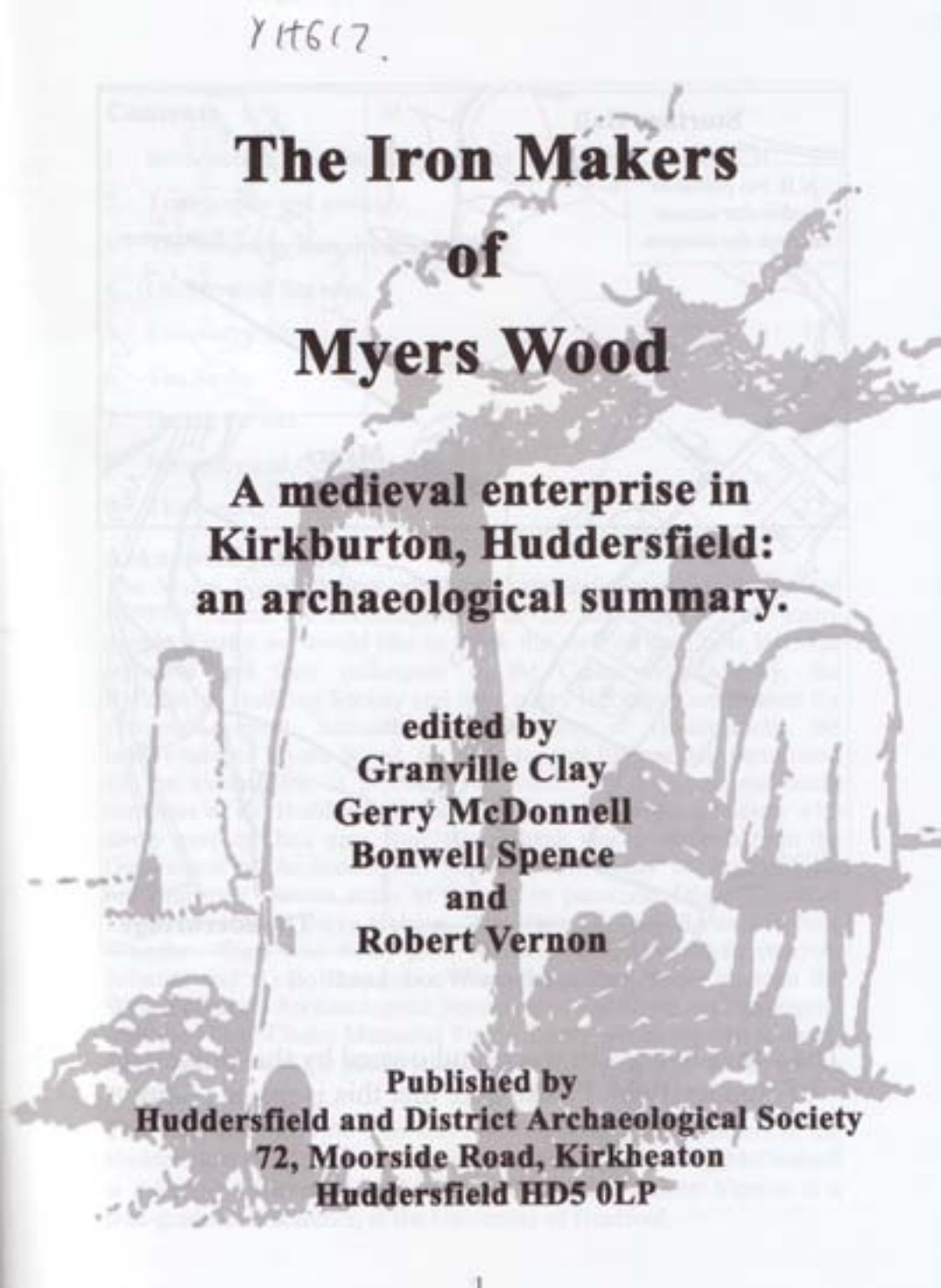


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The Iron Makers of Myers Wood

**A medieval enterprise in
Kirkburton, Huddersfield:
an archaeological summary.**

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1. Introduction - The Discovery and the Project.

Myers Wood is located in the grounds of Huddersfield University, Storthes Hall Campus, near Kirkburton and is very popular with dog-walkers (See Figure 1). It was while pursuing this activity that the Myers Wood iron-smelting site was first discovered by a member of the Huddersfield and District Archaeological Society (HDAS) in August 1998 (Spence, 2001).

Myers Wood is a mixture of conifer and deciduous woodland, very dense in some part, and is dissected by several unnamed streams that flow northwards to join Thunderbridge Dike. On the east bank of one stream there are six slag tips produced by iron-smelting activity (See Figure 2). Further investigation revealed that the slag covered an area of approximately 160 square metres. The scale of such activity suggested that it had once been a significant enterprise, but cursory investigation provided no documentary clues as to who had operated it or when.

The HDAS contacted various experts in the field of archaeo-metallurgy, and very soon it became clear that they had made a significant discovery. While such sites are known in West and South Yorkshire associated with Coal Measure ironstones, many had been lost to housing development or open-cast coal mining. It was probable, from its location, that the Myers Wood site was relatively undisturbed and so the opportunity was taken to investigate it further.

The HDAS approached the Department of Archaeological Sciences, University of Bradford (UB) and a small geophysical survey revealed the extent of the main site, and several anomalies thought to represent furnaces. Excavations were needed to confirm this, and to obtain material to date the site, so it was agreed that the HDAS would put forward an application to the Local Heritage Initiative (LHI) to finance this important work. Myers Wood fell into the remit for LHI funded projects as it was related to local heritage and would involve the local community. The site was important to local heritage as until its discovery no one had known that an iron-smelting industry once flourished at Kirkburton, and the opportunity would be taken to present the site to visitors, and widely disseminate its presence and purpose to the local community. To achieve this objective, the HDAS asked the UB if they would like to enter into a partnership; the UB providing archaeological skill and the HDAS labour, and so a project was born.

Both the Cistercian abbeys of Byland and Rievaulx (North Yorkshire) during the medieval period had Granges, administration centres that controlled a variety of industrial activities, e.g. woollen industry, tile production and iron smelting, at Flockton and Emley, to the east of Myers Wood. It was also probable that Grange Farm, located immediately to the south of Myers Wood in the hamlet of Thunderbridge was also the site of a similar establishment. Certainly there is documentary evidence to suggest that the Grange of Tymberwood, located in the township of Thurstonland, that included Thunderbridge, was associated with the Cistercian abbey of Roche, *sited near to Maltby, South Yorkshire (Faull and Moorehouse, 1981).*

Previous archaeological research has concentrated on the iron-working sites associated with the Cistercian Abbey of Rievaulx, North Yorkshire and has successfully investigated a number of iron smelting sites. (McDonnell 1999, Vernon *et al.* 1998a, 1998b, 1999, 2001, 2003). Those spatially separated and chronologically distinct iron-working sites are associated with Monastic Granges and were vital for the efficient monastic economy by providing tools for quarrying, construction and for the intense agricultural based economy. However no similar and comparative investigation of any surviving iron-working sites has been undertaken in West or South Yorkshire. The only known excavated iron-working site located on the Coal Measures of Yorkshire lies in South Yorkshire and was destroyed during the construction of the M1 motorway and is post-medieval (Crossley and Ashurst, 1968).

The aim of the investigation at Myers Wood was to try to put the site into its chronological framework, understand how the site functioned, and to initiate research into the medieval iron working landscape of West Yorkshire. The objectives of the fieldwork and excavations were therefore to:-

- (1) undertake detailed geophysical investigation of the furnaces.
- (2) identify the features on the site.
- (3) date the site by the associated finds, e.g. pottery, and archaeomagnetic and radiocarbon-14 techniques.
- (4) assess the quality of the metallurgy by metallurgical analysis.
- (5) investigate any associated smithing activity.

On a parallel investigation, documentary sources, including estate plans and deeds, were examined by members of the HDAS.

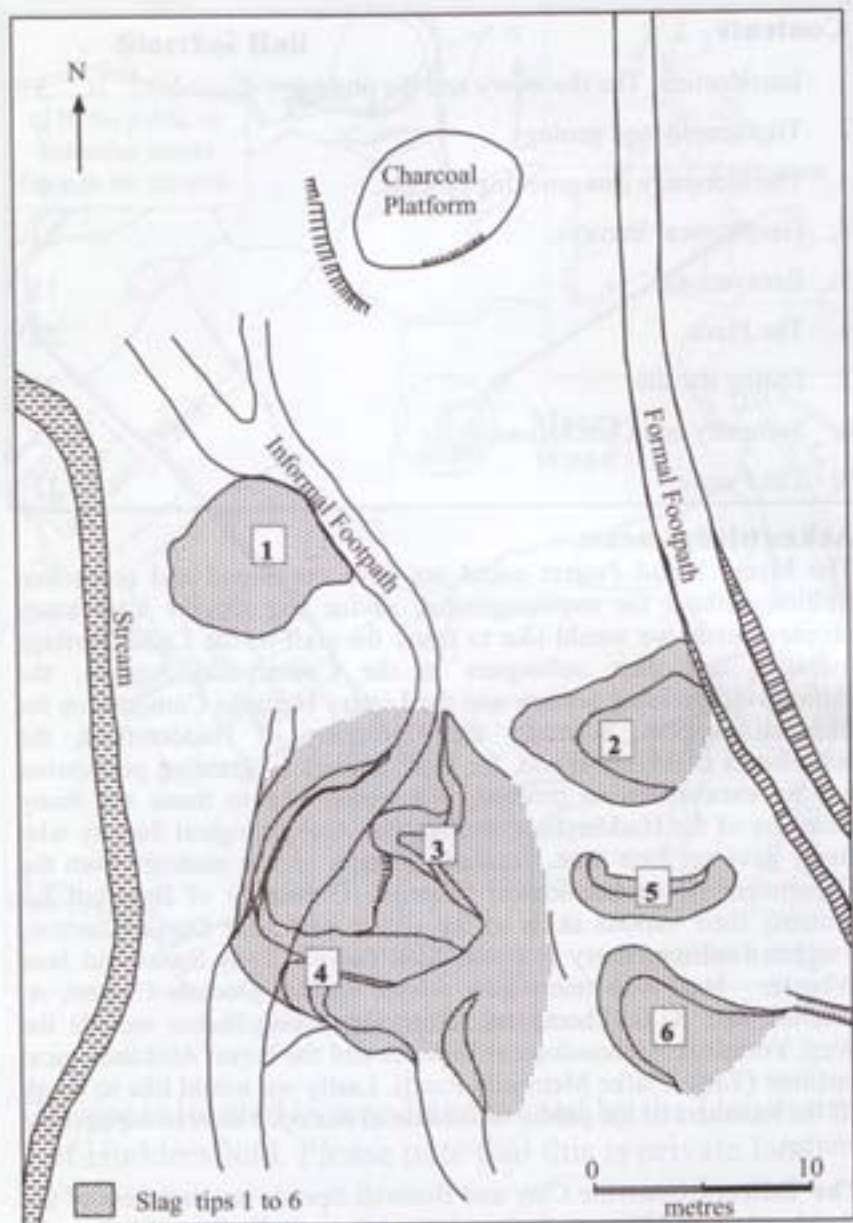


Figure 2. Myers Wood: Topographical Features

3. The Bloomery Iron Smelting Process

The iron manufacturing process at Myers Wood utilised shaft furnaces (See Figure 2), and is frequently referred to as a bloomery. The sideritic iron ore, an iron carbonate, was usually roasted on an open fire prior to smelting. This drives off the carbonate as carbon dioxide and leaves behind an iron oxide (Haematite), an easier ore to smelt.

The furnace was cylindrical and constructed from clay either built into a bank or supported by a stone structure. Furnaces usually had an internal diameter of 0.5 to 1.0m and were up to 2.0m in height. Air was blown into the furnace using hand / foot bellows via a tuyere located near the base of the furnace. In this method (Figure 3), often referred to as the *Direct* method, the furnace was filled with a mixture of iron ore and charcoal which was ignited. An iron bloom, a mixture of iron and slag, formed where the temperatures were highest close to the tuyere. Shaft furnace technology was a batch process. When an iron bloom formed, the process would be interrupted to remove the bloom. The formation and removal of the bloom frequently resulted in erosion of the lining, and cracking of the furnace walls, as the furnace cooled. The furnace would have to be relined, or even rebuilt. Once a furnace was beyond repair, it was either demolished and a new one constructed on its base or it was left to the elements and a new furnace constructed close by. By the medieval period the tap slag was being removed via a tapping arch and channel. Once a bloom was extracted it was taken to a bloomsmithy where it was continually reheated and hammered until sufficient slag had been removed to allow the iron to be manufactured into an artefact. There are numerous factors that seem to govern the location of a bloomery:

- a) A supply of iron ore, usually located close to the iron manufacturing site.
- b) A supply of charcoal manufactured from adjacent woodland.
- c) A supply of clay for manufacturing furnace lining.
- d) A supply of water for the production of furnace lining, quenching, and domestic use. Water power was used on some bloomeries towards the end of the medieval period.
- e) A settlement.

Myers Wood seems to have had all these requirements in the late medieval period. The local geology supplied iron ore and clay, and the site was close to water, woodland and a settlement (Thunderbridge).

5. Excavations

The locations of all the excavations are shown in Figure 5.

Session 1. September 2002

The first excavations commenced in September 2002. The purpose of the archaeological investigation work was to obtain sufficient samples to enable the site to be dated and also to establish what metallurgical operations were conducted. Four trenches were excavated and they are denoted as A, B, C, and D. A further six locations were also chosen for slag sampling pits.

Session 2 April 2003

A second series of trenches was commenced in April 2003. The purpose of these excavations was to continue to obtain sufficient samples to enable the site to be dated and also to establish the exact nature of the metallurgical operations on the site. Prior to the excavations commencing two trees were felled as they had become unsafe as a consequence of the earlier excavations at trenches B and D. It was also apparent from those excavations that archaeology existed under both trees that required further investigation and that it was also being destroyed by tree root action.

The excavations concentrated on further evaluation of the charcoal platform (trench A) and the excavation of the furnace under the felled beech tree at trench B. Four discrete and closely spaced geophysical anomalies (trench E) and an obvious furnace anomaly (trench G) were investigated. In the area to the southwest of the site where there was some evidence of a pond, opening up the possibility that water-power may have been used on the site, several excavations were made (trenches F and H).

Session 3. August 2003

The excavations concentrated on three specific areas. One area was investigated east of the main footpath to examine the purpose of this area (trenches K and O). Another excavation (trench N) was sited adjacent to excavation C to examine other strong anomalies. The third excavation (trench M) concentrated on determining the nature of the smithing area where the second beech tree had been felled and a possible furnace anomaly adjacent to it (trench L).

7. Dating the site.

Three methods (archeomagnetic, radiocarbon and pottery) have been used to date the Myers Wood site.

Archeomagnetic (Conducted at the University of Bradford).

This technique involves taking undisturbed samples of fired material, e.g. furnace lining and burnt surfaces, and measuring the direction of the earth's magnetic field recorded at the time the material was last fired. As the movement of the earth's magnetic field through time is known it is possible to compare the recorded direction with this movement and determine a date for the last firing. At Myers Wood archaeomagnetic dating indicates that the site was operating in the 12th, 13th and 14th century. Charcoal manufacture may be related to a late phase in the sites development.

Radiocarbon (Conducted at the University of Waikato, New Zealand).

This method measures the decay of a radioactive isotope carbon-14. All living organic material take in minute quantities of this isotope, but on death this process stops. The rate of radioactive decay of carbon-14 is 1% per 80 years, equivalent to a half-life of 5730 years. Measuring the amount of carbon-14 in a wood sample requires very precise measurement and an understanding of the procedures required in producing a date. This technique has confirms that the ore-roasting (trench C) and the iron-smelting (trench B) were being conducted in the 13th century. A later date range of between 1480AD and 1680AD is indicated for the charcoal platform. Radiocarbon dating of samples from other trenches is planned.

Pottery (Examined at Sheffield).

Pottery date ranges have already been included in 'Finds', section 6.

The date ranges from the bloomery furnaces and iron roasting appear to be contemporary. However both archeomagnetic and radiocarbon dating indicate that charcoal production occurred towards the latter phase of the site's development. It is unclear at present how this relates to the processes uncovered by the excavations. One explanation is that it may relate to a possible water-powered bloomery, recently discovered by geophysical survey and located on the north side of the wood.