



# Iron working in Anglo-Saxon England: New evidence to show fresh iron smelting of ironstone ores from the 6th–10th centuries CE

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## ABSTRACT

This paper discusses the current recycling and importation models of the Early Saxon iron economy. New evidence from the analysis of smelting slags and ores from the sites of Quarrington and Flixborough is presented which proves that fresh metal production was also occurring at this time, and with an increase in scale through the Saxon period. The findings are further supplemented by historical evidence which demonstrates that bedded iron ores were in use from at least the 7th century CE

## 1. Introduction

Iron working in Early Saxon England is well attested in terms of smithing (McDonnell, 1989), with evidence being found at several major sites across the country, large notable examples being those of Hamwic, and Coppergate, York representing urban smithies while Wharram Percy, and Flixborough are rural smithing centres (McDonnell, 1987a, 1987b; Ottaway, 1992; McDonnell et al., 2012; Evans and Loveluck, 2009). In contrast there are only four known smelting sites securely dated to the Early Saxon period (Birch, 2011: Table 1), however there are several dating within the range of Early-Middle Saxon, such as Mucking (McDonnell, 1993) and Easton on the Hill (Bellamy et al., 2001). This apparent lack of early primary production has led scholars to seek an alternative mechanism for the sourcing of ferrous materials which would then account for the secondary smithing activity. Fleming (2012) argues for a scavenging and recycling of pre-existing Roman scrap (Fleming, 2012: 10, 11, 15), by presenting the case for a technological collapse and a resultant inability to produce new metal.

This argument is based partly on the scale of Roman iron production, cited as 2250 t per annum (Fleming, 2012: 6). This is followed by the use of emotive language and a dismissive view of non-Roman capabilities in England (Fleming, 2012: 11). While it is true that no sites on the scale of Snorup, Denmark have been found in England (Fleming, 2012: 14, Smekalova et al., 1993), the apparent lack of primary production evidence may be a result of the focus of archaeological investigation being placed on other aspects of Saxon sites, rather than iron smelting locations. The other aspect of the argument for

technological collapse is the presumed loss of knowledge over the span of a century. This is simply not credible, as communities which have been heavily involved in a process such as iron production do not simply forget everything they knew in the space of two to three generations, as shown in the study by Van der Merwe and Avery (1987). In this instance an earlier furnace, constructed in 1910 is compared to one which was built in 1982 (Van der Merwe and Avery, 1987: Fig. 3). While the shape of the furnace is distinctly different, as it was constructed from the memories of the participants, rather than under the direct instruction of the earlier smelters, the furnace still produced a significant quantity of iron (Van der Merwe and Avery, 1987: 155). Archaeologically it is also seen that iron production occurs over time in locations where ores are accessible, such as Rockingham Forest where Early-Mid Saxon iron smelting occurred at Fineshade Abbey 600 m from the Roman smelting site at Laxton Lodge (Mudd, 2006; Jackson and Tylecote, 1988). It is likely that a community were involved in smelting in such locations over extended periods, and that there was a resultant continuity of knowledge.

Birch (2011) argues for a mixed economy where scavenging, and recycling exist alongside importation and limited production (Birch, 2011: 7–12). The argument used for the importation of iron is based upon the distribution of pattern welded blades, with recognition that the blades may have been imported as finished artefacts, and that the fittings may have continental origins (Birch, 2011: 12). Again, the lack of identified early smelting activity is used to support the plausibility of importation to satisfy demand, although there is no suggestion of what was being exchanged in return.

The main focus of the Birch study is that the iron was produced in

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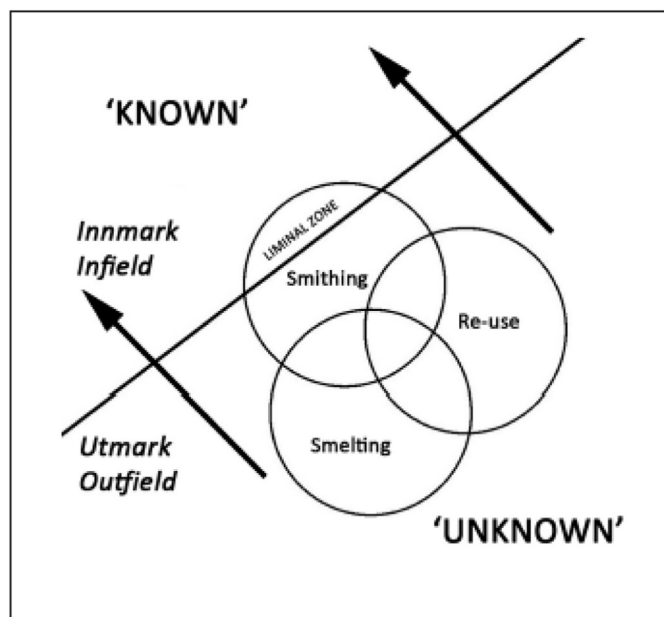


Fig. 1. Showing the model of Utmark and Innmark for iron working according to Birch (after Birch, 2011: 9).

areas which were generally unknown to the everyday populace. This is a concept derived from Scandinavian archaeology where it is referred to as the Innmark/Utmark model (Birch, 2011: 9), as represented in Fig. 1. This fits well within our current framework, where smithing is regularly seen and is better understood, not only by archaeologists, but also by the people in the past. This is reflected in historical texts, such as Aelfric's Colloquy, where the sights and sounds of smithing are described (Swanton, 1975: 175), demonstrating an awareness of the activity by those not directly involved in ironworking. This is not the case for primary production, which remained more mysterious, where only those directly involved appear to have had any knowledge of the activity.

Previously iron slag studies have examined the mineral composition of smelting slags (Tylecote, 1986; Dungworth, 2009) and the distinctive diagnostic morphologies which allow for slag and technological identification (Paynter, 2011: Figs. 3, 8, Tylecote, 1986). More recently slag investigations have moved towards the development of methods for determining iron provenance (Paynter, 2006; Blakelock et al., 2009; Navasaitis et al., 2010) and technological development (Charlton et al., 2013). These significant research advancements have resulted to the possibility of ironstone being used at Flixborough first proposed by Starley (1999) to remain as a likely, if unproven, suggestion.

## 2. Sites and material

A selection of diagnostic material was taken from both site assemblages, covering all the major phases of iron production. Ore samples

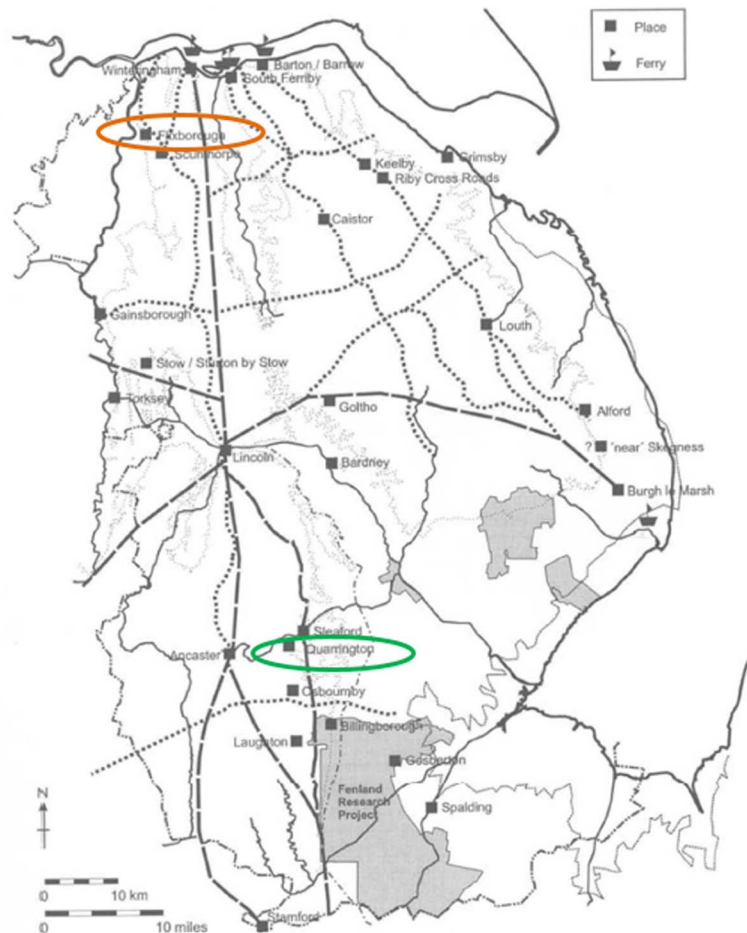
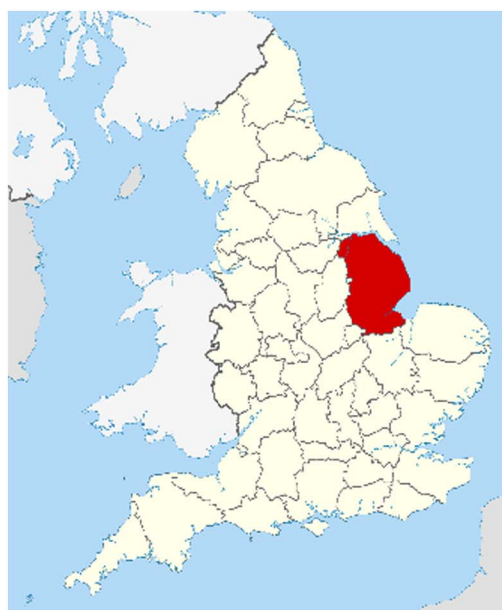


Fig. 2. Showing the locations Lincolnshire in England (red, left) and of Quarrington and Flixborough (circled in green and orange respectively, right) in Saxon Lincolnshire (after Ulmschneider, 2000: Fig. 2). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

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