

Say it in Iron

Symbols of Transformation and Reproduction in the European Iron Age

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The European research on iron has traditionally focused on the technical and economic aspects of iron production. However, a view of metal working in a wider regional context shows that it is generally entrenched in symbolic meaning and ritual activity. In this paper, the author employs four ethnographic case studies to show the importance of symbolic and ritual aspects of iron working and how these are intertwined with technological factors. What comes across are also the metaphorical links between pottery vessels, food, and furnaces used to produce iron. When looking at the European material, one can discern the same associations in the finds of cauldrons used for offerings of food as in the finds of cauldrons used for offerings of iron, such as iron weapons. The former are placed in a context of nurturing and human reproduction, while the latter are placed in a context of destruction. This indicates the ambiguity of iron as associated with nourishment-fertility and with destruction and death

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Ethnography and mythology provide abundant accounts of the symbolism of iron, iron making, blacksmiths, and iron products. Iron has material attributes that lend themselves well to symbolising hardness. As weapons, iron objects (spears, swords, daggers) are a means of killing and destruction and thus apt to symbolise male virility, penetration and power, as well as darkness and evil. As tools (hoes), iron objects are productive and may thus easily be associated with the fertility of earth as well as of women. Both iron smelting and pregnancy take place in container-like structures (the furnace and the female body respectively), and the frequently found metaphorical links between smelting and giving birth are, I have argued, based on the container schema.

These metaphorical links are grounded in imaginative constructions of understanding derived from the nature of the human body, in this case mainly the cognitive schema of the body as a container. Like the human body, pots and

furnaces are also containers and thus can be linked by metaphorical associations. What takes place in these different containers is understood as somehow similar. The baby in the womb, the boiling of food in the pot, and the smelting of ore in the furnace are all in a liminal state. There is surprising correspondence in the way people in very different cultural contexts have constructed symbolic elaborations based on these similarities. In the following I will explore this with particular reference to iron smelting.

The blacksmith's role in transforming ore in a liminal state (in the furnace) is probably the conceptual model for his frequently found role in transforming initiates in a liminal state (in rites of passage ceremonies). In his work in the smithy, the blacksmith forges liminal ore (bloom) into destructive and productive objects by means of fire and forceful tools like the hammer and anvil, in a setting evocative of cosmic forces (lightening and thunder) and that can convincingly serve as conceptual models for understanding the divine creation of the universe.

Iron smelting technology revolutionised man's means of destruction. With the possible exception of ornaments, the first iron artefacts were daggers, followed by spearheads and swords, while iron tools like hoes and axes occurred later (Pleiner 2000; Haaland 2004). Iron working is ambiguously placed in a context of destruction (weapons) as well as in a context of production (tools). The double nature of the smith is related to the material in which he works and to the dangers and blessings his products may bring about. Written texts concerning iron, such as Akkadian and Sumerian texts, suggest the symbolic importance of this metal. In Anatolia during Hittite rule in the 12th century both written texts and archaeological contexts show the use of iron in temples, indicating the ritual significance of the metal (Pleiner 2000: 9).

Iron thus seems to have qualities that stimulate people everywhere to spin far-reaching webs of significance (Geertz 1973) around objects and activities connected with its production and use. Although there are variations, there seem to be global structural similarities that are difficult to explain only as a result of the diffusion of ideas or migration of people.

I will present four cases of iron smelting as a basis for an attempt to develop some perspectives on the links between technological, organisational and symbolisation processes. By drawing on these case studies, I will explore the evidence for the ritual and symbolic importance of iron and iron products in Iron Age Europe. The ethnographic studies are based on fieldwork in Ethiopia, Sudan, Tanzania and Nepal (fig. 1).

I will start with a brief discussion of the technology, which shows that there is great variation in the four cases we have recorded on the ethnography of smelting iron. There is variation in the technique of treating the slag, from the use of slag pits to slag tapping, as well as variation in the type of furnace super-structure used. Crosscutting the variation in technology are the strikingly similar symbolic and ritual activities surrounding the smelting. The act of smelting is widely associated with the act of reproduction, where the insertion of the tuyeres and the

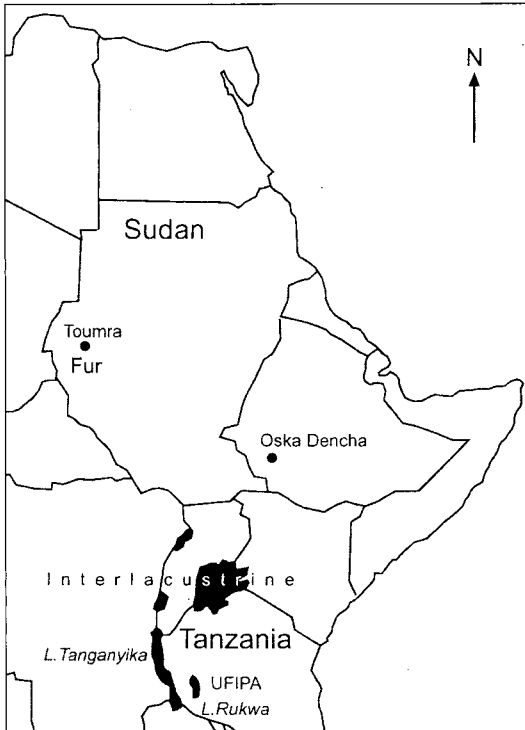


Fig. 1. Main localities mentioned in the text.

working of the bellows are aspects of the sexual act seen as an act of procreation, and where the output (bloom) is the foetus. Ideas associated with smelting are thus closely related to general ideas about procreation and transformation, which we seem to find as cross-cultural phenomena.

ETHIOPIA

I shall here present ethnographic material on iron smelting in the village of Oska Dencha, among the Tsara people, in the highland area of southwest Ethiopia. The fieldwork was done in 2000 and 2003. People are still smelting iron in the village, a rare occurrence in the world today and probably due to

the remoteness of the place¹. The furnace and the iron-smelting activities are situated outside the village. The iron smelting is based on a shaft furnace made of clay. The walls of the furnace are quite thick (12 cm) and are re-used several times. The height of the shaft is about 80 cm, and the pit is 40 cm deep and 50 cm wide (fig. 2). Radiating around the base of the furnace are 15 holes made for five pot bellows (of clay) that are attached to the tuyeres, and five people are needed to operate the bellows. The limonite ore is dug from small pits in a hill nearby. The smelting takes about nine hours. The slag sinks to the bottom where a pit had been dug. It is left to the next day to cool, and a small person (the young son of the smith) climbs inside the furnace to take out the bloom.

In general the work is based on male labour, although women can participate in working the bellows and making charcoal (however, there are strict taboos on

1) Fieldwork in Osaka Dacha in southwest Ethiopia was carried out by Data Dea, Gunner Haaland and myself in March 2000 and October 2003. The Norwegian Broadcasting Co-operation in conjunction with the University of Bergen financed the last fieldwork. The film made was shown on Norwegian TV in December 2004. However, from the 32 hours of film footage taken we have edited a video film for teaching purposes, "The Ethiopian Iron Smelter and his World. Technology, Organisation and Symbolism in Transformation of Nature". It should be emphasised that even if the people are still smelting in this village where we commissioned the work, we asked the smith to demonstrate the smelting process for us and we provided food and drinks for the work party. This was also the situation in the other case studies referred to below.



Fig. 2. The furnace is ready for smelting in Oska Dencha., Ethiopia (photo: Randi Haaland).

participating if they are menstruating). The iron smelter belongs to a special caste-like category where males are smelters and the females pot makers. In the neighbouring Dawra kingdom, the smelter is actually called big pot maker (*gita mana*) and is socially distinguished from the forger (*wugatche*) of iron objects. They are set apart as polluted, and this is manifested in the fact that their settlements are located at the outskirts and lower part of the village.

The idea of sacrifice to the ancestors is a prominent part of the smelting activities. The ideology related to procreation is manifest in the local terms used for the objects and activities of smelting. The local terms for the tuyeres are the same as the male sexual organs, indicating that the smelting process is metaphorically associated with sexual intercourse. When making a new furnace the smelter enters



the slag pit naked with a creeper around his waist; the creeper is seen as a metaphor for strength and sexual potency (fig. 3). The furnace is perceived as the womb of a woman. When the iron bloom is taken out (fig. 4), it is said that the woman (the furnace) has given birth, and the slag is called by the

Fig. 3. The master smelter has climbed into the slag pit naked, to line the pit with clay blocks (photo: Randi Haaland).



Fig. 4. The son of the master smelter is taking the iron bloom out of the furnace (photo: Randi Haaland).

same name as the placenta. Through the smelting operation a new object is created, and what was once ore has during the smelting operation become bloom. The metaphorical association between giving birth and making iron is manifested in the idea that the woman giving birth is polluted and so is the smelter. When the woman is giving birth she is brought to a hut outside the village, just as the polluting smelting activities take place outside the village (for further reference to the fieldwork see Haaland *et al.* 2000; Haaland *et al.* 2004; Haaland 2004).

FUR WEST SUDAN

In Darfur, West Sudan, iron smelting was practised among the Fur people until the 1950s, when scrap iron started to be used. When we did a study of iron smelting in the 1970s, some blacksmiths still possessed the knowledge of smelting iron and volunteered to demonstrate the process². The iron smelting is similar to the Ethiopian furnace as it is based on a simple shaft furnace with a slag pit. The slag sinks to the bottom of the pit and is not tapped during the smelting process, but is separated from the iron in a later process in a smithy. The furnace is broken down after each smelt in order to retrieve the bloom, and is thus different from the Ethiopian furnace. A furnace shaft less than 100 cm high, made of clay soil, is erected on top of a slag pit 50 cm wide and 60 cm deep. When the furnace is completed, plant fibres are tied around the shaft to prevent it from cracking during the smelt (fig. 5). On the outside the smiths draw some camel-like figures by smearing millet/sorghum flour mixed with water to protect the smelt from the evil eye (Haaland 1985). Radiating around the small furnace are four holes for

2) Gunnar Haaland and myself carried out fieldwork among the Fur in West Sudan in 1972, and I did separate fieldwork in 1978. The people had not been smelting iron since the introduction of scrap iron to the area in the early 1950s. We were able to see the smelting process with the construction of the furnace on both occasions



Fig. 5. Fur blacksmiths are making the furnace ready for smelting, note the drawings on the furnace wall, these are made with millet flour to keep the evil spirits away (photo: Randi Haaland).

the tuyeres, each holding two tuyeres each³. The iron ore consists of ferricrete sandstone taken from a sandstone hill situated about 35 km northwest of the smelting place. The smelting process we observed took about 16 hours. The wood used to make charcoal was hardwood acacia tree, and the smiths used two sacks of charcoal to smelt one sack of ore.

The transformative aspects of iron working are expressed in the way blacksmiths (*mir*) are thought to be able to transform themselves into animals like hyenas, dogs and lions, animals that are feared as both unclean and dangerous.

As the technical process of iron smelting is loaded with symbolic meaning, the technical specialist executing this process is also set apart from other community members. Iron working and pottery making among the Fur are seen as two complementary activities intimately connected. Iron working is to pottery making as husband is to wife. They belong to the same low-caste occupational groups *mir*. The potter, like the blacksmith, is a master of fire. It is with fire that one controls the passage of matter from one state to another (Eliade 1962). The male and female domains of the *mir* category are on the one hand very different, but on the other hand bound together by “earth” and fire. An important, subjective,

3) They used two types of furnaces according to the demand for iron. The small furnace was less than a metre high and the larger furnace had a height of 120 cm, with seven holes radiating around the base and holding two tuyeres each

associative link between the female body and the pot is that both can be conceptualised as sources of food – the women produce food with their own bodies during lactation and continue provisioning from the contents of the pot. Among the Fur this is explicitly recognised in the sense that pots often are spoken of as a mother (*eja*) and sometimes they are decorated with nipple-like protrusions (for further reference to the fieldwork see Haaland 1980; 1985; Haaland *et al.* 2002; Haaland 2004).

THE FIPA OF TANZANIA

Studies of the Fipa people, in western Tanzania, and their iron production is quite extensive and probably more fieldwork has been carried out among these people than among most other groups. Already in 1914, Wyckaert described many features of Fipa iron smelting technology. Later contributions include Greig (1937), Wise (1958a, b), Willis (1978; 1981), Wembah-Rashid (1973), and Barndon (1992; 2001). The above-mentioned publications as well as my own fieldwork (July 1991) make clear that the symbolic aspects of iron working are quite a pronounced part of the Fipa iron smelting (Haaland *et al.* 2002; Haaland 2004). The Fipa stopped smelting when scrap iron was introduced in the 1950s; the later work produced was commissioned by archaeologists⁴.

The Fipa iron smelting is technologically quite different from the two cases described. It is a two-stage process; the first stage takes place in a tall, chimney-like, natural draught shaft furnace (fig. 6). Openings are placed at the base of the furnace and numerous tuyeres are placed inside to catch the air. The ore is crudely smelted in the large furnace, and in the second stage in a small 50-cm-high furnace where the slag is separated from the iron bloom by tapping the slag through a small opening at the base (fig. 7).

The Fipa smelting operation is thus technologically quite complex and labour intensive. In the context of both furnaces there is a strong ritual emphasis on sexuality. The large furnace is explicitly talked about as a virgin and a bride, while the small furnace is said to be like a woman giving birth (fig. 7). The Fipa people quite clearly make the metaphorical connection between biological reproduction and the cultural production of iron.

Smelting thus takes place not only in a context of rich sexual metaphors; it is also surrounded by taboos imposing constraints on mixing the fertility of women with the fertility of the kiln. The blacksmith is prohibited from having sex during the smelting process. The compulsory celibacy for the smelters makes sense against the background of the symbolic identification of the furnace as the wife of the smelters and the metaphorical association of smelting with sexual intercourse.

4) Fieldwork among the Fipa in West Tanzania was carried out by Randi Barndon and myself in July 1991. I did not record the construction of the tall, natural draught furnace, since this was a furnace re-used several times. My discussion is based on the observations by Greig 1937, Wise 1958a, Wembe-Rashid 1973, and Barndon 1992. I did, however, observe the construction of the small furnace and smelting in both furnaces.



Fig. 6. The Fipa master smelter in front of the large natural draught furnace. He is sitting in front of the “father door” and examines the result of the first preliminary smelt (photo: Randi Haaland).

Sexual intercourse with ‘real’ women is looked upon as committing adultery against the metaphorical furnace wife.

If we look at the transformative aspects involved in iron smelting, they seem to have served as a source of metaphorical symbolisation in a similar way as in our case studies from Sudan and Ethiopia. The transformative aspects of iron working are expressed through the blacksmith’s role in rituals connected with the investiture of the king.

NEPAL

Here, I will briefly present material from iron smelting in Nepal (Rijal 1995, 1998). The shaft furnace used is of the slag-tapping type⁵. The furnace walls are approximately 10 cm thick and 120 cm high. A pit 90 cm wide and 90 cm deep is dug in the ground and a trench about 120 cm long is made for tapping the slag; two stone slabs are put on the ground to serve as a base for the furnace above the slag pit (fig. 8). Around the base of the shaft are two holes for inserting the tuyeres. The flow of slag is monitored by regularly piercing holes in the clay, which has been put in place between the two stone slabs. This enables the slag to flow; the sponge of iron is left in the furnace, and the furnace walls are broken down for the bloom to fall out of the furnace. The smelting takes about 11 hours.

The smelting is also here regarded as an act of procreation and the furnace is seen as a female where gestation takes place. The smith has to refrain from having sex with his wife during the smelt as this is considered an unfaithful act against the furnace, which is symbolically said to be his “wife”. If one did not observe

5) Fieldwork in Nepal was done by Suman Rijal in 1995 and 1998. Rijal first wrote his Master’s thesis based on the fieldwork he did in the Jajarkot village in central Nepal; this thesis was submitted at Tribuvhan University. The second fieldwork was in the village of Lohakot in eastern Nepal. The work was submitted for a Master’s thesis, and in both cases he observed the construction of the furnace and the whole smelting process. I supervised Rijal for his thesis in Bergen, and Gunnar Haaland supervised his thesis at Tribuvhan. Suman was very sadly killed in a motor accident in 2001 when he was about to start on his PhD program.



Fig. 7. Slag starts to flow from the small blast furnace.

these sexual taboos, one would enrage the ancestors and thus risk ruining the smelt. A symbol of the very sexual act of smelting is suggested by the fact that the smith is naked while inserting the tuyeres into the furnace. The tuyeres have names, which are modified terms for the male genitals. The pumping of the bellows is seen as heavy breathing during intercourse. Comparing Nepal with the African cases described earlier, there are striking similarities particularly with regard to metaphorical associations between the furnace and women, smelting and sex.

The product of iron smelting, the bloom, is regarded as sacred and one should treat it piously. Iron has symbolic meanings attached to it, for example iron rings are used to ward off evil spirits. The shaman

uses an iron knife or sickle when treating a patient. In the Vedas, the oldest known Hindu hymns, one also finds the mystical power of iron expressed as a means of counteracting witchcraft.

GENERAL SUMMARY

There are, as we observed in our four case studies, differences in technology, in the furnace types, but mainly in the treatment of the slag. The different technologies produced different types of slag. In the case of Sudan, where the furnace was broken down after each smelt, the slag left in the slag pit appeared as a slag cake; the Ethiopian furnace, on the other hand, was re-used several times and the slag was taken out through the opening by breaking the bloom into pieces, producing small, broken pieces of slag. The slag-tapping type of furnace used in Nepal produced slag with flow structure. However, there are striking similarities in the symbolism surrounding iron smelting particularly with regard to the metaphorical association between the furnace and women, smelting and sex. The dominant feature in the case studies is that these similarities are all constructed on the ideas related to transformations.

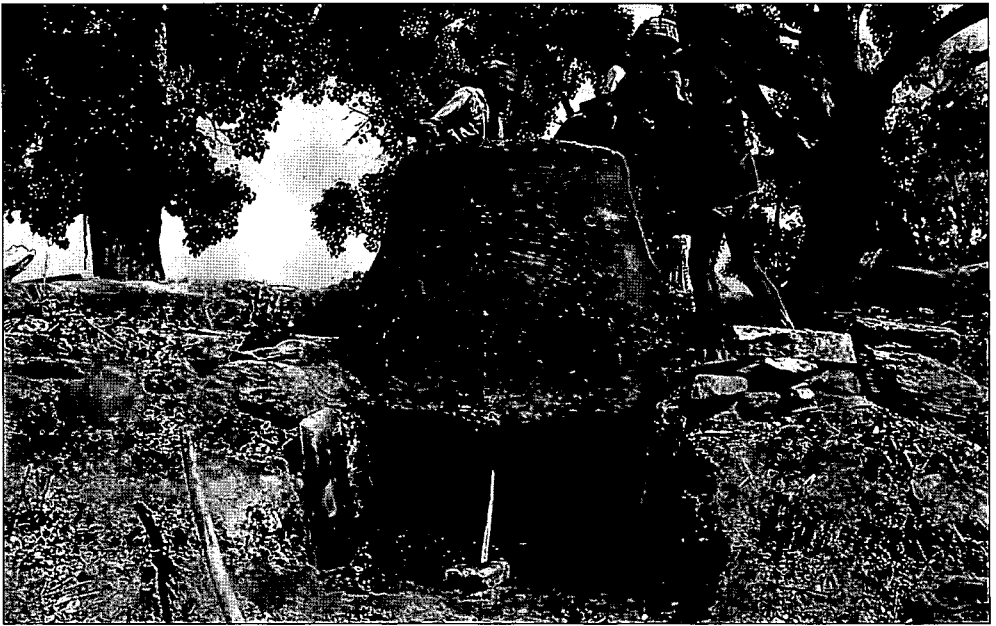


Fig. 8. Slag is starting to flow from the shaft furnace, from the village of Loharkot, Nepal (photo: Suman Rijal).

The social identity of the smith is related to smelting activities and the occupation is hereditary. The attitudes expressed towards the smelter are complex and ambivalent. The rest of the society, from farmers to kings, was dependant on the smith's products, from agricultural tools of production to weapons of destruction. It was also evident that smelting activities took place in a predominantly male context. Smiths are male, although women provided a great deal of ancillary labour when preparing ore, making charcoal and tuyeres, and in Ethiopia women could operate the bellows, though there were taboos that prohibited a woman from participating in these activities if she was menstruating. The male activity is, however, embedded in a rich symbolic imagery built around the association of the furnace with a woman giving birth. The concrete object through which the practical work of iron production is conducted is thus loaded with metaphorical significance based on associations with forms and processes of the female body. The common theme is the link between the smith seen as the big pot maker (expressed very clearly in Ethiopia where they are called the big pot makers) and women making pots. Iron working and pottery making are seen as complementary activities intimately connected within the same category as we saw in our case studies from Sudan and Ethiopia. Iron smelting is to pottery making as husband is to wife. Both involve the transformation of natural things (ore to iron, clay to pot) by means of the same transformative agent, namely fire. The two containers, the furnace and the pot, are similar in that they are vessels used for transforming natural items like iron and grain into cultural items like iron and porridge. Both

activities involve the use of fire. In all the case studies, the smelting activities took place outside the village.

Smelting is hedged by restrictions – taboos and protection against the evil eye, which serve to surround smelting with a certain amount of secrecy or separateness. The most fundamental feature of the concrete process taking place in the furnace is its transformative character, and the most striking feature of the objects and activities involved in this transformation is their potential to evoke association to sexual intercourse and gender imagery.

In an evolutionary perspective, pottery making emerged as an important component in the female domain of hearth-centred activities – a domain focused on tasks connected to food preparation such as fetching water and firewood, grinding grains, making the fireplace, making the pots, and cooking the food. These are activities that take place inside the house or inside the village. In other words pottery is unambiguously placed in the life-giving context of motherhood, nurturing and human reproduction (Haaland 1997). Iron working, on the other hand, is ambiguously placed in a context of destruction (weapons) as well as in a context of production (tools). It is universally placed in a male domain – a domain which contrasts with the female domain by taking place at the outskirts of the village or the market; the smithy is of a more public character, with its closer association to killing in hunting and warfare.

BLOOMERY IRON: AN OVERVIEW

The most common types of furnaces in ethnographic and archaeological contexts are furnaces with slag pits and slag tapping, which are found in many parts of the world ranging from Africa to Europe, the Middle East and the Indian subcontinent. Archaeological finds show that the shaft type of furnace with a slag pit is one of the oldest techniques employed in iron smelting (although in some areas it might have been preceded by the bowl type of iron smelting). Devices for tapping the slag and thus separating the slag from the iron bloom⁶ – a more efficient form of iron production which enabled a relative increase in yield – represent a later phenomenon, closely associated with Roman iron working (Cleere 1972; Tylecote 1987; 1992; Rostoker & Bronson 1990; Pleiner 2000: 281). Although it is important to stress that the furnace of the slag-tapping type did not always replace the slag-pit furnace, in many areas they co-existed. The natural draught type of furnace, which we recorded from Tanzania, has a more limited geographical distribution, mainly to West and Central Africa, but it has been recorded in Burma as well (Miller & van der Merwe 1994). The evidence today indicates that iron smelting originated in one region, in western Asia, and from there was spread by diffusion or migration⁷ to the other parts of the old world, except for China which seems to be different (Tylecote 1987; 1992; Pleiner 2000).

6) Different theories have been put forward as regards indigenous development of iron production in Africa and Europe. However, it is not the purpose of this paper to take up this discussion.

I have earlier stated that the emphasis in the European research tradition has been on the technological aspects of iron production, while the symbolic aspects have been neglected (2004). In my earlier work I have not drawn attention to the similarities between the technology used in the European Iron Age and the technology that I have described in my ethnographic studies. Below, I will briefly comment on these similarities, but as my focus in this paper is on the ritual and symbolic aspects of iron smelting, not on technology, I will give only a short summary of the technological features.

The shaft furnace with a slag pit, which we saw being used in Sudan and Ethiopia, is what typified the Early Iron Age in Europe, while the art of tapping slag (which we saw in Nepal) was to a large extent introduced into Europe during Roman times (Tylecote 1987; 1992; Pleiner 2000). The African iron smelting processes were variants of the bloomery process, as was the first European iron smelting. In Africa this bloomery process has survived up to today, as was seen in Ethiopia. In Europe and the Near East the bloomery process was in use until the blast furnaces began to be utilised in the 12th century and gradually replaced the less productive bloomery furnaces. However, a few places like Scandinavia and Pyrenees produced bloomery iron until the 18th century (Pleiner 2000; Espelund 2004).

When looking at the European iron smelting furnaces, there are as Tylecote rightly points out quite a variety of different shapes, from the parallel shaft to the bulbous shaft, from low to high, etc. However, Tylecote is aware of the problem of classification based on the shaft types because of variable preservation of the archaeological material, and he admits that the only certain classification we can give them is slag tapping or non-slag tapping. Cleere, who has classified the types of furnaces recovered, shares this point of view and he suggests two major types based on how the slag is dealt with: A) the non-slag tapping type, and B) the slag-tapping type. He makes a further classification of these according to the type of superstructures built (Cleere 1972). The importance of slag tapping as classificatory criteria is also stressed by Craddock (1995). Rostoker and Bronson emphasise the greater efficiency of the slag-tapping technique (1992).

Remains of shaft furnaces with slag pits, like those we described from Sudan and Ethiopia, are numerous in Northern Europe; they are found in Jutland, northern Germany, northern France, East Anglia, Wales, Holy Cross Mountain, Poland and Sweden (Tylecote 1987; 1992). We find much the same development in Norway, where the oldest slag-pit furnaces are dated to the 4th century BC (Espelund 1985; Stenvik 2003), while iron technology was much earlier in Sweden (Hjartner-Holdar 1993). These slag-pit furnaces are quite distinct, and Tylecote remarks on their striking similarities with the African ones (Tylecote 1987).

7) According to Tylecote, the bloomery process derives its term from the fact that the iron is produced below the melting point as a sponge of raw bloom (Tylecote 1986: 129).

The more efficient slag-tapping shaft furnace, as we described from Nepal, was closely associated with the Romans. In the Mediterranean region it was in use from the first century BC. Several furnaces of the shaft type with slag tapping have been found in Central Europe. In Czechoslovakia they date to c. AD 100-300, and the same observations can be made for Germany (Pleiner 2000). In Britain one can see an interesting development: while during the Roman period slag tapping was the main smelting technique, one finds that during the collapse of the Roman Empire, with migration of the Anglo-Saxons from Jutland, the less efficient non-slag-tapping furnace began to be used again (Tylecote 1987).

In Norway the slag-tapping furnace was in use from around AD 700, as was the case for Denmark and Sweden (Serning 1976; Voss 1985; Stenvik 2003). However, material from Norway indicates that furnaces with a slag pit existed parallel with those with devices for tapping slag (Narmo 1997). I will return to this point later.

Tylecote maintains that the furnaces used in Africa recently belong to a large number of types, and relates this to the time depth: "...Presumably, an area with an Early Iron Age (EIA) tradition lasting 2500 years will have developed more types of furnace than an area with a shorter history" (Tylecote 1987: 56). This mechanical view on change, which has to do with technological and metallurgical factors of iron working becoming more complex and differentiated over time, is quite different from the view presented by Alexander (1983). He looks at material from Sub-Saharan Africa and sees the great variations, which exist even in neighbouring communities, as related to religious, social and political factors rather than metallurgical or economic ones. He finds this a useful perspective when looking at the spread and development of iron working in Europe. Our ethnographic work described above is a case in point. Tylecote and Alexander thus have very different perspectives on factors influencing the development and variation in iron smelting.

ARCHAEOLOGY AND THE SYMBOLIC ATTITUDE TO IRON

The purpose of the article is to see how these perspectives can give us some new insight into the European research on this topic. I will thus start by looking at how these activities are manifested in the archaeological material, and I will also look at literary, mythological and folkloristic traditions. As we saw from our ethnographic case studies, the various activities related to ritual and symbolism were interwoven with technology. When we start to look at the archaeological material from this perspective, we find that the features indicating a ritual attitude to iron in the European Iron Age are quite rich. We can first look at material related to iron smelting, since our ethnographic material shows the rich symbolism surrounding the smelting process.

The first example, from the Classical period in Greece, is a black-figure vase painting from Vulci, dated to the 5th century BC. It depicts a furnace with a mask attached to the front. The type of furnace used is not quite clear. However, Faraone

(1994) suggests that there are two possible interpretations for the mask used: it can be seen as an effigy of a fire demon, or it may have been used in a ritual to protect against the evil eye (i.e., to protect the smelt in a similar way as our example from West Sudan).

Looking at the archaeological material from Norway, we find indications that ritual activities were part of the smelting activities. At the iron working site of Meråker, smelting took place in shaft furnaces with slag pits, and after the smelting was completed the shaft was apparently pulled down and special care was given to flagstones carefully laid on top of the slag pits. Such a closing of the pit does not seem to have had any functional purpose. It is enticing to see this as a symbolic act to conceal secret knowledge (Rundberget 2002). Similar perspectives have been advocated by Pleiner, who has looked at several European bloomery sites with remains of both slag pits and slag tapping. The circumstances of several of these suggest that the furnaces were intentionally pulled down for ritual purposes (2002: 142).

I have earlier discussed the advantage of slag tapping compared to furnaces with pits since it led to an increase in the yield of iron (Pleiner 2000: 262). The furnaces with pits are generally found to be the oldest; we also see this pattern in Norway (Steinvik 2003). One has assumed that the technologically more advanced slag tapping gradually replaced the furnaces with pits. This does not seem to have taken place since we see the parallel use of both techniques (Narmo 1997). We see the same pattern in England, while during the Roman period slag tapping was the main technique; with the migration of the Anglo-Saxons from Jutland one finds that there is an emphasis on furnaces with slag pits. Tylecote sees this as an indication that the more advanced smelting technique was not widely disseminated, and when the Romans left the old technique was re-introduced by the Migration people (Tylecote 1987: 180). It is rather tempting to see iron smelting as related to secret knowledge hedged with taboos and rituals. The examples cited show the importance of Alexander's statement that we should view the religious, social and political factors as equally significant as the technological factors.

IRON, FOOD, DEATH AND REGENERATION

A common theme throughout the European Iron Age is the metaphorical links between objects and activities associated with iron working and with food making, as well as with events of death and birth, fertility and destruction.

Leach (1962) has suggested that there was worship of an indigenous smith god by the Britons during the Roman occupation. He makes a special reference to a find of a ceramic container dated to the second century AD, which depicts a bearded figure holding a hammer ready to strike an ingot, which he holds with a pair of tongs in his left hand over an anvil. Several similar finds, although more fragmentary, have been recovered. Leach sees this as an indigenous smith god, which in Irish myths appears as Goibhniu. He was worshiped and had character-

istics that the conquerors viewed as similar to their own smith god, Vulcan. Green develops the argument further and sees the smith god Goibhniu as linked to cauldrons and food. Goidhniu is the provider of the other-world feast, with his own ever-replenishing cauldron of regeneration. The ritual importance of vessels and their association with iron working is manifested in the sacrifice of a cauldron that was found at a sacred site associated with iron mining in Wales (Green 2002).

The association between cauldrons and food and iron is seen in food offerings in wetlands and the finds of votive ironwork, often weapons, which had been ritually destroyed and deposited in large vessels. This underlines the link between iron weapons and nourishment. Green (1998) has on the one hand emphasised the close connection between cauldrons and death, and the related concept of regeneration on the other. She sees the link between the cauldrons and iron as manifested both in the archaeological record and in the myths. I have earlier emphasised the intimate relation between the potter and the smith, whereby one is responsible for making food and the other for producing iron, activities that both take place in container-like structures. However there is an important difference between the output of the two activities: food making is obviously beneficial, while the making of iron products is ambiguous since the iron objects are both means of production and means of destruction. I think that the symbolic use of iron objects may frequently be based on this ambiguity. From this perspective, it is interesting to look at the close association between iron objects and cauldrons as manifested in archaeological finds and myth.

Green (2002) discusses the way iron objects were subjected to ritual treatment such as breakage and then deposited in special places, in wetlands or in shrines. She looks at how iron weapons, such as swords and spears, seem to be deliberately destroyed before being sacrificed. She speaks of iron weapons as being “killed” before deposition. This custom was widely practised in Europe during the Early Iron Age, from Denmark to France. She refers to miniature iron weapons found in shrines and cult places, which she takes to indicate sacrifice or dedication. She discusses iron objects that were placed in other ritual locations, such as disused grain silos, which indicate the symbolic connection between iron and food, as we will see below (*ibid.*).

The ritual association between food and iron is also seen in Norway. Slag is often recovered in the so-called cooking pits. These are large shallow pits often more than one metre in diameter, which contain large amounts of fist-sized fire-cracked stones that show traces of having been in fire, used in cooking (Wood 2000). Experiments show that a pit this size can be used to cook food that can feed up to 30 people. These cooking pits are often found in mountainous regions or in liminal areas, between the cultivated land and outlying brush land. They can occur together in one group (9-10 pits), and they also seem to occur close to iron smelting areas. Some of these are dated to the Early Iron Age. Narmo has interpreted these cooking pits as ritual places where communal offerings to the gods took place (Narmo 1996).

Iron slag is frequently found in burials, from the Early Iron Age, the pre-Roman Iron Age, to the late Viking period. Pieces of slag are found in cremation burials (Farbregd 1993). Both iron slag and cremation involve transformation by means of the transformative agent fire, in the furnace and on the cremation pyre. Both are dramatic events of transformation. Slag was recovered in several burial mounds along the west coast of Norway. It was found in connection with layers of ash/charcoal and as filling in the graves. The analysed pieces of slag derive from iron smelting and not blacksmithing (Dommasnes 1997: 133-136). Burström also refers to slag found deposited as grave goods as well as in the earth filling of the graves (Burström 1990). Burström looks at the slag from a religious perspective, and iron smelting as a kind of ritual where the transformative character of the activities is central, the transformation of ore to iron – nature to culture.

ARCHAEOLOGY AND MYTH

What comes across as a common theme within European literary and folklorist traditions is the twilight nature of the smith: Welend, Gueland, Vølundr, known throughout Northern and Western Europe as the master of smith-craft, may appear as wise and honourable and as the father of a heroic son, but also as a dangerous and fierce opponent given the cruelty of his excessive vengeance. The artisan of mythology is often vital to the creation and defence of cosmic order. Yet like the Greek smith god Hephaistos, he may be grotesquely shaped and subject to derision (Motz 1977: 14).

It is not only the twilight nature of the smith which is communicated in myths; it is also that he is set apart from the community, as exemplified by his location in the depths of the mountains, earth or water, or on an island or in a cave. The smith god of the Greeks commands a smithy in the ocean, while the Latin Vulcan (the Greek god Hephaistos) rules the fires of Mount Aetha, and the Irish Lom mac Liomatha lives within a cavern. This is the legendary smith (Motz 1977; Barndon 2005).

The many archaeological remains of iron working recovered from caves are an indication that these places were of ritual importance. Bjørnstad (2003, 98) has recorded slag remains in seven caves of which the most famous is Ullshelleren where the slag recovered seems to be drip slag, and there also are clay fragments from furnace linings (Odner 1969), which indicate that iron production actually took place within the caves. The earliest date of such finds is to the pre-Roman Iron Age (Diinroof 1997) but the use is known throughout the Iron Age. It is enticing to see the symbolic use of the caves for iron working as it is reflected in the myths, where the legendary smith is set apart from the community as exemplified by his location in the depths of mountains or in caves.

The transformative aspects of iron and iron working are apparent in symbolism related to birth, weddings, and death/burials. Within folklorist traditions there is a strong association of steel with magical power; this power seems to be especially important in liminal contexts. If put in a cradle of a newborn baby, steel would

protect the child from evil powers. The power of steel to protect a newborn is found to be common cross culturally, from Scandinavia to Bangladesh. At birth the child is in a transitory phase, before becoming a social being, and it is an apt token that iron is used for protection (Opie and Tatem 1989: 212). The old European metal workers called their furnaces the mother womb, the crucible in which the marriage was consummated (p. 413). The role of the smith in transformative rituals is seen at Gretna Green in Scotland, where the blacksmith performed marriage rituals (Budd & Taylor 1995).

In folktales the blacksmith can rise as a potent force against the devil and trap him, as when the devil transforms himself to a worm and hides in a nut. He is also pictured in alliance with the evil being to whom he has sold his soul in payment for magical powers. The devil is thus often depicted in the smithy as a liminal person, half man and half animal, as indicated by his left leg being a horse's foot with an iron horseshoe. The devil appearing with the iron scythe is a sign of death. The dual nature of the blacksmith, as having the power to heal but also to harm by cursing, was known in rural Ireland and the Scottish Highlands until the recent past (Green 2002). The blacksmith's forge is seen as both the fire of Heaven and the flames of Hell, as the instrument of the Demiurge and also of the Devil. This duality may relate to the products, to the weapons of destruction as well as to the tools of agricultural production.

EUROPEAN IMAGERY TRANSFORMATION, REPRODUCTION AND DESTRUCTION

There are several features and processes associated with iron that in combination serve to create different levels of ambiguity. One level is related to characteristics of the two different operations involved in iron working, i.e. smelting and forging, where the first operation is apt to be symbolically associated with sexual intercourse, procreation and reproduction, and the second with cosmic creation. A related level is connected with the near universal association of the furnace with the pot and nurturance. Another level derives from the potential of iron to be a means of destruction (weapons) associated with death, as well as a means of production (tools) associated with fertility. Birth and death are two aspects of natural regeneration and are as such a fundamental human concern. I suggest that the similarities we find in the symbolic elaborations humans have spun around iron making and iron makers are related to these different levels of ambiguity. The close connection between pottery containers used for food, and the furnace used to produce iron, came across very clearly in our ethnographic studies. In archaeological material and legends we seem to find the same associations both in the finds of cauldrons used for offerings of food and in the finds of cauldrons used for offerings of iron weapons. One is placed in a context of nurturing and human reproduction, the other in a context of death and destruction. A further indication of the ambiguity of iron as associated with both nourishment-fertility and death, is the finds of slag both in cooking pits and in graves and burial

mounds. There are, of course, features of iron symbolism in Europe that are specific to certain communities (and they are important to document because differences in technology and style may reveal a lot about processes such as diffusion, migration and local innovation). In this article I have, however, tried to explore underlying general features of iron working that led to similarities in symbolic elaborations. Symbolism related to transformation does not seem to be connected to any particular iron technique or time period; that is, whether the iron-smelting technology was of a slag-pit type or a slag-tapping type did not seem to matter in iron symbolism.

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