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In the wake of the hoards
– glimpses of non-ferrous metalworking through the finds of the Gotland hoard projects

By Ny Björn Gustafsson

Gotland, c. 90 km east of the mainland, is Sweden’s largest island (fig. 1). By the Late Iron Age its population had developed a distinctive material culture, and even though it shared traits with societies on both shores of the Baltic Sea it was still significantly Gotlandic. Deposition of coins and other precious metal objects was a widespread custom in Scandinavia during the Late Iron Age and the Early Medieval period, but on Gotland this took proportions on a scale unseen elsewhere. As a result more than 700 Viking Period silver hoards have been recovered to date, with additional hoards found more or less annually (Östergren 2008, p. 11).

Looting of archaeological sites also has a long tradition on Gotland (cf. Kidd & Thunmark-Nylén 1990), but the 1970s saw a new threat dawn on Gotlandic heritage management: metal detectors. The technical development now enabled looting on a new level: sites known to have yielded hoards were systematically looted and the finds dispersed among unscrupulous collectors. In 1977 the Swedish National Heritage Board’s Gotlandic branch, Riksantikvarieämbetets Gotlandsundersökningar (RAGU) launched Skattfyndsförebyggande (RAGU) launched, the “Hoard Project” as a response to the problem. Its main goal was pre-emptively to survey and metal-detect known, partly known and likely find sites of silver hoards (Östergren 1989, p. 15). Even though RAGU was later dismantled, metal detector surveys have continued in a series of intermittently occurring projects on Gotland (Hellqvist & Östergren 2011). Reports and archival material account for at least 690 metal-detector interventions on 386 properties by the close of 2010. This does not include the fieldwork of looters, but at many looted sites legal work was undertaken to salvage what was left behind. Note also that...
these 386 properties do not equal 386 individual find sites: many of them have more than one concentration of finds. In one case at Mallgårds in Levide parish, 16 discrete find clusters were located within one property measuring 690 by 410 m (Östergren 2004).

Metal Detecting
Metal detectors employ locally emitted magnetic fields which are altered when metallic objects enter them; this is monitored through, for example, changes in the pitch of an audio signal. Due to the variation in phase response it is theoretically possible, to some extent, to determine which specific metal the detector is triggered by. In practice this is complicated by the fact that different metals can give similar signals due to similarities in phase response – infamously for instance gold, silver and aluminium.

The magnetic field of a ground sweeping metal detector is created through the coil and hence emitted radially. Since it is somewhat stronger in the middle, it creates a downward cone-like search volume (Connor & Scott 1998). The diameter of
the coil sets the detector’s effective search-depth: a normal metal detector is seldom effective below c. 0.25 m, but note that the operator’s level of proficiency is crucial to the outcome of a survey (Paulsson 1999).

Archaeological metal detecting is generally confined to ploughsoil due to context issues, i.e. areas where the stratigraphically deposited context has been altered. However, the fact that objects are not recovered in situ does not mean, as is sometimes put forth, that they have lost their context. Even when dislocated by a plough, an artefact rarely moves very far. Thus a metal find scatter in ploughsoil roughly reflects the original distribution. Additionally, it has been repeatedly observed via excavations of ploughed-out hoards that the original stratigraphical sequence can still be partly preserved below plough depth (e.g. D. Carlsson 2010).

**Contexts**

During the 19th century vast areas of new farmland were claimed on Gotland through drainage campaigns. Simultaneously a new efficient policy for land consolidation (laga skifte) allowed farmers to modernise and maximise their land use. In this period the number of reported hoards increased rapidly as drainages and ditches were dug and new fields cleared. These hoards were generally added to the collections of the National Historical Museum in Stockholm or, later, to what would become the Gotland County Museum in Visby.

Particularly on higher grounds the old meadows hid a multitude of settlement sites; sometimes all the way up through the Middle Ages. Late Iron Age settlement sites are often found close to their cemeteries. While graves of the period on the mainland often have visible and durable markers, their Gotlandic counterparts are normally of more modest proportions. They may have had ephemeral superstructures of wood (e.g. Trotzig 1983, p. 376 pp), but in our time Gotlandic graves can be hard to identify. Evidently thousands of settlements – and adjacent burials – have been ploughed out over the centuries. The distribution of finds in these areas is heterogeneous. Aside from hoards, stray coins and easily classified objects such as jewellery and everyday utensils, there is one particular category of finds which stand out to a trained eye – metalworking debris.

**Metalworking in Prehistoric Gotland and Mainland Scandinavia**

Most of Gotland’s sites with traces of metalworking have evidence for both ironworking and non-ferrous metalworking, but this study focuses on the latter. The main reason for disregarding ironworking is that its remains are common on Gotland and highly uniform throughout the prehistoric and later periods. It allows only very general conclusions as to the origin of the remains – especially in ploughed-out contexts. Secondly, recovered iron objects tend to require more effort and expense in conservation. This has led to a practice of not collecting or even lifting iron objects during metal detection. Thus a chiefly economical consideration has rendered the recovered assemblages less useful for studies of ironworking. Lastly, non-ferrous metalworking requires a wide range of specialist knowledge, not only of metals and alloys but also of clays and their level of heat resistance. A general assumption is thus that even average traces of such metalworking often reflect a higher level of specialisation than similar traces of ironworking. From that point of view even the humblest presumed “household” caster (Hedegaard 1992) should be seen as a specialist.

Gotland has no non-ferrous metal ores; the islanders have always been dependent on import of such metals. The Late Iron Age saw no break in this practice, rather the opposite, as is visible through the abundance of indigenous jewellery designs. To date many thousand specimens of, for example, animalhead brooches and box brooches have been found on the island. A now somewhat dated statistical estimate suggested a total production of 122,400 individual animal-head brooches between AD 725 and 1150 (A. Carlsson 1983, p. 83). This approximate number of brooches may serve as a reminder of the large quantities of metal needed locally. Just how this metal reached the island and how it was distributed there is beyond the scope of this paper. Suffice to say that the craftsmen of Gotland clearly knew how to get non-ferrous metals and turn them into a wide range of indigenous objects.
Indications of Non-ferrous Metalworking

Non-ferrous metalworking is generally indicated by the presence of a number of diagnostic artefact types. Casting moulds of stone or tempered clay are among the more obvious. The clay mould fragments are particularly important as they have no re-use value and rarely survive secondary deposition, and so are a good indicator of casting at the site where they are found. Symptomatically, such moulds were only reported from a very small number of sites before 2000. One was the mouth of the cave Stora Förvar on the island Stora Karlsö off Gotland’s west coast. These fragments derive from the casting of Viking Period objects – a Gotlandic box-brooch, an oval brooch of the pan-Scandinavian mainland type P 25, and lastly, the crown of a Gotlandic disc-on-bow brooch (GM 0176-2006; SHM 13418). The mould fragments for Gotlandic jewellery are important as they are the only recognisable moulds for these two brooch types that have been identified. In 2000, however, the number of mould fragments increased dramatically through the addition of a single important site: a small workshop at Bottarve in Fröjel parish. It had escaped ploughing and thus represents the only undisturbed Gotlandic Late Iron Age metal workshop to date (Söderberg & Gustafsson 2006; Gustafsson & Söderberg 2007). The building measured 5.5 by 4 m and yielded clear evidence of silver cupellation (Söderberg 2011) and silver casting (Wojnar-Johansson 2005) in the form of crucibles and a large number of mould fragments. The importance of the Fröjel workshop is difficult to overstate – as the best preserved metal workshop of the Gotlandic Late Iron Age known to date it is invaluable for the interpretation of less well preserved sites.

In addition to the moulds several other find types indicate non-ferrous metalworking. Crucibles and metal-impregnated hearth lining (cf. Gustafsson, in press) are two of the more diagnostic, but casting jets, metal spillage and droplets are often just as indicative. Several other find types may be added, such as miscasts, ingots and pieces of scrap metal. Hammers, pliers and other tools have often been pointed to as evidence of metalworking, but it should be kept in mind that they may derive from destroyed burials or depositions.

Defining the Sites

In the absence of more well-preserved workshops the aforementioned metal detector finds offer essential clues to the understanding of Gotlandic non-ferrous metalworking. Due to their non-descript appearance they have mostly been overlooked by previous research. Of the 386 surveyed properties, I have found 56 to have yielded evidence for non-ferrous metalworking. A large number of other sites also produced similar finds, but in these cases the connection to non-ferrous metalworking is vague. To deal with this problem I had to establish a basic selection criterion: preferably several indicative find types should have been recovered from an area for me to regard it as a metalworking site. Stray finds, on the other hand, must be treated with caution. A good example is offered by pieces of ingots and scrap metal. They do not necessarily prove that metalworking has taken place, as they may just as well derive from ploughed-out depositions or from finished objects fragmented by farming implements. The highly indicative clay mould fragments are unfortunately few at the metal-detected sites. When they do occur, they have generally been recovered during follow-up excavations.

It is often difficult to date the metal-detected sites precisely as most of the original contexts have been ploughed out. The situation would have been rather hopeless if it had not been for settlement customs on Gotland. At many sites the farmstead’s buildings were not fixed to a certain position, but kept moving around its lands. This is largely supported by 1pq-dated silver hoards and datable artefacts recovered in their vicinity. The hoards themselves often seem to have been a kind of permanently deposited house offerings, to which silver was sometimes added over time (Westholm 1990, p. 23 f; Jonsson & Östergren 1990, p. 156 ff). Apparently they were tightly connected with their buildings as they were left in place when these were destroyed or abandoned. Not all hoards were deposited in this fashion though – if they were indeed deposited at all. Several “hoards” can possibly be interpreted as collections of scrap silver intended for remelting. These can be difficult to distinguish from more ordinary hoards, but as a rule they tend to consist of pieces of ingots, larger droplets and scrapped jewellery, rather than
whole coins. To date no thorough examination of the Gotlandic hoards from this point of view has been published, but there are several examples of collections of silver objects which were probably not deposited in the true sense of the word. Two recent examples are the finds from Klints in Othem parish (Pettersson 2005) and Lilla Bjärge in Vallstena parish (D. Carlsson 2010). On the other hand it cannot be entirely ruled out that these collections of silver were actually ritually deposited in the apparent workshops in accordance with now traceless practices. It may have been seen as quite suitable to deposit raw material as an offering in such a context.

Like most Norse-speakers, Gotland’s inhabitants practised a bullion-based economy in which silver was valued according to purity and weight (cf. Kilger 2011; Söderberg 2011). The island enjoyed a steady influx of silver coins. Coins were presumably the most important source of silver on Gotland, where it was remelted and cast into local artefact types such as penannular brooches and bracelets. In present-day Russia, along the main silver route from the Baghdad Caliphate to Gotland and Scandinavia, extensive studies of 200 coins and 160 Slavonic and Norse silver objects has shown that there is a clear difference in the silver-base metal ratios of the two find categories. The proportion of silver is significantly higher in the jewellery than in the coins, though the latter were presumably the main source of the silver. Coin silver must thus have been refined to remove base metals prior to casting (Eniosova & Mitoyan 2011). No similar study has as yet been undertaken in Scandinavia, but the process is confirmed through extant cupellation hearths, both on Gotland and the Swedish mainland (Söderberg 2011).

Sites and Finds
As mentioned above the surveyed Gotlandic farming properties occasionally contain more than one settlement. Conversely, a site can sometimes extend across two or more properties. A scrutiny of the 56 surveyed properties with clear evidence of non-ferrous metalworking yielded 67 individually defined sites; an addition of 19 sites which have not primarily been metal-detected give a total of 86 sites. A selection is presented here, and a full catalogue will be included in my forthcoming PhD thesis. The sites can be divided into four categories: farmsteads, workshop sites, potential workshop sites and larger, extroverted coastal settlements. The first group is the largest with 49 sites. 14 other sites can securely be interpreted as workshop sites while 13 sites have yielded individual finds that normally occur in professional metalworking contexts – press models, matrices and master models. These are considered as potential workshop sites. The last group, the harbour sites, numbers six members, and these represent something quite different from the other groups. Even though they were parts of the era’s society they seem to primarily have acted as a link between the Gotlanders and the outside world. Hence they were not typical for Gotland in general. Four sites which have not been metal-detected cannot be categorised since they have only yielded stray finds of fragmented crucibles, i.e. clear indications of non-ferrous metalworking but nothing to define its extent.

The most comprehensively metal-detected parish on the island is Eke on the south-eastern coast. It is also one of the smallest of the island’s 93 church parishes, measuring only c. 19 km². It was the focal area of the Eke Settlement Project – a spin-off from the official Hoard Project, headed by Torgny O. Andersson. He aimed to metal-detect as much as possible of Eke’s farmland. A follow-up of the largely unpublished reports show that 138 farming properties had been surveyed by 2000. According to Andersson’s own calculations that was more than 85% of the farmland in the parish (Andersson 1999, p. 24; 2000, p. 16 f). The number of surveyed settlements is not clear, but Andersson accounted for 16 Viking Period settlements within 11 properties (2000, p. 17 p). Via the reports and curated finds it is possible to establish that non-ferrous metalworking took place in at least six of the surveyed fields. Sadly it is hard to determine from which settlement within these fields the finds derive. In addition to Andersson’s finds, note the Smiss find recovered in Eke parish in 1869, on lands belonging to the modern farm Smiss (SHM 4778; Zachrisson 1962). It is a large collection of unfinished objects in Gotlandic, mainland Scandinavian and Baltic styles as well as tools – among these several master models – and scrap metal. The Smiss find is crucial for the
understanding of Gotlandic non-ferrous metalworking, but until recently the find spot was unknown (Andersson 2000, p. 81). Unfortunately the indicated find spot has been mostly covered by landscaping for an early 20th century house and its adjacent garden. However, in the light of other similar tool hoards (cf. Lund 2006), it is probable that the objects were not buried at a workshop, but deposited as an offering.

Outside Eke, metal detector surveys have been more sporadic, targeting known or likely find spots of silver hoards. As mentioned above, non-ferrous metalworking has largely been identified through the occurrence of diagnostic artefact types and combinations of such. At the 14 workshop sites these diagnostic types occur much more frequently. It is tempting to interpret them as production centres on a regional level. At a number of sites several large clusters of metalworking debris and diagnostic types – i.e. ploughed-out workshops – have been found fairly close together. These clusters may represent successive incarnations of the same farmstead. This could be taken as evidence for the – hardly surprising – existence of hereditary craft specialisation, i.e. that the metalworking skills were kept and passed on within families.

Among the place names of Gotland certain farmstead names recur across the island. Some scholars (e.g. Hyenstrand 1989) have interpreted them as evidence for a system of social organisation predating the High Medieval parishes. One of these name types is variations on the theme Smiss, “the smith’s [farm]”, found in about 20 of the parishes (Olsson 1984; cf. the Smiss find mentioned above). A number of the sites surveyed during the Hoard Project are on land belonging to, or close to modern Smiss farms. Note however that because of the moving settlement custom few modern farms can be expected to have stayed at their current locations farther back than to – at most – the Middle Ages.

Based on finds from the secure and potential workshop sites one might put forth a hypothesis that regional specialists were based at the settlements with more extensive traces of metalworking. There they made non-ferrous – and probably also iron – objects which were distributed regionally and inter-regionally. This picture is however contradicted to some extent by the fact that traces of small-scale, yet skilled non-ferrous metalworking have been found at quite a number of settlements. In many cases these remains may document a single event, and so these finds may indicate farm-based casting. But if regionally dispersed larger workshops are taken into account it is questionable if people at ordinary farms would have had to deal with non-ferrous metalworking.

Research on early metalworking often tend to focus on metals and alloys while less is said about the fact that a craftsman would not have been able to cast anything with a higher melting point than tin or lead if he was not skilled in the use of heat-resistant (refractory) materials. They are essential to achieve and uphold the temperatures needed. Given the demand for such proficiency it is more probable that these skills were held by only a few people. Clearly many people on Viking Period Gotland could get hold of metal – but transforming it into local jewellery types was probably an art mastered only by a few.

The island’s culture has sometimes been seen as relatively egalitarian (Siltberg 2012). As with most other archaeological cultures this proposition is difficult to test. Here scholars often become stuck in shifty empiricism patched up with historical accounts, modernist social theory and ethnographic parallels, aids which often cause more trouble than good. Still, venturing into the realm of social theory, it does appear likely that non-ferrous metalworkers would have enjoyed higher prestige than normal farmers and tradesmen. Thus it is possible that in the remains of single casting episodes at otherwise normal settlements we are seeing the traces of metalworkers gaining or “recharging” prestige through public display of their skills. These were so specialised that they could without risk be shown to non-specialists who may themselves have provided the metal (cf. Apel 2009, p. 119 p). Speculation aside, attempts to uphold prestige is one possible explanation for farm-based casting. A more functional one might of course be that semi-itinerant metalworkers travelled around and produced what was needed locally, much as makers of fur coats still did in remote parts of Scandinavia in the 19th century (Matsson 1976). But one explanation must not necessarily contradict the other; after all most
practices within a society tend to fulfill multiple purposes.

Methodological Caveats and Source Criticism
So far I have discussed sites with many indications of non-ferrous metalworking alongside those with only a few. But there are several complicating factors. One of the more important is that many sites have not been metal-detected on a sufficient number of occasions. This is particularly evident at sites where few coins or other precious metal objects have been recovered. One such site is found on land belonging to Nygårds in Etelhem parish. Despite being metal-detected only twice it has yielded several diagnostic finds of archaeometallurgical significance. The site is in the middle of a field and, especially during the second survey in 1990, a wide range of objects were recovered. These include droplets and spillages of copper alloy, lead lumps, fragmented hearth lining, a casting jet and a weight. Normally, these finds would have marked the site as an ordinary farm with occasional metalworking. However, three additional finds point in a different direction: a copper alloy matrix for the making of embossed sheet metal ornaments (fig. 2a), half of a casting mould of lead for a small ornamental feature, intended for beeswax (fig. 2b), and what appears to be half of a polyhedral ornament. Given the widespread Gotlandic fashion to adorn iron objects with cast-on polyhedral elements the ornament from Nygårds is most probably a master model for mould making. These three items indicate in a qualitative manner that metalworking at Nygårds was more extensive than the small number of finds implies.

A similar situation is seen at Gerete in Fardhem parish. During a metal detector survey in 1990 several finds with a clear connection to non-ferrous metalworking were recovered (Almqvist et al. 1990). Beside an abundance of copper-alloy spillages and droplets a silver spillage with adhering fragments of burnt clay was found. Two polyhedral weights were also recovered, along with brooches and belt fittings. These latter finds might indicate ploughed-out burials, but just like the site at Nygårds in Etelhem the site at Gerete has yielded finds which indicate limited non-ferrous metalworking. What distinguishes it from an ordinary farm site is a finely decorated object of typical Gotlandic design – a tongue-shaped pendant (SHM 34689:2:35). Several other pendants in the same style are known from the island but the Gerete pendant is special as it has no suspension hole and is made of lead. These traits signal that it is most probably a master model (fig. 3). It was designed to spawn multiple clay moulds and its presence signals extensive organised non-ferrous metalworking. Only one silver coin was recovered though and it was not until 2000 that a second survey was carried out at Gerete (Ström 2000). It resulted in the recovery of some new finds, but due to unsatisfactory field documentation not much was added to the understanding of the on-site metalworking.

Gerete illustrates one of problems with using finds recovered by the Hoard Project and other subsequent survey campaigns in a scientific study. Sites where rich finds of precious metal have been made are usually surveyed again soon after the first survey. This is done because objects at a

Fig. 2. Nygårds in Etelhem.
[a. Matrix for embossed sheet metal production. b. Lead mould.]
greater depth in the plough soil are generally not found during a single survey; instead several visits are needed after harrowing or ploughing. Sites like Nygårds in Etelhem and Gerete in Fardhem are less attractive for re-survey because of their relative lack of find categories that might attract looters. The primary goal of the Gotlandic metal detection campaigns has always been to salvage finds with a market value, not to collect data with a bearing on any given set of questions. Thus highly interesting sites can be left without any further archaeological intervention while remaining under continual erosion through ploughing. From other sites it is evident that visible traces of settlements and crafts activities, discernible as areas of darker soil and concentrations of debris, become blurred and disappear completely over time as a result of regular ploughing (e.g. Gustafsson & Viberg 2011). If potential clues to the understanding of non-ferrous metalworking have once been present at a site, nothing may survive 20 years later. Likewise it has to be taken into account that sites where only a few metalworking-related finds have been recovered may conceal diagnostic finds like dies and master models which have not yet been dislocated by ploughing or lifted to detectable depth in the plough soil. A study of the present kind must thus be seen as provisional since much of the underlying empirical base is subject to change.

Other Sources
Besides more contextualised finds from excavations and metal detector surveys on Gotland there is another informative group of finds in museum collections both in Sweden and abroad – finds without any more specific context than “Gotland” and finds attributed to Gotland on stylistic grounds. Two such attributed finds have recently undergone analysis at the Archaeological Research Laboratory in Stockholm and may serve as examples.

Given the explicit aims of the Hoard Project it is ironic that these important and informative pieces of metalworking debris might not have been recovered and known to science if it had not been for a group of presumably British looters, who operated on Gotland in 1989 (Jonsson & Östergren 1989). In November 1991, a “Small Late Saxon Period Hoard, probably from Scandinavia” was offered for sale at auction by Glendinings in London. The lot consisted of coins, hack silver and a number of lead objects. Swedish numismatists regarded the combination of coins as well as their patina as typical for Gotlandic hoards, and so the lot was purchased by the Royal Coin Cabinet (the National Museum of Economy); the objects where given the inventory number KMK 102031.
Based on earlier finds and documented looting cases in Grötlingbo parish the hoard and the accompanying objects were tentatively attributed to the farm Kattlunds (Eva Wiséhn, accession catalogue entry, inv. no 102031, KMK dnr 420/91). This must of course be taken with a grain of salt since the lot may have been partly put together by the seller – but it is still interesting for the scope of this paper as two of the objects were sold as “Moulds (2), for brooch-end and small ornamental boss” (figs 4–5). Both are made of lead or a lead-rich alloy, and while one of the objects was quite correctly connected to the production of ornamental bosses, the other is definitely not intended to produce a brooch end. Nor is either of the two a mould: they are imprinted pieces of lead used to produce embossed sheet metal ornaments for jewellery on press dies (cf. Armbruster 2007).

The smaller of the two pieces has been used to produce one or possibly two decorative embossed sheet metal bosses of a type found on 10th century tortoise brooches (e.g. Jansson 1985, p. 110). On one face is a deep and somewhat distort-
ed imprint of a boss (fig. 4a). On the other, convex face, faint traces of a second, hammered-out imprint are visible. Via 3D-white light scanning it is possible to render a picture of what a boss would have looked like (fig. 4b). A similar piece of lead has been found at Bondarve in Levide parish (find no. 421, Östergren 2004, p. 57). The other, larger piece of imprinted lead is even more intriguing (fig. 5a). It has been used to make sheet metal filigree pendants. An inverted 3D scan shows that it matches a press die for pendants of bird-like design (fig. 5b). To date such dies – two in all – have only been reported from the harbour basin of Haithabu (fig. 5c). No surviving pendant of this style has yet been found.

If these pieces of lead were indeed recovered at Kattlunds they allow two different interpretations. Firstly, that they were produced during on-site metalworking. Secondly, and equally plausibly, that the pieces reached Gotland as scrap metal. Regardless, both interpretations suggest a connection between Gotland and Haithabu, but since the objects were looted they have lost most of their potential as clues to non-ferrous metalworking.

Conclusion

This review of reports and finds from older excavations and metal detector surveys suggests that non-ferrous metalworking took place on a large number of settlements throughout Gotland during the Late Iron Age and Early Middle Ages. It is possible to identify a number of settlements with more abundant traces of metalworking. These were surrounded by settlements where small-scale metalworking occurred, possibly at only a few occasions. The significance of this is still unclear to some extent, but the finds may imply that metalworking was rather tightly organised on the island. If so, it was probably just one part of a much larger system of social organisation which is mostly undetectable to archaeological research. However, thanks to the metallic content in a range of find types it can be observed to some extent, as it resurfaces in the wake of the hoards.

References


Summary

This article presents and discusses evidence for non-ferrous metalworking on Gotland, Sweden. The finds have mainly been recovered during metal detector surveys from the 1970s and onwards and are roughly dated to AD 500–1150. Non-ferrous metalworking was chosen over ironworking as the study’s subject as it is better represented in the find material. Also it may be assumed to demand, even when undertaken on a limited scale, a higher level of proficiency than everyday ironworking. A closer examination according to the occurrence and combinations of certain diagnostic finds such as moulds, crucibles, casting jets, spillages and hearth lining showed that such finds have been recovered at 67 individual sites within 56 land properties. The setting of the sites and the frequency of diagnostic finds allow for a division of the sites into groups. The largest one is labelled as normal farmsteads where one or possibly a few casting episodes have occurred. As a contrast a number of sites have yielded larger numbers of diagnostic finds. Some appear to have been workshops with a substantial production. At some of these sites traces can be seen of what appears to be hereditary craftsmanship: the workshop has followed the rest of the settlement when it has relocated, i.e. more than one generation of metalworkers has been active at these farms.

The general conclusion drawn from the sites and the spread of finds is that they indicate the existence of larger, regionally active metal workshops. Based on surviving place names including variations of the possessive Smis – “the smith’s” – it has previously been suggested that such regional workshops operated on the parish level – possibly indicating an organisational system pre-dating the parishes. Unfortunately it is not possible to connect more than a few known workshop sites to extant Smis farm names. The evidence for small-scale non-ferrous metalworking at ordinary farms is interpreted as possible traces of semi-itinerancy among the regional metalworkers – possibly pursued as a means to gain prestige through the display of skill.

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