2361

Ancient Monuments Laboratory
Report 76/93

ASSESSMENT OF NON-FERROUS METAL ARTEFACTS FROM BARRINGTON (EDIX HILL HOLE), CAMBRIDGESHIRE EXCAVATIONS, 1987-1991

Catherine Mortimer BTech DPhil

Ancient Monuments Laboratory Report 76/93

ASSESSMENT OF NON-FERROUS METAL ARTEFACTS FROM BARRINGTON (EDIX HILL HOLE), CAMBRIDGESHIRE EXCAVATIONS, 1987-1991

Catherine Mortimer BTech DPhil

Summary

Excavations at this early Anglo-Saxon inhumation cemetery produced a large collection of grave goods. It is recommended that the non-ferrous artefacts be analysed to determine their compositions. A study of the punchmarks would provide a greater understanding of the metal-working production systems supplying the community.

Author's address :-

Catherine Mortimer BTech DPhil

Ancient Monuments Laboratory
English Heritage
23 Savile Row
London
W1X 1AB

Assessment of non-ferrous metal artefacts from Barrington (Edix Hill Hole), Cambridgeshire excavations, 1987-1991

Catherine Mortimer

Barrington (Edix Hill Hole) has been known as an early Anglo-Saxon cemetery site for more than a century, the first discoveries being in the 1840s. Grave goods resulting from 19th century activity at this, and nearby Hooper's Field (Barrington B[1]), is retained at several museums (Cambridge University Museum, Ashmolean Museum, British Museum). Metal-detector finds in 1987-8 showed that further elements of the site were still in existence, although threatened with plough damage. Fieldwalking, metal-detector survey and excavation in 1989-91 confirmed this and revealed over 100 inhumation burials, with a variety of grave goods.

The copper-alloy[2] metalwork from the site consists of 24 brooches (at least 7 pairs), 3 cylindrical 'beads', 14 buckles, 17 wrist clasps (at least 6 pairs or sets) and 21 rings, 5 coins, 4 tweezers, 5 pins, 5 pieces of wire or objects made from wire, 6 strapends, 26 pieces of sheet/plate or objects made from sheet/plate and a small number (less than 10) other, unclassified objects. The material appears to be in a generally good condition. About six ferrous objects are also likely to be inlaid with non-ferrous metals or have non-ferrous metal attachments (*eg* shield bosses).

Two objects have been tentatively identified as silver or gold.

Potential for technological analysis

Technological analysis would identify the metalworking techniques employed, thus allowing a more accurate description of the artefacts; it would also provide information about some of the materials (both metal and non-metal) used. Some classes of technological information would also be of use during conservation work.

Chemical analysis would determine the alloy types used. Some other groups of early Anglo-Saxon metal artefacts have been analysed qualitatively, *ie* a general description, such as 'brass' or 'bronze' was given after surface analysis using X-ray fluorescence analysis (XRF).[3] As comparative, fully-quantitative datasets are now available,[4] the results of quantitative analysis

---

[1] Meaney A 1964. A Gazetteer of early Anglo-Saxon burial sites. (London).

[2] Copper-alloy artefacts are all described as 'bronze' in the listings supplied for this assessment. These terms will be used in their proper sense here; 'copper alloy' is used when the metal is thought to be mainly copper, 'bronze' and 'brass' when analysis shows that the metal is copper-tin or copper-zinc, respectively.

[3] *Eg* Wardley K 1984. 'X-ray fluorescence analyses of 'Bronze' objects' in Hills C, Penn K and Rickett R 1984. The Anglo-Saxon Cemetery at Spong Hill, part III. (EAA 21): 38-40; Wilthew P 1985. Analysis of non-ferrous metal objects from Finglesham (Ancient Monuments Laboratory Report 4434).

[4] *eg* Mortimer C 1990 Some aspects of early medieval copper-alloy technology as illustrated by a study of the Anglian cruciform brooch, Unpublished DPhil thesis, Oxford.

of the Barrington copper-alloy objects could be compared with those of other Anglo-Saxon objects of similar typology and technology. Regional and national patternings of alloy use can then be re-evaluated.

At the site-specific level, determining the balance of alloy types used at the site would provide an insight into the metal supply to the metalworkers who made objects for this community. Establishing the types of alloys used for each type of object is also of interest; Anglo-Saxon artefacts show a range of metalworking techniques, which would have required different alloy characteristics. Pairs or grouped artefacts (*eg* from single, well-furnished graves) could be compared compositionally, to see if they could have been cast from the same melt.

Quantitative chemical analysis requires small drillings to be taken from the object, normally from the back of the object, in consultation with the conservator. The samples could be mounted and analysed by the X-ray analyser attachment of a scanning electron microscope (SEM-EDX) or by other methods, such as inductively-couple plasma spectroscopy (ICP). Some of the artefacts are not suitable for sampling, being too thin or too fragile and surface XRF will serve to identify the general alloy type in these cases. The silver or gold objects should also be analysed to confirm their identifications.

Chemical analysis could also be used to identify the inlays and coatings used on the objects. Gilding and white-metal coatings[5] on copper-alloy artefacts can be identified using non-destructive XRF analysis of the surfaces. Non-ferrous inlays and attachments on ferrous objects could also be analysed in this way.

Further quantitative analysis may be required on some of the more unusual artefact forms. The composite saucer brooches (a pair from Grave 530 and two metaldetecting finds) are of particular interest, as the method of construction for this form is not yet fully investigated. The technology behind the 'sheet gold' decoration on these pieces is especially intriguing, but useful scientific research would require sampling, which needs to be carefully considered.

The white and blue inlays on the disc brooch from Grave 126 could probably be identified using XRF, X-ray diffraction (XRD) and SEM-EDX.

Other types of technological analysis could be usefully carried out to investigate metalworking techniques.

Many of the copper-alloy objects have punchmark decoration on them. **A detailed study of the punchmarks** would require taking silicon rubber moulds and examining them with a scanning electron microscope. Individual punch tools can be identified where the punchmarks are well-preserved and where the tools have distinctive and unusual details (*eg* broken edges, additional lines or irregular details); where marks are poorly-preserved or nondescript, the general form of the tool only could be recorded. It would be an interesting and worthwhile project to establish the range of punchmarks observed within a single cemetery (this has never been done before, to my knowledge); combining data from the 1989-1991 material with that from objects from early excavations would make this more satisfactory. On a site-specific level, this would identify which artefacts share the same punch tool - these were probably made by the same individual or workshop.

Surface XRF allows the analysis of large areas of coatings *etc*. More detailed analytical work on the surfaces of objects can be carried out by putting the whole object in the SEM (where the condition of the object is good) and analysing minute areas for structural or chemical information *eg* the beaded wire on the disc brooch from Grave 126.

---

[5] White metal coatings are described as silvering in the listings provided for this assessment. The less specific but accurate terminology will be employed here.

Conclusions

Some sort of chemical analysis is required to accurately identify the non-ferrous metals used at the site. The existence of comparative datasets means that quantitative analysis would have a strong 'value added' component and this is therefore advised here, where feasible. The identification of the true nature of inlays and surface coatings on non-ferrous artefacts is also advisable, for accurate description during cataloguing.

The punchmark study is an 'optional extra' but one which has considerable academic potential. If the Barrington material is taken as a case study, the work may promote a more extensive study of the subject. This work might make an interesting short project for a conservation or archaeological science placement student at the AML. The research is likely to produce data suitable for a separate publication.

Structural investigation of the composite saucer brooches is also not strictly essential for basic cataloguing of the finds. However, I would be interested in examining the material at the AML, as it would provide valuable information about this type. If funding is particularly tight, these samples could perhaps be considered within the framework of a doctoral research program on gilding which is planned at Oxford University; I can supply further details about this on request.

CM 1 July 1993

Time estimates for technological analysis of non-ferrous artefacts from Barrington

A) Quantitative analysis of *c.* 30 non-ferrous metal objects

Sampling: 1 day (2 days, if I have to travel to sample)
Analysis: 1 week
Background research: 3 days
Report writing: 1 week

Total: About 3 weeks.

B) Qualitative analysis of surfaces (*c.* 40 objects)

Analysis: 1 day (NB analysis has to be carried out in AML)
Report writing: 2 days

Total: 3 days

C) Analysis of inlays from c. 6 objects

Analysis: 3 days (sampling can be carried out at the same time as A)
Background research: 3 days
Report writing: 2 days

Total: 8 days

D) Punchmark study (?20 objects)

Taking impresssions: 1 week
Analysis: 1 week
Background research: 1 week
Report writing: 1 week

Total: 4 weeks

E) Structural analysis of two composite brooches

Sampling: 1 day (2 days if I have to travel; can be done at the same time as A)
Analysis: 3 days
Background research: 3 days
Report writing: 3 days

Total: 10-11 days

Total, if all options adopted; 11-12 weeks