Contents

IV. Report on the Iron Sword from Grave 218

by Karen Wardley and Brian Gilmour

(Figs 464-5)

The scabbard

by Karen Wardley

Examination was carried out using a zoom-stereo microscope, with magnification of x7 to x40. Because of its fragility the sword was only examined on one face (the upper face during burial).

The scabbard appears to consist of a thin layer of wood, which totally covers the upper section of the blade but is more fragmentary over the lower section. A layer of leather can be seen below the wood in two small areas: just below the hilt and about half-way down the blade. In several areas are traces of very degraded leather lying on top of the wood. On the upper part of the blade are some small patches of textile overlying the wood. These are too degraded for any weave to be distinguishable, although some 'S' spun threads can be seen in one area.

It seems, therefore, that the scabbard was made of wood, lined with leather and with a leather covering. The patches of textile may have been associated with the scabbard, as an outer layer, or may have been from clothing in the grave in contact with the sword.

Structural aspects of the blade deduced from radiographs

(Figs 464-5)

by Brian Gilmour

Radiographs of this sword showed the central part of the blade to be pattern-welded. The most likely interpretation of the X-ray indicates a simple herringbone pattern visible on either side of the blade (reconstruction, Fig. 461). Criss-crossing marks show that the herringbone pattern pointed in opposite directions also on either side of the blade. A simple pattern of this type was probably made by welding together two composite rods, twisted in opposite directions along their whole length.

It is also most likely that two separate pairs of twisted rods have been welded back-to-back to form this central part of the blade (Fig. 462). Where metallographic analysis has been carried out on swords of this type (Tylecote and Gilmour forthcoming) they have, so far, always turned out to have two layers of pattern-welding. Sometimes the two layers are found to be separated by a plain core piece but in this case the radiograph suggests that no such piece is present. The central part of this blade therefore belongs to Type V of the classification suggested for body types of sword blades with welded-on cutting edges (Tylecote and Gilmour forthcoming).

Any further or more definite comments on the blade's composition, especially the cutting edges and the metallurgical structure, would require the metallographic examination of a section from the blade.

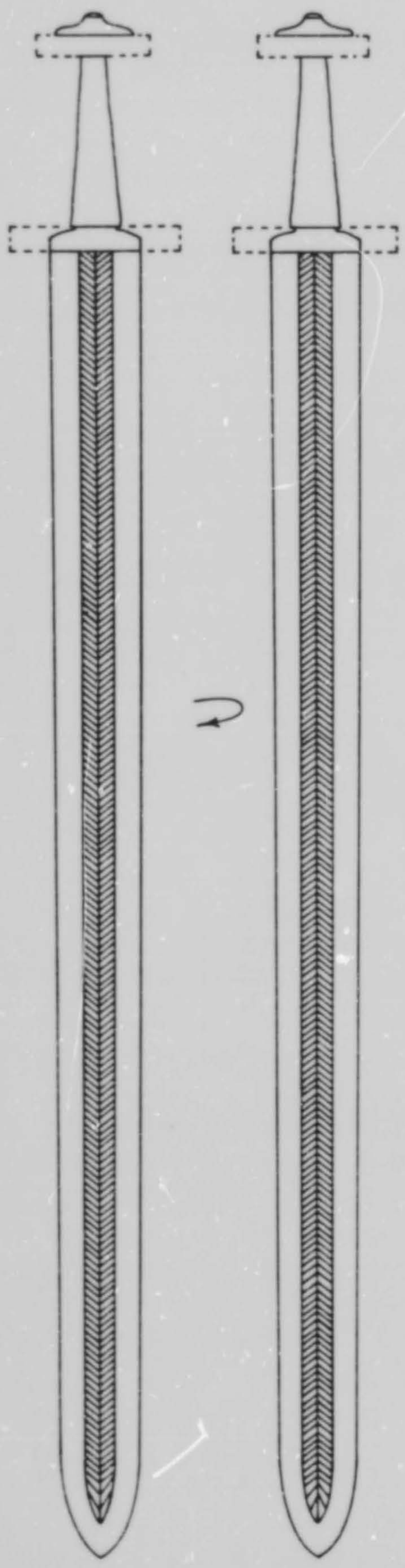

Figure 464 Conjectural original appearance of sword 218B

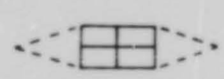

Figure 465 Diagrammatic view of structure of blade, sword 218B

V. Analysis of Non-Ferrous Metal Objects

(Fig. 466; Tables 6-8)

by Paul Wilthew

Introduction

A total of fifty-five non-ferrous metal objects were examined. The vast majority were copper alloy objects (Table 6), although many of these had been coated or inlaid. A few pewter, silver and gold items were also present (Table 7). A further five objects were submitted for analysis after the completion of this report. These results are included in Table 8.

The objects were all analysed elementally using energy dispersive X-ray fluorescence (X.R.F.) to determine, as far as possible, the composition of both the base metal and any coatings on the object. In one case (153.A) the inlay was analysed using an energy dispersive X-ray analyser attached to a scanning electron microscope (S.E.M.).

Several areas of some objects were analysed, and where possible individual components of multi-part objects were analysed separately. The analytical results are summarised in the appendices, together with comments on the probable composition of each object.

Method

The analytical method used was an energy dispersive X-ray fluorescence system with a Rhodium tube run at 35kev. It was not quantitative, but to enable comparisons to be made between analyses of different areas of an object, the ratio of the main peak height of each element present in the copper alloys to the copper K peak height was obtained. These ratios (multiplied by 100) are quoted in Table 6. They are not percentages and are only approximately internallv comparable.

Several terms are used below to describe the base metal of the copper alloy objects and these are defined as follows:

__Bronze:__ an alloy containing copper and tin with, at most, a relatively small amount of zinc

__Brass:__ an alloy containing copper and zinc with, at most, a relatively small amount of tin

__Gunmetal:__ an alloy containing copper and significant amounts of both tin and zinc

Fairly pure copper may also be found in which, at most, small amounts of tin or zinc are present.

Any of these alloys may also contain significant amounts of lead, in which case they are described as __leaded.__ There are, however, no firm boundaries between the different types of alloy, although most objects can be categorised with reasonable confidence. The compositional relationship between the alloy types is illustrated in Figure 466, in which the closer a point is to the vertex corresponding to an element the greater the proportion of that element in the alloy.

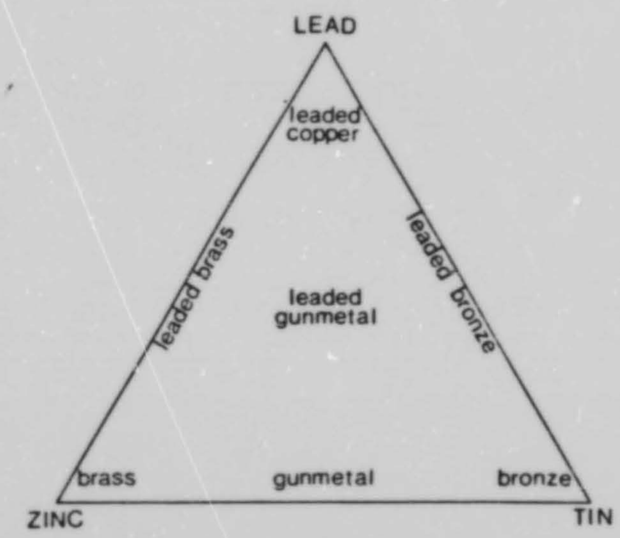

Figure 466 Composition of copper alloys

Results

The results for the pewter, gold and silver objects (Table 7) did not present any problems of interpretation and these results will not be discussed further, but there were several complications associated with the results for the copper alloy objects (Table 6).

An unusually high level of tin was detected in most of the copper alloy objects. This suggests that considerable tin enhancement may have occurred due to the loss of other elements from the surface of the objects as a result of corrosion during burial. X.R.F. involves analysing the surface of the object and in this case no surface preparation was carried out to ensure that the process was completely non-destructive. Most of the objects were corroded to a greater or lesser extent and this weathering affects the proportions of elements present which is reflected in the analytical results.

Six objects which had extremely high tin and, to a lesser extent, lead levels may have been affected by loss of copper and, in two cases, zinc. 362.H and 370.D both contained zinc and were therefore probably leaded gunmetals originally rather than corroded pewter (tin-lead alloy) as it is unlikely that both copper and zinc would be present at significant levels as contaminants. The other four objects (209.A, 209.E, 369.N and 369.P) did not contain zinc, and it is possible that the copper detected was contamination and that they were originally pewter. However they could also have been heavily corroded bronze or leaded bronze. Examination of a section through the object or the quantitative analysis of a core sample of the material might enable a firm conclusion to be reached.

Many of the other copper alloy objects were at least partially coated with visible tin, tin-lead, or silver coatings. It was possible to determine whether silver was present in all cases, but distinguishing between tin and tin-lead coatings were often impossible. Visibly coated areas were compared with areas in which no coating was (apparently) present, and if substantially higher tin or tin and lead levels were detected in the coated area the white metal could be identified with some confidence. In several cases, however, no significant difference was found and if both tin and lead were present the exact nature of the coating could not be identified. This lack of precision could have been due to the presence of tin and lead in the base metal of the object masking the effect of the coating, or the apparently uncoated area could have been coated originally but all visual evidence of the coating may have been lost or masked by corrosion.

In practice, apart from one object (214.A) all the white metal coatings were either essentially tin or were a tin-lead alloy. In general the tin coatings were probably applied for decorative effect, and on some objects this was clearly the case as the coating was applied to the decorated front surface of the objects. The tin-lead alloy coatings could also have had a decorative purpose but they may have been, in some cases at least, the remains of solder. Certainly solder appeared to be present on several of the wrist clasps, such as 16.Di-ii, 16.Gi-ii and 148.Ii-ii.

Difficulties also arose in determining the composition of the base metal some coated objects as it was not always possible to decided whether tin and lead were present in the base metal as well as in the coating

Despite these individual problems, some comments about the composition of the objects can be made.

The results suggest that the majority of the objects contained at least several per cent of zinc, although none of them, probably, contained more than about 10% zinc. These levels are considerably lower than those found in Roman brasses, which may contain up to about 25% zinc.

Lead is detectable in most copper alloy objects of this period, and it was almost certainly present in all or almost all the copper alloy objects analysed in this work. However the results suggest that only about 1%-2% or less of lead was present in those objects with values of up to about 2-3 in Table 6, and the vast majority of the other objects probably contained a maximum of about 5% lead. This is to be expected as a high prcportion of the objects were wrought, and alloys containing more than a few per cent of lead are not suitable for hammering to shape.

As discussed above, the tin contents of the objects was difficult to determine, but the high levels detected suggest that a few per cent or more of tin was present in most objects, but almost certainly not very high (about 20% or greater) levels in any object.

It appears that the general pattern of copper alloy usage was similar to that found on other pagan Anglo-Saxon sites. Most of the objects almost certainly contained both tin and zinc, and in some cases contained a few per cent of lead. The extensive use of gunmetal-type alloys has been observed on other sites of this period and may indicate the re-use of scrap metal on a large scale.

Key to Table 6:

Area analysed column

White metal = area in which a white metal coating was visible. The coating may not have covered the entire area analysed, or even a high proportion of it.

Base metal = area in which no coating or inlay was visible. It is possible that a coating or inlay was present originally, and that detectable traces of it survive.

Element present column

1. The figures given are the ratios of the zinc K00, lead L00, tin K00, gold L00, mercury L00, and silver K00 peak heights to the copper K00 peak heights, all multiplied by 100. These objects are not directly proportional to the composition of the object as different elements fluoresce more or less strongly.

2. - = not detected. The detection limit varies from one element to another but is of the order of 1%.

3. Variations in the figures for an element in different areas of an object are probably not significant unless they differ by a factor of two or more.

Comments column

1. When a coating containing tin was present but it was not clear whether the coating also contained lead the object is described as 'tinned'.

2. When describing base metal alloy types as bronze or gunmetal, it is assumed that if a high level of tin was detected tin was present in the base metal, even if a coating was present. This will almost certainly be correct for the majority of the objects, but it is possible that in an occasional case the assumption is not valid and so when there was any doubt the composition is qualified by 'probably'.

3. Unless otherwise stated in the table, lead was almost certainly present as a low level (a few per cent or less) in all the objects. This level of lead would not have had a significant effect on the properties of the metal so these objects should not be described as deliberately leaded. There is no comment on the lead level in these objects in the table.

Table 6 Analytical results for copper alloy objects

Object	Description	Area Analysed	Elements present Zn	Pb	Sn	Au	Hg	Ag	Comments
6.Bi	Annular brooch	White metal	11.9	10.4	2.7	-	-	-	Tinned, possibly over the whole of the front surface. Base metal was probably ?leaded gunmetal.
	front	Base metal	10.5	25.1	3.9	-	-	-	
	back	Base metal	7.1	10.9	1.6	-	-	-	
16.B	Cruciform brooch	White metal	2.3	4.7	3.0	-	-	-	Mercury gilded and tinned. Mercury gilding was the method of gilding normally used during this period. Gilding contained silver. Base metal probably ?bronze.
		Gilded area	4.7	6.8	2.8	62.0	18.8	2.4	
		Base metal	2.9	2.9	2.2	-	-	-	
16.D	Wrist-clasps	White metal	6.7	8.3	2.4	-	-	-	Tin-lead alloy coated. Base tinned. Metal was gunmetal.
		Base metal	7.9	2.5	1.3	-	-	-	
16.G	Wrist-clasps	Base metal	5.9	13.4	3.5	-	-	-	Both surfaces of each piece gave similar results. No coating visible, but high lead and tin values suggest that a tin-lead coating was originally present in some areas. Base metal probably gunmetal. ?Tinned.
35.E	Wrist-clasps	Base metal	5.6	3.0	0.8	-	-	-	Both surfaces of each piece gave similar results. No evidence for a coating. Base metal was gunmetal.
44.E	Disc plate brooch	White metal	2.9	5.6	3.5	-	-	-	Tinned. Base metal was bronze.
		Base metal	2.4	4.4	3.0	-	-	-	
50.A	Wrist-clasps	White metal	3.0	5.0	2.9	-	-	-	Tinned. Base metal probably Bronze. Both pieces gave similar results.
		Base metal	3.0	2.5	1.4	-	-	-	
50.B	Wrist-clasps	White metal	2.9	4.9	2.8	-	-	-	Results were similar to 50.A. Both pieces gave similar results. Tinned. Base metal probably ?bronze.
		Base metal	2.7	3.0	2.1	-	-	-	
97.B	Wrist-clasps	White metal	1.4	7.4	2.9	-	-	-	Both parts were similar. Tinned. Base metal probably ?bronze.
		Base metal	1.3	7.6	3.1	-	-	-	
97.S	Wrist-clasp	White area	3.3	7.1	3.2	-	-	-	Results similar to 97.B. Tinned. Base metal probably ?bronze.
		Base metal							
108.Ci	Wrist-clasps	White metal	8.0	16.1	7.0	-	-	-	Tin coated. Base metal was gunmetal. Tinned.
		Base metal	8.8	15.4	3.2	-	-	-	
108.Cii	Wrist-clasps	White metal	6.0	11.5	6.6	-	-	-	Tinned, tin coated. Base metal was bronze. Results similar to 108.Ci
		Base metal	8.9	14.1	2.2	-	-	-	
115.Hi	Buckle & plate	Loop	2.1	23.3	1.7	-	-	-	Loop was a leaded bronze. Plate was a gunmetal.
		Plate	0.0	1.3	0.8	-	-	-	
115.Hii	Plate	White metal	1.0	2.0	2.1	-	-	-	Tin coated. Base metal was tinned, probably ?bronze.
		Base metal	2.1	1.7	2.4	-	-	-	
126.Ci	Wrist-clasp	Front	6.9	5.1	0.7	-	-	-	No evidence for a coating. Base metal was gunmetal.
		Back	6.2	3.9	0.9	-	-	-	
133.Gii	Brooch	Edge	5.4	16.3	3.4	-	-	-	There was no conclusive evidence that the edge was coated. Base metal was leaded bronze.
		Back	4.4	14.3	2.2	-	-	-	
146.A	Plate brooch	White metal	4.6	12.6	4.4	-	-	-	Tin-lead alloy coated. Base metal was bronze. Tinned.
		Base metal	2.7	3.8	2.0	-	-	-	
146.B	Brooch	White metal	4.4	16.6	5.4	-	-	-	No base metal area was analysed. Results similar to 146.A, and this brooch probably also tin-lead alloy coated ?bsonze. Tinned.
148.H	Wrist-clasps	White metal	6.4	7.7	2.8	-	-	-	Both pieces similar. Tinned, tin coated. Base metal probably gunmetal.
		Base metal	14.0	5.3	1.4	-	-	-	

Object	Description	Area Analysed	Zn	Pb	Sn	Au	Hg	Ag	Comments
			Elements present						
148.I	Wrist-clasps								
	Front sheet	White metal	9.1	11.0	5.0	-	-	-	Both sides of front sheet probably tin-lead alloy coated. Tinned. Base metal of both sheets probably ?gun-metal.
	Front sheet	Back	12.9	14.6	2.1	-	-	-	
	Back sheet	Base metal	14.6	3.8	0.9	-	-	-	
153.A	Ring	Base metal	4.3	0.8	-	-	-	-	The inlay contained sulphur (from S.E.M. analysis) and was almost certainly a copper sulphide niello. Base metal was (low zinc) brass.
157.G	Buckle	Loop	2.4	6.1	2.9	-	-	-	Loop was bronze. Pin probably ?tinned tin-coated bronze.
		Pin	0.9	1.4	7.3	-	-	-	
207.C	Sheet	White metal	1.4	7.0	2.3	-	-	-	Tinned. Base metal probably ?bronze.
207.D	Disc	White metal	2.0	8.4	5.3	-	-	-	Tinned. Base metal probably ?bronze.
209.A	Annular brooch	Base metal	-	42.1	203.4	-	-	-	This object had a very unusual composition which could not be identified with confidence. It contained very high levels of tin with significant amounts of copper and lead Ae (not identifiable).
209.E	Wrist-clasps	Base metal	-	126.4	91.1	-	-	-	As 209.A Ae (not identifiable).
209.F	Wrist-clasps	White metal	1.0	7.6	4.2	-	-	-	Lead-tin alloy coated. Base metal bronze. Tinned.
		Base metal	0.8	2.7	2.1	-	-	-	
214.A	Square-headed brooch	White metal	8.4	2.2	2.4	?	-	1.1	Coating silvered. Gold detected on front suggests that the brooch may have been ?gilded, although no gilding visible. Base metal was gun-metal.
		Front	5.0	1.1	1.8	2.2	-	0.5	
		Back	3.9	0.7	1.6	-	-	?	
249.E	Wrist-clasps	White metal	3.0	6.8	2.6	-	-	-	Tinned. Base metal probably ?bronze.
		Base metal	1.8	3.5	1.1	-	-	-	
249.F	Wrist-clasps	White metal	5.1	8.6	3.6	-	-	-	Tinned. Base metal probably ?bronze. Results similar to 249.E.
		Base metal	2.1	4.9	1.8	-	-	-	
249.H	Wrist-clasps	White metal	2.2	5.0	2.4	-	-	-	Tinned. Base metal probably ?bronze. Results similar to 249.E and 249.F.
		Base metal	2.7	6.4	2.4	-	-	-	
249.J	Wrist-clasps	White metal	3.6	6.3	2.2	-	-	-	Tin-lead coated. Base metal probably /bronze. Tinned.
		Base metal	2.2	2.6	0.9	-	-	-	
251.D	Wrist-clasp	Base metal	7.8	2.3	0.5	-	-	-	Both sides similar. No evidence for a coating. Base metal was gunmetal.
251.E	Wrist-clasp	Base metal	6.7	3.4	0.4	-	-	-	Both sides similar. No evidence for a coating. Base metal was gunmetal. Results similar to 251.D.
253.P	Cruciform brooch	Front	9.3	1.5	0.7	-	-	-	No evidence for a coating. Base metal was gunmetal.
		Back	7.0	2.2	0.9	-	-	-	
293.G	Sheet	Base metal	7.5	15.6	5.4	-	-	-	Although no coating was visible, the high lead & tin levels detected suggest that the object may have been tinned. Base metal was probably gunmetal.
303.B	Stud	Top: white metal	3.5	3.6	1.7	-	-	-	Coating probably tin. Tinned. Base metal was gunmetal.
		Underside	7.1	3.4	1.5	-	-	-	
351.Aiii	Strip	White metal	0.7	7.3	3.2	-	-	-	Back almost certainly tin-lead alloy coated. Tinned. Base metal was bronze.
		Base metal	0.9	2.0	1.5	-	-	-	

Object	Description	Area Analysed	Zn	Pb	Sn	Au	Hg	Ag	Comments
			Elements present						
353.T	Plate	White metal	2.2	10.3	3.8	-	-	-	Tin-lead alloy coated. Base metal was bronze. Tinned.
		Base metal	1.2	4.1	2.4	-	-	-	
362.G	Buckle	Loop	5.2	20.0	6.3	-	-	-	High levels of lead and tin detected suggest that all the components were tinned. Tin-lead coated.
		Plate	5.8	36.5	7.4	-	-	-	
		Pin	9.9	19.5	7.7	-	-	-	
		Loose plate:							Coating was only visible on the loose plate. Base metal of loop, plate and pin probably ?gunmetal in each case, but the loose plate was probably ?bronze
		White metal	5.1	14.5	4.1	-	-	-	
		Base metal	2.8	13.1	3.7	-	-	-	
362.H	Strip	Base metal	26.2	132.2	72.5	-	-	-	Probably heavily corroded ?gunmetal.
369.N	Wrist-clasp	Base metal	-	60.6	87.8	-	-	-	As 209.A Ae (not identifiable).
369.P	Wrist-clasp	Base metal	-	41.6	67.0	-	-	-	As 209.A Ae (not identifiable).
370.D	Fragments	Base metal	43.5	56.5	28.5	-	-	-	Probably heavily corroded ?gunmetal.
393.C	Ring	White metal	4.6	6.2	1.7	-	-	-	Tinned. Base metal probably ?gunmetal.
		Base metal	3.9	4.1	1.3	-	-	-	
393.G	Tag-ends (2)	Coated tag-end	9.1	2.6	1.6	-	-	-	One tag-end was tin coated, but no evidence that the other was coated. Base metal of coated tag-end probably ?tinned ?gunmetal, but the other was probably ?bronze.
		Non-coated tag-end	2.8	2.5	0.6	-	-	-	
397.M	Tag-ends	White metal	2.4	4.8	2.4	-	-	-	Both pieces gave similar results. Both tin-lead alloy coated, tinned, with a bronze base metal.
		Base metal	2.6	2.3	1.4	-	-	-	
407.H	Annular brooch	Front	12.0	12.1	3.7	-	-	-	Tinned. Base metal probably ?gunmetal.
		Back	17.2	19.0	4.1	-	-	-	
415.A	Ring	White metal	3.8	13.3	8.5	-	-	-	Tinned. Base metal probably ?gunmetal.
		Base metal	3.5	9.5	7.8	-	-	-	
415.F	Annular brooch	White metal	4.6	9.6	4.0	-	-	-	Tinned. Base metal probably ?gunmetal.
		Base metal	5.2	11.9	4.9	-	-	-	

Key to Table 7:

Elements present column

1. Underlined elements were detected at high levels.

2. Elements in parentheses were present in trace levels only.

Table 7 Analytical results for gold, silver and pewter objects

Object	Description	Elements present	Comments
108.L	Sheet	Ag, Cu (Au, ?Pb)	Fairly pure silver, but containing some copper and traces of gold and poss. zinc
238.Eii	Leaf frags.	Au	Gold with some copper and poss. traces of sinc and silver
353.E	Ring	Sn, Pb	Pewter
375.A	Ring	Ag, Cu (Pb, Au)	Fairly pure silver with some copper and traces of lead and gold
378.F	Ring	Ag, Cu (Au)	Fairly pure silver with some copper and a trace of gold.

Table 8 Analysis of additional objects

Object	Description	Comments
25.Ai-ii, Ci-ii	Wrist-clasps	Both objects were tinned, and the base metal in both cases was bronze
153.I	Cruciform brooch	The base metal was gunmetal (it probably also contained a few % of lead but not enough to suggest deliberate addition). The inlay was almost certainly niello, and the white metal visible near the catchplate was tin
157.H	Belt plate	The base metal was bronze and the object had been mercury gilded. The extra rivet was almost certainly copper alloy
384.E	Stud or mount	The silver contained a few percent of copper and possibly gold. It had been gilded, but the technique used was not clear. The inlay was almost certainly niello.

VII. Report on the Skeletal Material

by Jacqueline I. Mckinley

Table 11 Pathology

Grave No.	Pathology
27	Large occipital 'bun'.
80	Maxillary premolar, strong hyperplastic line low on crown.
106	Both maxillary 3rd molars, accessory grooves in bucco-mesial cusps.
133	Mild tartar deposits round anterior and posterior teeth in mandible and maxilla. Hyperplastic lines on crowns; mandible: left canine, half-way; maxillary: left 2nd incisor in first 1/4 of crown. Right canine, 2 close together half-way.
147	Mild tartar round mandibular molar. 2 hyperplastic lines in lower 1/2 left mandibular 2nd molar.
200	Mandibular right canine, 3 hyperplastic lines spaced down crown, medium tartar deposits. Mandibular premolar, mild lingual tartar, uneven occusal wear on one half as if from continuous rubbing?
218	Wear on 3rd molars indicate c. 10 yrs less than other teeth, possibly result of late eruption or interupted 'bite'.
238	Hyperplastic lines on crowns; maxillary: canine, one half-way. Right premolar, one at neck. Both 2nd molars, one at neck. Mandibular: 1st premolar, 2 together half-way. Variations in 3rd molars. Maxillary: shape as normal, arbitrary cusp and groove arrangement, disto-mesial groove in buccal half, 'star' shaped small groove radiating from palatial half. Mandibular: small versions of 1st molars.
248	Uneven wear of tooth crowns, right side exhibiting marked

Table 11 (cont.)

palatial wear as well as occusal, left side showing only occusal wear: problems with 'bite'?

253 Most teeth show mild-heavy tartar all round. Hyperplastic lines on most teeth; mandibular: 1st incisor, 2 lines 1/3 down creating pronounced ridge, both 1st molars, left 2 heavy lines at 1/3 and 1/2, right one line half-way. Two 2nd molars (not a pair, 2 individuals in grave), both with one line half-way. Maxillary: 2nd premolar, 3 lines from half-way to neck. 1st molar, one line half-way. Right 2nd molar with one line half-way.

Variation in 3rd molar crown formations; both mandibular crowns with 5 cusp variation, smaller than 1st molar and with accessory grooves. Both maxillary crowns, variations in cusp size with 2 large cusps and 2 small, one each on buccal and palatial sides, one crown slightly larger than the other.

265 Mandible with very prominent mental protruberance; lower portion of body starts to jut-out from foramen anteriorly with distinct ridge c. 2/3 down from alvioli margin and up to 5 mm out from normal body line.

Hyperplastic lines on crowns; mandibular: left 1st incisor 3 lines in lower 1/2, 1st premolar one line half-way. Maxillary: 2nd premolar line 1/3 down.

Both mandibular 3rd molars, 5 cusp varients.

288 Mandibular body with square, slightly prominant mental protruberance, mandibular body shallow and broad.

Both mandibular 1st incisors and left 2nd incisor sockets resorbed, judging from other teeth unlikely to have been lost from wear, probably knocked out as a result of a blow to the face - accidental or deliberate.

Table 11 (cont.)

	Heavy tartar on deposits on most teeth, especially anterior ones, mandibular incisor being covered by several mm of deposit.
	Maxillary 3rd molar shows considerably less wear than other teeth - 5 to 10 yrs less than would expect - possibly as a result of late eruption or interupted 'bite'.
322	Mandibular 3rd molar, usual cusp arrangement but surface made irregular by accessory grooves.
351	Mandibular 2nd molar with large bulge to mesal/distal cusp.
358	Maxillary 2nd molar with extra fissure crossing crown from central fissure across meso-buccal cusp.
396	Mandibular 3rd molar, usual 4 cusps but large and irregular form, cusps of unequal size with accessory grooves. Prominent cervical bulge on buccal/lingual surface.