

THE ROMANO-BRITISH METALWORK FROM POOLE'S CAVERN, BUXTON

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INTRODUCTION

Poole's Cavern, near Buxton, has been the subject of archaeological investigation since the nineteenth century. Buxton Museum houses a considerable amount of material from these excavations, amongst which is a large and interesting collection of metalwork, comprised of objects from two sources: i) the Victorian collection; and ii) the excavations conducted by the Peakland Archaeological Society between 1981 and the 1984. The Victorian collection was assembled over a period of years, and originally deposited in the Poole's Cavern museum along with a wide variety of other curios. Inevitably, therefore, there is some doubt about the find circumstances and even the provenance of many of its constituent items. The Peakland Archaeological Society's finds are much better documented—mainly in the excavation records, although an interim report (Bramwell *et al.*, 1983) presented a good sample of them.

At the suggestion of Dr M. Bishop of Buxton Museum, KB and JB were invited to prepare a catalogue and study of the metalwork (KB), and analyses of a substantial sample of the same (JB). It was intended that the report should cover all the metalwork discovered in the Cavern to date. In the event, it was found that the Victorian, and later, disturbance and contamination of the deposits had led to the incorporation of a quantity of recognisably modern ironwork. Since, with few exceptions, the bulk of the remaining ironwork (nails, studs, fragments etc.) was not dateable within itself, it was decided to exclude it from this study. This report therefore concentrates on items of copper alloys and of lead.

THE CATALOGUE (KB)

Information on each entry is provided in the following sequence:

Catalogue number (asterisk indicates analysed item);

Buxton Museum registration number;

Abbreviated reference to either previous publication (B3, 4, 5 = Bramwell *et al.*, 1983: Small Finds Report, sections 3, 4, or 5) or source of material (VC = Victorian Collection; PCCP = Poole's Cavern car park);

Identification of item;

Principal measurement, in centimetres (L = length; W = max. width; D = diameter);

Figure reference, if illustrated;

Comments, parallels, suggested date (all dates AD, unless otherwise stated).

*COPPER/BRONZE ARTEFACTS***A. Brooches** (Figs 1, 2)

- 1* 5166 (B3,1) Fibula. L 5.5. Fig. 1. Colchester derivative, Polden Hill type; Mackreth suggests a date *c.* 75-100
- 2* 5167 (B3,2) Fibula. L 4.8. Fig. 1. Colchester derivative; Mackreth suggests a date *c.* 80-150.
- 3* 5095 (B3,3) Fibula. L 3.1. Fig. 1. British knee-brooch; Mackreth suggests a date *c.* 125-200.
- 4 5103 (B3,6) Fibula. L 4.4. Unfinished trumpet brooch; probably 2nd cent.
- 5* 5101 (B3,16) Fibula fragment. L 1.0. Fig. 1. Cast loop and collar; probably from a trumpet brooch.
- 6 5291 (VC) Fibula. L 5.0. Fig. 1. Trumpet brooch with enamelled stud; cf. Wheeler, 1936: fig. 44, 30; Wedlake, 1958: fig. 51, 18. Probably 2nd cent.
- 7* 5138 Fibula, L 4.2. Fig. 1. Knee-brooch with blue inlay on head; pin missing. Probably 2nd cent.
- 8 5228 Fibula? L 2.3. Broken centre portion of an equal-ended brooch? Cf. Frere, 1984: fig. 8, 48 (155-210).
- 9* 5139 Fibula L 2.2. Head and loop of a trumpet brooch of 2nd cent. type.
- 10* 5255 Fibula catch plate. L 2.6. Probably late-1st/2nd cent.
- 11* 5096 (B3,4) Fibula. L 4.7. Fig. 1. Trumpet brooch; Mackreth suggests a date *c.* 100-150, and no later than 175.
- 12* 5137 Fibula. L 5.9. Fig. 1. Polden Hill brooch with gold leaf on hinge bar; 2nd cent.
- 13* 5129 Bow and fan-tail brooch fragment? L 3.3. Fig. 1. Type identification uncertain: much damaged. The plate has a blue enamel cross on a red enamel ground, and further red enamel surrounds the perforated circular area where a bow may have joined the plate. Possibly later-1st/2nd cent.
- 14* 5168 (B3,9) Disc brooch. D 3.1. Fig. 1. A 'buckler' brooch, of a type common in 2nd cent.
- 15* 5308 (VC) Disc brooch. D 3.2. Fig. 1. Identical to no. 14.
- 16 5091 (B3,8) Disc brooch. D 3.0. Fig. 1. Mackreth argues in favour of a continental origin for this type (blue and white enamel mosaic in outer zone, and turquoise inlay — possibly with millefiore — on inner); he tentatively proposes a 2nd cent. date.
- 17* 5092 (B3,11) Disc brooch. D 3.4. Fig. 2. Blue enamel outer zone, red enamel inner zone with reserved metal spots. Mackreth suggests a 2nd cent. date.
- 18* 5257 Disc brooch. D 2.4. Fig. 2. Red enamel inlay with seven reserved metal spots. Common type 2nd/3rd cent.
- 19* 5090 (B3,10) Wheel brooch. D 3.5. Fig. 2. Dating uncertain.
- 20* 5169 (B3, PCCP) Wheel brooch. D 3.2. Fig. 2. Identical to no. 19.
- 21* 5113 (B4,2) Openwork brooch? D 3.2. Fig. 2. Triskele, crude and possibly unfinished, incised decoration on arms: cf. Frere, 1984: fig. 48. Date uncertain.
- 22 5170 (B3,14) Penannular brooch. D 2.8. Fig. 2. Fowler, 1960: type D1: 1st/3rd cent.
- 23* 5171 Penannular brooch. D 2.4. Fig. 2. Similar to no. 22.
- 24 5288 (VC) Penannular brooch. D 2.7. Fig. 2. Cf. Leach, 1980: fig. 117, 32; 3rd/4th cent.?
- 25 5289 (VC) Penannular brooch. D 2.6. Fragment of similar type to no. 24.
- 26* 5141 Penannular brooch. D 2.5. Fragment; probably Fowler, 1960: type D1: 1st/3rd cent.
- 27* 5259 Penannular brooch. D 3.0. Fig. 2. Fragment, similar to no. 24.

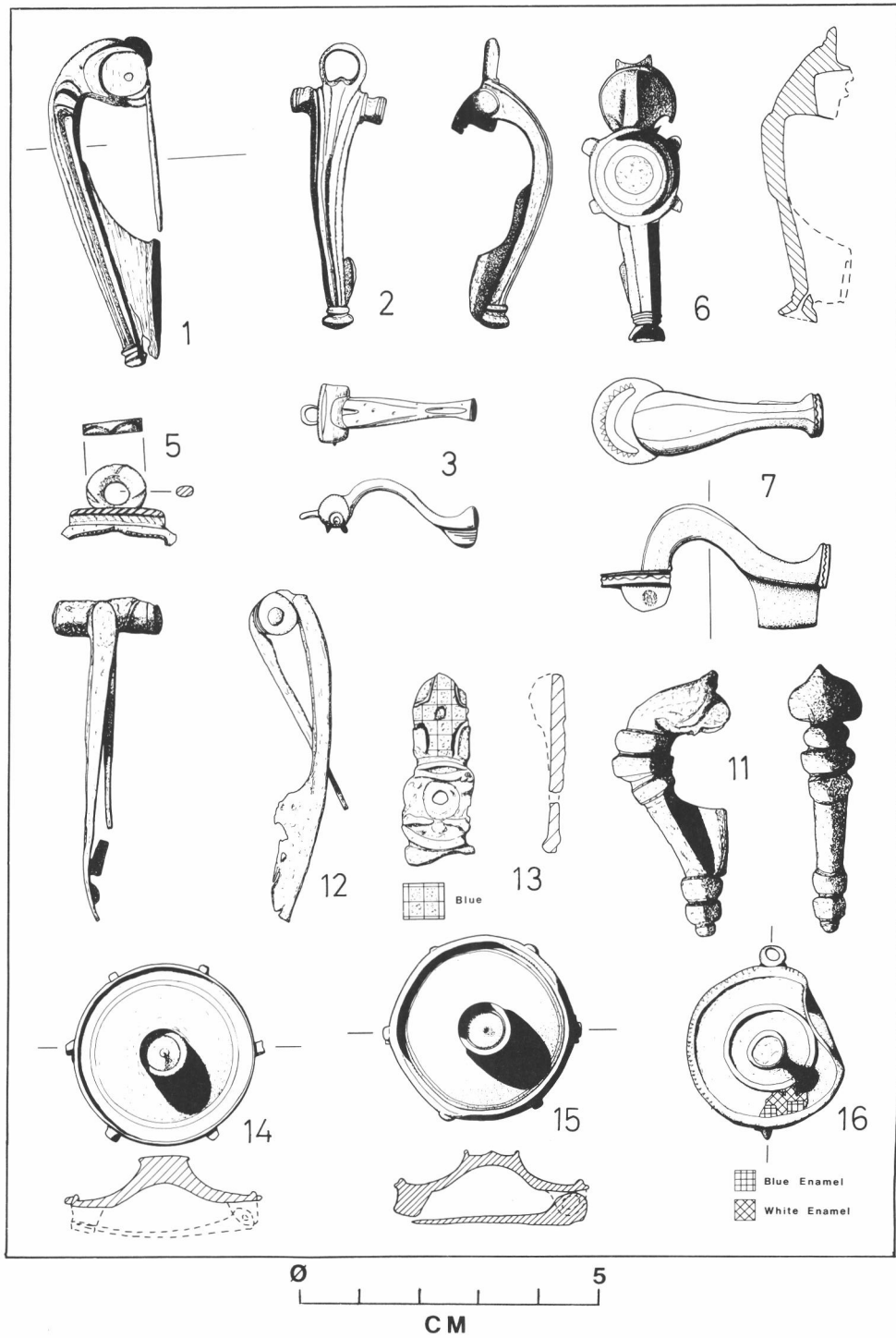


Fig. 1 Pooler's Cavern metalwork: copper and copper alloy brooches.

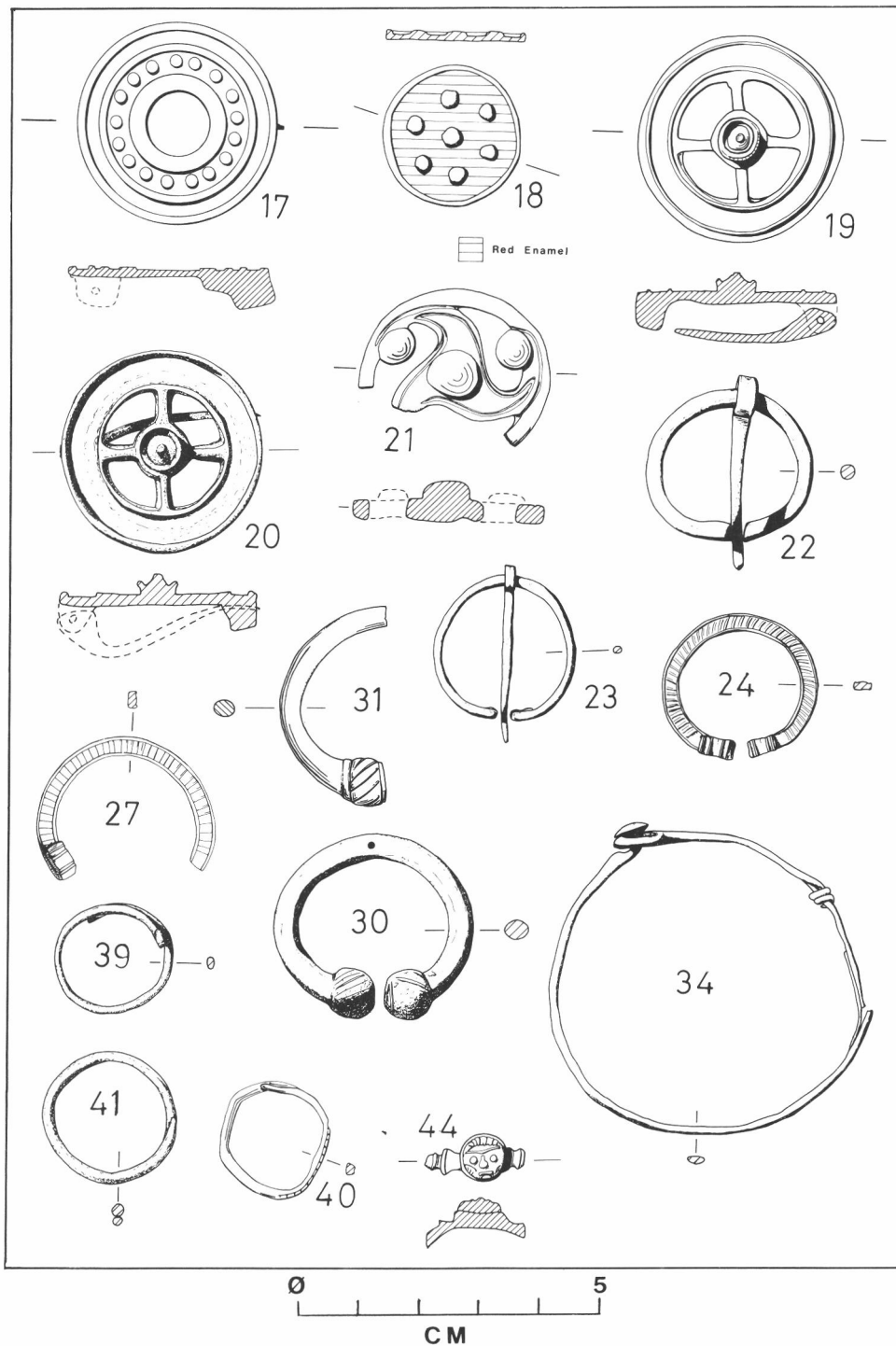


Fig. 2 Poole's Cavern metalwork: copper and copper alloy brooches, bangles and rings.

- 28* 5226 Penannular brooch. L 1.9. Fragment of Fowler, 1960: type A/A1: 1st cent. BC/3rd cent. AD.
- 29* 5093 Penannular brooch. L 3.7. Broken, Fowler, 1960: type A/A1: date as no. 28.
- 30 5287 (VC) Penannular brooch. D 3.3. Fig. 2. Fowler, 1960: type A/A1: date as no. 28.
- 31 5290 (VC) Penannular brooch. D 3.5. Fig. 2. Fragment of Fowler, 1960: type A/A1: date as no. 28.
- 32* 5094 Pin, probably of penannular brooch. L 2.3.
- 33* 5136 Pin, probably from a fibula. L 3.7.

B. Bangles, rings, pendants (Figs 2, 3)

- 34 5306 (VC) Bangle. D 5.4. Fig. 2. Unusual type with knob-and-loop fastening device, not certainly identifiable as Roman.
- 35 5249 Bangle. D 3.0. Fragment only; circular section with small spherical projecting knob.
- 36 5300 Bangle fragment. L 3.8. Fragment of flat-section crenellated bracelet.
- 37* 5209 Bangle fragment. L 2.3. Fragment similar to preceding.
- 38 5307 (VC) Bangle. D 6.5. Flat bronze strip; repair (?Victorian) at one side; not certainly identifiable as Roman.
- 39 5117 (B4,6) Finger ring. D 2.0. Fig. 2. Simple coil.
- 40 5144 Finger ring. D 1.9. Fig. 2. Simple coil.
- 41 5143 Finger ring. D 2.2. Fig. 2. Simple coil.
- 42 5298 (VC) Penannular finger ring. D 1.6. Pointed terminals.
- 43 5227 Penannular finger ring. D 2.3. Similar to no. 43.
- 44 5119 (B4,8) Finger ring. D 1.8. Fig. 2. Blue glass inset, with human face in bezel; cf. Neal, 1974: fig. 60, 115 — with plain blue inset.
- 45 5299 (VC) Plain annular ring. D 1.9. Hexagonal section.
- 46 5118 (B4,7) Ring bezel? L 1.8. Fig. 3. Diamond-shaped piece with red inlay; two short prongs on opposite arms — ?for attachment to ring.
- 47 5303 Ring bezel? L 2.5. Diamond-shaped piece with recessed centre, no surviving inlay. Similar to seal-box lid but no rim/seating.
- 48 5229 Pendant? L 2.4. Fig. 3. Cf. Brodribb *et al.* 1972: fig 30.
- 49 5148 Pendant coil? D 0.35. Small wire coil.
- 50* 5147 Pendant coil? D 0.37. As no. 49.

C. Clothing attachments (Fig. 3).

- 51 5293 (VC) Pin. L 3.4. Fig. 3. Moulded head, broken shaft.
- 52* 5248 Pin. L 4.0. Fig. 3. Curled terminal, wire around shaft.
- 53 5132 Pin. L 0.9. Spherical head.
- 54* 5134 Pin shaft. L 7.4. In two pieces.
- 55* 5135 Pin shaft. L 3.5.
- 56 5295 (VC) Pin shaft. L 3.9.
- 57 5297 (VC) Pin shaft. L 3.8.
- 58 5294 (VC) Pin shaft. L 6.9.
- 59* 5258 Rosette fastener. D 1.4. Fig. 3. Rosette stud, with wire loop for fastening.
- 60* 5140 Rosette fastener. D 1.5. Fig. 3. Similar to no. 59, but with deeper stud, plain rim and no petal pattern.
- 61 5240 Button. D 1.3. Semi-spherical button with broken loop on underside.
- 62 5180 Fastener. L 2.0. Fig. 3. Loop only from a cloak fastener; could be from any of Wild's

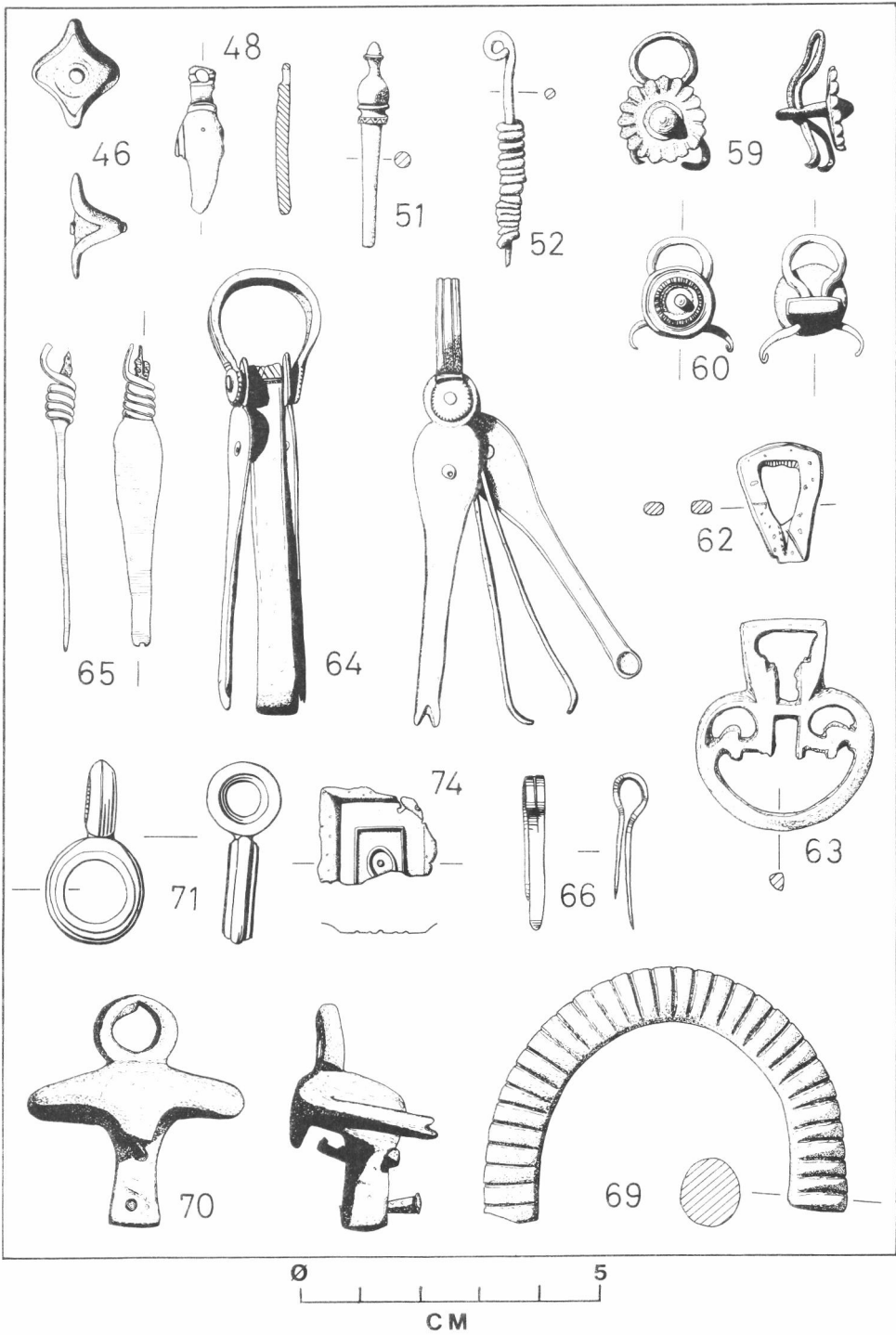


Fig. 3 Poole's Cavern metalwork: copper and copper alloy objects.

(1970) five types: possibly type VI — 2nd cent.

- 63 5304 (VC). Buckle. L 3.5. Fig. 3. Cf. Wachter and McWhirr, 1982: fig. 38, 122; probably not Roman.

D. Toilet implements (Fig. 3)

- 64 5292 (VC) Manicure set. L 7.5. Fig. 3. Superbly made set of tweezers and ear/nail cleaners; compact design. Cf. Wedlake, 1958: fig. 59, 3T; but our example is far superior.
- 65 5115 (B4,4) Nail scraper. L 5.1. Fig. 3. Common type.
- 66 5116 (B4,5) Tweezers? L 2.5. Fig. 3. Small size and narrow uneven tips made identification uncertain.

E. Furniture fittings (Figs 3, 4)

- 67 5254 Staff embellishment? D 3.2. Solid ring, circular section, with conical projections on outer rim.
- 68* 5212 Handle fragment? L 2.5. Curved flat bar, with chased decoration of two parallel grooves and two chevrons.
- 69* 5236 Handle? D 7.8. Fig. 3. Possibly a bangle, but shape is a flattened oval, more suited to a handle.
- 70 5112 (B4,1) Ox-head casket attachment. L 5.0. Fig. 3. Stylised ox-head, with two rivets in the muzzle, and loop on head.
- 71 5179 (B4,9) Linked rings. L 3.0. Fig. 4. Two rings joined at 90°, possibly from a casket?
- 72 5250 Casket fastener? L 5.2. Fig. 4. Fastener, or possibly prop for lid of casket?
- 73* 5100 (B3,15) Clasp of casket? L 3.9. Fig. 4. Hinged flat bar, with chased linear decoration. According to Mackreth, possibly part of a large and anomalous brooch, of Aucissa type.
- 74 5302 (VC) Sheathing. W 1.9. Fig. 3. Fragment of square embossed panel.
- 75 5238 Sheathing. L 1.4. Bent at right-angle.
- 76 5218 Sheathing. L 2.4. Semi-circular section, from beaded rim cover?
- 77 5151 Sheathing. L 5.0. Three fragments. Largest has two small pin holes and is bent over along one edge; one side is polished, the other dull.
- 78 5150 Sheathing. L 2.5. Corner of rectangular sheet, with rivet hole.
- 79 5145 Sheathing. L 1.0. Corner of rectangular sheet, with rivet L 1.2.
- 80 5123 Sheathing. L 1.7. Corner of rectangular sheet, with rivet L 1.2 and embossed arc.
- 81* 5104 Sheathing. L 7.0. Three rivet holes.
- 82* 5260 Sheathing fragment. L 2.8. Knife-tip shape, probably fortuitous.
- 83 5247 Embossed sheet. L 1.8. Fragment, with embossed rib.
- 84 5157 Sheathing. L 6.0. Tongue-shaped, rivet L 1.6.
- 85 5233 Sheathing. L 2.0. Fragment with concentric chased circles D 3.0, 2.6.
- 86 5114 Seahorse mount. L 4.6. Fig. 4. Rivets at head and tail.
- 87 5235 Embellishment. L 7.5. Fig. 4. Thick strip, with oval area marked by corrosion and scored line; two small notches in edge — for fixing tacks?
- 88* 5154 Embellishment? L 3.1. Figure-of-eight outline, no rivet holes.
- 89 5142 Decorative boss. D 1.9. Hollow conical boss, rivet hole in top.
- 90 5133 Decorative boss. D 1.9. Fig. 4. Similar to no. 89, but no rivet hole.
- 91 5223 Stud cap. D 0.8. Hemispherical.
- 92* 5224 Stud cap. D 1.1. Hemispherical, corrosion mark at base.
- 93 5178 (B4,13) Face stud. L 1.0. Fig. 4. Eyes, nose, and mouth all indicated.
- 94 5177 Stud, hemispherical head. L 2.4.

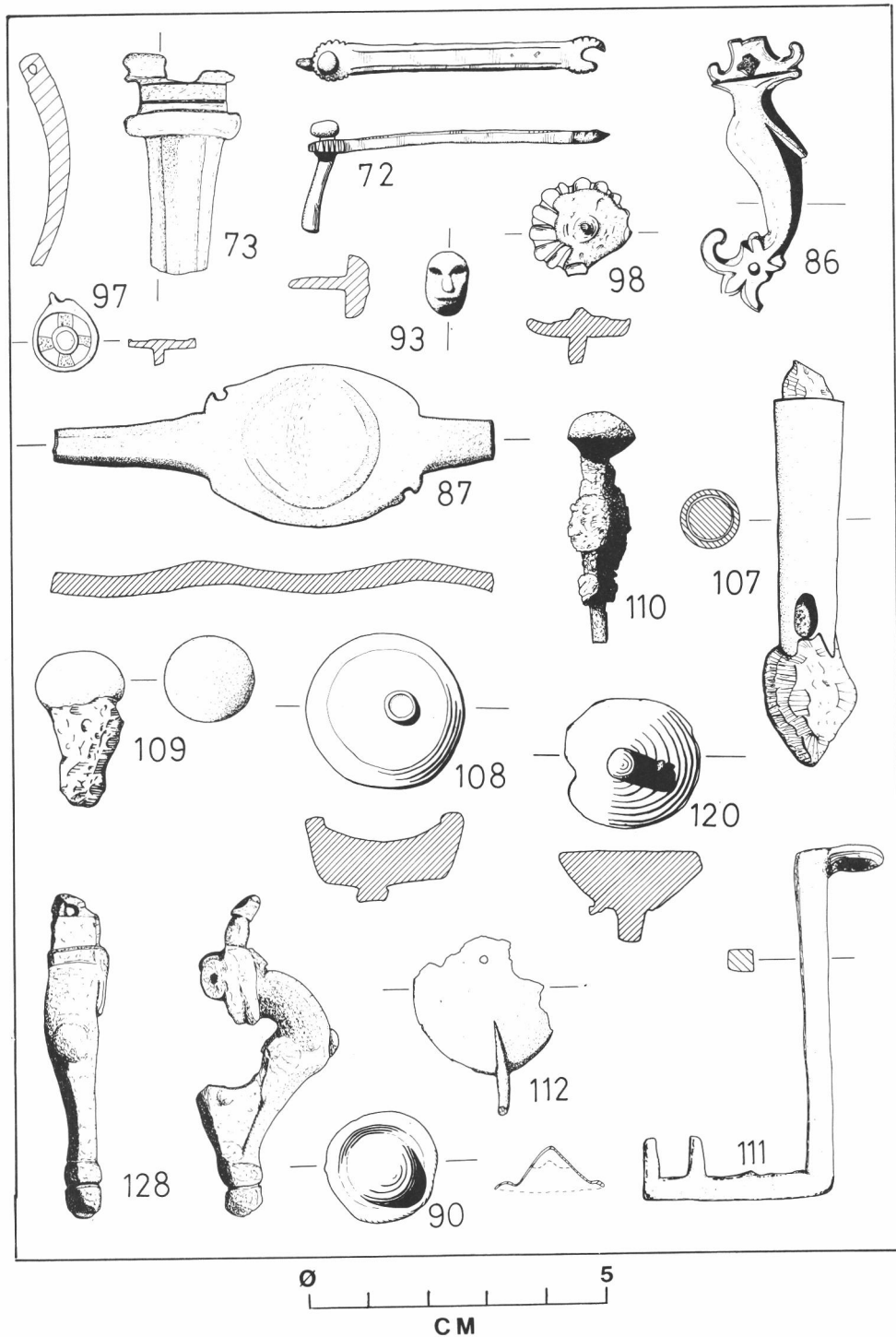


Fig. 4 Poole's Cavern metalwork: copper and copper alloy objects, and a lead brooch (No. 128).

- 95 5241 Stud, hemispherical head. D 1.6. Iron pin, broken off.
 96 5222 Stud, hemispherical head. D 0.9.
 97 5120 (B4,10) Decorated stud. D 1.1. Fig. 4. Flat head with green four-armed cross in red field inlay. Cf. Neal, 1974: fig. 55, 32; Frere, 1984: fig. 17, 144.
 98* 5102 (B3,17) Rosette stud. D 1.8. Fig. 4. Mackreth suggests it may have been broken off an elaborate trumpet brooch.
 99 5163 Stud. L 1.0. Head a flattened sphere.
 100 5161 Stud, hemispherical head. L 1.2.
 101 5164 Tack, ovoid head. L 1.3.
 102 5131 Tack, flat head. L 1.9.
 103 5162 Tack, small spherical head. L 1.7.
 104 5215 Tack, small flat head. L 1.1.
 105 5165 Tack, small spherical head. L 1.4.

F. Tools and implements (Fig. 4).

- 106 5297 (VC) Awl. L 3.5. Square section, broken.
 107 5269 Punch? L 6.9. Fig. 4. Iron tool with irregular 'polished' facets at tip, bound in bronze sheath.
 108* 5176 Doming cup? D 2.7. Fig. 4. Hemispherical 'cup' with shallow depression, D 2.0; inside of cup shows marks of punch, and striations on side of bowl.
 109* 5122 (B4,12) Doming punch? L 2.6. Fig. 4. Iron tool shaft, with bronze ovoid head.
 110* 5239 Doming punch? L 4.0. Fig. 4. Iron tool shaft, with bronze hemispherical head and collar.
 111 5121 Key. L 5.8. Fig. 4. L-shaped tumbler-lock lift key.
 112 5225 Spoon bowl. D 2.5. Fig. 4. Round-bowled *cochleare*, common in 1st/2nd, but in use to 4th. cent.
 113* 5234 Mirror fragment? L 1.4. Curving flat rim.

G. Metalworking waste (Fig. 4)

- 114* 5256 Bar, rectangular section. L 16.6. Striations and hammer marks.
 115* 5252 Bar fragments (2). L 1.2. Square section.
 116 5208 Bar fragment. L 2.0. Circular section.
 117* 5110 Bar fragment. L 1.6. Square section, cut at both ends.
 118* 5108 Bar fragment. L 1.4. Oblong section.
 119* 5106 Bar fragment. L 2.7. Square section.
 120* 5146 Casting sprue. D 2.5. Fig. 4. Conical casting waste with broken stem.
 121 5244 Waste sheet bronze. L 3.5.
 122 5230 Waste sheet bronze. L 1.4. Fragment of decorated sheet, clipped edges.
 123* 5105 (B4,14) Coil of waste sheet bronze. W 2.0. Partly melted.
 124 5107 Lump of waste bronze. L 1.2.
 125* 5109,5130,5159,5160,5213,5234,5251,5253,5261. Droplets of melted bronze. L 1.2.

LEAD ARTEFACTS (Fig. 4)

- 126* 5205 Fibula. L 3.5. Colchester derivative, broken and possibly unfinished: mid-1st cent.
 127* 5206 Fibula. L 2.6. Broken bow and hinge plate of fibula of uncertain type, possibly a trumpet brooch; probably 2nd cent.
 128* 5099 Fibula. L 5.4. Fig. 4. Unfinished fibula with unreduced flashing, but complete apart

- from pin. Discussed in detail by Mackreth (1983: 56).
- 129 5111 (B4,18) Sealing. L 2.3. Oval impression on lead sealing, with two lines of three letters *VIN/OEN*. Fully discussed in Bramwell (1983: 63-5).
- 130 5181 (B4,17) Weight. L 2.7. Square weight perforated at one corner.
- 131 5182 (B4,19) Spindle whorl. D 2.1. Semi-spherical.
- 132 5187 (B4,20) Rivet. L 1.2. Flat head.
- 133 5185 Furniture sheathing? L 5.2. Sheet lead, hammered over a former; uncertain shape, but may be a feline foot from a piece of furniture.
- 134 5262 Casket embellishment? L 2.2. A curious object of uncertain use, with drum-shaped head and broken stem.
- 135* 5207 Pin head? W 2.6. Flat round head with notch in top, on a short broken shaft.
- 136 5183 (B4,21) Lampholder? L 8.2. Not seen; identification uncertain: could be waste lead formed around base of vessel whilst molten.

DISCUSSION

Analysis and examination of the metalwork: copper alloys (JB)

A wide range of objects was analysed, but the majority were either brooches or evidence for metalworking. The brooches were from a wide range of types (Mackreth, 1983), and the metal of which they were made also, as might be expected, displayed considerable variation (Bayley and Butcher, 1981; Bayley, forthcoming [1]). The metalworking evidence too was very varied, including both tools and waste metal, and suggested that a variety of processes was being carried out.

The majority of the analyses were carried out completely non-destructively by X-ray fluorescence (XRF). The results, which are presented in Table 1, are simply qualitative, as the composition of the corroded surface is related only in general terms to that of the original, uncorroded metal. Even when the object does not look corroded there will have been some leaching from the surface, altering the proportions of the elements present. A smaller number of similar objects had previously been analysed at Sheffield University by M. C. Bishop and M. J. Dobby. The Sheffield analyses were done using atomic absorption, but the results were not fully quantitative and so are presented in the same format as those obtained by XRF (Table 2).

Almost all the copper alloy objects contained detectable amounts of tin, lead and zinc in addition to copper. However, there were sufficient significant variations in the relative amounts present to allow the assigning of specific alloy names to each object. Those objects described as 'brass' contain mainly copper and zinc; 'bronzes' are mainly copper and tin; and 'gunmetals' are copper with significant amounts of both tin and zinc. Some bronzes and gunmetals, described as 'leaded', also contain relatively large amounts of lead. Figure 5 illustrates the relationships between the different alloys and their composition. Where more than one alloy name is given in Table 1 it is because either the object seems to be of intermediate composition or there is uncertainty in the interpretation of the analytical data (question marks also indicate uncertainty).

No idea of the percentage composition can be obtained from the XRF results but, from comparison with other Roman metalwork, the brasses probably contain 15-25% zinc, the bronzes 1-10% or more of tin, and the gunmetals at least several percent of both tin and zinc. Lead contents are very variable and may rise to over 25%, though 5-15% is more usual in leaded alloys.

The brooches

Bayley (forthcoming, [1]) presents comparative data for brooches from some fifty sites throughout the country. In general, the results of the analysis of the Poole's Cavern brooches are

Cat. no.	Buxton no.	Object	Alloy
1	5166	Colchester derivative fibula	Bronze
2	5167	Colchester derivative fibula	Bronze
3	5095	Knee fibula	Brass
5	5101	Headloop from fibula	Gunmetal
7	5138	Knee fibula	Bronze
9	5139	Headloop fragment	(Leaded) Bronze
10	5255	Catchplate from fibula	Bronze
11	5096	Trumpet fibula	Brass
12	5137	Polden hill fibula	Gunmetal
13	5129	Bow and fan-tail fibula	Gunmetal
14	5168	Disc brooch	Bronze/Gunmetal
15	5038	Disc brooch	Leaded gunmetal
17	5092	Disc brooch	Bronze
18	5257	Disc brooch	Gunmetal
19	5090	Disc brooch	Leaded gunmetal
20	5169	Disc brooch	?Bronze/Gunmetal
21	5113	Openwork triskele brooch?	Bronze
23	5171	Penannular brooch	Gunmetal
26	5141	Penannular brooch	Bronze
27	5259	Penannular brooch	(?Leaded) Bronze
28	5226	Penannular brooch	Bronze
29	5093	Penannular brooch	Leaded bronze
32	5094	Penannular brooch pin	Bronze
33	5136	Pin, probably from a fibula	Bronze/Gunmetal
37	5209	Bangle fragment?	?Bronze
50	5147	Pendant coil?	Gunmetal
52	5248	Pin	Bronze?Gunmetal
54	5134	Pin shaft	Gunmetal
55	5135	Pin shaft	Leaded gunmetal
59	5258	Rosette fastener	Bronze
60	5140	Rosette fastener	Gunmetal
68	5212	Handle fragment	Bronze/Gunmetal
69	5236	Handle?	Bronze/Gunmetal
73	5100	Clasp of casket?	Leaded bronze
82	5260	Sheathing fragment	Bronze
88	5154	Embellishment?	Bronze
92	5224	Stud cap	Brass
98	5102	Rosette stud	Gunmetal
108	5176	Doming cup?	Leaded gunmetal
109	5122	Doming punch?	Bronze
110	5239	Doming punch?	Leaded gunmetal
113	5234	Mirror fragment?	—
114	5256	Bar	Bronze
115	5252	Bar, two fragments	?Bronze
117	5110	Bar fragment	Bronze
120	5146	Casting sprue	Leaded gunmetal

Table 1: *Poole's Cavern metalwork: XRF analysis of a selection of copper alloy objects.*

Cat. no.	Buxton no.	Object	Alloy
4	5103	Unfinished brooch	Leaded bronze
81	5103	Sheathing	Bronze
118	5108	Bar fragment	Bronze
119	5106	Bar fragment	Bronze
123	5105	Part-melted sheet	Bronze

Table 2: *Poole's Cavern metalwork: atomic absorption analysis of a selection of copper alloy objects (M. C. Bishop and M. J. Dobby).*

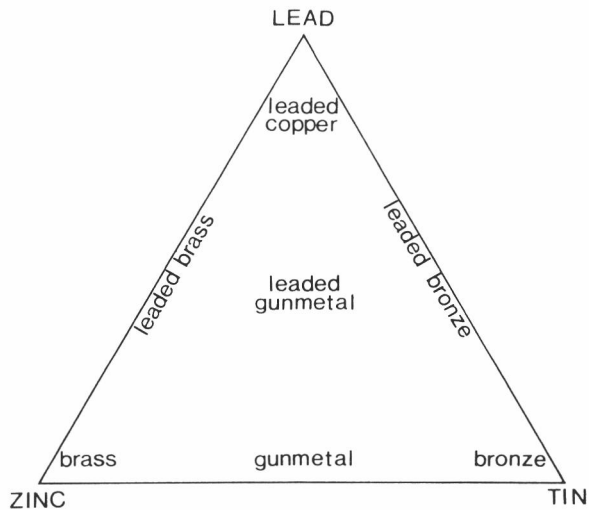


Fig. 5 Poole's Cavern metalwork: composition of copper alloys.

atypical (though not unique), and show little consistency, even in respect of similar brooches.

Over sixty brooches with a Polden Hill-type head have been analysed, and more than two-thirds of them shown to be leaded bronzes. Both bronzes and gunmetals (e.g. Nos. 1, 12) are known, but are uncommon. Leaded bronze is also the predominant alloy used for brooches with headloops, so No. 2 is again unusual but not without compositional parallels. Trumpet brooches show more variation, with leaded bronzes being used for those with a fixed headloop (like No. 9), but brass or other zinc-rich alloys being used for those with separate headloops (like No. 11). Results from over fifty knee-brooches show that over half are leaded bronzes, with the remainder mainly brasses or gunmetals. The brass examples come mainly from the north of Britain and, like No. 3, have areas of tinning that originally attached repoussé silver foil bands and rosettes. The bronze example, No. 7, is almost without compositional parallel, but is not otherwise unique.

There are two enamelled disc brooches (Nos 17, 18), both of them types where traces of tinning often survive on the front of the brooch, as they have done here. The tinning sometimes appears to be a decorative effect in its own right, but occasionally traces of silver foil strips or rosettes that were soldered onto the brooch survive. No. 18 definitely had applied silver foils, while No. 17 probably did. The enamel on the first brooch is red, that on the second blue in the

outer ring and red in the inner one. These types are probably of British rather than continental manufacture, and the majority of comparable, analysed examples are leaded bronzes. The numbers analysed are far lower than for the bow brooches so no comment can be made on the apparently non-standard composition of these two brooches.

The four remaining disc brooches comprise two non-identical pairs. The wheel-brooches, Nos. 19 and 20, have rather different compositions; I have no other analyses to compare them with. The two umbonate brooches, Nos. 14 and 15, are also of different compositions; they may usefully be compared with three similar brooches from Deepdale (Buxton nos 3631-2, 3852: (leaded) bronze, leaded gunmetal and leaded bronze respectively). However, despite the varying alloy names used to describe them, the umbonate brooches together represent a limited range of compositions: the 'leaded' alloys do not contain very much lead, and the difference between the 'bronzes' and 'gunmetals' is probably only that the latter contain a very small amount of zinc.

The final group of brooches consists of the penannulars. These are normally made of any alloy with a minimal lead content, as they are usually wrought rather than cast, and leaded alloys cannot be worked in this way. The lead level in No. 29 may therefore appear to be unusually high, but this brooch is far more massive than penannulars usually are, and it was probably cast, which may explain its unusual composition.

Analysis and examination of the metalwork: lead (JB)

Four objects were analysed; two of them were found to contain an element of tin (see Table 3).

The evidence for metalworking (JB, with assistance from KB)

Amongst the Victorian discoveries in Poole's Cavern was a small crucible (Croft and Dawkins, 1922: 11), the first indication that metalworking had occurred in the cave. The recent finds confirm the working of both molten and solid copper alloys. The evidence for the former is the solidified metal droplets, the casting sprue and the unfinished brooch. These suggest that metal was being melted in crucibles and poured into clay moulds to cast objects; bar ingots could also have been cast. No crucible or mould fragments have yet been noted among the finds from the recent excavations, but they may come to light when the pottery is examined in more detail. Those droplets which were analysed were either bronze or gunmetal, while the sprue was a leaded gunmetal; the unfinished brooch was leaded bronze.

There are four groups of finds that suggest that copper alloys were being wrought. The first consists of the pieces of bar (Nos 114-119). These six pieces may be interpreted as either semi-manufactured material on the way to being made into objects, or reject pieces of metal. The largest piece, No. 114, has been hammered to reduce its cross-section and elongate it; the hammer marks are still visible on one surface. The others are smaller offcuts (on No. 117, the cut-marks are still clearly visible). No. 37 may also be a bar fragment, but could also be a fragment of an object. All these bars, and that previously analysed by Bishop and Dobby, are made of bronze.

The second group of finds that suggests the cold working of copper alloys is made up of two fragments of thin sheet metal. No. 88 is apparently part of an object, while No. 82 is an offcut. Both fragments are bronze, as is the sheet metal previously analysed by Bishop and Dobby. The third group consists of several fragments of wire (Nos 54-58), some of which are pointed and may have been pins. No. 52 appears to be a replacement brooch pin, while the coil, No. 50, may be part of a brooch spring. All these wire fragments are probably unfinished parts of objects, and they may be nearer finished than the bars; most of them are gunmetals.

The final evidence for bronze working comes from a group of three tools used to make sheet metal hemispheres. There is one doming block (No. 108) and two punches (Nos. 109 and 110),

Cat. no.	Buxton no.	Object	Alloy
126	5205	Fibula	Lead
127	5206	Fibula	Lead-tin
128	5099	Fibula	Lead
135	5207	Pinhead?	Lead-?tin

Table 3: *Poole's Cavern metalwork: XRF analysis of a selection of lead objects.*

all of different diameters (c. 15 and 12 mm respectively). Each would have been part of a set, with the punch slightly smaller in diameter than its matching block. The block would be set into an anvil or solid base (perhaps a large timber); a piece of sheet metal would then be laid over it and struck with the punch until a neat hemispherical dome (as No. 92) was formed. These domes were usually made of brass, an alloy able to withstand extreme working such as this without the need for frequent annealing. One tool (No. 109) was bronze, the others leaded gunmetals. The bronze would have been harder, but all would have been suitable for their purpose. Either of tools 106 and 107 might have been used for 'tracing' or punching decoration on copper alloy sheet, but they could equally well have been used for other purposes.

In respect of the evidence for lead-working, three of the objects appear to be parts of bow-brooches belonging to the headloop/trumpet group. One of these (No. 128) was published by Mackreth (1983: 56) and described by him as a brooch that "... was finished with every intention of its being used". One might query this interpretation as the other fragments, though less complete and deeply corroded, do not appear to have been from usable brooches. In particular, the lugs behind the head of No. 127 are not perforated to take a pin-spring assembly; and the lug perforations on No. 128, though present, are very fine and would not have taken a wire of the diameter normally used for pins. They also show no signs of wear which would surely be expected as lead is so soft. The catch plate too on this brooch does not really look finished as there is a rib along the edge where the return would normally be found.

As an alternative interpretation we would suggest that these lead brooches were the models round which clay piece moulds were made. On this argument, specific functions may be assigned to the features noted by Mackreth. The perforations in the lugs would have produced some sort of 'blip' on the mould, which would in turn have made a slight depression in the casting, marking the place for the craftsman to punch or drill his hole; and the rib on the edge of the catch plate would provide the extra metal necessary to form a true return. Once formed, the moulds would have been taken apart, the model removed, the mould re-assembled and then used. Clay piece moulds for brooches, made in this way from models, have recently been found at Prestatyn and Compton Dando (Bayley, forthcoming [2], [3]). Lead would have been a suitable material of which to make the model as it is easy to work yet will take fine detail and a good finish. The so-called lampholder (No. 136) may also testify to the use of molten lead in the Cavern. The discovery of a casting of a similar copper alloy brooch (No. 4), which had not been cleaned up, adds further weight to this argument and indeed is a direct indication of the sort of objects being cast by the metal workers at Poole's Cavern.

It is possible that the location of the metalworking was in the partially filled pit in Trenches VI, VID, VIIC and VIID, where a hearth with "plenty of charcoal ash and cinders" was recorded by Bramwell (Exc. Notebook: 1981-Aug. 1984). Further examination of residues and debris would, however, be necessary to confirm this hypothesis.

CONCLUSION (KB)

This concluding section of the report seeks briefly to address three aspects of the Romano-British usage of Poole's Cavern and the significance of its metalwork assemblage: i) the date of the assemblage; ii) the nature of the Romano-British occupation; and iii) the relationship of the cave usage to contemporary Romano-British occupation in the surrounding region.

The date of the assemblage is indicated by three groups of material — the pottery, the coins and the metalwork itself. Only pottery excavated to 1983 is included in the interim report of the Peakland Archaeology Society's excavations, but this is overwhelmingly of second-century date, with the majority of the vessels having been produced during the later part of this century, and possibly the early part of the next. The same excavations produced eight coins, spanning the reigns of Claudius and Antoninus Pius (41-161); earlier excavations produced three coins of Trajan (98-117). Issues of Nerva (96-98) and Faustina (138-141), catalogued with other Poole's Cavern material in the Cavern Museum Catalogue of 1922, were probably also found in the Cavern. These thirteen coins, small sample though they are, strongly support the evidence of the pottery, particularly in indicating that there was little activity in the cave after the early-third century. (The absence of the ubiquitous issues of the later-third century seems a decisive confirmation of this argument.) As for the metalwork assemblage itself, this too points very firmly to a largely second-century use of the cave. The earliest fibula (No. 1) dates to the last quarter of the first century, the rest to the late-first/early-second or second centuries; and the same applies to other dateable brooches. The pennanular brooches could be as early as the first and as late as the third centuries, but it needs special pleading to disassociate them from the fibula, coins and pottery. Taking all the evidence into account, it seems clear that the principal usage of the cave occurred during a period of no more than about one century from the reign of Hadrian (i.e. c. 120-220). Some small-scale use in the late-first and mid-third centuries is possible but not certain.

The nature of the second-century occupation is not entirely clear. Bramwell and Dalton (Bramwell *et al.*, 1983: 68-72) proposed that the cave may have been used as a shrine. Domestic occupation was considered by them, but rejected as the explanation for the assemblage of the material on three grounds: i) that the assemblage was too 'wealthy'; ii) that there were too few animal bones; and iii) that the material was found in two discrete spatial groups, one containing coins and fibulae and the other pottery and food refuse (Bramwell *et al.*, 1983: 72). The last point is an interesting one, but is not documented in detail in their report, and against it must be set the fact that the notebooks for the post-1983 excavations record finds made in the area of a "pit", which are certainly mixed — pottery, bones, bronze jewellery and other items, ironwork, and lead (though no coins). With regard to their second point, the 'pit' deposit also contained a substantial quantity of animal bones, running into several hundred fragments. As to their comment that the assemblage is too wealthy to be remains of domestic occupation, that is a view which depends on a subjective judgement of how wealthy the Romano-British users of the cave should be; it anyway begs the question as to how one measures 'wealth' in Romano-British society, and whether one must assume that all the items found in the cave were the personal belongings of those using it. The general range of material from the cave looks very much like a domestic assemblage, with the possible exception of the quantity and character of the metalwork, and the evidence for metalworking discussed above. In contrast, there is not a single item from the cave which can confidently be identified as cult or ritual furniture, nor does the faunal sample show any significant bias such as has been noted at some Romano-British shrines, such as Uley (Ellison, 1977: 41). We propose, therefore, that the principal occupation of Poole's Cavern in the Roman period had a domestic aspect, but that this was directly related to the use

of the cave for metalworking. One of the products of the metalworkers was clearly brooches, and the quantity of fragments of thin sheet bronze suggest that pins and rings made from rolled sheet may also have been produced. Whether the fragments of embossed sheet and the many studs and tacks came from caskets and similar small items of furniture produced for sale is uncertain.

There is mention in reports of Victorian discoveries of human skeletal material in the cave (Crofton and Dawkins, 1922). Some of this material is said specifically to have been found in a "refuse heap", whilst there is also a reference to what appears to have been an articulated burial: "the bones of a Roman found during the winter of 1883, with enamelled fibula, and Roman pin and dagger." These early reports are supplemented by the reports of the Peakland Archaeological Society. Bramwell *et al.* (1983: 66-68) refer to teeth found in their excavations; the analysis of these indicates several individuals, including juveniles. The unpublished material from the later excavation of the 'pit' also includes some fragments of human material. How the human remains relate to the domestic occupation of the cave is uncertain. It is clear from the discovery of the human bones in the Peakland Archaeological Society excavations that some human remains were deposited in the same area as that used for domestic occupation and metalworking. This must almost certainly imply that in this area at least, and probably in the cave in general, the burials and the domestic/metalworking activity belong to different periods of time. The incorporation of fragmentary human remains in largely undisturbed Roman levels, as happens in the lower levels of the 'pit', suggests that the burials are unlikely to be post-Roman and probably precede the domestic/metalworking phase of usage. On the other hand, the one apparently intact burial recorded (from 1883) was clearly Roman rather than prehistoric, and to date only three small scraps of supposed prehistoric pottery have been identified from the cave. The evidence would seem to point to an early Roman phase of burial activity, still to be accommodated within the period from the late-first/early-second to the early-third century, followed by a phase of domestic/metalworking usage. That second phase of usage may have been both short-lived and seasonal: there is no reason to suppose permanent use throughout the second century, and certainly the quantity of metalworking debris is too small to support the hypothesis that there was prolonged occupation of the cave for that purpose.

A Romano-British usage of the cave beginning in the second century fits broadly into our still scanty knowledge of Romano-British occupation of the White Peak. There is very little evidence, and none of it certain, for civilian Romano-British settlement in the region in the first century AD. Excavations at Roystone and Carsington suggest new settlements being established in the second century (Hodges and Wildgoose, 1980; Branigan, 1981); and several cave sites produce material of second century date (e.g. Harborough Rocks, Rains Cave, Old Womans House, Thors Cavern, Thurst House, and possibly half a dozen others). A second century colonisation of the Peak, broadly coinciding with the removal of the garrisons at Brough-on-Noe, Chesterfield and Melandra, might be postulated. Poole's Cavern was clearly only one of many caves utilised now or later in the Roman period. Hart (1981: 105) records about two dozen caves with Romano-British material; and the brief records available suggest that most were in use during the second and/or third centuries. Not all of these caves were used in the same way as Poole's Cavern, and indeed not all were capable of similar use. Frank I'Th' Rocks, near Buxton, is a deep narrow fissure which appears to have been utilised for burials (Palmer, 1925). On present evidence some of the other caves may have been employed as little more than seasonal shelter by shepherds. One of the nearest caves to Poole's Cavern, however, Thurst Hole, Deepdale, has produced an assemblage remarkably similar to that of the Cavern, both in general terms and particularly in the details of its metalwork (Ward, 1897; and unpublished material in

Buxton Museum). Both of these caves are very close to the Roman spa settlement of Buxton, and one way or another this may account for the richness of the assemblages from these caves. It is possible that both caves were occupied by metalworkers who, for a while, found a ready market for their trinkets at the spa.

The extensive use of caves, for various purposes, in the Peak District during the Roman period is repeated elsewhere, most notably in the Mendips and north Yorkshire, but also in Wales and elsewhere. It is hoped to examine this phenomenon on both a wider scale and in much greater detail in the near future.

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REFERENCES

- Bayley, J. (forthcoming [1]) The production and use of brass in antiquity with particular reference to Britain. In P. Craddock (ed.), *2000 Years of Zinc and Brass* (British Museum Occasional Paper). London.
- Bayley, J. (forthcoming [2]) Non-metallic evidence for metalworking. In *Proceeding of the 25th Symposium on Archaeometry, Athens, 1986*.
- Bayley, J. (forthcoming [3]) Non-ferrous metalworking: continuity and change. In E. Slater and J. D. Tate (eds), *Science and Archaeology*. British Archaeological Reports, British Series 196: 193-208. Oxford.
- Bayley, J. and Butcher, S. (1981) Variations in alloy composition of Roman brooches, in *Revue d'Archéométrie. Actes du XX^{ième} Symposium International d'Archéométrie, Paris, 1980*, vol. 3: 29-36. Paris.
- Bramwell, D. *et al.* (1983) Excavations at Poole's Cavern, Buxton: an interim report. *DAJ* 103: 47-74.
- Branigan, K. (ed.) (1980) *Rome and the Brigantes*. Sheffield.
- Branigan, K. (1981) Carsington. *Current Archaeology* 75: 125-26.
- Brodribb, C. *et al.* (1972) *Excavations at Shakenoak Farm III*. Oxford.
- Crofton, D. (1922) Vestiges of human habitation in Poole's Cavern. In F. Redfern, *All About Poole's Cavern, Buxton*: 14-17. Derby.
- Ellison, A. (1977) *Excavations at West Hill Uley: 1977. The Romano-British Temple*. Bristol.
- Fowler, E. (1960) The origins and development of the pennanular brooch in Europe. *Proceedings of the Prehistoric Society* 26: 149-77.
- Frere, S. S. (1984) *Verulamium Excavations III*. Oxford.
- Hart, C. (1981) *The North Derbyshire Archaeological Survey*. Chesterfield.
- Hodges, R. and Wildgoose, M. (1980) Roman or native in the White Peak. In Branigan (1980), 48-53.
- Leach, P. (1982) *Ilchester. Volume I: Excavations 1974-5*. Bristol.
- Mackreth, D. (1983) Small finds (Part One): the Roman brooches, in Bramwell, D. *et al.* (1983), 52-61.
- Neal, D. (1974) *Roman Villa at Gadebridge Park*. London.
- Palmer, L. (1925) Frank i'th'Rocks Cave and other northern caves in relation to the Ice Ages. *Proceedings of the University of Bristol Speleological Society* 2: 224.
- Wacher, J. and McWhirr, A. (1982) *Early Roman Occupation in Cirencester*. Gloucester.
- Ward, J. (1897) Recent cave-hunting in Derbyshire. *Reliquary*: 87-98.
- Wedlake, W. (1958) *Excavations at Camerton, Somerset*. Bath.
- Wheeler, R. E. M. (1936) *Verulamium: A Belgic and Two Roman Cities*. London.
- Wild, J. P. (1970) Button-and-loop fasteners in the Roman provinces. *Britannia* 1: 137-55.