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Assessment of archaeometallurgical residues from Nesscliffe Hill Camp, Shropshire

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Abstract

The submitted collection comprised approximately 9.6kg of hand-picked materials plus two small bulk samples.

The assemblage include evidence for both ferrous and non-ferrous metallurgical activities of Iron Age date. Iron working is represented by 3.5kg of iron slag, mostly complete or fragmented smithing hearth cakes (SHCs). Fifteen SHCs were essentially complete, with weights ranging from 56g to 530g (with a mean of 196g). Although the sample size is small, these statistics compare well with those of other early assemblages from sites involved with blacksmithing rather than iron production. Two small fuel ash pieces were poorly preserved but showed similarities with examples of clay coatings employed in heat treatment of ferrous materials.

The evidence for non-ferrous metalworking comprises ten certain and one possible crucible sherds, each probably from a separate vessel. Five of these sherds come from crucibles with a lug handle and a fabric rich in charcoal (and others may also have done so). These vessels are rare, being known from only five other sites, three of which are in close proximity.

One fragment, although provisionally included with the crucibles here, may alternatively be a fragment of a clay coating applied to a metal object during its manufacture. Two pieces of fuel ash slag-like material may also be similar coatings.

Other ceramic materials included fragments of vitrified hearth lining and several pieces that were probably, although not certainly, from tuyères'.

Some non-metallurgical materials were also included within the submitted materials, including three sherds of a large, cauldron-like, ceramic vessel, a small fragment of fired daub and some substantial pieces of charcoal.

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Methods

All materials were examined visually, using a low-powered binocular microscope where required. The identifications of materials in this report, as an assessment during which no instrumental analysis was undertaken, are necessarily limited and must be regarded as provisional.

This assessment was conducted in January 2024 and was commissioned by Prof Gary Lock of Oxford University. The materials derive from excavations at Nesscliffe Hill Camp, Shropshire.

The bulk samples were disaggregated and were wet-sieved at 90µm. The retained fraction was separated with a magnet to produce a subsample for examination for hammerscale.

Results

General nature of the assemblage

The submitted materials comprised approximately 9.6kg of hand-picked materials plus two small bulk samples.
The hand-picked materials included 20 pieces of rock (total 4.1kg), 39 pieces (3.5kg) of iron slag, 58 pieces (1.2kg) of hearth ceramic, 3 pieces (366g) of pottery and 11 pieces (150g) of crucible and related materials.

There was also a single fragment of fired daub, some substantial pieces of charcoal and some concretionary material.

Sample <35> produced a trace level of flake hammerscale in the magnetic part of the >90µm fraction.

Sample <36> had a >90µm fraction that is almost entirely red sand; it contains no metallurgical residues.

Hearth materials

Several distinct facies of technical ceramics were present, of which the crucibles are considered separately below.

Those pieces of straightforward hearth lining show an oxidised sandy fabric to the rear, with a dark (mostly) vitrified and/or slagged surface to the front. The pieces with the very dark slagged face are likely to have from hearths employed for iron working; those with a simple clear green wood-ash glaze may have been produced during the heating of crucibles. Most of the fragments are small and provide little morphological information about the hearth(s).

The largest fragment ((from (1029)/(1042); now in two pieces) weighs 284g and is a thin slab measuring 170x100mm. The rear is very sandy and although it is most likely that this reflects a simple sandy ceramic, it is just possible that the clay had been applied to a sandstone surface. One edge shows the margin of the superficial slag overhanging a recessed clay face. Such a margin is often observed on the lower edge of the face of a tuyère block, but equally it could be generated in a hearth with a simple ceramic blowing wall. The vitrification is dark greenish and patchy, but fades towards the slab margins, suggesting the blowhole had been near the centre of the long edge of this fragment.

A 40g piece (without context attributes) of vitrified oxidised-fired hearth ceramic shows a smooth, unvitrified surface turning away from the slagged surface. Like the piece described above, it is unclear if this is from a tuyère.

An 82g piece (also from (1029)/(1042)) is a large irregular mass of low-density charcoal rich clay (similar to the fabric seen in many of the crucible fragments) as in crucibles. It shows a rounded rear surface with a surface with 60mm radius and an irregularly curved highly vitrified front face. This appears to be a fragment from the margin of the face of a tuyère. It is highly irregular but suggests either a cylindrical form or rectangular block with rounded corners. The apparent inner parts of the block show elongate moulds of straw rather than the more charcoal of the outer parts.

A further fragment (45g) from (1029)/(1042) shows a very complexly curved dark green glazed face on a sandy ceramic with moulds of straw. This is probably also a fragment from the margin of a tuyère face.

A rather different sort of technical ceramic is represented by two sub-hemispherical rounded masses of fuel ash slag (FAS)-like bloated material with deeply dimpled pale green glazed convex external surfaces and a planar basal surface showing vitrified (partially melted) ceramic. Although other interpretations are possible, these pieces resemble fragments of clay that had been attached to the surface of a piece of metal. Clay coatings were applied to metal surfaces for various purposes in Iron Age metallurgy. These include the control of carbon exchange during the welding of steel, protection of iron surfaces from oxidation (particularly during the fire welding of large complex assemblies) and protection from oxidation in the brazing of iron (the surface coating of iron with a copper alloy film). These possibilities cannot easily be differentiated.

Crucibles

The collection includes 10 crucible sherds, plus 1 fragment (Crucible #5) that, although it closely resembles the crucible fragments, may have been generated in a different process.
The crucibles are formed in a fabric that is not especially refractory. Most examples show significant bloating. The fabric bears fine quartz sand in varying proportions, plus an organic temper in including larger fragments (possibly charcoal fines) and, at least in some examples, hair.

Five pieces show evidence for a lug handle created by pinching in one side of the vessel.

Details:

Crucible #1, 19.1g from (1029)/(1042)
This fragment is the base of a medium-sized crucible. It is almost circular internally, approximately 20mm in internal diameter at 5mm above the internal base. At 30mm above the external base (approximately 15mm above the internal base it would have been approximately 50mm x 40mm externally. A thickening of the wall to approximately 15mm at this height on side probably represents the base of a lug handle. The profile of the base is irregular because of variable external slagging, but is moderately pointed in transverse section, more even rounded in the plane of the handle.

The fabric is extremely porous towards the outside, but internally may be more compact, mid-grey in colour with charcoal inclusions. The internal surface is rough and indurated. The external surface is dark, almost black, glass with sand inclusions, except for a limited sand-rich area with a clear green glaze. The outside is locally coated in ferruginous, charcoal-bearing accretion.

Crucible #2, 10.2g from (1029)/(1042)
This is a friable fragment from the upper part of very porous crucible lug handle. The handle is 30mm wide on its upper surface where it merges into the crucible wall. There is a slight central groove on upper face. The crucible wall is approximately 7mm thick or less away from the handle. The lower part of the handle and the rim are missing.

Crucible #3, 8.2g from (1029)/(1042)
This piece comprises two parallel, fused, thin slagged sheets of technical ceramic. One if the sheets is rich in charcoal clasts and is likely to be a sherd from a thin-

walled crucible. The other sheet has a 10mm quartz grain and thus is unlikely to also be from a crucible and may be contamination from the hearth wall.

Crucible #4, 5.4g from (1029)/(1042)
This sherd is from the base of a probably medium-sized crucible in fine sandy fabric, pale grey in colour, becoming slightly bloated towards the external surface. The internal surface is mainly pale grey and relatively unaltered. The outside bears a dark glass that carries abundant sand-grains and is slightly fissured. The base is 13mm thick. The profile is asymmetrical, but the presence or absence of a handle cannot be determined.

Crucible #5, 2.9g from (1029)/(1042)
This piece is only provisionally placed amongst the crucibles. It is a deeply vitrified sandy ceramic. The external surface is curved, with an effective diameter of 27mm and with a very slight convex longitudinal curvature too. Internally, the surface shows a coaxial curved surface with an effective diameter of about 4mm, with a little less that a semi-circular section.

The fabric is a grey, somewhat sandy ceramic. Where least altered in the core of the piece it is mid-grey, but becomes paler and more bloated towards the external surface, where it is very pale. The external surface has a greenish grey glaze with abundant sand.

The internal surface is pale grey, very smooth, with a very slight hint of a subtle transverse, possibly spiral lineation.

If this is a crucible sherd, then it represents an unusually tight corner (either by design or by deformation at high temperature). An alternative interpretation would be that is a fragment of a clay coating applied to a metal object (represented in negative by the inner surface). Such coatings are used in metallurgical process for various reasons, including controlling carbon transfer and scaling during the heating of iron objects and during the application of a metal coating, particularly during brazing. The alteration of the piece indicates high temperature use under reducing conditions, which precludes it from being a mould fragment, which it resembles morphologically.

Crucible #6, 7.6g from 1049 (SF <51>)
This sherd forms much of the side of a small, thin-walled crucible, with a preserved height of 38mm with only the very base missing. The wall is mostly straight and flaring, 6mm thick near the bottom of the side and 4mm thick at 5mm below the rim. The curvature at the rim is irregular but suggests a diameter of approximately 40mm.

The fabric is slightly porous (mostly from bloating), dark grey, with visible white temper (quartz) and some charcoal clasts. The external surface shows a poorly preserved dark glaze with a bleb of adhering variegated (dark green, pale, red) slag near the base. The internal surface similar with a variable density of vesicles. The glaze is red (from Cu_2O) along the rim.

Crucible #7, 16.5g from 1042 (SF <39>)
A substantial sherd including the rim and most of the lug handle of a thin-walled crucible, somewhat similar to #6, but slightly larger and differing in preservation. The preserved part probably includes part of the upper 52mm of the vessel. The wall is straight and flaring, typically 5-6mm thick away from the handle.

The pinched handle has closed the walls, thtso they form an approximate right angle internally adjacent to the handle. The top of handle is at approximately 12mm below the rim (although the rim does not actually survive immediately above the handle). The handle has depressed sides, is 10mm thick between the outer edges at the top and almost 20mm at lowest preserved part of the handle, 40mm below its top.

The wall thickness is almost entirely bloated and locally pale in the core. The internal surface is vitrified with a red-brown glass. The external surface has a very dark glaze. All surfaces of the fragment show coating with a cream-coloured powdery material, probably ash.

Crucible #8, 28.7g from TR1x (SF <36>
This is a very large crucible lug handle, 60mm tall, 34mm wide at the top and bottom, and 22mm in the centre. It has a wide central groove 3mm deep. The thickness between the centres of the lateral dimples is about 25mm. Little crucible wall is preserved, but it is highly bloated, apparently about 7mm thick, and has a fabric rich in charcoal, together with isolated fibres, probably hair.

The external surface has a green glaze; the inner face is probably eroded.

Crucible #9, 32.8g, in an unlabelled bag with <36>
This piece is a second very large crucible lug handle. The handle is 65mm tall, 22mm wide at top, 20mm at centre, and then flares into the base of crucible.

The crucible wall is about 8mm thick. Its outer part is highly bloated, the inner part less so. The inner part shows the fabric is rich in charcoal and has some hair as well as sand.

There is a slight external glaze preserved with some red (from Cu_2O) below the handle. The internal surface is smooth and apparently unaltered.

Crucible #10, 12.1g
This slagged base of a crucible is approximately 10mm thick at base, decreasing to 5mm at 30mm up the side. The vessel is very fine on the relatively unaltered interior surface, with abundant charcoal and probably also hair. The outside has a dull dark glaze with localised copper rich red splashes. There is a lump of vesicular fuel ash slag attached to very bottom of the outside.

Crucible #11, 6g
This is a body sherd from a relatively thick-walled crucible. The fabric is fresh, sandy and dense compared with most other pieces. But, like others it has abundant charcoal inclusions. The outside is slightly dimpled with a wood ash glaze with splashes of red (Cu_2O) contamination.

Iron smithing residues

Smithing is represented by 39 pieces (3.5kg) of iron slag from (1029)/(1042), in addition, presumably to much of the hearth lining. The iron slags are dominated by material from smithing hearth cakes (SHCs; the approximately plano-convex slag cakes that form in front of, and just below, the air blast into the hearth, from a mixture of melted hearth ceramic and iron/iron oxide lost from the workpiece.

Of this material, 15 pieces (total 2.9kg) were substantially complete examples of SHCs permitting, despite the small size of the assemblage, some

consideration of their general nature. The largest example weighed 530g, a slight outlier from the main range of examples from 56g to 360g. The mean weight was 196g. Most examples showed a prilly internal texture (suggestive of a rather viscous slag, because of composition or temperature, or a low rate of slag production).

The weight-frequency statistics are illustrated in comparison to a suite of Romano-British assemblages in Table 2 (there are very few sets of similar figures available for Iron Age assemblages, and these are for specialist bloomsmithing assemblages). The Nesscliffe assemblage sits well within the corpus of blacksmithing residues, towards the heavy end of the group of rural sites or the light end of assemblages from larger settlements.

Iron smithing microresidues (flake hammerscale) are present in trace quantities in sample <35> from (1051). The concentrations are sufficiently low as to suggest that this context is not directly associated with the smithing activity.

Other materials

Three sherds (Tr1x, <35>, 366g) of very thick pottery (up to 20mm) had abundant large grit including mica in a dark grey fabric and were locally buff on the surfaces where not sooted/carrying burnt residues. The largest sherd shows a simple rounded rim The wall was 16mm thick immediately below rim. The orientation was not quite certain but was suggestive of hemispherical, cauldron-like vessel with at least 120mm height preserved. The diameter is hard to assess but probably >300mm.

A 210g tabular pale red/brown meta-siltstone from the unlabelled stone collection was a potential whetstone, showing some faceting and with a very highly polished area

An item <49> weighing 86g was labelled as a possible whetstone but is considered unlikely to be so.

Various stones, both angular pieces of red sandstone and water worn pebbles were submitted. None (apart from the 210g possible whetstone mentioned above) show conclusive signs of use or modification.

Two substantial fragments of roundwood charcoal from (1029)/(1042) have not been examined in detail.

Several pieces of sandy concretion from (1029)/(1042) were submitted. Some of these reduced to a simple core of slag on vigorous cleaning (and are listed as slag), but one piece appeared to be simply concretion with some small stone and slag fragments. This piece was 138g after cleaning.

Interpretation

The residues represent a small assemblage from a wide range of Iron Age metallurgical activity. The assemblage is only relatively small, but this is not necessarily a guide to the scale of the original activity since the metalworkers would normally clear their work area of debris.

The smithing of iron at Nesscliffe represents the end use of iron, rather than the processing of raw iron. There are hints, in the presence of possible ceramic coatings, that some rather specialised techniques may have been used.

The non-ferrous metalworking entailed the melting of copper alloy in crucibles. It is assumed that this was primarily for casting of artefacts (but see also other possibilities in the discussion below), but no mould fragments were recovered, so there is no evidence as to the type of artefacts involved.

Discussion

The crucibles for copper alloy melting have a very distinctive form with lug handles. Their fabric too is unusual, having a relatively low quartz content and a very high initial organic content. The lug handles were formed by pinching the side of an otherwise rather conical vessel.

Similar vessels are known from only a very small of sites – almost all in close proximity to Nesscliffe in the Powys-Shropshire border area, from Llwyn Bryn-dinas (22km WNW), The Berth (5km NE) and Old Oswestry (15km NW).

The examples from Llwyn Bryn-dinas were illustrated by Musson *et al.* (1992, Figure 3). They show handles that are 40-45mm tall and 18-26mm wide, on vessels 70-90mm tall, with wall thickness 20-25mm on the base (which is conical in profile), 14mm at the bottom of the side and 5-10mm thick at 5mm below the rim. The examples with a preserved rim show a pouring lip at right angles clockwise (in plan) to the handle.

The specimen from The Berth was illustrated by Morris & Gelling (1981, Figure 18.11). It appears to show a shed comprising a lug handle with an inclined base sloping down to a steep crucible wall. Unfortunately, the published drawing has no scale.

The example from Old Oswestry has been illustrated twice: by Savory (1976, Figure 34D) and by Hughes (1996, Figure 12). This example is complete, 41mm tall and approximately 41mm across at the rim. The handle is 24mm tall and 10deep, 9mm thick centrally and approximately 13mm thick where it joins the body of the vessel. The wall is a fairly constant 6-7mm until within 4mm of the top of the rim. The handle starts 4mm below the rim and continues to a level 10mm above the base. The handle is somewhat rectangular in outline and does not merge into the line of the base. preserved rim show a pouring lip at right angles clockwise (in plan) to the handle. The interior appears to pass smoothly across the inside of the handle.

A group of five crucibles with lug handles were also recovered together at Danebury from cp 3/4 (Cunliffe & Poole 1991, 380-382 and 411-12). These were vessels that were much squatter than the Shropshire/Powys examples, with a relatively shallow rounded base and very large, stout handles. The handles of the example shown as 7.140 is 30mm tall and 30mm wide at tis base, with a square profile and section (although dimpled in the vertical faces). that as 7.141 has a very thick wall (10-14mm) with a handle 15mm long and 20mm wide and 30mm tall and that as 7.142 has a handle 35mm wide, 33mm long and 39mm tall, again very rectangular in section, with dimples on the faces. Thus, both crucible form and handle shape differs markedly from the Shropshire/Powys examples.

Dating of the comparative examples lacks precision. The most closely dated are the Danebury examples,

which derive from CP3-4, dated to 310-270BC according to Cunliffe (2013). The Old Oswestry example was recovered from below a rampart and therefore deemed to be 'early'. The Llwyn Bryn-dinas examples were associated with a ^{14}C date (CAR-708; 2160 /- 70 BP) that calibrates to BC 390-40.

The Llwyn Bryn-dinas examples were associated with finds of copper metal with a distinctive impurity suite including including iron, arsenic, silver and zinc. Such metal forms has been identified a wide range of artefacts across North and Mid-Wales and is associated with metal smelted from the Llanymynech ore source (Musson *et al*. 1992; Musson & Northover 1989; Northover 1991; Havard *et al*. 2016; Young 2010).

Northover (in Musson *et al*. 1992) raised the possibility that the crucibles at Llwyn Bryn-dinas might have employed in a crucible-based process for smelting and/or refining a sulphidic ore. Such a purpose was also suggested for a small hearth/furnace found behind the rampart of the Llanymynech Hillfort (Musson & Northover 1989).

The Llanymynech furnace (dated to cal. 336 BC–AD 129 and an associated pit to cal. 386 BC–62 BC) was later reinterpreted (Young 2010; Young in Havard *et al*. 2016) as a smelting furnace on the basis of similar pit furnaces from Four Crosses, in the valley below he hillfort. The Four Crosses furnaces produced several 14C dates (365-150 (94.5%) & 131-121 (0.99%) cal BC; 357-258 (38.9%), 258-206 (1.4%), 233-99 (53.9%) & 69-59 (1.3%) cal. BC; 378-194 (93.3%). 187-177 (2.1%) cal. BC and 368-150 cal. BC) which suggest a date in the 4th to 2nd centuries BC. Such furnaces remain almost unique in British prehistory.

The apparently contemporary distribution of the lug handled conical crucibles in the area surrounding the Llanymynech ore source suggests they form parts of the same phenomenon of Middle Iron Age copper exploitation.

Further work

There is only rather limited potential for further investigation of this assemblage to yield archaeologically useful information. There are no visible metallic deposits on the crucibles, but analysis of the crucibles by pXRF might determine whether they show the elevated zinc concentrations that might be expected for vessels handling copper from Llanymynech (other sources of copper in Iron Age Britain effectively lack zinc).

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Table 1: summary catalogue, weights in g.

context	sf	This report	W (g)	No.	Notes
1029/1042			360	1	block comprising rather low-density slag tongue or SHC with prilly base; top probably dimpled but largely covered by collapsed slagged face of wall from above cake-top level; attachment 100mm wide, shows arcuate base; SHC part is 95x100x40mm; lining slag on top appears more like collapsed face than simple sloughing; triangular in plan
			308	1	small dense SHC, highly accreted with soft sandy, charcoal-rich accretion, slag lobate, traces of siliceous glaze on top visible on one side
			340	1	SHC, 135x105x65(40) mm, dense, well-formed, slightly biconvex; charcoal rich; post-depositional accretion on top with plant moulds; has an upstanding proximal? lump
			104	1	100x(50)x30mm; a little over half of a small dense SHC, top obscured, base in large lobes
			170	1	70x65x30(20)mm; small dense SHC with flat puddle top to bowl; dense prilly base has interacted with sediment on hearth floor
			106	1	65x65x25mm, small flat-topped puddle-like proto SHC with somewhat lobate margins
			56	1	small lobate slag lump - probably proto SHC but might be a fragment of a larger SHC
			108	2	broken small lobate SHC 50x70x35mm
			530	1	100x90x50mm; substantial, internally lobate SHC, with straw-rich accretion on upper surface and sediment contact on base; really a 90x70x50mm dense cake with some distally protruding lobes
			108	1	60x60x35mm small dense SHC, charcoal-bearing, lobate, biconvex
			92	1	essentially a low convexity burr with lobate slag adhering in a thin layer; unclear if it is effectively a small SHC
			266	19	small fragments of dense iron slag - mostly finer SHC fragments
			202	3	substantial fragments of small SHCs
			86	1	small lobate mass, slightly irregular, but probably an entire small SHC, 60x50x25mm
			98	1	55x50x35mm irregular probable SHC, very weathered, resembles some of the more accreted material
			286	1	80x80x40mm, neat, slightly double-layered SHC; base strongly flow lobed and shows marginal lobes; top is a puddle with slight wrinkles, upon which are clasts (lining/stones?)
			180	1	60x90x45mm irregularly shaped SHC; mixture of charcoal-rich zones and denser prills; top has an area of either lining slag or a glazed stone clast,
			114	1	60x85x30(17)mm, thin SHC-like flat topped puddle resting on indurated sediment/stone floor
			88	2	natural red sandstone
			36	1	fragment of vein quartz pebble

			82	1	large irregular mass of charcoal-rich clay, just as in crucible fabric; shows a rounded rear surface suggestive of a 60mm radius and an irregularly curved, highly vitrified front face; this appears to be a fragment from the margin of the face of a tuyère - either cylindrical or rectangular with rounded corners; inner parts show what appears to be straw moulds rather than charcoal as a temper
			46	1	fragment with very complexly curved dark green glazed face; probably a tuyère face-edge fragment; sandy ceramic with straw moulds.
			2	3	roundwood charcoal
			150	17	fragments of oxidised fired clay with dark superficial glass, all with recent fractures
			284	2	conjoining slab fragments, total 170x100mm; one edge shows overhanging slag margin; vitrification is dark greenish and patchy; vitrification fades across slab, good dark green glaze on centre of long edge (so near blowhole?); not conclusively from a tuyère, could be an applied clay slab on the blowing wall; rear is intensely sandy - unclear if it is a sandy ceramic or rock
			16	1	small fragment resembling larger slab above, but not joining it
			384	30	miscellaneous fired and vitrified clay/lining slag fragments
			36	1	small piece of peeled lining (oxidised) with vitrified surface
			52	1	lining slag and lining passing into denser slag - possibly from near contact of wall with in-hearth slag?
			74	1	oxidised fired clay with FAS-like slag attached, clay looks ashy and has large abundant rounded quartz grains
			138	1	concretionary material containing slag fragments, unclear if mostly slag or mostly concretion
			4	1	very fine hard clay with straw impressions - fired daub?
			14	2	sub-hemispherical rounded masses of FAS-like bloated material with deeply dimpled pale green external glaze; opposite side on both is a planar surface; more deeply fired that typical brazing shroud, but possibly coatings of some sort.
		crucible #1	19.1	1	base of crucible; almost circular internally, thumb sized; irregular externally, possible bulge below handle; 35x45mm at 25mm above base; walls 5mm expanding to 13mm below possible handle; all very porous, dark; external glaze, internally indurated and rough
		crucible #2	10.2	1	upper part of porous crucible handle; 30mm wide at upper merge; slight central groove on upper face; walls 7mm or less
		crucible #3	8.2	1	two superimposed slagged sheets of ceramic; one rich in charcoal - so presumably a crucible fragment; the other sheet has a 10mm quartz grain - so likely to be a sherd melted onto hearth contamination
		crucible #4	5.4	1	base of crucible in fine sandy fabric, pale grey – not the same fabric as the handled sherds
		crucible #5	2.9	1	tightly curved sandy ceramic; deeply vitrified; 27mm externally, 4mm internally; unclear what this is - just possibly a crucible handle with a void left in core after pinching?
1042	39	crucible #7	16.5	1	thin-walled crucible, similar to <51>, with pinched handle; walls form right angle by pinch internally; top of handle 12mm below rim; handle has depressed sides, outer edge 10mm thick at top, almost 20mm at bottom; wall thickness entirely bloated; internal surface brown vitrified; external has very dark glaze; surfaces with coating of cream coloured powdery material

	1049	51	crucible #6	7.6	1	crucible sherd; straight flared wall with narrow rim; 38mm high sherd, the bottom of the sherd is probably very close to bottom of crucible; wall 6mm near bottom of side, 4mm at 5mm below rim; approximately 40mm external diameter at rim; fabric very porous (mostly from bloating), dark grey with visible white temper (quartz?) and some charcoal clasts; external surface shows poorly preserved glaze and bleb of adhering slag near base; internal surface similar, but red coloured (Cu2O-bearing) glaze preserved locally near rim.
	1049	53		114	1	rounded pebble broken to reveal internal fossil - probably orthoceratid
	1051	49		86	1	split worn pebble of fine micaceous sandstone; no conclusive signs of artificial wear; probably not a whetstone
	1051	52		1515	1	red sandstone slab with smooth surface, surface shows some sub-parallel scratching but not conclusively modified
	1051	50		490	2	conjoining sandstone pieces with a 'channel' on a smooth surface - this appears to be a natural ripple with accompanying cross lamination
Tr1x		35		366	3	three sherds of very thick pottery (up to 20mm); abundant large grit including mica, fabric dark grey, locally buff on surfaces where not sooted/carrying burnt residues; largest sherd shows a simple rounded rim, wall 16mm thick immediately below rim; orientation not quite certain but suggestive of curved bowl side with at least 120mm height preserved; diameter hard to assess but probably >300mm, suggests a rather hemispherical, cauldron-like vessel.
TR1x		36	crucible #8	28.7	1	crucible handle 60mm tall, 34mm wide top and bottom, 22mm in centre; central grove 3mm deep; thinnest part of handle in dimples about 25mm; wall highly bloated, apparently about 7mm thick, but little preserved; fabric rich in charcoal, with some hair; outside glazed with green glaze, inner face probably eroded
?			crucible #9	32.8	1	(unlabelled bag placed with <36>) crucible handle; 22mm wide at top, 20mm at centre, then flares into base of crucible; 65m tall handle; wall about 8mm; outer part of wall highly bloated, inner part less so - this is rich in charcoal and has some hair as well as sand; slight external glaze preserved, red below handle; internally smooth and unaltered; rim not preserved
?			crucible #10	12.1	1	(in unlabelled bag in ceramic box) slagged base of crucible; fabric fine on surface, with abundant charcoal and probably also hair; wall 8mm or so thick at base, decreasing to 5mm at 30mm up the side; inside unaltered, smooth; outside has dull dark glaze, locally red splashed; knob of vesicular fuel ash slag attached to very bottom
?			crucible #11	6	1	body sherd of thick-walled crucible; fabric fresh, sandy with abundant charcoal; outside slightly dimpled with wood ash glaze with splashes of red Cu_2O contamination
				40	1	fragment of vitrified hearth wall with oxidised firing

	40	1	fragment of vitrified oxidised hearth wall, on one side the smooth surface oxidised fired clay turns away from the slag – it is rather irregular but is potentially fragment from a tuyère margin
	12	1	fragment of vitrified oxidised hearth wall, slag/glaze is decomposing
loose rocks	206	1	pebble
	306	1	pebble
	138	1	pebble
	88	1	slice of fractured pebble
	232	1	pebble
	180	1	pebble
	210	1	potential whetstone, shows some faceting and a very highly polished area; finer grained than most of pebble collection; pale red/brown meta-siltstone
	96	1	pebble
	184	1	pebble
	138	1	pebble
	166	1	pebble

Table 2: Comparison of the overall SHC weight-frequency distribution with that of selected Romano-British assemblages from southern Britain, ordered by mean weight. Weights in gram.

Site:	**Cleevelands**	**Exminster**	**Uffington**	**Ipplepen**	**Ebrington**	**Nesscliffe**	**Neath**	**Ware**	**Newyears Green**	**Mantles Green**	**Kingstone**	**Dymock**
Source:	Young 2016a	Young 2014b	Young 2015	Young 2022	Young 2016c	This report	Young 2013a, 2014a	Young 2014c	Young 2021	McDonnell 1985	Young 2012	Young & Kearns 2010
Site type	Rural	Rural	Rural	Settlement	Rural	Hillfort	*Vicus*	Small town	Iron making	Iron making	Iron making	Iron making
count	176	107	57	49	37	15	47	70	93	29	15	10
min. wt	44	32	36	44	53	56	74	36	46	200	230	112
max. wt	530	482	614	640	628	530	630	952	1975	1700	1035	3885
mean wt	125	127	137	159	180	196	244	246	472	550	565	1032
% <150g	73%	77%	72%	63%	46%	53%	32%	44%	17%	-	-	20%
% <500g	99%	100%	98%	94%	97%	93%	89%	82%	65%	59%	47%	60%
% >1000g	-	-	-	-	-	-	-	-	9%	7%	7%	20%
% >3000g	-	-	-	-	-	-	-	-	-	-	-	10%

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