GeoArch

Report 2018/25

Assessment of archaeometallurgical residues from Ranelagh, Co. Roscommon (15E0136)

Dr Tim Young
19th November 2018

Assessment of archaeometallurgical residues from Ranelagh, Co. Roscommon (15E0136)

Dr T.P. Young

Abstract

The submitted assemblage (34 items, 2.5kg, from 24 different contexts) comprised a very sparse assemblage of probably mainly residual materials.

Much of the slag material was very poorly preserved: typically the residues were fragmented and worn with some being very weathered. Only one single smithing hearth cake was complete. Three smithing hearth cake fragments from different fills of ditch C3 showed hammerscale inclusions in their adhering concretionary material. Although this hints that those contexts may also have contained iron-working microresidues (increasing the likelihood that they were primary disposal contexts), in the absence of sieved samples this cannot be proved. An alternative hypothesis would be that the accretionary material had formed in a primary depositional context elsewhere, before re-incorporation of the accreted slags into the ditch fill.

All the identifiable macroscopic slag residues (total 2.27kg) were from ironworking and were fragments of smithing hearth cakes of forms associated with a potential age ranging from early medieval to early post-medieval. A small proportion (<100g) of the slags were of uncertain origin, mostly compatible with, but not certainly from, an origin in iron working rather than iron smelting. One small piece (6g from c1339) of fuel ash slag was not necessarily metallurgical in origin – and might equally have been produced in a hearth or kiln (for instance in a cereal drying kiln).

Non-ferrous metalworking was indicated by a small number of finds of copper-alloy prills and blebs, mostly if not entirely spills from the casting process. The site interim report refers to finds of crucible and mould fragments, but no such materials were included within the submitted collection.

The general style of material parallels that from other enclosure sites, but the very small quantity of residues recovered suggests that metallurgy did not constitute a significant activity on this site. A low level of blacksmithing and casting of copper alloy is suggested, but no association with a particular phase or area of the site was evident, with the possible exception of the ironworking remains from ditch c3. The possibility remains that the iron-working evidence, at least, relates to activities undertaken outside the excavated area.

Contents

Abstract 1

Contents 1

Methods 2

Results 2
General description of the assemblage ... 2
Ironworking residues 2
Smithing hearth cakes 2
Indeterminate slags 2
Copper-alloy particles 2
Distribution of the assemblage 3

Interpretation 3

Further work 3

References 3

Table 1. Summary Catalogue 4

Methods

All materials were examined visually, using a low-powered binocular microscope where required. As an assessment, the materials were not subjected to any high-magnification optical inspection, not to any form of instrumental analysis.

The identifications of materials in this report are therefore necessarily limited and must be regarded as provisional.

This assessment was conducted in November 2018 and was commissioned by Maeve Tobin of IAC Ltd.

Results

General description of the assemblage

The supplied assemblage comprised approximately 2.5kg of material provisionally classified as archaeometallurgical residues (not 1.7kg as indicated on the accompanying documentation), together with approximately 46g of material described variously as ‘copper alloy object’ or ‘copper slag’.

The material supplied as archaeometallurgical residues was mostly iron-working slag, although a small number of pieces were ferruginous concretions, probably cored on metallic iron (s216, s754, s862

The copper alloy material was, so far as could be determined morphologically, in the form of blebs and prills, probably as casting spills.

Ironworking residues

Smithing hearth cake

All the identifiable macroscopic slag residues (total 2.27kg) were from ironworking and were fragments of smithing hearth cakes. Only one SHC was complete (if broken). This was a 266g example from pit c501.

Most of the broken fragments of SHCs appeared to be from rather larger examples, including approximately 50% of an SHC from c79 that weighted 520g.

All the SHCs showed evidence for the use of charcoal fuel; no examples were coal-fuelled.

Three smithing hearth cake fragments from different fills of ditch C3 showed hammerscale inclusions in their adhering concretionary material. Although this hints that those contexts may also have contained iron-working microresidues (increasing the likelihood that they were primary disposal contexts), in the absence of sieved samples this cannot be proved (although context descriptions should be checked to see if any hammerscale was observed, but not sampled, during excavation). An alternative hypothesis would be that the accretionary material had formed in a primary depositional context elsewhere, before re-incorporation of the already-accreted slags into the ditch fill.

Indeterminate slags

Some of the dense slag pieces were not attributable to an origin in smithing hearth cakes.

Four pieces were identifiable as flow slags. Slags that cooled as flowed prills within the fuel bed may be formed during both iron smelting and iron smithing. Although some of the material here had no diagnostic features, find s1132 (a maroon-surfaced slag with pebbles of granitic composition) was probably more likely from smithing. A flow of somewhat similar clinkery appearance (s885, from c1391 a fill of possible souterrain structure c1390) appeared to contain a fragment of coal shale – possibly indicating that it was a true clinker (the inorganic residue from the burning of coal).

Find s1162 was an unusual block containing much incorporated ceramic material. This may have simply been a fragment of an SHC that had incorporated some large pieces of the adjacent wall, but other interpretations are possible – including derivation of the bloated ceramic from the heating of rock rather than hearth wall.

Context c1203 (from the pelvis of sk380) produced a tiny (6.2g) broken vesicular bleb of fuel ash slag. Although such slags may be produced during both ferrous and non-ferrous metalworking working, they may also arise from non-metallurgical activities, such as cereal-drying kilns.

Copper-alloy particles

This material included three complex prills from c1202 (from two finds), an oxidised bleb from the gave-fill for sk25, two pieces from the top fill of ditch c206, and two tiny blebs from the grave-fill of sk237

All of the fragments appeared to be spills or other losses from casting. The two pieces from the top fill of ditch c206 (s1207 and s1208) both showed unusual fine transverse grooves across their surfaces, suggesting that they had both spilled across a surface with what were probably fine plant stems (most likely grass).

Distribution of the assemblage

The residues were sparsely-distributed across a wide range of disparate contexts. Of the materials from ditches that could be assigned to particular enclosures, 253g derived from ditches of Enclosure A, none from Enclosure B, 898g from Enclosure C and none from Enclosure D. 408g derived from grave-fills. Given the weathered, rounded and therefore presumably residual nature of much of the material all this probably indicates is that some of the assemblage is from relatively early in the site development. On the other hand, .the presence of microresidues in association with the slags from ditch C3 may suggest a degree of contemporaneity (see discussion above), and therefore that some of the iron-working was post-medieval.

The finds of copper-alloy droplets and prills included two finds from topsoil. two from the top of ditch C206, and two from grave-fills. This is a very insubstantial dataset, but may again suggest intermittent activity over a very long time period.

Interpretation

This assemblage was very small considering the scale of the excavation, so a very low level of metallurgical activity is indicated, particularly given the long time-span implied by the distribution.

The assemblage provides no unequivocal evidence for metal production at the site; more likely the location was employed for the occasional production of artefacts through the forging of iron and casting of copper alloys, sporadically during the site's development. The probable residuality of at least some of the ironworking residues and the lack of identifiable metallurgical hearths, means that the precise timing of the metalworking cannot be resolved. The iron slags would be compatible with an age anywhere from the early medieval to the earlier post-medieval. The most coherent group of materials is arguably that from ditch C3, with five SHC fragments, three of which bear accretion containing hammerscale, suggestive of a lower degree of residuality than much of the collection.

The small amount of material, taken together with the style of site, bears comparison with sites such as Moneygall (Young 2008a; a long-lived site with a sparse residue assemblage), Derrinsallgh 3 (Young 2008b; a site in which the main enclosure yielded very little metallurgical residue, compared with adjacent sections of the site) and Killeany 1 (Young 2008c; a sparse assemblage from an enclosure with cemetery). Such sites stand in contrast to others such as Parknahown 5 (Young 2009) with its more significant evidence for ironworking, and Ballykilmore (Young 2012), which had a protracted history of sporadic iron production and iron working in both its early phase and later cemetery phase. It seems likely that intensive metalworking was not, therefore, typically a feature of such sites except in areas where metal production was a significant part of the local economy.

Further work

The assemblage has very limited research potential and no further work is recommended.

The residues are of relatively low importance for preservation within the site archive, unless the archaeological context of the material means that either the identification of the material as deriving from iron-working (blacksmithing), or the age implications of that identification (for instance the contexts had been interpreted as earlier prehistoric) is unexpected.

References

YOUNG, T.P. 2008a. Evaluation of archaeometallurgical residues from Moneygall, Co. Offaly, 06E0321. *GeoArch Report 2008/10*. 15pp

YOUNG, T.P. 2008b. Evaluation of Archaeometallurgical residues from the M7/M8 Contract 2: Derrinsallagh 3 (E2179). *GeoArch Report 2008/22*. 11pp.

YOUNG, T.P. 2008c. Evaluation of Archaeometallurgical residues from the M7/M8 Contract 3: Killeany 1 (E2171). GeoArch Report 2008/31. 6pp

YOUNG, T.P. 2009. Evaluation of Archaeometallurgical residues from the M7/M8 Contract 1: Parknahown 5 (E2170), *GeoArch Report 2009/21*, 21 pp.

YOUNG, T.P. 2012. Appendix 3 -. Exploiting the bog -: iron production and metalworking, pp. A3.1 – A3.60 *In:* P. Stevens & J. Channing, *Settlement and Community in the Fir Tulach Kingdom*. National Roads Authority and Westmeath County Council.

Table 1: summary catalogue of submitted materials.

c.	s.		l wt (g)	comment
1	1200	topsoil	66	sheet of iron rich material - might be simply corroded iron, but likely iron-bearing slag
1	1201	topsoil	78	exploding irregular lump of iron; two patches of charcoal visible through magnetite rind; probably a piece of iron-rich slag?
1	1202	topsoil	18	two complex prilly flows of copper/copper alloy, dark carbonaceous matrix with unburnt organics (possibly just peaty topsoil)
1	1205	topsoil	20.4	slightly complex flow lobe of copper/copper alloy, slightly asymmetric, open vesicles on one face
105	80	ditch c3	108	very siliceous slag in irregular sheet-like form; base is mostly grey, dimpled, but appears to be as siliceous as the top of most SHCs; it includes a section of a quartz-rich geological material with crystal terminations - suggesting a vein or joint coating; the grey passes up into a convoluted pale layer, of similar crystal appearance but having inclusions that may be relict quartz; the upper layer is either convoluted or has very deep (collapsed?) fuel dimples; the whole piece probably forms the margin of an SHC formed over a siliceous substrate
105	862	ditch c3	40.4	concretion on iron probably
105	913	ditch c3	154	irregular fragment of coarse highly vesicular slag, almost honeycomb texture; probably shows original base with hollow downward facing small scale prills.
106	79	ditch c3	520	fragment (almost half) of SHC (110)x130x50mm or larger; centre of top depressed ,flat, surrounded by roll-like rim with some maroon-surfaced large lobes; inner top is pale grey smooth with large olivine in surface; body of slag is fairly fine grained with abundant large vesicles; base obscured by accretion; accretion shows rich FHS and SHS scale assemblage
107	914	ditch c3	32	small flap of poorly flowed slag with dark smooth tip; remainder largely obscured by accretion; probably from the margin of a SHC; the accretion contains a fragment of probable FHS
180	892	ditch c3 (basal fill)	44	fragment of the dimpled base of SHC; very weathered, worn and accreted; slag dense and fine, accretion shows a single flake of FHS
374	215	spread/occupation layer	110	rather worn fragment of SHC; top shows very pale green eutectic olivine-rich slag as seen in other examples, but pale and deeply fuel-impressioned; edge and body of cake in a denser iron slag with abundant charcoal; base covered in charcoal impressions; several areas appear to show corroding iron
402	1206	grave-fill - Sk25	0.7	oxidised bleb of copper/copper alloy
433	216	possible pit	10	small irregular ferruginous lump; iron-rich concretion; probably formed around piece of iron rather than slag
502	243	pit c501	266	(main piece plus three small fragments) 80x110x40mm, SHC with flat, slightly 'recurved' profile top and irregular lower part with charcoal-rich material interspersed with a denser sub-horizontal flowed sheet/lobe; the top is the densest part, very slightly glassy in places and has deep fuel impressions; the raised margin is very slightly lobate and dimpled below; the lower flowed material between the charcoal-rich layers is similar
540	569	ditch c4	168	very heavily accreted irregular slag lump, rich in charcoal; no detailed observation could be made because of accretion but thickness of accretion might suggest iron metal was present
541	269	top fill of ditch c4 (SE quadrant)	26	irregular iron concretion
577	573	feature c577	10.4	prill of flow slag, apparently formed around medium sized charcoal/wood clasts

679	369	fill of grave-cut c678	162	central section of a medium-sized SHC; piece has fragmented on extraction, tearing along mid-line, probably along charcoal clasts, leaving part of dimpled basal layer with coarse olivine lower than the main section; main slag vesicular and has well developed upper plate with glassy lining influenced section on top
681	802	ditch c206 (top fill)	38	extremely heavily accreted with silt, fine organics and charcoal, but shape suggests underlying item is a piece of flow slag
681	1207	top fill of ditch c206	4.8	probable spill of copper/copper alloy, has multiple narrow grooves, so possibly spilt into grass or similar
681	1208	top fill of ditch c206	0.9	small spilled bleb - has groove, similar to item #1207
858	571	pit c851	250	fragment from a moderately-sized SHC; has upper plate c12mm thick, with a smooth, slightly lobate? top surface, with coarse olivine forming surface; body of slag below the upper plate is a charcoal-rich material, the thickest seen is approximately 40mm, but the base is not preserved
989	1204	grave-fill - Sk237	1.1	tiny oxidised copper/copper alloy blebs
1088	770	ditch c206	15.5	thin sheet of mineralised material - sand with some charcoal and fine organic moulds, probably formed around thin iron sheet
1191	753	grave-fill - Sk 381	204	extremely dense SHC fragment containing much iron metal; top has deeply impressed fuel moulds, in cream weathered material; lower slag shows rusting on several faces - so plenty of iron present; starting to explode after washing
1219	754	posthole c214	5.5	irregular iron concretion
1339	1203	pelvis of sk380	6.2	broken vesicular bleb of FAS with slightly harder greyer zone on surface
1391	885	structure c1390, souterrain?	1.7	small clinker prill with fragment of probable coal shale
1675	1132	grave-fill - Sk527	8.5	irregularly branching prill of maroon gravelly slag; large clasts of possible granitic composition
1712	1104	grave-fill - Sk542	25	fragment of lobate very weathered pale grey flow slag; has charcoal surviving well between flow lobes
1786	1162	posthole c1785	108	piece exploded into 2 main pieces and more than 15 fragments; deeply weathered slag with zones of highly-bloated partially-melted ceramic locally with a bronze-red colour, in contrast to the pale greenish-weathering main slag; presumably this is an odd lining-rich SHC that is highly weathered; on side has a bright red iron oxide film on the surface; the whole lump is rounded and probably residual

GeoArch

geoarchaeological, archaeometallurgical & geophysical investigations

Unit 6, Block C,
Western Industrial Estate,
Caerphilly,
CF83 1BQ

Office: 029 20881431
Mobile: 07802 413704

E-Mail: Tim.Young@GeoArch.co.uk
Web: www.GeoArch.co.uk