

Evaluation of slag from the SE Motorway, Co. Dublin (02E0428, 02E0272, 02E0074 and 02E0076)

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Abstract

A single slag piece from Carrickmines Great (02E0428) is a plano-convex smithing hearth cake. The slag shows evidence of production within a charcoal fired hearth and at 635g is a typical size for derivation from blacksmithing.

An assemblage of slag from Carrickmines Great (02E0272) is indicative of bloomery iron smelting. The associated "hearth" can be interpreted as the truncated base of an iron smelting furnace. The slag assemblage bears close comparison with other recently-discovered iron smelting sites, and shares the same "slag-pit furnace" technology.

The Murphystown material (02E0074 and 76) included 1 piece of stone and 5 small pieces of dark slag. Most of this material appeared to have been fairly fluid. The slag included pieces of detritus, including, most commonly, shale. These features are strongly suggestive of the slag being produced in a coal- or coke- fired process. Such material might be derived from an industrial process or might be derived from a relatively recent coal/coke fired blacksmiths. Industrial slags of this type were sometimes employed as agricultural fertilisers, so a local source of the material is not necessarily implied.

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Background

The material from three of the sites covered by this report appears to be unstratified (context 1).

The fourth site, Carrickmines Great (02E0272), has a significant collection of slags from 2 stratified contexts (1088 and 1195. This site was apparently dominantly of earlier prehistoric age, but included a "bowl-furnace" (context 1088, of which the fill was context 1088) and an adjacent linear pit (context 1202), of which the secondary fill (context 1078) which yielded most of the slag assemblage.

This report is of an evaluation involving inspection of the material in "hand-specimen". No analytical studies of chemical composition or mineralogy have been undertaken. The evaluation of the potential of the material is based on this inspection.

Interpretation

The material is listed in the attached inventory.

Carrickmines Great (02E0248)

The slag from Carrickmines Great (02E0428) is a classic plano-convex smithing hearth cake. It is linguete in plan, with a length of 125mm (although slightly broken distally) and a width of 88mm. It has a depth of 35mm (excluding a slightly raised lip proximally). The piece weighs 635g. The distal section of the cake is distinct from the upper proximal part, suggesting that growth of the slag cake was interrupted. The upper surface of the cake is smooth and lower shows the impression of charcoal fuel material. Yellow-brown hearth-lining material is spread over the upper surface of the cake (possibly as a result of disturbance during removal from the hearth). The lining material is sandy and micaceous.

Slag cakes of this form and size are typical of blacksmithing in a clay-walled, charcoal-fired hearth. It is therefore not particularly diagnostic of age. Blacksmithing would have produced cakes of this sort from the earliest working of iron, through to the abandonment of charcoal as fuel. In some areas with a ready supply of mineral coal, use may have been made of coal from an early period, but some blacksmiths preferred to use charcoal until very recent times.

Carrickmines Great (02E0272)

The furnace was heavily plough-truncated, but was 0.37m in diameter and 0.09m deep. Some slag on the base was interpreted as primary, but the main fill appears to have been charcoal- and slag-rich debris (context 1088). The furnace is slightly smaller than the Tullyallen example (Young 2003c), but similar to examples at Celbridge (Young 2003a). The slag assemblage comprises 550g of dense, well flowed, slag prills and blebs. The Tullyallen example demonstrates that these slags would be expected in

the lower part of an iron smelting furnace, and therefore it is possible that they were essentially in-situ in the furnace base.

The purpose of an adjacent large pit (2.30 x 0.59 x 0.30m deep) is unknown, but its secondary fill also contained iron smelting slag debris. The slag assemblage comprises 670g of slags, which broadly resemble those from the furnace. They are dominated by dense prills, which show good evidence for flowage around very large charcoal pieces, as at Tullyallen. There are also some pieces derived from the furnace wall. As with the assemblage from the truncated furnace, these slags would have had their origin in the very base of the iron-smelting furnace. There is little evidence for slags from higher up in the structure.

The significance of these new occurrences of early smelting is discussed in a separate discussion document (Young 2003b), providing more details of their context, parallels and possible interpretation.

Murphystown (02E0074 and 02E0076)

The material from Murphystown (02E0074 and 02E0076) comprises small (<20g) blebs of dark glassy slag bearing small inclusions of a variety of materials, but dominantly of shale. The dark slag locally shows a superficial maroon colour. These features are typical of slags produced in coal- or coke- fired hearths, either those of industrial forges, or those of blacksmiths. The material is similar to slags often employed as agricultural fertilisers in recent times. The slags are most likely to be of relatively recent origin.

Further work

There is little that would be gained from further studies of the three finds of unstratified materials.

The Carrickmines Great (02E0272) site however would be well worth further investigation, to provide comparative data with other iron smelting sites, possibly to provide any evidence for varying technology, but certainly to assist with provenancing the ores utilised. It is recommended that the focus should be on providing chemical analyses of representative slag pieces.

References

- YOUNG, T.P. 2003a. Evaluation of slag from Celbridge Site 5, County Kildare (01E0306). *Geoarch Report 2003/07*.
- YOUNG, T.P. 2003b. Is the Irish iron-smelting bowl furnace a myth? A discussion of new evidence for Irish bloomery iron making. *Geoarch Report 2003/09*.
- YOUNG, T.P. 2003c. Evaluation of slag from Tullyallen 6, Co. Louth (00E00944). *Geoarch Report 2003/10*.

Site	Site No.	Context	Location	Find #	Weight	Description
Carrickmines Great	02e0428	1	gr 20	#25	635g	Classic plano-convex cake, linguete, slightly broken distally, preserved length 125mm, width 88mm, depth 35mm, excluding raised lip at burr. Upper surface smooth with lining spread, lower with charcoal impressions. Basal crust 8mm. Lining v sandy & micaceous, yellow brown. Distal part almost separate cake, lower than main part
Carrickmines Great	02E0272	1078		#1	<5g	Fragment of fired clay furnace lining.
		1078		#2	80g	Well flowed dense fayalitic slag, which has flowed around charcoal moulds.
		1078		#3	5g	Rusty iron-rich particle.
		1078		#4	5g	Dense fayalitic prill.
		1078		#6	45g	Well flowed fayalitic slag, lobes penetrate between large charcoal moulds.
		1078		#7	50g	Dense descending prilly slag, with adhering rather rusty slag.
		1078		#8	405g	Large block of well flowed fayalitic slag, exceptionally large charcoal moulds, vertically run slag.
		1078		#9	40g	Well flowed dense slag around charcoal moulds.
		1078		#10	<5g	Low density bleb of melted furnace lining.
		1078		#11	25g	Well flowed dense slag around charcoal moulds.
		1078		#12	5g	Sieved sample: well flowed dense slag prill.
		1088		#1	550g	55 pieces of dense blebby slag, 1 piece of furnace wall.
		1089		#1	<5g	Small fingered lobe of fayalitic slag. Rusty surface coating
Murphystown	02e0076	1	g7	#5&6	45g	2 pieces: 1 piece of dark slag apparently flown and included chips of stone, some maroon colour on surface, 1 blebby piece of dark slag - flown around fuel but not diagnostic
Murphystown	02e0074	1	g8	#24	10g	Fragment of decalcified fossiliferous siltstone - not slag.
		1	gr17	#280	10g	Dark vesicular slag enclosing fragments of shale, piece forms rounded bleb.
		1	gr17	#281	5g	Rounded bleb of dark flown slag, vesicular, dark colour on surface.
		1	gr16	#339	15g	Small piece of dark fluid slag enclosing sandstone, chert, bone (?) and shale fragments, piece has sheet-like form.