

## VII.

### A ROMAN OVEN AT MUMRILLS, FALKIRK. BY Miss ANNE S. ROBERTSON, M.A., F.S.A.Scot.

*Read March 28, 1942.*

In April 1941 the remains of a Roman oven were found within the area occupied both by the Agricolan fort at Mumrills and by the Annexe to the later Antonine fort. These remains lay partly on land sublet to Messrs Young, of Oaklands, Laurieston, and partly on ground sublet to Mr Robert W. Howie, of Highbank, Laurieston. Their presence was first detected by the latter's son, Mr Forbes Howie, and was at once reported to Mr Samuel Smith, tenant of Mumrills. After completely uncovering the remains, Mr Smith identified them as those of a Roman oven, and

communicated with Dr A. O. Curle and myself. At the request of Dr Curle and Mr Smith I undertook the task of recording the discovery. In doing so, however, I wish to acknowledge Mr Smith's constant help in the work of photographing and drawing the remains, and in supplying certain essential information.

Thanks are also due to Mr Robert Howie for his interest and forbearance, and to Professor Trueman, of the Geology Department, Glasgow University,

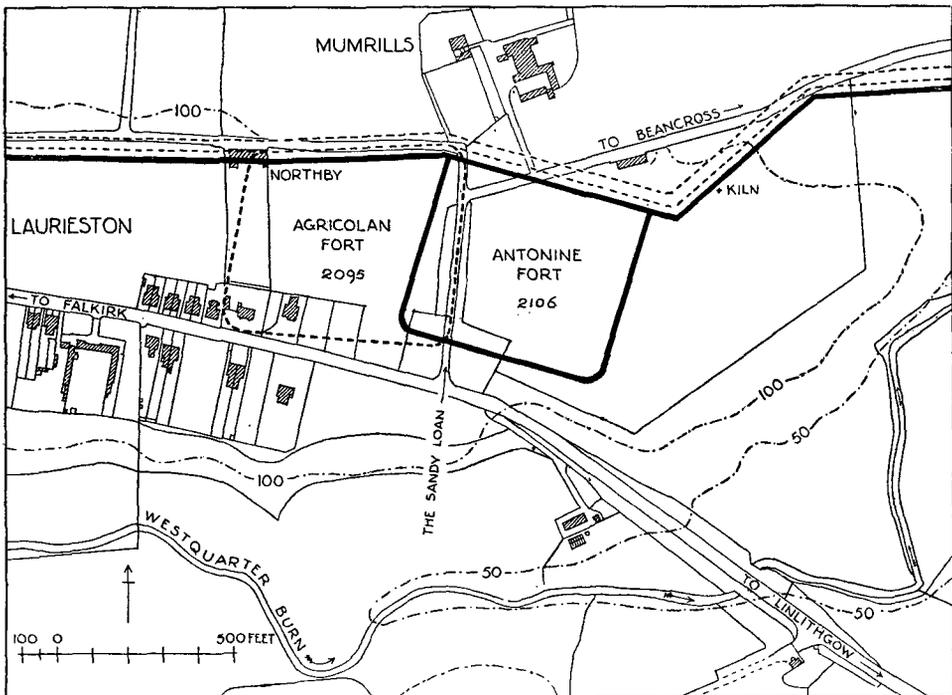


Fig. 1. Map of the Site of Mumrills Fort.

to Dr Smythe, of King's College, Newcastle-on-Tyne, and to Mr Charles Taylor, of Castlecary, for technical advice of various kinds.

The remains of the oven were found at a depth of 6 to 9 inches below present ground level, under the fence bounding field 2095 on the west and 76 feet from its southern end (fig. 1). The oven had had its main axis lying east to west, and had been roughly circular in plan. The floor measured  $2\frac{1}{2}$  to 3 feet across, and the surrounding walls had an overall diameter of about 5 feet. From the western end led a flue, about  $3\frac{1}{2}$  feet long by  $1\frac{1}{2}$  feet wide (fig. 2, and Pl. XXIX, 1).

The floors of oven and flue were continuous, and were formed of large flagstones, about 2 inches thick, the largest being as much as  $2\frac{3}{4}$  feet long. When uncovered, the walls were standing to little more than a foot in

height, that on the south side being better preserved than that on the north. They had been built of undressed stones, of various shapes and

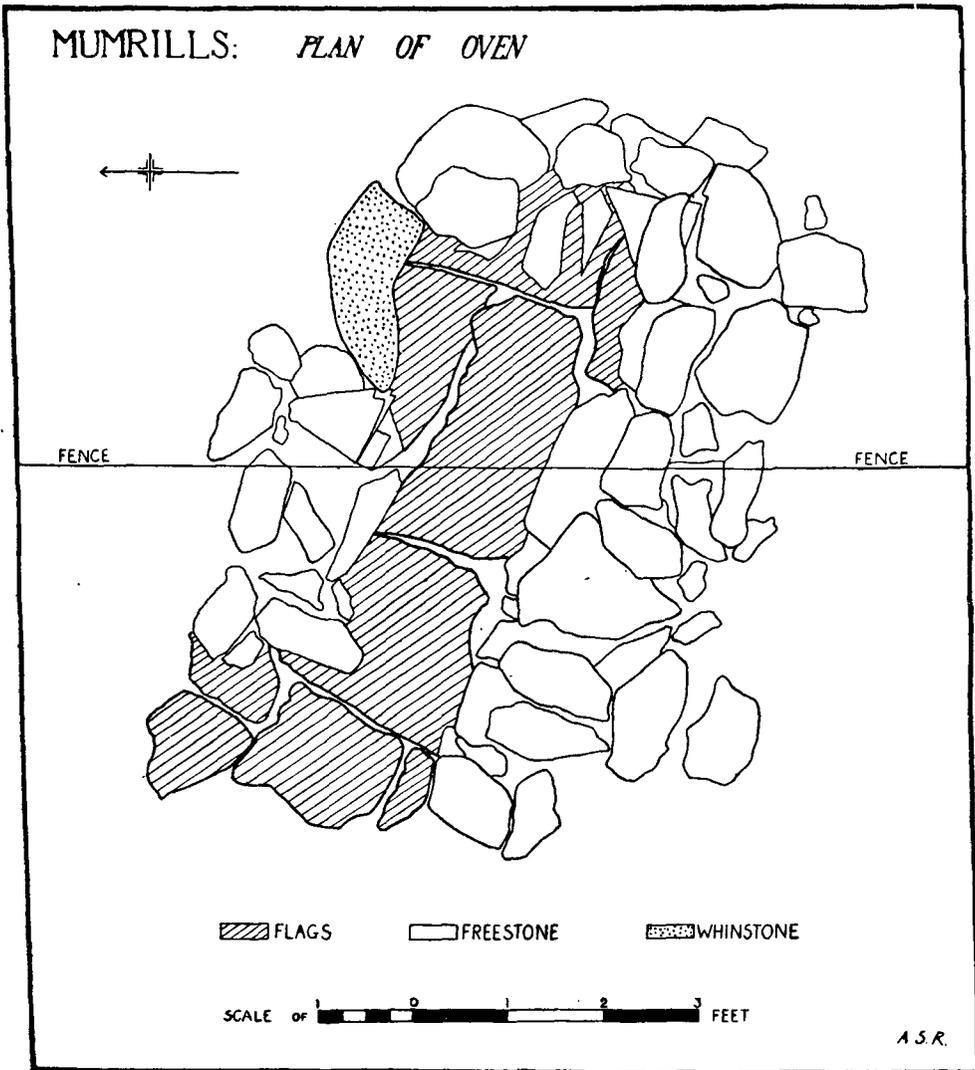


Fig. 2. Plan of Oven.

sizes, set in clay. The majority of these were freestone, with the notable exception of a whinstone boulder, 2 feet long, on the north side, whose naturally curved outline had helped to give its circular shape to the oven.

The remains of the oven walls had been no more than the foundation of a clay and rubble dome, the ruins of which were still preserved in the

form of numerous small stones lying in and around the oven, along with several lumps of clay burned red with intense heat. The dome must have been shaped rather like a bee-hive, with a hole in the top to serve as a chimney. A fire-reddened flagstone, about 1 foot square by 2 inches thick, which was found inside the oven, may have been used as a damper to cover the chimney. Signs of burning were most noticeable at the inner end of the flue, just at the point where it joined the oven.

That the flue walls, on the other hand, survived to their original height was suggested by their level top and finished appearance. The level top may have served as a hob. The north flue wall differed markedly in construction from the south flue wall and appeared to take the form of a level rectangular platform surmounted by a step or check. It was suggested by Dr A. O. Curle that this structural peculiarity may have had some connection with the heavy door which would be required to close the oven.

The north flue wall, too, stopped short of the south flue wall, possibly in order to allow ashes to be raked out into a pit at the north-west corner. A depression was in fact found at this point, but unfortunately it proved impracticable to determine its dimensions or to decide whether it was contemporary with the oven.

Samples of burned clay from the interior of the oven were examined by Professor Trueman, of Glasgow University, and, through the good offices of Mr Charles Taylor, by Mr J. F. Hyslop of the analytical staff of Messrs John G. Stein & Co. Ltd., of Castlecary. Both were agreed that the clay had not been subjected to a very high temperature, comparable, for example, with that required for smelting iron or firing bricks. The oven could only have been used for baking.

A similar conclusion was reached by Dr Smythe, of King's College, Newcastle-on-Tyne, as a result of his analysis of a piece of slag-like material which was found in a layer of burned clay inside the oven. Dr Smythe was inclined to the view that the material was furnace-clinker, formed by the burning of coal. He added that the temperature had been fairly high, though not so high as in a smelting furnace.<sup>1</sup>

Unfortunately, the discovery of one solitary scrap of material which is possibly, but not certainly, clinker formed by the burning of coal cannot be taken to prove that coal was used in fuelling the oven. Further, no evidence for the use of coal at Mumrills in Roman times was forthcoming in the excavations carried out on the site in the years 1923 to 1927.<sup>2</sup> On the contrary, the quantity of soot found in the pillared hypocausts and the large size of their stokeholes left little doubt that they had been fuelled with wood, while the lack of discoloration in the channelled hypocausts

<sup>1</sup> See Appendix.

<sup>2</sup> *Proc. Soc. Ant. Scot.*, lxiii. (1929) pp. 396 ff.

and the smallness of their stokeholes suggested that they had been fuelled with charcoal.<sup>1</sup>

The discovery of the supposed clinker in the oven, therefore, does no more than hint at the remote possibility that coal was used on occasion at Mumrills. Further evidence on this point may yet come to light, and, meanwhile, it may be noted that there is an outcrop of the Armadale Main Coal Measures on the banks of the Westquarter Burn, not more than half a mile to the south-west of the fort.<sup>2</sup> This outcrop, like so many others in Britain, may well have been exploited in Roman times. In Scotland, for example, coal has been found in the bottom of a pit or refuse hole in the Antonine fort on the Bar Hill,<sup>3</sup> which too lay within a short distance of a coal outcrop, and also beside the granary of the fort at Castlecary.<sup>4</sup> In England and Wales, evidence for the use of coal is much more abundant, especially in the forts on Hadrian's Wall, and in the villages and villas of the south-west. The former lay within easy access of the coal outcrops in the Tyne Valley and Cumberland, while the main source of supply for the latter must have been the coalfields in the Forest of Dean.<sup>5</sup>

The purposes for which the coal was used included the smelting of iron, as, for example, at Warrington,<sup>6</sup> the smelting of lead, as at Pentre, Flintshire,<sup>7</sup> and the heating of hypocausts, as at Castlesteads.<sup>8</sup> Coal has also been found in ovens at Corbridge, but these may have been connected with metallurgical processes.<sup>9</sup> No definite evidence for its use in firing baking-ovens seems to have been recorded, and it is generally assumed that these were fuelled with wood or, possibly, charcoal. Wood ash has been discovered in connection with ovens at Fendoch,<sup>10</sup> Malton,<sup>11</sup> and Cawthorn,<sup>12</sup> and a layer of charcoal is said to have covered the oven floors at Birrens<sup>13</sup> and Inchtuthil.<sup>14</sup> Coal, however, would not be altogether unsuitable for heating an oven, especially a small oven like that at Mumrills. The disadvantage of the slow rate of combustion would be offset by the fact that a coal fire needed less constant replenishing and maintained a higher temperature than a fire of wood. Nor would the soot generated by coal

<sup>1</sup> *Proc. Soc. Ant. Scot.*, lxxiii. (1929) pp. 458 ff., 469 ff., 488 ff.

<sup>2</sup> *Geological Survey of Scotland* (2nd ed., 1899), Stirlingshire, Sheet xxx, N.E.

<sup>3</sup> Macdonald and Park, *Roman Forts on the Bar Hill* (1906), p. 62.

<sup>4</sup> *Proc. Soc. Ant. Scot.*, xxxvii. (1903) p. 313.

<sup>5</sup> For the whole question of the use of coal in Roman Britain see R. G. Collingwood in *An Economic Survey of Ancient Rome*, iii. (1937) pp. 35-37.

<sup>6</sup> Thomas May, *Warrington's Roman Remains* (1904), pp. 29 ff.

<sup>7</sup> *Archæologia Cambrensis*, 1856, p. 306.

<sup>8</sup> Hutchinson, *Hist. of Cumberland*, i. p. 114.

<sup>9</sup> Information from Mr Ian Richmond.

<sup>10</sup> *Proc. Soc. Ant. Scot.*, lxxiii. (1939) p. 137.

<sup>11</sup> P. Corder, *The Defences of the Roman Fort at Malton* (1930), p. 17.

<sup>12</sup> *Archæological Journal*, lxxxix. (1932) p. 36.

<sup>13</sup> *Proc. Soc. Ant. Scot.*, xxx. (1896) p. 101.

<sup>14</sup> *Proc. Soc. Ant. Scot.*, xxxvi. (1902) p. 209.

be much more troublesome than the smoke and ash produced by the burning of wood.

Whatever the fuel used, there is no doubt as to the manner in which the Mumrills oven was worked. A fire would be kept blazing in the interior, fanned by the prevailing, westerly, wind blowing along the flue, until the oven walls and dome had been heated to the required temperature. The fire would then be allowed to die down and the ashes be raked out by way of the flue, the raking out being facilitated by the smooth surface of the flagged floor. After the smoke and soot had dispersed, a baking pan or tray containing the bread or other material to be baked would be inserted. Chimney damper and furnace door would then be closed, and the baking be carried out by radiant heat from the oven walls. These must have been of considerable thickness to ensure the "solid" continuous heat essential to successful bread-making.<sup>1</sup> The chief disadvantage of this method of baking lay in the fact that the fire had to be rekindled and raked out again before every fresh batch of bread was baked.

In its general plan and in the way in which it was worked, the Mumrills oven resembled the circular baking-ovens commonly used in Roman forts. Well-preserved examples of these have been discovered at Mumrills itself,<sup>2</sup> at Balmuildy,<sup>3</sup> Birrens,<sup>4</sup> Inchtuthil,<sup>5</sup> Fendoch,<sup>6</sup> Malton,<sup>7</sup> Castleshaw,<sup>8</sup> and Cawthorn.<sup>9</sup> It is worth noting that the oven found inside the fort at Mumrills, though similar in plan to that uncovered in 1941, differed from it considerably in construction. The former had been built of much smaller stones than the latter, and appeared to have had its walls lined with potsherds and broken tiles.

The Mumrills oven was, however, much smaller than the usual fort oven, measuring only  $2\frac{1}{2}$  to 3 feet across internally instead of 5 to 7 feet. In this respect it resembled, for example, ovens found in the Annexe at Housesteads,<sup>10</sup> outside the signal station at Goldsborough,<sup>11</sup> and in houses at Colliton Park, Dorchester, Dorset,<sup>12</sup> and Atworth, Wiltshire.<sup>13</sup> These small ovens had clearly been intended to supply the needs of a smaller group of people than the fort ovens.

It is only reasonable to suppose that so useful an article of kitchen equipment as an oven would be made to serve other purposes besides that of bread-baking. The proximity of certain fort ovens to granaries, as at

<sup>1</sup> See W. Iago, *The Chemistry of Wheat, Flour and Bread, and Technology of Bread-making* (1886), pp. 319 ff.

<sup>2</sup> *Proc. Soc. Ant. Scot.*, lxxiii. (1929) p. 499.

<sup>3</sup> S. N. Miller, *The Roman Fort at Balmuildy* (1922), pp. 27, 31, 40.

<sup>4</sup> *Loc. cit.*

<sup>5</sup> *Loc. cit.*

<sup>6</sup> *Loc. cit.*

<sup>7</sup> *Loc. cit.*

<sup>8</sup> I. A. Richmond, *Huddersfield in Roman Times* (1925), p. 55.

<sup>9</sup> *Archæological Journal*, lxxxix. (1932) p. 63.

<sup>10</sup> *Archæologia Eliana*, 4th ser., ix. (1932) p. 230.

<sup>11</sup> *Archæological Journal*, lxxxix. (1932) p. 211.

<sup>12</sup> *Proc. Dorset Nat. Hist. and Arch. Soc.*, 59, p. 12.

<sup>13</sup> *Journal of Roman Studies*, xxix. (1939) p. 221.

Balmuildy,<sup>1</sup> has suggested that one of their uses was that of roasting grain before grinding. Roman writers on agriculture do in fact tell us that it was the practice of their countrymen to harvest grain, particularly barley, before it was fully ripe, in order to prevent mildew, or damage by shaking or from animals' hooves, and then to parch it in the sun or roast it by fire before grinding.<sup>2</sup> Striking evidence for the practice of roasting grain in Britain has been provided by the discovery of charred wheat in a series of drying chambers at a Romano-British homestead at Hambledon, Buckinghamshire.<sup>3</sup> Charred wheat has also been found on several other Roman sites, for example at Westerwood,<sup>4</sup> although not, so far as seems to be recorded, inside an oven. The absence of charred grain inside an oven does not, however, discount the possibility that it may have been used on occasion for the roasting of grain. The grain would be placed in a receptacle of some kind before being inserted in the oven, and would, or should, all have been withdrawn after roasting.

The heat to which ovens were subjected necessitated their frequent repair or even reconstruction. One at least of the Fendoch ovens had been provided with a new floor,<sup>5</sup> while an oven at Malton had been rebuilt several times.<sup>6</sup> That the Mumrills oven, too, had undergone reconstruction was suggested by the fact that its north side had been laid on made-up soil, and by the discovery of a heavily burned sandstone under the large whinstone boulder. The sandstone must at one time have occupied a position nearer the source of heat.

It may be inferred that the oven belonged to the Antonine rather than to the Agricolan occupation of Mumrills, both from its proximity to the present surface and from the pottery found in it. This comprised one fragment of a Samian ware platter (form 18/31 or 31), sherds from three grey urns or ollæ, and from an olla of coarse fumed ware, one fragment from the rim of an olla of fine fumed ware (fig. 3, 1), and one from the rim of a bowl of fine fumed ware (fig. 3, 2). These were all common Antonine types.

The only other finds from the oven itself were the scrap of slag-like material already referred to, and a badly corroded fragment of iron.

A number of potsherds were also recovered from ground within a radius of twenty yards of the oven. These included one fragment of a decorated bowl of Samian ware (form 37). The decorated zone was divided into panels containing a caryatid (Déchelette 658 and Oswald 1203), a figure (Déchelette 265 and Oswald 450), the same caryatid and a medallion. In one panel the caryatid was replaced by the stamp of the Lezoux potter

<sup>1</sup> *Op. cit.*, p. 27.

<sup>2</sup> Columella, *De re rustica*, ii. 9; and Pliny, *Hist. Nat.*, xviii. 10, 14, 18, 20, 23, 30, 72.

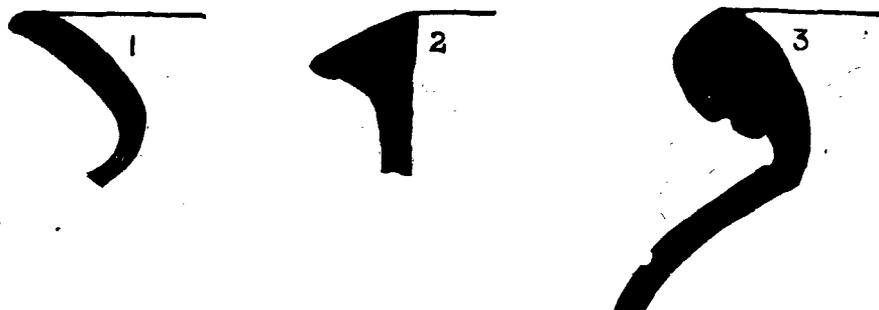
<sup>3</sup> *Archæologia*, lxxi. (1921) pp. 151 ff.

<sup>4</sup> Macdonald, *The Roman Wall in Scotland* (1934), p. 256.

<sup>5</sup> *Loc. cit.*

<sup>6</sup> *Loc. cit.*

Albucius—ALBVCI—a stamp which has occurred before at Mumrills.<sup>1</sup> There were also sherds of two grey ollæ and one of fine fumed ware, and one fragment from the thick, sharply everted rim of a grey olla of hard, close-textured clay, with a girth groove on the shoulder (fig. 3, 3). This last



SCALE +

FIG. 3. Pot Rims from the Oven.

fragment was strongly reminiscent of first century types of ollæ, especially those bearing rustic decoration,<sup>2</sup> and may well be a relic of the Agricolan occupation.

The finds have been presented to the National Museum of Antiquities, Edinburgh, by Charles W. Forbes of Callendar, J.P., D.L., Callendar House, Falkirk.

#### APPENDIX.

##### SLAG FROM A ROMAN OVEN ON THE SITE OF THE FORT AT MUMRILLS, FALKIRK. By J. A. SMYTHE, Ph.D., D.Sc.

The material is in the form of irregular, thin slabs or cakes, abounding in blow-holes and encrusted with red oxide of iron. When broken across, it is seen to be far from uniform, and surfaces ground, polished, and examined in reflected light show very imperfectly fused slag, with numerous blow-holes, and inclusions of unfused or imperfectly fused materials. The slag is neither glassy nor obviously crystalline, and the whole appearance is that of a fritted mass of diverse material.

I have endeavoured to isolate the slaggy constituents from the oxidised and unfused matter by crushing finely and selecting the portion passing the 30-mesh sieve, but stopped by the 80-mesh sieve. This, after thorough

<sup>1</sup> *Proc. Soc. Ant. Scot.*, lxiii. (1929) p. 506, No. 12.

<sup>2</sup> Cp., for example, Jas. Curle, *The Roman Fort at Newstead* (1911), pl. xlvi, 29; Thomas May, *Templebrough* (1922), pl. xxxii B, 205, 206; and P. Corder, *The Defences of the Roman Fort at Malton* (1930), fig. 17, No. 18.

washing and drying, consisted of dark-coloured extremely hard grains, almost free from red oxide and slightly magnetic. Partial analysis of this gave:

SiO <sub>2</sub>	40·75
Al <sub>2</sub> O <sub>3</sub> + TiO <sub>2</sub>	21·75
FeO	21·60
MgO	4·62
CaO	5·50
SO <sub>3</sub>	..
	<hr/>
	94·22
	<hr/>

Total iron is reckoned as ferrous oxide, and it is mostly present in this form. Heavy metals like lead and copper are absent; titanium was proved qualitatively to be present.

Having regard to the origin and age of the slag, it cannot be considered as a product of smelting iron ore in a blast furnace, and the high iron-content and low values for the fluxes (lime and magnesia) are in accord with this. On the other hand, it is not a typical bloomery slag, for in several analyses I have made of such slags, and in others quoted in Straker's *Wealden Iron*, ferrous oxide is of the order of 50 per cent., and lime and magnesia, and still more alumina, are much less in quantity.

I am inclined to think that it is a furnace-clinker, formed by the burning of coal. The temperature has obviously been fairly high, though not so high as in a smelting furnace, and the clinker represents the mineral matter in the coal. This has been essentially of a clayey nature and has probably also contained those ankeritic minerals (carbonates of iron, magnesia, and lime) which frequently occur in coal. The complete absence of sulphate is rather surprising, and indicates that the iron in the clinker has been all present in the ankerite, and none in pyrites.