

WHIN MILLSTONES IN BALDERNOCK, WESTERN CENTRAL BELT

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Whin, otherwise known as gorse, furse or furze, is a prickly evergreen shrub with bright yellow flowers that smell of coconut. The most common species of whin is Common Gorse (*Ulex europaeus*), a native of Western Europe. In the eighteenth and nineteenth centuries, whin shoots were a supplementary cattle feed, once the whin's prickles had been crushed and the shoots bruised and reduced to a pulp that is palatable to cattle and horses.¹ Graeme Collie's recent *Vernacular Building* article posed the question as to whether whin mills are a uniquely Doric phenomenon.² Collie was revisiting an issue raised more than eight decades earlier by James Ritchie who had also concentrated his discussion of whin mills on Aberdeenshire.³ As Collie noted, Ritchie's concentration on Aberdeenshire may have simply reflected the narrowness of his investigation and his main sources of information, including his father-in-law who was an Aberdeenshire farmer.⁴ Collie judged this explanation unsatisfactory, however, because the information held by the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS) and notes in Sites and Monuments Records confirm that, as Collie said, 'all the known examples [of whin mills] are found in modern (i.e. post-1996) Aberdeenshire'.⁵

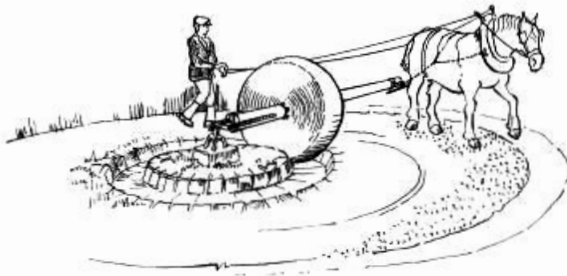
Shaw reported the earliest known example of a mill for crushing whin, from Aberdeenshire in the late 1760s.⁶ Fenton reported the construction of a mill for crushing whin shoots in Perth in 1778, and went on to note that many whin mills were set up subsequently, from Inverness-shire to the Borders, but with a concentration in the North-East.⁷ A range of machinery was used to crush whin, including the complicated and sophisticated early to mid-nineteenth-century 'furze machine' and 'Mackenzie's Gorse Masticator, made in Cork'.⁸ Forrester described similar machines, also noting that steam-powered gorse crushers were advertised in

the second half of the nineteenth century.⁹ The type of whin mill described by Ritchie, Collie and Forrester is simpler than these machines, consisting of either a cylindrical or slightly tapered stone roller, pivoted at one end and pulled by an animal around a circular path to crush the whins, or a circular stone with an axle fixed at one end to a central pole, with the stone on its axle pulled edge-on around a circular trough containing the whins to be bruised. Both types were illustrated by Collie and the latter – an edge-running stone or ‘edgerunner’ – is our interest here (see fig.1).¹⁰ Ritchie, Forrester, Collie and Fenton all included one or more photographs of this type of whin mill, with Fenton noting that the whin mill was used to crush year-old whin shoots and that ‘an acre of whins could keep six horses for four months, on twenty minutes bruising daily’.¹¹ Interestingly, that acreage and whin consumption were reported from late eighteenth-century practice in Midlothian (i.e. not the North-East), and Forrester reported whin gathering and crushing throughout the British Isles (England, Wales and Ireland and the Isle of Man, along with Scotland), as well as noting the use of whin in early nineteenth-century Brittany.¹²

This note picks up on that last point and Collie’s question as to whether whin mills were, ‘perhaps with very few exceptions, unique to Aberdeenshire’.¹³ The quarrying of possible whin millstones is reported in Baldernock, a rural locality about 2 kilometres (just over a mile) east of Milngavie on the northern outskirts of Glasgow in East Dunbartonshire. Baldernock is famous for Baldernock Mill, a still-functioning water mill in which the mill wheel, which used to drive a corn mill, now drives a saw mill. This note on whin millstones in Baldernock arose from an examination of the Baldernock Mill and its associated dam and lade.¹⁴ Before reporting on the possible whin millstones in Baldernock, a brief background on millstones is provided.

Millstones

Millstones are either monolithic (a circular disc of a single stone) or segmented (generally between eight and 28 pieces of stone



WHIN MILL, Quittlehead Farm,
Lumphanan, Aberdeenshire

- a 37'-0" dia. course
- b horse shaft
- c crushing stone
- d channel or trough
- e swivel coupling
- f stone anchor block

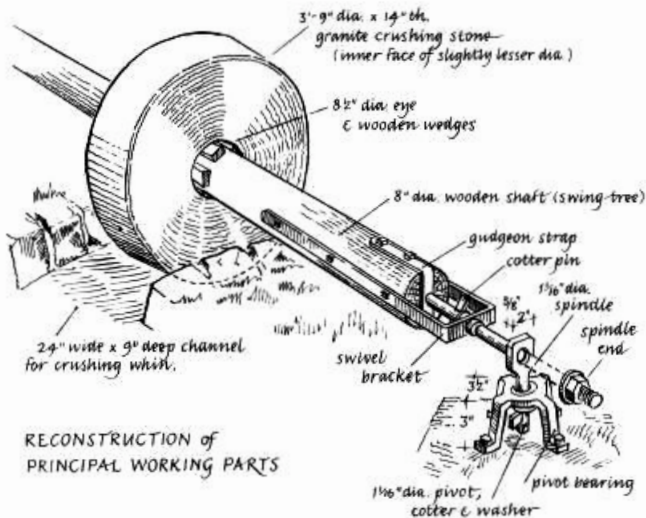
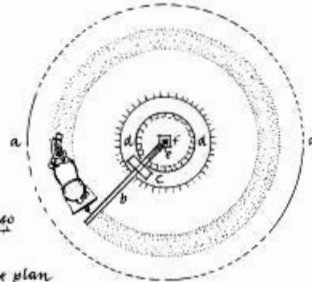
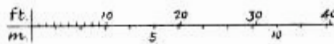


Figure 1. Plan and drawings of whin mill at Quittlehead, Lumphanan, Grampian, from the RCAHMS Scran website (<http://www.scran.ac.uk/>, Scran ID: 000-299-998-742-C). (© Crown Copyright: RCAHMS. Licensor www.rcahms.gov.uk)

	Lithology (where known)	Diameter (mm)	Thickness (mm)		Eye diameter (mm) and character	Fig.no.
'Normal' Scottish monolithic millstone (Tucker 1984)*	N/A	c.1100–1400	c.300			
Gauldie (1981)** on corn millstones in general (p.95)	N/A		New stone: 280–457			
			Worn down to ~75 thick			
Worn millstone at Baldernock Mill Cottage	Pebbly sandstone	1410	Rim: 108	Eye: 180	290–345 'stepped'	Figs 2–3
Burgh Muir (Tucker 1984)*		1676	Rim: 254	Eye: 305		
Kaim Hill (Tucker 1984)*	Quartz sandstone / conglomerate	1220				
Abbey Craig (Tucker 1984)* (segmented)	Basalt	1370	Rim: 280	Eye: 330		
Spittal (Tucker 1984)*		c.1500				
Gigha (Tucker 1984)*		1500				
Barnacarry (Tucker 1984)*		1000–1200				
Mull (Tucker 1984)*	Pebbly grit stone	c.1250				
<i>[Norse – horizontal water wheel (Tucker 1984)*</i>		<i>680–910</i>	<i>130]</i>			
Pennan stone (Gauldie 1981, p.93)**			356			
Perth grain mill stone specification (Gauldie 1981, pp 93–4)**	Grey sandstone	≤915 ['not more than 3' in diam. (which is plenty)']	Glamis Greys			
			Rim ('hem'): 191–203	Eye ('crown runner'): 267–279		
	Sandstone		French Burrs			
			Rim ('hem'): 279	Eye ('crown'): c.318–330		
In England (Gauldie 1981, p.94)**	N/A	610–1829, but 1219 most common	Rim: 381	Eye: 432		

	Lithology (where known)	Diameter (mm)	Thickness (mm)		Eye diameter (mm) and character	Fig.no.
Craigmaddie Muir						
Pecked outline of millstone on outcrop west of Muirhouse Farm (RCAHMS)***	Sandstone	1524–1981				
Broken monolithic millstone, Muirhouse Farm yard	Sandstone	1280	355		140; circular	Fig.4
Millstone set in stone wall at gate, Muirhouse Farm	Sandstone	1420	Rim: 405	Eye: 460	140; ?circular	Fig.5
Craigmaddie Muir north-east of Muirhouse Farm						
RCAHMS***	Sandstone	~1220 ('about 4' in diam.')				
Partially cut stone (reported by Tucker 1984)*	Sandstone	1420				
Unlifted millstone measured by author	Sandstone	1300	c.430 (max)			Fig.6
Pecked millstone outline	Sandstone	1380				Fig.7
Two adjacent circular 'cavities' from which millstones appear to have been lifted	Sandstone	1830–2130 (NB. > diam. of the lifted millstone)				
Whin millstones as reported by Ritchie****		~750–~1500 but mostly ~850–~1400	~150–~500 but very predominantly ~300–~400		~150–~300 but predominantly ~180–~250; both circular and square holes reported	

Table 1. Characteristics and sizes of Scottish millstones (all monolithic, except if noted as segmented).

*D G Tucker, 'Millstone making in Scotland', Proceedings of the Society of Antiquaries of Scotland, Vol.114 (1984), pp 539–56

**E Gaudie, The Scottish Country Miller, John Donald, Edinburgh, 1981

***RCAHMS, Site Record for Craigmaddie Muir, Millstone Quarries, Canmore database, <http://canmore.rcahms.gov.uk/>

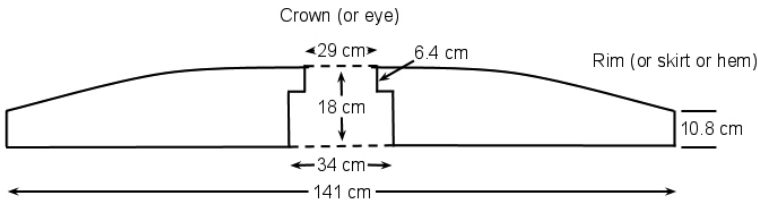
****J Ritchie, 'Whin-mills in Aberdeenshire', Proceedings of the Society of Antiquaries of Scotland, Vol.59 (1924–5), pp 128–42

cemented together and bound by iron hoops to form a circular ‘disc’).¹⁵ Whin millstones are monolithic. Millstones, as we commonly think of them in water mills or windmills, consist of a pair of stones mounted in horizontal position, the runner stone atop the nether stone (which is also known as the bed stone or lying stone). The vertical circular motion of the water wheel or windmill sail is converted by a set of gears into the horizontal circular motion of the runner stone; the nether stone is stationary. In grain mills, the grain is fed through the eye (a large hole at the centre of the runner stone) and ground between the rotating runner stone and the stationary nether stone as the grain makes its way outwards. The grain emerges from the edges of the stones as meal or flour, depending on the spacing and dressing of the stones. The two stones are generally of the same diameter, but the nether stone is normally a thick discoid in shape, with parallel top and bottom



Figure 2. Baldernock Mill runner stone viewed from the underside. Note the cross section of the eye and the circular grooves around it. The ruler on top of the stone is 457 mm (18 in) long.

Figure 3. Diagrammatic cross section of Baldernock Mill runner stone (not to scale) with measured dimensions. The upper surface of the stone is slightly curved (shown diagrammatically here).



surfaces, whereas the runner stone is commonly thicker at the eye than at the rim (see figs 2–3). In some instances the upper surface of the nether stone may be convex-up, in which case it is matched by a concave-down lower surface of the runner stone; the curved surfaces help the grain to migrate outwards as it is ground. Table 1 (see previous pages) sets out measured and reported dimensions of some millstones in Scotland and elsewhere.

Millstones may also be used singly, as a monolithic edge-running stone that grinds by on-edge rotation about a central pivot (see fig.1). Many materials were ground in this way, including bark, charcoal, sulphur and gunpowder, as well as whin.¹⁶

Craigmaddie Muir Millstone Quarries

Craigmaddie Muir, about 1.5 kilometres (just under a mile) north-north-east of Baldernock Mill, is underlain by sedimentary rocks (sandstones and conglomerates) of the Carboniferous Lawmuir Formation. Sandstones along the southern edge (the Baldernock side) of the muir crop out as disconnected ragged cliff sections over about half a kilometre. These sandstones have been worked for millstones and the overall site is known by RCAHMS as the Craigmaddie Muir Millstone Quarries.¹⁷ Evidence of the millstone working ranges from circular pecked outlines of (presumably) millstones, to *in situ* but unlifted millstones, to circular depressions in the rock where millstones have been lifted, to complete monolithic millstones that have been recovered from the muir (see figs 4–8).



Figure 4. Broken monolithic millstone, Muirhouse Farm yard. Ruler is 457 mm (18 in) long.



Figure 5. Millstone set in stone wall at Muirhouse Farm gate. Ruler is 914 mm (36 in) long.



Figure 6. Unlifted millstone north-east of Muirhouse Farm.



Figure 7. Pecked millstone outline north-east of Muirhouse Farm.

Figure 8. Detail of broken monolithic millstone in Muirhouse Farm yard, highlighting the millstone edge's worked (pecked), slightly convex-out surface. Scale is 457 mm (18 in) long.



RCAHMS and Tucker implicitly treated the Craigmaddie quarry site solely in terms of its being for the production of millstones for the grinding of grain as outlined above.¹⁸ That viewpoint was identical to my own on first recognising the site, which occurred before I was aware of the RCAHMS and Tucker discussions. The farmer at Muirhouse Farm on Craigmaddie Muir commented, however, that he had been told that these were stones for the grinding of whin, and that comment stimulated this note.

Several characteristics of the stones point to their not being millstones for the grinding of grain. In particular, there is a complete lack of any stones that have been shaped as runner stones, in terms of either the stone being thinner at the rim than at the eye or the shape of the hole through the stone at the eye. The Craigmaddie stones are massive, basically worked monoliths. The data in Table 1 from the millstone set in the wall at the Muirhouse Farm gate do show that that stone is thicker at the eye than at the rim, but this greater thickness is symmetrical either side of the stone and not asymmetrical as in the runner stone at Baldernock Mill (figs 2–3). Moreover, the central hole of the Baldernock Mill stone is larger, neater, more finely finished and more elaborate than the simple circular hole in each of the moorland stones. The diameters and thicknesses of the Craigmaddie Muir millstones (when these can be determined) lie within the ranges of these dimensions reported by Ritchie¹⁹ for Aberdeenshire whin millstones (see Table 1).

In detail, the edge of the stone that is lying in the Muirhouse Farm yard is slightly convex outwards and has been worked to peck its surface, whereas its exposed flat surface (upper surface here) has been left rough and almost unfinished (figs 4 and 8). The convex pecked surface of the edge is entirely consistent with the stone being rolled on edge as a crusher and is also apparent in Fenton's photograph of the whin mill.²⁰ The slight outwards curvature (convexity) of the edge presumably would have aided the crushing action. The slight difference in inside and outside diameters of the stone illustrated in fig.1 helped the edge-running stone to roll around a circle, but that difference in diameters is neither essential for satisfactory operation of an edge-running stone nor universal in whin millstones described by Collie.²¹ In short, all the evidence points to the millstones quarried from Craigmaddie Muir Millstone Quarries being edge-running stones, most likely used to crush whin. The latter use is not proven by the data presented here but the farmer's comment that the monolithic stones are whin millstones is telling.

Final comment

It might not yet be possible to conclude definitively that the Craigmaddie Muir millstones are whin millstones, but that possibility raises several interesting issues concerning Graeme Collie's question as to whether whin mills are a uniquely Doric phenomenon in Scotland. Early reports of whin mills from across the British Isles in general, as well as from across Scotland in particular, suggest that they are not uniquely Doric. Collie argued that the best evidence for whin mills is the archaeological trace of the course and trough, but the massive nature of edge-running stones used to crush whin means that the stones may provide better evidence for the former presence of whin mills. The data also presented here suggest that diagnostic characteristics of a whin millstone include its massive character and a convex edge that is pecked for better crushing. Indeed, many monoliths identified by RCAHMS and Tucker may in fact have been misidentified as stones for milling grain. If some or the majority of those stones are

indeed whin millstones, it means that the former distribution of whin mills may have been quite widespread throughout Scotland.

Acknowledgments

I thank Douglas Murray, of Muirhouse Farm, for permission to work on the Craigmaddie Muir site and for interesting discussions about the millstones. Members of the Scottish Industrial Heritage Society are also thanked for responding to my early queries about whin mills.

Notes

- ¹ C J Humphries and E Shaughnessy, *Gorse*, Shire Books, Aylesbury, 1987, p.18; J Shaw, *Water Power in Scotland 1550–1870*, John Donald, Edinburgh, 1984, p.163; S Forrester, ‘Gorse mills’, *International Molinology*, Vol.51 (1995), pp 11–15.
- ² G Collie, ‘Whin mills – a uniquely Doric phenomenon?’, *Vernacular Building*, Vol.32 (2009), pp 41–56.
- ³ J Ritchie, ‘Whin-mills in Aberdeenshire’, *Proceedings of the Society of Antiquaries of Scotland*, Vol.59 (1924–5), pp 128–42.
- ⁴ Collie, *op.cit.*, p.51.
- ⁵ Ibid. pp 48–9.
- ⁶ Shaw, *op.cit.*, p.163.
- ⁷ A Fenton, *Scottish Country Life*, John Donald, Edinburgh, 1976, p.141.
- ⁸ Ibid. pp 143 and 142.
- ⁹ Forrester, *op.cit.*, p.12.
- ¹⁰ Collie, *op.cit.*, pp 42 and 43.
- ¹¹ Fenton, *op.cit.*, p 141.
- ¹² Forrester, *op.cit.*, p.14.
- ¹³ Collie, *op.cit.*, p.54.
- ¹⁴ P Bishop, E Muñoz-Salinas, A B MacKenzie, I Pulford, and J McKibbin, ‘The character, volume and implications of sediment impounded in mill dams in Scotland: The case of the Baldernock Mill dam in East Dunbartonshire’, *Earth and Environmental Science Transactions of the Royal Society of Edinburgh*, Vol.101 (2010), pp

97–110; P Bishop, ‘The water mills of Baldernock Parish’, *History Scotland*, Vol.11, No.1 (2011), pp 39–44.

¹⁵ D G Tucker, ‘Millstone making in Scotland’, *Proceedings of the Society of Antiquaries of Scotland*, Vol.114 (1984), pp 539–56.

¹⁶ Shaw, *op.cit.*, pp 469 and 418.

¹⁷ RCAHMS Canmore database, <http://canmore.rcahms.gov.uk/en/site/44419/details/craigmaddie+muir+millstone+quarries/> [accessed 25 January 2011].

¹⁸ *Ibid.*; Tucker, *op.cit.*.

¹⁹ Ritchie, *op.cit.*.

²⁰ Fenton, *op.cit.*, p.142.

²¹ Collie, *op.cit.*, p.44.