Ingleborough Archaeology Group

A survey of the north-west flanks of Ingleborough 2007-2011

Stone working

David Johnson

Stone has been fundamental to life for centuries and stone-built structures – dry stone walls, field barns, vernacular houses – define the very essence of the Yorkshire Dales landscape. Many of these structures were built using stone won from quarries but, in earlier times, walls were built using field clearance stone – stones grubbed out of the soil as farmers tried to create fields suitable for ploughing. In many instances stone was simply picked off scree slopes thereby avoiding the need to quarry it.

Exploitation of stone around Ingleborough

The accompanying essay on geology discusses the wide variety of rock types that outcrop on and around the mountain. All of these have been exploited in one way or another. Basement rocks have been quarried on an industrial scale since at least the 18th century. Nowadays it all goes out as high quality roadstone or aggregate from Arcow (SD804 704) and Dry Rigg Quarries (SD804 694) at Helwith Bridge and from Ingleton Quarry (SD705 741). In the past the Horton flagstones were cut into sections to make water tanks, dairy slabs, gate posts and boskins (the dividers between cattle stalls in cowhouses) from half a dozen small quarries at Helwith Bridge. Quarry products from here were exported across the North of England, to Derbyshire and as far away as London.

Carboniferous limestone is still worked at Horton Quarry (SD800 722) but it used to be obtained all round Ingleborough from quarries large and small, with the disused Foredale Quarry (SD799 704) and Ribblehead Quarry (SD767 787) having been the largest apart from Horton (Johnson 2010, passim). In nearby Kingsdale some Yoredale limestone beds were cut and shaped to make what the trade called Dent marble, not a marble at all but a highly polished dark limestone. Yoredale sandstones were quarried on Little Ingleborough and the slopes of Park Fell for building and roofing stone; and Yoredale shales, with their high carbon content, were exploited as poor quality coal. Millstone Grit was worked for *dimension stone* or *freestone* to produce semi-dressed quoin stones, lintels and jambs. Sandstone was also exploited to make grinding stones while Millstone Grit was worked to produce millstones. These are discussed below.

Stone getting in the Dales

Excluding limestone quarries, arguably the largest pre-modern quarry in the Dales was Scot Gate Ash Quarry in Nidderdale (SE160 667) which was worked from the medieval era until 1915 for sandstone dimension stone (Blacker 1995; MPP 10, 1996). Documentary evidence confirms stone getting there from as early as 1351 whereby ‘manie inhabitants .. do dwell farre distant from anie parish church … (and) do get manie things and manifold of the ground, that is to saye, of iron digging, lead digging and stones digging’. In 1531 the abbot of Fountains was granted the right to ‘dig and carry away … so much fire stone as he shall have occasion for.’

Sandstone and flagstone were obtained in a very different way at Burtersett Stone Mines (SE896 888) near Hawes where four adits (horizontal tunnels) cut into the hillside were worked between 1870 and the 1930s (SD895 888) (Hall 1985; MPP 6, 1996;Skipsey 2003).

Carperby Slate Quarries (SE000 902) worked flagstone by open pits and an adit to obtain dimension stone and roofing stone (MPP 7, 1996). Two large flagstone quarries stand high above Garsdale, again with a mix of open pits and adits – Blades Outrake Quarry (SD739 890) was mainly open-cast but nearby Bridge End Quarry (SD719 898) had five adits. Stags Fell Quarry (SD879 921), above Simonstone in Wensleydale, was a similar undertaking, again working flagstone from adits. Very similar in nature, but smaller in scale, were High Pike Quarries (SD716 824) on the watershed between Kingsdale and Deepdale.

All the quarries mentioned in the previous paragraph operated through the late 18th and the 19th centuries but sandstone quarries on Embsay Moor and Addingham Moor began in the medieval period. Repairs to Skipton Castle were carried out in 1437, 1485 and 1523 using stone from Embsay Moor, part of which is peppered with small pits (centred on SD992 558) (pers. comm. Alison Armstrong, October 2010). On Addingham Moor (SE069 471) the freeholders were leasing rights of stonary from at least the late 17th century, initially on three-year leases, for the winning of dimension stone and millstones. A court case records that, in 1789, there were thirty finished millstones lying on the moor awaiting despatch (Preston 1952).

Limestone getting on Ingleborough

Actual limestone quarries on the western side of the mountain are rare, apart from above Skirwith Cave and below Raven Scar, where limestone was long worked to feed six lime kilns and for building stone, and on Storrs Common which was (and still is) common land where Ingleton residents could freely take stone for their own needs. What is very common, though, are small workings strung out along dry stone walls. Though they hardly warrant the term ‘quarry’ they are often known as *lazyman quarries*. The wall builders brought most of the stone they needed from the screes and scars above but where they were short of stone they cut tiny workings alongside the wall. Examples include ING 048, 054 and 096 along the south-east wall of Douk Cave Pasture.

Dimension stone

The stone getter had different terms for distinguishing one type of stone product from another. They also knew which blocks or rock faces to work on: they knew empirically which had potential and were able to ‘see’ the finished product within each block. *Dimension stone* referred to blocks of stone cut out of and removed from a rock face by cutting along the back edge. These blocks were always cuboid. *Freestone* was a very specific term used for blocks that could be cut in any direction, making such stone prized for medieval church building. A further term was

Fig.1 Daystone block ING 135

in use – *daystone* – to describe free-standing blocks of stone that were worked by stone getters. Daystone blocks had fallen from a rock face above at some point in the past (Fig.1).

Fig.2 Pre-1800 tooling marks ING 119

On the slopes below the summit plateau, on Black Shiver Ridge and Falls Foot, there are signs that dimension stone has been worked in the past. There is, for example, one large free-standing block of daystone with tooling marks clearly visible (ING 119) (Fig. 2). Given the dynamic nature of these slopes and the amount of landslipping that has happened, it is very difficult now to distinguish blocks of freestone from blocks of basic dimension stone. However, there are a number of blocks, earthfast or otherwise, that have tooling marks on at least one face. Examples on Black Shiver Ridge are ING 68 (Fig.3) and ING 178.

Regardless of the technical details of the type of stone being cut, all the work was done with the use of hand tools. There was no mechanisation at all. Methods and tools changed over the centuries and each tool left its own distinctive mark. This enables one stone getting area to be tentatively dated in relation to another.

Fig.3 Broached notches ING 68

Medieval stone getters devised an effective way of removing blocks of stone from their natural rock outcrop. They used simple iron tools and wedges to cleave the rock apart, ideally along a natural line of weakness in the rock. They used a chisel-like tool – a *nicking tool* – and a lump hammer, or a *broaching axe,* to create a line of pits or notches, called *nicks*, up to 150mm long and 80mm deep. Then the wedges were hammered in to these notches using a sledge hammer, or *holing pick*, to deepen them. If the stone block proved reluctant to cleave (or split), a long-handled *bottoming pick* was brought in to deepen the cleavage even further. The required block could then be levered off using a crow bar, or *gavel*. Such methods of cleaving leave a tell-tale mark on the rock that is left behind. When the block was levered off half of the notch came away with it but the rear half remained so that the stone left behind has a series of shallow semi-circular notches, up to 150mm in length, along its top outer edge (see ING 68 and ING 132) (Fig.3).

These methods remained in use for centuries. It was only around 1800 that a new method of cleaving was devised though the use of wedge notches was not immediately given up (Stanier 2000, 57). The new technology involved the use of the *plug and feather* technique. This was much quicker to use and more accurate; there was less chance of the cleavage going awry. In turn, this meant that fewer blocks of decent stone had to be discarded. Lines of holes were bored along the top of the rock, at regular spacings. In one block on West Harts Hill, on Embsay Moor, the average spacing is 250mm. On this same rock all the holes had been hand-bored to a depth of 35mm using a *jumper*. It has been said that the diameter of such holes was 25mm but on this rock it averaged 20mm and varied from 11mm to

23mm. Two men were involved here – one to strike the hammer while the other gave the jumper a half-turn in between blows. Once the hole had been bored a tapered iron or steel wedge – the *plug* – was inserted between two half-round pieces of iron – the *feathers*. A sledge hammer was used to drive the feathers more deeply, hitting them alternately, and the stone would slightly open up from top to bottom. A crowbar – or *gavel* – was then used to prize the blocks apart.

What distinguishes plug and feather bore holes from earlier notches is the regularity of the half-moon holes: they look to have been drilled with precision by machine. It was only in the 20th century that compressed air drills replaced jumpers, but this could never have been used in a remote working area like Ingleborough. Indeed, no examples of plug and feather have yet been identified on the mountain.

Millstones

The uppermost layer of rock on the summit plateau is Millstone Grit which is a coarse-grained sandstone ideal for grinding, or milling, cereal grain into flour. From the Iron Age to the early medieval period various types of *querns* were used for grinding corn by hand. The grain was spread on a base stone sandwiched between that and an upper stone. The name Whernside derived from quern so it is assumed that querns were made from sandstone on the slopes of that hill.

By the medieval period round millstones were in use in water-powered cornmills and they were made of Millstone Grit because of its coarser grain and greater ability to grind down the corn more finely. The millstones were roughed out on the hill wherever suitable pieces of stone occurred. These pieces needed to be thick and broad enough to have a millstone carved out of them, and they had to be without flaws. There can have been nothing more frustrating for the stone getter to have spent hours – or even days – chiselling away at a new millstone only to see it fracture. Once they had been roughed out, the millstone was moved off the hill. Bearing in mind how steep the slope is between the gritstone beds and the flatter ground below, the use of sleds or carts would have been impossible. Smaller millstones were rolled down, in a controlled fashion, possibly using a pole to stop them gaining too much momentum. Bigger ones seem to have had the central hole chiselled out on the mountain before being lowered. It would make sense for the men to have slotted a wooden pole through the hole and to have run down with it using the pole as a kind of axle. The fact that broken millstones have been found at the foot of the steepest ground (eg ING 118) and

Fig.4 Abandoned millstone ING 118

Fig.5 Broken millstone ING 177

that some abandoned millstones lie scattered in all directions is evidence enough that the rolling did not always go to plan (Fig.4 and Fig.5). Some clearly ran out of control.

The first task, having identified a promising piece of stone, was to separate the proposed millstone from the rest of the rock. This was done using a hammer and chisel. One unfinished millstone lies abandoned at the foot of Millstone Hagg on Gragareth in Kingsdale (at SD6962 8037): it had been chiselled out for part of its intended diameter and then just abandoned. Once detached from the rock, the stone was cut into its rounded form and partly dressed using a *kevelle*, a chisel-like tool designed for rough-dressing. The roughout was then, as described above, taken off the hill and either finished in a dressing shop (none is known on this side of Ingleborough) or at the cornmill where it was to be installed. If a millstone has been carved out of a block of stone, the discarded piece usually remains *in situ*. They are technically known as *negatives* (ING 132, 138.1 and 138.2). These had a curved inner edge and usually display tool marks. Potential stone working areas can be seen at ING 133, and 180.

Various attempts have been made to formulate a typology of millstones. Radley (1963-64) put forward a dual classification system: his 'old type' were thin in profile, had rounded edges, a diameter between 1.85m and 2.1m, and a convex upper face. Maximum thickness at the centre was 300mm. His 'new type', he wrote, 'looked new', had straight edges and was proportionately thicker than his earlier form and generally did not have a convex upper face.

It has been suggested elsewhere that a tripartite typology is more meaningful, at least for Peak District millstones. Early millstones had a maximum thickness of 300mm and a minimum of 200mm, with rounded edges and a diameter between 1.7m and 2.1m (Tucker 1985). Intermediate forms, from the eighteenth and early nineteenth centuries, had a slightly smaller diameter, between 1.4m and 2.1m, were thicker (more than 300mm) and had right-angled edges and a convex rather than flat upper face. Later forms, in use during the late 19th and early 20th centuries, according to Tucker's hypothesis, were distinctly smaller with a diameter of 1.10m to 1.35m but with a greater thickness. These were used as *edge runners*. However, towards the end of the 18th century French *burr* stones began to be imported. They were cheaper and slowly began to kill off the trade in locally cut millstones. Evidence from surviving millstones does confirm that later ones were as described but, in this writer's opinion, there is simply insufficient evidence to say that earlier types conformed to the dimensions given above.

It has also been suggested that millstones with a diameter less than 1.4m were not millstones at all but *grinding stones* or *edge runners.* This is a controversial claim though. Grinding stones needed fine-grained sandstone to hone iron or steel blade edges, such as the very fine-grained Moughton Whetstone found at the head of Crummack Dale on the southern side of the mountain. Gritstone could not have been used for such purposes. Edge runners were rotated in the vertical rather than the horizontal plane (*ie* the edge of the stone was used and not its flat face); they were used to grind down mineral ores, to pulp wood or vegetable matter like gorse. This writer has seen such edge runners in Central Scotland, used for grinding gorse for winter fodder, made of limestone. Millstone Grit would probably not have been a suitable material for pulping.

This brings the discussion to the sizes of millstones abandoned on Ingleborough and other sites within the Dales. Tables 1 and 2 summarise the data:

Table 1 Millstone roughouts: dimensions

Location	NGR	ING no.	Diameter (m)	Thickness (mm)
Ingleborough				
	SD7376 7516	134	0.93	230
	SD7481 7528	-	0.95	280
	SD7372 7455	118	1.45	260
	SD7346 7474	137	1.05	160
	SD7426 7503	177	1.60	250
	SD7382 7505	178	1.03	260
n = 6		**average:**	**1.17**	**240**
Millstone Hagg	SD6965 8030	n/a	1.15	250
	SD6962 8037	n/a	1.15	180
n = 2		**average**	**1.15**	**215**
Peak District				
n = 14		**average**	**1.45**	**-**
Embsay Moor		n/a	1.10	160
		n/a	0.85	130
		n/a	0.80	130
		n/a	0.90	110
		n/a	0.85	180
		n/a	0.85	200
		n/a	0.82	180
		n/a	0.76	180
		n/a	0.75	140
		n/a	0.74	-
		n/a	0.70	-
		n/a	0.78	-
n = 12		**average**	**0.76**	**136**

Table 2 Summary of dimensions of millstone roughouts

Site	Average diameter	Average thickness
Ingleborough	1.17m	240mm
Millstone Hagg	1.15m	215mm
Peak District	1.45m	-
Embsay Moor	0.76m	136mm
Average	**1.13m**	**197mm**

If the notion described above, that stones with a diameter less than 1.4m are not millstones, then only two of the Ingleborough sample (ING 118 and 177) were millstones and the others must have been either grinding stones or edge runners. Had the other three been made of a finer grained sandstone rather than coarse gritstone, this hypothesis would be acceptable. As matters stand, however, they cannot have been. Neither of the Millstone Hagg stones and none of the stones from Embsay Moor conform to the theory.

It has been impossible to determine whether any of the Ingleborough or Millstone Hagg stones had a convex surface as all are partly buried under turf or fallen rock. Radley's measurement of thickness referred to the centre point of each millstone: in the current sample it was only possible to measure thickness at the rim, so the data shown in Table 1 and 2 are of minimal practical value in assigning these stones to Radley's or Tucker's typologies.

A key attribute for both typologies was the detail of the rim: earlier forms were said to have rounded edges while later ones had straight edges. Of the Ingleborough sample only one definitely had a rounded edge (ING 118); none of the others was far enough advanced in the manufacturing process to be able to make any meaningful judgement. In summary, it would be premature to slot the Dales' samples into either Radley's or Tucker's typologies as the evidence is insufficient. However, this point will be revisited in the section on dating.

Shelters

A field walking exercise, prior to the Ingleborough project, identified a series of stone-built shelters along the lower western slopes of Ingleborough. As this was undertaken before any stone working evidence had been found, the tentative conclusion was that they must have been shepherds' shelters from the days when those with common rights of pasture on the mountain jointly employed a shepherd to manage the flocks. It was considered odd, though, that there should be so many shelters in such a small area below Black Shiver and on Falls Foot, especially as most are built within natural boulder spreads.

Fig.6 Sit-in shelter ING 111

Ten shelters have been logged and their constructional details vary. Some are very ruinous and consist of little more than a crude single wall (ING 63, 64, 65); several have an intact corbelled roof (ING 66, 111) or a collapsed roof (ING 112). One is internally very short but is wide enough for someone to have sat inside (ING 111) (Fig.6), while two others are long and narrow (ING 66, 115 and 175) and may have allowed someone to stretch out, while others are merely arcuate lengths of dry stone wall (ING 63) (Fig.7).

The most likely function for these structures was as shelters for the stone getters. In times of inclement weather they could have retreated to the nearest shelter until it had passed over. They do not all face the same direction so, where there are several close together, the men would sensibly have chosen the one giving maximum protection depending on wind (and horizontal rain) direction. It can be no coincidence that a very similar shelter stands close to stone workings in Little Dale below Blea Moor, and that there is also a fine example below Millstone Hagg, close to the two abandoned millstones.

Fig.7 Arcuate shelter ING 063

Dating

We return now to the issue of trying to ascribe a date – or loose period – to the stone workings on Ingleborough. Whether they were of medieval, post-medieval or early modern origin seems to be an important question to address. There are three potential sources available. One is millstone typology, which is itself a reflection of the detailed morphology of the millstones that remain on the fell. A second is the detail of tooling marks on dimension stone blocks or negatives. The third is documentary evidence.

Taking millstone diameter measurements first, only two of the Ingleborough sample fit into any of Radley's or Tucker's categories: one at 1.45m and one at 1.6m would conform to Tucker's intermediate group. The others are too small to be millstones, using their suggested classification systems, and must be edge runners or grinding stones, but this has already been discounted above. Taking thickness measurements, and bearing in mind the corollary concerning where this is measured, then they all conform to Radley's 'old type', being less than 300mm thick. It was not possible to determine if any of the sample had a (buried) convex face.

The finding thus far must be that the Ingleborough millstones (not edge runners at all) are neither of Radley's 'new type' nor tucker's 'late' form. Taking into account all the imponderables, it is this writer's firm opinion that these millstones are neither 'new' / 'late' nor even definitely 'intermediate' (late 18th or 19th centuries): instead, they are 'old' / 'early'. Their morphology suggests that, without doubt, they predate 1800 and may well even predate 1700.

It should be borne in mind, however, that there is a dearth of conclusive dating evidence nationally and the available sample size from known millstone working locations is too small to state with conviction what the key differences were between early and late forms. Beyond this, no one can say with conviction that stone getters on, say, Ingleborough worked to the same template as those in Derbyshire. Millstone suppliers produced what mill owners demanded: who is to say that these demands were universal?

As stated earlier, tooling techniques changed around 1800 with the introduction of plug and feather boring. It may well be the case that the old wedge notch method continued in use after 1800 but plug and feather technology cannot have appeared prior to that date. If any evidence of plug and feather tooling marks had been found on Ingleborough a firm conclusion could be drawn that the stone workings here post-dated 1800. However, no evidence of such methods has been found despite thorough searches on the ground. All the tooling marks located have either been from straightforward chiselling or from notches cut by the use of wedges. There is a high probability that these do pre-date 1800 (given other supporting evidence) but this cannot be stated with any degree of conviction.

What of documentary sources? It would be rare indeed to find any written evidence of small-scale workings such as these. A thorough trawl of manorial records may throw up the odd entry connected with annual rentals or the renewal of a lease to work the fell for millstones – and they do survive for lead workings in this general area – but nothing has been located so far. There is, fortuitously, one brief but incredibly significant mention in the Hornby Castle Muniments (quoted in Chippindall 1939, 104), dated 1582:

> Paid by Thomas Marshe for one pair of mylnestones bought at Ingleton xxvjs. And for cost of carriage from Ingleton Fell to Hornby xiijs. ivd. And to George Gibson carpenter and his servants for repairing the said mylnes and buying the said stones and making a new wheele in August Anno 24 Eliz: and the board and wages of the said George and his servants xxviijs. vijd. … And for the expenses and charges of the said Thomas Marshe and two with him riding to Ingleton Fell to buy the stones xvd.

Thus we have indisputable evidence that millstones were being worked on the western slopes of Ingleborough. 'Ingleton Fell' could refer to anywhere on the mountain, including the Clapham side, but the only accessible gritstone is on the western side so its provenance is beyond doubt. It also confirms that each millstone cost 13s. 4d., or 1 mark, and that transport costs for the two stones equalled the purchase cost of one stone. What we do not know is whether the stones had been worked into their finished form or were sold as semi-dressed roughouts. Either way they did not come cheap: converting those prices to current values translates into a total expenditure by Thomas Marshe of £528, excluding the relevant part of George Gibson's expenses (calculated on www.measuringworth.com, accessed 9 February 2011). That is by any definition a sobering amount.

We have here reliable dating evidence for stone working on Ingleborough. It is immaterial whether or not the surviving abandoned millstones are coeval with Thomas Marshe's purchase; millstones were being sourced from the western slopes of the mountain in the late 16th century. As to when the stone getting industry in general began here and when it ended, nothing conclusive can be said with certainty.

Fig.8 Shelter on Brown Haw

It is impossible to date the stone shelters or to determine whether they were in use at more or less the same time. However, evidence from elsewhere in the Dales could shed a little light on their age. A stone-working area on Brown Haw, on Towns Fell, near the boundary between Dentdale and Barbondale, has field evidence of the sorting and removal of sandstone, with a probable dressing floor. There is also a beehive-shaped stone shelter (Fig.8)

remarkably similar to ING 66 and ING 111, sited at SD6852 8477.[1] The key difference between this shelter and Ingleborough's is that this has two timber roof supports, one forming the lintel and the other further back. Both are of softwood and small in cross-section (600mm by 600mm). The inner support has largely rotted away but the lintel is intact and stable. Clearly they are both protected by the stone roof from the worst vagaries of the weather but for the outer – and more exposed – timber to still be sound cannot make this shelter very old, suggesting that the Ingleborough shelters considerably post-date the documented history of millstone working there.

Glossary of terms

Bottoming pick	an iron pick, with a very long handle, used to fully open up the void between the required stone and the earthfast rock. q*v holing pick and nicking tool.*
Burr stone	a very hard rock containing quartz crystals which wears down much more slowly than gritstone and is less abrasive to the grain thereby producing whiter flour. The best burr stone was imported from one quarry at La Ferte sous Jouarre near Châlons to the east of Paris. Burr only occurs in small pieces so a millstone was made up of wedges bound together by an iron hoop.
Daystone	a free-standing block of worked stone, not attached to earthfast rock.
Delf	a vernacular term for a small quarry hole.
Dimension stone	a stone block chiselled out of earthfast rock.
Edge runner	a small circular stone, rotated in the vertical plane to crush or pulp ores or vegetable matter.
Feathers	two small and half-round pieces of iron placed in holes bored along the cleavage line on a block of stone. q*v plug.*
Freestone	a block of stone that can be cut in any direction.
Gavel	either a mallet or a type of crowbar.
Grinding stone	a circular stone used to polish or sharpen iron or steel blade edges.
Holloway	a sunken track, deepened by the passage of pack ponies or horse-drawn sledges, accentuated by the flow of rain water.
Holing pick	a chisel like tool, with a long handle. *qv bottoming pick and nicking tool*.
Jumper	a long iron bar with a chiselled end used for hand-boring holes along the cleavage line.
Kevelle	a type of chisel used to rough dress millstones or dimension stone.

[1] I am grateful to Mr Dennis Sanderson for bringing this site to my attention.

Lazyman quarry a small quarry hole close to a newly built dry stone wall used as a handy source of building stone.

Negative a discarded offcut of stone after a millstone or block of dimension stone has been removed from the parent rock.

Nicking tool a type of chisel used to create a line of notches or nicks when separating a block of stone from its parent rock. *qv bottoming pick and holing pick.*

Plug an iron or steel wedge inserted into a feather (*qv*).

Quern a hand-operated device for grinding grain into flour, consisting of a fixed lower stone and an upper stone that is either rubbed or rotated on the lower, with the grain in between.

Semi-dressed a block of stone or a millstone that has been part-finished but which requires final smoothing down.

Sled run a clearly defined, narrow trackway, often in a holloway (*qv*) along which wooden sledges containing stone were pulled by ponies.

Stonary the right to take and carry away from common land stone that was needed for domestic, building or agricultural use by those with rights of common. None was to be sold.

References

Blacker, G. 1995 'The stone industry of Nidderdale, Part 1 Pateley Bridge' *British Mining No. 55 Memoirs* pp. 47-80.

Chippindall, WH. 1939 *A sixteenth century survey and year's account of Hornby Castle, Lancashire, with an introduction on the owners of the castle* Chetham Society New Series 102.

Hall, D. 1985 *Burtersett Quarries. A Wensleydale mining community* Hawes: privately published.

Johnson, D. 2010 *Limestone industries of the Yorkshire Dales* Stroud: Amberley.

MPP (Monuments Protection Programme). Quarrying industry: site assessment. North Yorkshire 6. Burtersett slate quarry, 13 November 1996.

MPP (Monuments Protection Programme), Quarrying industry: site assessment. North Yorkshire 7. Carperby slate quarries, 13 November 1996.

MPP (Monuments Protection Programme), Quarrying industry: site assessment. North Yorkshire 10. Scotgate Ash Quarry, 8 October 1996.

Preston, WE. 'An Addingham millstone quarry' *The Bradford Antiquary* IX, New Series, VII, pp. 32-38.

Radley, J. 1963-64 ‘Peak millstones and Hallamshire grindstones’ *Transactions of the Newcomen Society* 36 pp. 165-73.

Skipsey, B. 2003 ‘A first look at Burtersett stone mines’ *Yorkshire History Quarterly* 8 (3) pp. 2-8.

Stanier, P. 2000 *Stone quarry landscapes* Stroud: Tempus.

Tucker, DG. 1985 ‘Millstone making in the Peak District of Derbyshire: the quarries and the technology’ *Industrial Archaeology Review* VIII (1) pp. 42-58.