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Culduthel

An Iron Age Craftworking Centre in North-East Scotland

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Part B

Stone

Lithics

Torben Bjarke Ballin

A total of 630 lithic artefacts were recovered. The vast majority of the finds are in flint (92%), supplemented by some quartz (6%), and small numbers of artefacts in rock crystal, chalcedony, quartzite and sandstone. Almost the entire assemblage is based on material from local pebble sources, although 13 pieces in grey flint are thought to represent importation from primary flint sources in Yorkshire, or possibly even south-east England. Approximately 10% of all lithic artefacts have been exposed to fire, either in their primary settlement contexts or, later, during the intense industrial activities taking place in the Iron Age. A burnt cobble, some glassy slag and 1,300 pieces of crushed, burnt quartz are thought to be directly related to the latter.

Practically the whole assemblage represents redeposition, as almost all artefacts were recovered from post-holes, hillwash layers or post-abandonment contexts. Only knapping debris from three waste pits was found in situ and, as it would not have been possible to sub-divide the assemblage into its original chronological units, it was decided to deal with the lithic collection as a whole.

The three main artefact categories – debitage, cores and tools – make up approximately 90%, 2% and 8% (22% if chips are disregarded), respectively. In total, 565 pieces of debitage were retrieved, with chips amounting to 73%, flakes 22%, blades/microblades 2% and indeterminate pieces 3%. The high tool ratio is almost impossible to interpret, as it is unknown which chronological unit may be responsible for this ratio, and the exceptionally high chip ratio is most likely a result of the recovery of three waste pits with chip-sized knapping debris. The blanks were mainly detached by the application of hard percussion (66%), supplemented by some use of bipolar technique (28%). Only three pieces (4%) were manufactured in soft percussion. As almost two-thirds of the debitage are tertiary pieces, it is thought that most raw material must have been decorticated at the source, but 13 primary pieces (or 10%) indicate that some nodules were brought to the site with their cortex intact. No core preparation flakes were recovered.

The 16 cores include four single-platform cores, two of which are early prehistoric specimens, whereas one may be the exhausted remains of a Late Neolithic Levallois-like core. The remaining cores are all simpler, probably later prehistoric, forms, embracing one irregular core, one Kombewa core, eight bipolar cores and two core fragments. The tools are dominated by 19 scrapers (40%) and 15 pieces with edge-retouch (29%), supplemented by three knives, three combined scraper-knives, one piercer, three truncated pieces, four notched pieces and one piece with invasive retouch. The most regular pieces are three early prehistoric blade-scrapers, and Early Bronze Age thumbnail scrapers, scale-flaked knives and scraper-knives, but the majority of the tools are expedient, probably later Bronze Age pieces produced for *ad hoc* tasks.

The technological composition of the assemblage clearly defines it as a pell-mell collection of finds from various parts of Scottish prehistory: it includes small numbers of finds from early prehistoric microblade and macroblade industries, elements from Late Neolithic Levallois-like production, neat Early Bronze Age pressure-flaked tools, and expedient later prehistoric tools.

Apart from diagnostic technological attributes, the lithic collection is also dated by elements such as raw material preference, diagnostic types and, to a minor degree, find contexts. The 13 grey flints are clearly exotic pieces, and they represent importation from south of the border. This form of flint is mainly recovered from Scottish Late Neolithic sites, where they are associated with the manufacture of chisel-shaped arrowheads and cutting implements. Diagnostic types include: two conical microblade cores (Late Mesolithic/Early Neolithic); intact and recycled pressure-flaked thumnail-scrapers (Early Bronze Age); scale-flaked knives, some of which are combined with a scraper-edge (Early Bronze Age); and a Kombewa core (later prehistory). The only safely stratigraphically dated finds are the chips from Pit 3026, which are thought to be contemporary with Cairn 2671.

Due to the generally residual character of the Culduthel material, the research potential of the lithic assemblage must be classified as low. The most important data provided by the site's lithic finds is the chronological evidence, clearly testifying to an extended period of settlement continuity at Culduthel. Apparently, people lived on, or near, this site for several millennia, as evidenced by lithic finds from the Late Mesolithic/Early Neolithic, Late Neolithic, Early Bronze Age and later Bronze Age periods – before the Culduthel site became the focus for an industrial complex in the Iron Age period.

The stone artefacts

Dawn McLaren with contributions on the mould and the shale by Fraser Hunter and geological identifications by Fiona McGibbon

Summary

The excavations at Culduthel recovered a total of 68 stone tools, dominated by quern fragments and prosaic, everyday tools. All of the tools have been produced from locally sourced stone, exploiting both glacial erratic cobbles and boulders as well as local outcrops of schists and granites. The small quantity and restricted range of the cobble tool assemblage is surprising considering the large scale of excavation, and contrasts sharply with the large number of querns represented. Only one decorative or personal object, a shale bead, was identified, although simple decoration was noted on three upper rotary quern stones.

The catalogue, which follows the discussion, is split into broad functional groups within which typological categories are described and discussed. To aid comparative analysis of the cobble tools, the classification system utilised at the Howe (Ballin Smith 1994, 196), based on wear type, has been used.

Discussion

The excavations at Culduthel recovered a sizeable quantity but a limited range of coarse stone tools, dominated by quern fragments and prosaic, everyday tools (summarised in Table 6.10). Food processing tools are the most frequent tool type from the site, in the form of rotary querns, saddle querns and rubbing stones. Also present are small quantities of smoothers, sharpening stones, whetstones and working surfaces, which hint at craft activities such as leatherworking and hide-processing, as well as the maintenance of metal blades and tools. General purpose cobble tools, such as grinders and pounders, which could have been used for a range of tasks are present, but in surprisingly small quantities compared to the large numbers of querns. Hammerstones and spindle whorls, typical finds on Iron Age sites, are notably absent, although a roughout for a spindle whorl is present.

Table 6.10
Range and quantities of coarse stone tools present

Function	Type	Qty
Food processing	Saddle querns	4
	Rubbing stones	6
	Rotary querns	21
Tools	Grinders	2
	Pounders	3
	Smoothers	6
	Combination tools	5
	Whetstones	2
	Sharpening stones	1
	Grinding stones/working surfaces	8
	Unidentified tool fragments	2
Household	Pivot stones	1
	Perforated stones	3
Other	Basin	1
	Spindle whorl roughout	1
	Palette	1
Personal	Shale bead	1
Total		**68**

Quern stones

Thirty-one quern stones (saddle and rotary) and associated rubbing stones were recovered throughout the excavated area, accounting for over 45% of the total coarse stone assemblage.

The six rubbing stones and four saddle querns form an interesting group in both spatial and chronological terms. Saddle querns and their associated upper rubbing stones were used to grind grain and other foodstuffs and had a long currency of use, continuing even after the advent of the rotary quern (Caulfield 1978; Armit 1991, 190–5). All of the saddle querns from Culduthel (apart from one unstratified find) and the majority of rubbing stones were recovered from secondary contexts in the Early Iron Age roundhouse (House 3). They were incorporated into the structure of the building, either coming from the walls of the roundhouse (SF0204, SF0205 and SF0206) or being used as post-pads within the post-holes (SF0233, SF0234, SF0235 and SF0428). None of the food processing tools from this structure appear to have been in use during its occupation. A multifunction cobble tool (SF0223 – Illus. 6.15), a whetstone (SF0244) and a grinding surface (SF0238) were also recovered from pits and post-holes associated with the roundhouse. It is unclear whether these were also incorporated as packing material around post-holes or are related to the structure's use.

The deposition of quern stones is often interpreted as a significant act (Heslop 2008, 73–80; Hingley 1992, 32; Williams 2003, 237). These grain processing tools would have been an integral tool within the household. It has been suggested that querns would have been valued beyond their functional qualities due to their connection to the agricultural cycle (Hingley 1992, 32). The intentional fracturing, and selective and deliberate deposition of some quern stones after their practical use had come to an end suggests that such objects were seen not just as functioning tools, but as potent symbols relating to concepts of life-cycles, fertility, longevity and memory (Heslop 2008). Although not all quern stones appear to have been deposited in a meaningful, structured way, widespread evidence of such a practice is observed in later prehistoric contexts. The incorporation of saddle querns within structures can be widely paralleled, as at Dryburn Bridge, East Lothian (Cool 2007, 75–7), Kintore, Aberdeenshire (Engl 2008, 223–6).

At Culduthel, no obvious patterning to the distribution of the saddle querns could be observed within this structure, although one large, substantially complete saddle/trough quern (SF0147 – Illus. 6.15) was placed with the grinding face upwards, orientated north-south, among the stones outside the entrance to the roundhouse. The concentration of these early querns in the construction of this building, and the lack of any associated rotary quern fragments,

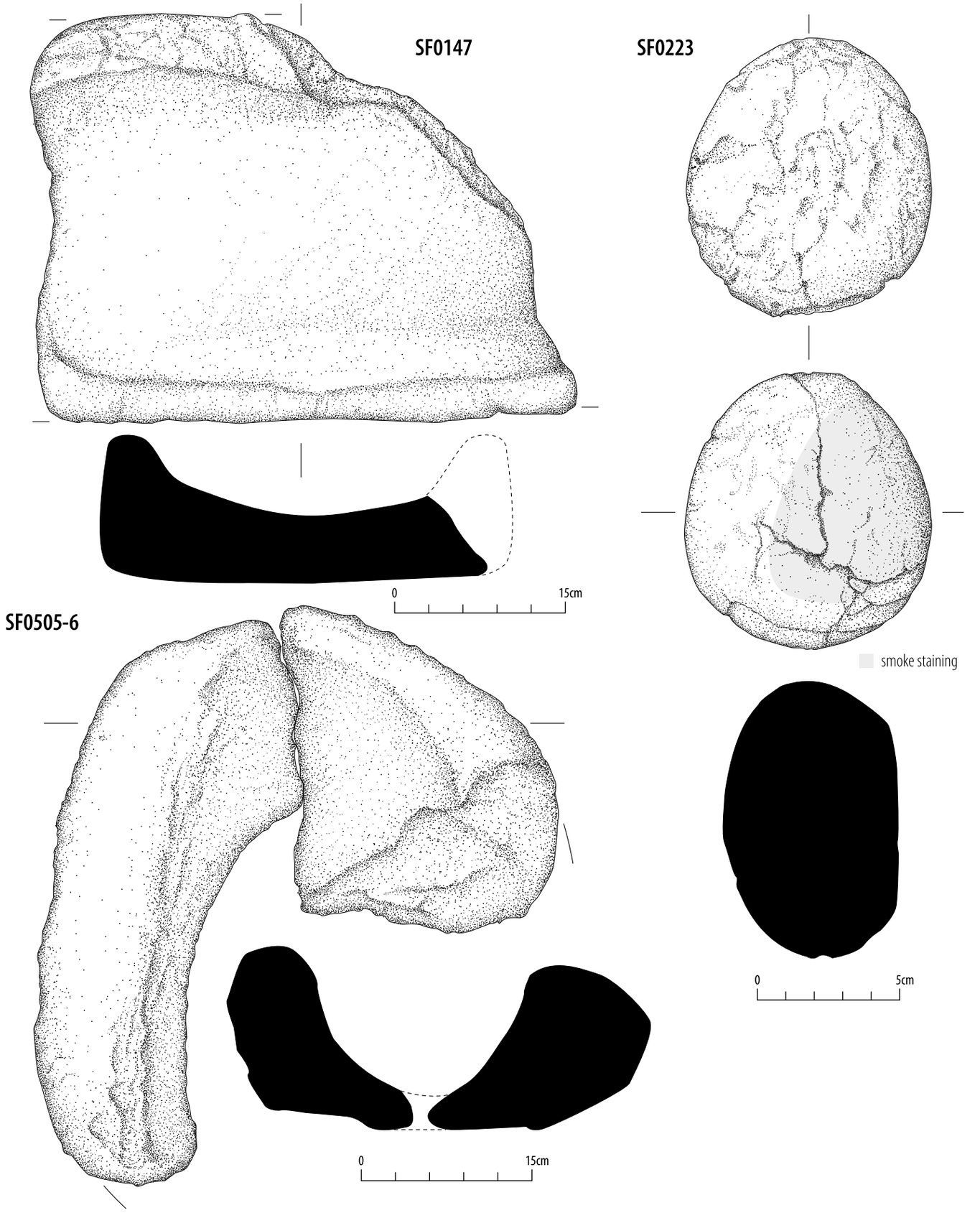

Illustration 6.15
Saddle querns and a cobble tool

confirms the early date of this roundhouse in the site's sequence. All of the saddle querns and rubbing stones were produced from local rock types, the majority from rounded glacial erratic boulders with minimal modification to the stone prior to use. The large saddle/trough quern (SF0147) is likely to have come from a local sandstone outcrop. Only one of the saddle querns (SF0428), a very small plano-convex stone, is complete, which contrasts with the rubbing stones, which, apart from one fire-cracked example (SF0658), are all intact. Three of the rubbing stones have evidence of secondary use in the form of peckmarks and gouges from expedient use as working surfaces (SF0204 and SF0205, SF0206 and SF0235) and one (SF0206) has a small pecked facet that may be from use as a pounder.

Twenty-one rotary querns are represented among the 29 fragments recovered; four complete examples and fragments of a further 17 stones. It has not been possible in all cases to identify whether an upper or lower stone is present due to the level of fragmentation or post-depositional damage, but the majority are upper stones (13 examples). Only three possible lower stones, one of which is unfinished, have been identified. The greater number of upper stones is not entirely surprising as these are more easily identified than lower stones due to the presence of features such as handle sockets and hoppers. Despite this, a disproportionate quantity (80%) of the identifiable stones are upper stones, suggesting that differential retention or depositional practices were taking place at Culduthel (although further lower stones may be present among the small unidentified fragments). Where handle sockets are present they are all vertical. Two querns (SF0328/ SF0365/ SF0654 and SF0508) have two handle sockets, implying heavy use resulting in repair.

Normal models of Iron Age rotary quern use in north-east Scotland would suggest a dominance of disc-querns (MacKie 1971; 1987, 5), but low bun-shaped querns are more frequent at Culduthel, with nine examples identified. Only five possible disc-querns are present although there may be disproportionately more among the unidentified examples as most are broken thin fragments. The difference between the two types is typically based on the identification of specific features of the upper stones: disc-shaped querns are thin, wide stones with flat upper surfaces that contrast with the generally smaller bun-shaped stones, which are thick in proportion to their diameter and have distinct rounded upper surfaces. Some examples inevitably combine features of both. MacKie's consideration of rotary quern use in Scotland during the Iron Age identified a significant difference in distribution between disc- and bun-shaped querns (1971, fig. 5), with disc-querns predominating in the north and west, and bun-shaped querns being more common in the south and east. The dominance of bun-shaped querns at Culduthel is somewhat unexpected and suggests that the traditional model of quern distribution may merit revisiting.

All of the rotary querns have been produced from local schists. Biotite schist was favoured but garnet-rich mica schists, psammitic schists and talc/muscovite schists were also used. Many of these rock types are very friable, leading to frequent spalling of mineral grains. At first glance, these rock types appear an odd choice for use as quern stones since any detached stone would have been incorporated within the ground flour. Yet detailed lithological analysis has identified deliberate selection strategies of the stone used for production of some querns that aimed to minimise spalling. In some examples, such as SF0324, SF0465/0471 and SF0685, the quern has been cut parallel to the natural banding of the stone with the grinding face exploiting dense, quartz-rich layers that occur naturally in the rock. In the case of SF0324, this quartzite layer appears to have been almost completely worn away, probably contributing to the stone's abandonment. The use of rocks with large mineral inclusions (such as garnet-rich mica schists and talc/muscovite schists) also appears to be a deliberate choice for querns at Culduthel; they have not been used for any other tool type at the site. Although minerals will frequently detach during use, they are of such a size that they could be quite easily picked out of the flour.

Two examples among the assemblage provide insights into specific elements of manufacture. SF0339 (Illus. 6.17) is an unfinished, possibly lower quern. The stone, produced from a slab of biotite schist, has seen little modification in shape with the flat smooth 'grinding' face being formed by splitting the slab across a natural bedding plane. At the centre of the face is a biconical perforation, its irregular shape suggesting that it had not been finished or used. Evidence of production is also present on SF1004, a low bun-shaped quern, where the beginnings of a shallow hopper and vertical handle socket had been started on one side but abandoned and used as the grinding surface instead.

Three of the upper stones have simple embellishment consisting of peckmarked or raised collars surrounding the feeder pipe or handle socket: SF1007, with wide but shallow raised collars around the feeder pipe and vertical handle socket (Illus. 6.16); and SF0631 and SF0184 (Illus. 6.17), with pecked grooves defining slightly raised collars encircling the feeder pipes. Raised collars around feeder pipes are fairly common. Although an embellishment of the quern, they are not necessarily primarily decorative, often fulfilling a functional purpose by creating a broader hopper to hold the grain (McLaren and Hunter 2008, 115). Raised collars around vertical handle sockets are more likely to be decorative, although they might give extra reinforcement to strengthen the handle socket during use. Decorated quern stones are not common in Scotland and are notably rare in north-east Scotland (McLaren and Hunter 2008, 114), with only four other examples known: from Mill Farm and West Grange of Conan in Angus; Kirkton of Bourtie, Aberdeenshire; and Roy Bridge, near Inverness (NMS: BB 134; Coutts 1971, 78, no. 179; Howard 2002, 8, fig. 1; Anon 1892, 70). Some forms of decoration, like that on the Roy Bridge quern, continued into the post-medieval period. One example from Culduthel, SF0631, was incorporate into an industrial hearth (Hearth 2166), which has been dated to 350–40 cal BC, providing a useful *terminus ante quem* for the use of this decorated quern.

Only four complete rotary querns were recovered, with 80% being fragmentary. These fragments range from less than 10% to 85% of the original stone. There does not appear to be any pattern to their fragmentation and none of the quern fragments have clear evidence of deliberate fracturing or destruction; most either broke during use or were discarded due to extensive wear. In six examples (SF0184, SF0324, SF0465 and SF0471, SF0605, SF0630, and possibly SF0328, SF0365 and SF0654 (Illus. 6.16)), the quern has broken across a vertical handle socket. In half of these cases, extensive use led to the handle socket perforating the grinding surface and causing a major point of weakness in the stone. It is likely that in these cases the continued use of the quern resulted in the stone fracturing from this weak point, either causing a large portion of the edge to detach or the stone to split. Several of the

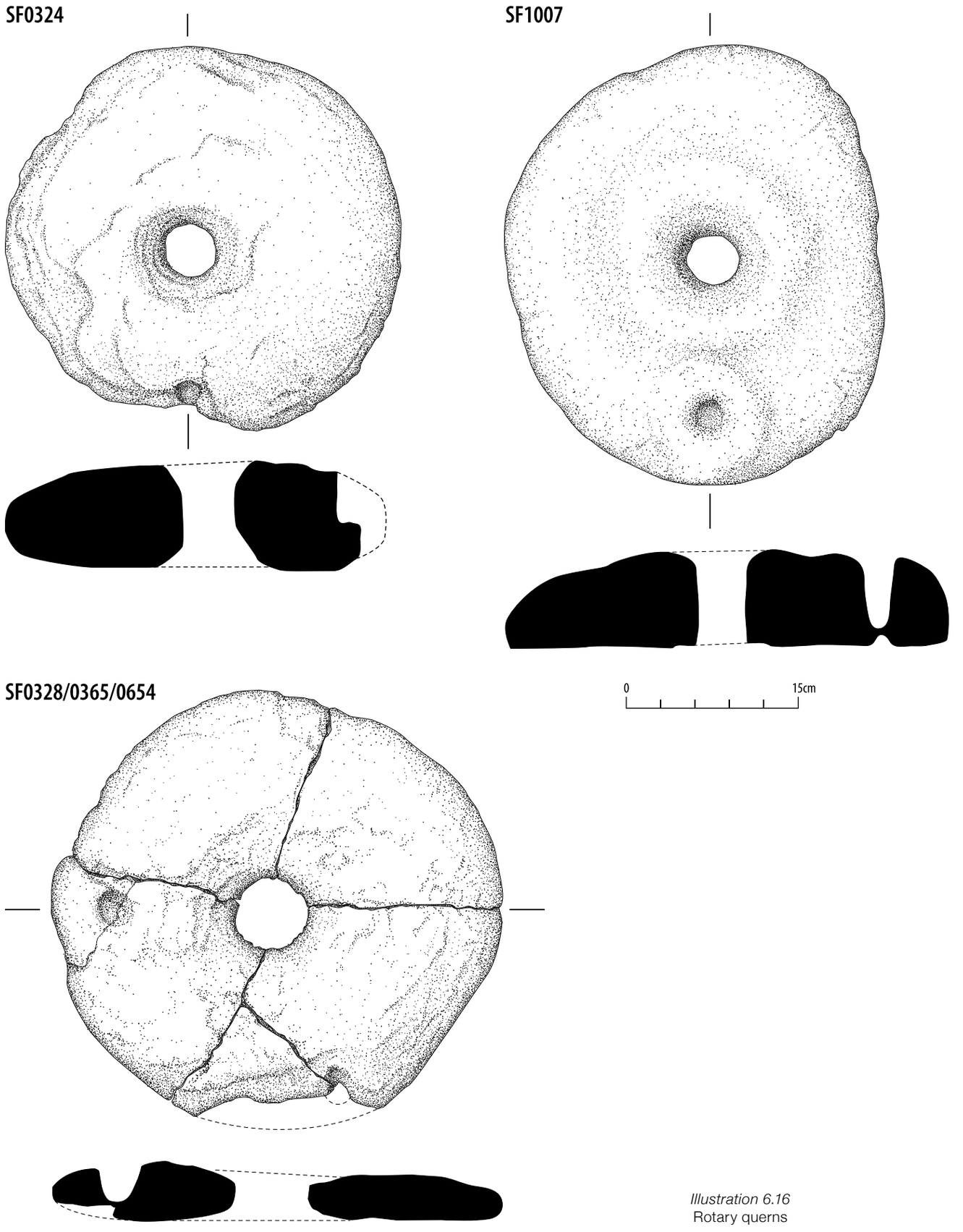

Illustration 6.16
Rotary querns

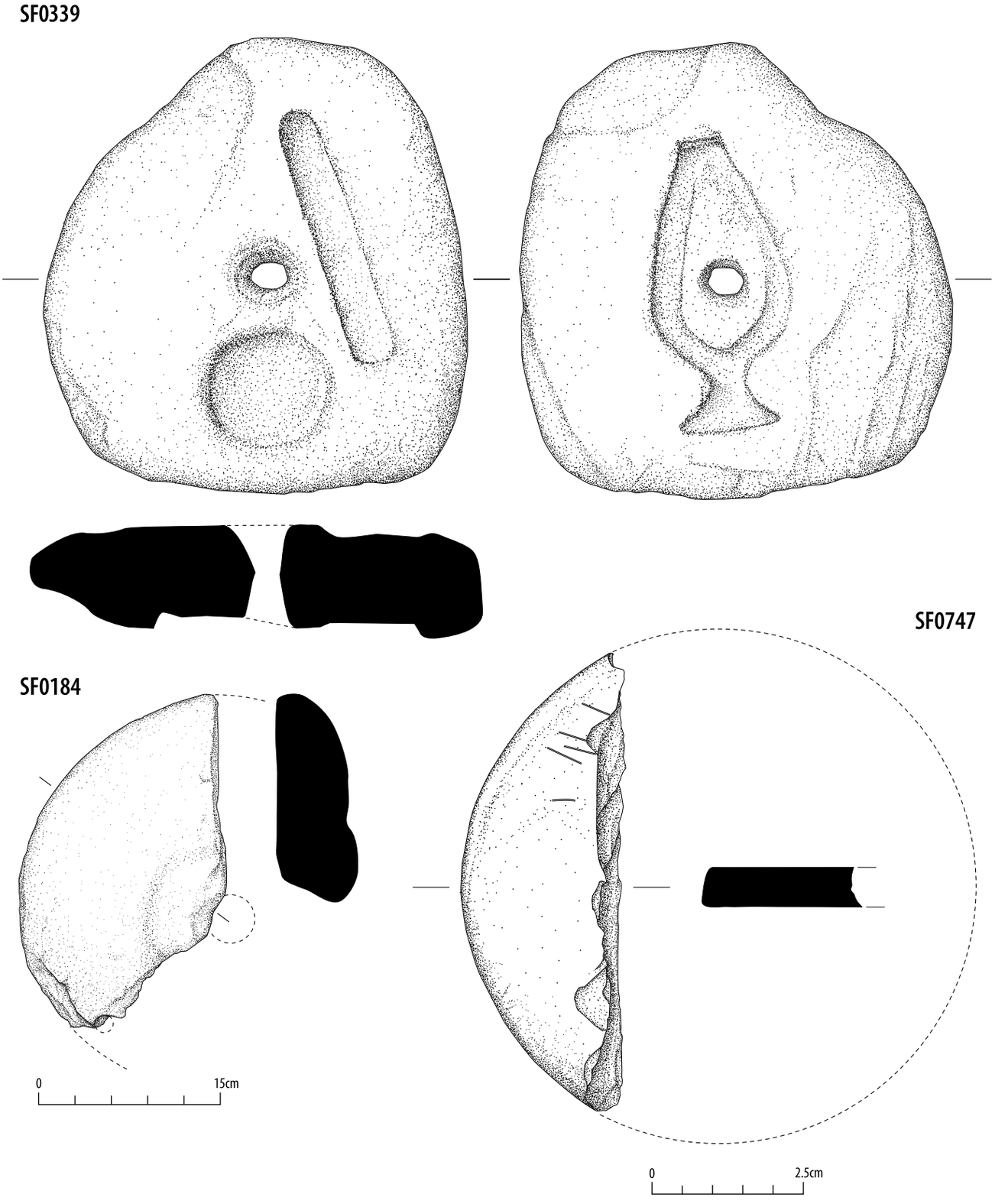

Illustration 6.17
Rotary querns

bun-shaped querns are very thin, suggesting that they had seen extended use with much of the thickness of the stone, or the specifically selected hard layers, being worn away.

Despite only three possible lower stones being identified within the assemblage, they show a consistency of form. The central socket, in which the spindle is inserted to connect the upper and lower stones, perforates the entire thickness of the stone in every example. Such a feature, typically seen on disc-querns, may have allowed the height of the upper stones to be adjusted without having to remove the upper stone to insert washers (MacKie 1987, 5). This would enable different grades of flour to be milled: the closer the stones, the finer the flour would be. One, SF0457 and SF0458, was incorporated into the fill of an iron-smelting furnace (context 2246), which has been dated to 200–0 cal BC (2σ % age probability) (GU-21919 2080 ± 35 BP).

The most significant of the stone tools and perhaps the most intriguing stone find from the site was an unfinished lower rotary stone (SF0339 – Illus. 6.17), reused on both faces as a mould for non-ferrous metal casting. It was recovered from an ephemeral structure (Workshop 11) within the main focal area of industrial activity on the site, and may have been left in situ after use. A disc- and a bar-ingot mould have been carved into one face and a unique 'vase'- or 'fish'-shaped mould has been cut into the unused grinding face. It is clear that the central perforation was present prior to the addition of the moulds, as the disc and bar moulds are arranged around it and the 'fish'-shaped mould centres upon it. The surface of the stone at the edge of the bar mould has fractured, probably during removal of the ingot, but the interior of the disc mould appears unfinished and there is no evidence of use.

The 'fish'-shaped mould is more complex. This mould is, to our knowledge, unique, making it difficult to identify what the intended casting was for and how it was made, but detailed examination of its features reveals some interesting points. Firstly, it is likely that this is the upper half of a two-part mould, with the unfinished quern's perforation used as the casting channel for the molten metal. The central area of the mould surrounding the spindle socket has been left in relief, indicating that the cast metal would have flowed into the edges of the mould; this has fractured when the casting was extracted. The form of the lower half can only be speculative. The surviving shape does not match any known object, but was clearly carefully designed, and it may have been a pre-form intended for sheetwork. Given this, one plausible interpretation could be as a vessel, with the lower half forming the bowl and the upper half forming a thick rim that could be hammered out, the wide 'fish-tail' at one end of the mould destined to become the handle. While feasible, the form of the vessel (both in the presence of a handle and its non-circular form) would be unique in the Scottish Iron Age repertoire, although it is equally certain that our knowledge in this area is partial. The 'fish'-shaped mould is unique and difficult to compare to existing Iron Age moulds. Iron Age stone moulds have never been studied in detail, but they are a widespread category. A similarly enigmatic example from the later prehistoric fort at Ardifuar, Argyll (Christison and Anderson 1905, 268–9, fig.8) is similar in overall form, consisting of a large sub-circular green micaceous schist slab with three large moulds on one face, and a further mould on the opposite surface. These comprise a long, wide, curving bar, a narrow, pointed bar and an elongated ox-hide-shaped object. Near the centre of the opposite face is a fractured flat oval mould. A shallow circular hollow towards one fractured edge of the stone gives the object the appearance of a reused rotary quern stone, but there is no evidence of such use.

Moulds reusing the flat, grinding faces of quern stones are not common but a small number of examples are known from both Bronze Age and Iron Age contexts. At East Cruchie (or Cruichie), Aberdeenshire, the mould for a Bronze Age flat axe has been carved into the prepared surface of a possible saddle quern (Cowie and O'Connor 2009, 317, fig.3). Similarly, two bar-shaped moulds, one possibly for an awl, were carved into the grinding face of a saddle quern fragment from Tweedsmuir, Peebleshire (*Proc Soc Antiq Scot* 100, 201, No. 17; NMS: x.CM 49). Turning to the Iron Age, at Lochlee, Ayrshire, a bar mould appears to have been carved into the lower, fractured surface of a dished and abraded stone, possibly a saddle quern, which has further secondary evidence of use as a whetstone on one smooth, concave edge (Munro 1882, 104–5, fig. 54; NMS: x.HT 2). A small bar mould reuses the grinding face of a fragment of an already broken upper bun-shaped rotary quern stone at Dun Beag, Highland (Callander 1921, 122; NMS: x.GA 1068), and Whitekirk, East Lothian (D. Clarke, pers comm; NMS: unregistered), while at Baleshare, North Uist, a bar mould was carved into the face of a probable saddle quern (Hunter, pers comm; Heald 2007, 203). A bar and two ring moulds have been carved into the abraded face of a stone slab at St Blane's, Bute, although its fractured condition makes it impossible to confirm it was a quern (Anderson 1900; NMS: GQ 39).

The reuse of quern stones as moulds for metalworking is rare and has not been studied in detail. The examples cited above, however, demonstrate that this form of reuse was widespread and long-lived. The reuse of quern stones for other purposes such as whetstones and working surfaces is well attested, and in many cases appears to take advantage of the fine-grained stone, or pre-prepared smoothed and abraded grinding surface. Their reuse as moulds is not so straightforwardly pragmatic. Where the quern was of fine-grained stone, this would be useful for a mould, but this is by no means always the case. It suggests a more deliberate and symbolic form of reuse. Quern stones, already discussed here as symbols of agricultural fertility, may have shared a special association with metalworking (Hingley 1997). Both querns and metalworking draw on associations of creation, fertility and life-cycles, and the reuse of such tools as moulds fits well with these concepts (Williams 2003, 233). Some querns may have been used to grind iron ore, as well as being used as food processing tools (Heslop 2008, 65–6). Such a use is hinted at on one rubbing stone from Culduthel (SF0204 and SF0205); its grinding face is darkly stained from grinding something other than grain, possibly ore or pigment. A further connection between quern stones and metalworking is present at Culduthel with the incorporation of rotary quern fragments (SF0457 and SF0458, SF0630 and SF0631) within metalworking features; such reuse may have performed a significant or symbolic role within the structures, although there is no consistent pattern to their use.

Cobble tools

Cobble tools are a typical component of most later prehistoric stone tool assemblages, but only a small quantity and restricted range were recovered from Culduthel. This is surprising considering the large scale of excavation and the quantity of quern stones present, and contrasts sharply with the quantity of such

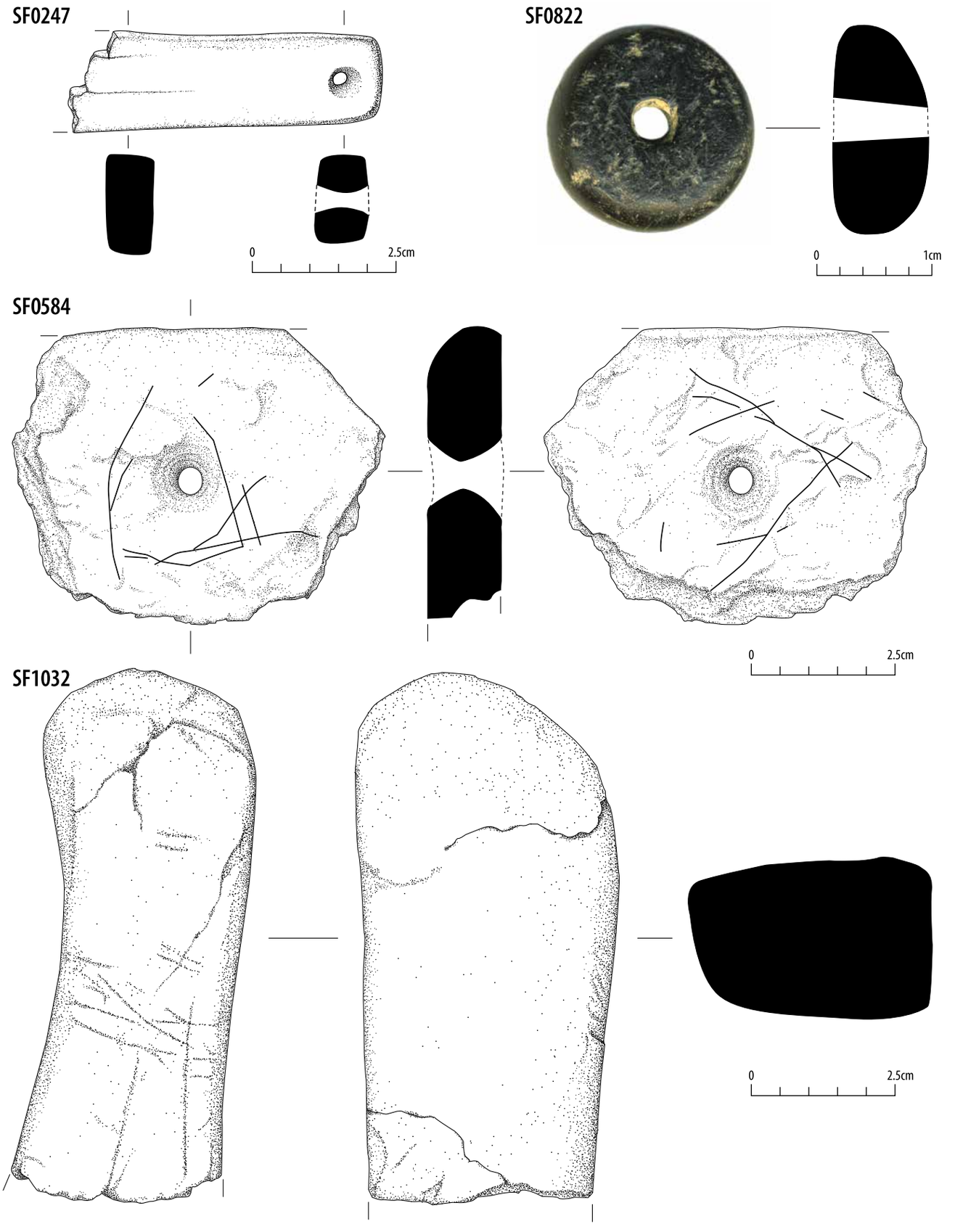

Illustration 6.18
Worked stone – Whetstone, shale bead, spindle whorl and a pounder

tools from the later prehistoric settlement at Birnie, Moray (Hunter [in prep.]). As a result, detailed comparative analysis of wear patterns is limited. It is likely that cobble tools, particularly grinders, pounders and hammerstones, were used for a variety of tasks, from processing grain and other foodstuffs to minerals for pigment, ores for metalworking or clay for potting, inter alia. Even if the processes by which these wear patterns formed are not always fully understood, differentiating the form and character of the wear allows a level of detailed comparison.

Only grinders, pounders, smoothers, whetstones and multifunction tools are present among the cobble tools. No hammerstones were identified. These cobble tools were everyday implements, some of which show multifunctional wear. The wear on the single-function grinders and pounders, defined by areas of abrasion and pitting respectively, is generally restricted to one end or one edge, and in some may only be the result of use on a single occasion. One ovoid pounder has light pecking around three-quarters of the circumference, a widespread pattern (e.g. Braehead, Renfrewshire (McLaren and Hunter 2007); Langskaill, Westray (McLaren and Hunter [forthcoming])). The general lack of developed wear on these tools contrasts with the smoothers and whetstones that appear to have been used more heavily, many having well developed wear facets associated with areas of polish from extended use. The relative lack of whetstones is surprising, given the amount of ironworking at the site.

Smoothers, plausibly hide-processing tools, are the most common cobble tool type at Culduthel, with six single-function tools and evidence of such use on two multifunction cobbles. They are identified by their smoothed, often polished surfaces and dark organic staining (Lane and Campbell 2000, 179). At Culduthel, wear is generally confined to the faces of the cobble but in two examples (SF0335 and SF0757), the rounded sides and ends have been utilised.

Only five multifunction cobble tools were recovered, displaying a limited range of wear. Three show two distinct types of wear, while only two tools show more than two different wear types.

All of the cobble tools have been manufactured from unmodified water-worn or rounded glacial erratic cobbles. Only one, SF0413, has been shaped prior to use. It is clear that the form and rock type of the cobbles was a consideration in their selection. Although the larger stone tools from Culduthel utilise a wide range of schists and sandstones, the cobble tools use a different range of stones. Ovoid quartzite cobbles were favoured for use as grinders and pounders, probably due to their hard wearing, durable properties, although fine-grained microdiorite and schist cobbles were also used. Quartzite also dominates as the rock type of choice for smoothers. The fine grain of such stone and the naturally smooth faces of the cobbles provide good surfaces for this purpose.

Personal and decorative items

Personal or decorative objects are notably rare. The most significant is a single annular oil-shale bead (SF0822 – Illus. 6.18), which came from hillwash deposits to the east and south-east of House 10. It is likely that this was worn as part of a necklace, although no further beads were recovered. The source of shale was probably at Brora (Sutherland). This source was exploited in the Iron Age, with the products travelling north to Caithness and the Northern Isles, and south at least as far as the southern coast of the Moray Firth. A number of Iron Age sites in the Inverness area have such finds, notably bangles from Balloan Park and Knock Farril (Wordsworth 1999, illus. 6; NMS HH 900), while further along the Moray Firth coast there are finds from Culbin Sands, Tarra (Forres), Covesea, Birnie and Green Castle (Portknockie) (Callander 1916, 223; Will 1998a, 66; Benton 1931, 201, fig. 19 no. 12–14; Hunter 2006c, fig. 16a–b; Ralston 1980, fig. 2.12). This shows something of contact networks. In most cases it was the finished objects that travelled, but one of the Birnie finds is unfinished, indicating the movement of raw materials or roughouts.

Apart from the shale bead, only three other stone objects from the site have seen decorative embellishment, consisting of the upper stones of three rotary quern stones that have been discussed in detail above. Although not decorative, one whetstone (SF0247) had been perforated at one end so that it could be suspended either from a belt or around the neck, suggesting it was a personal tool.

Household items

Very few of the worked stone objects shed any light on the furnishings of the structures at Culduthel. One possible pivot stone has been identified (SF0725), a flat irregular schist slab with a smooth shallow circular hollow, slightly off-centre, on one face. Although the hollow lacks any rotational wear that would confirm its use as a pivot stone, it came from a paved surface associated with the substantial roundhouse (House 10/3) and may have been in situ.

Two perforated stones, possibly used as weights, were recovered from occupation deposits to the east and south-east of House 10, but were not associated with a particular structure, and their function cannot be confirmed. A further fragmentary perforated stone, from the fill of a post-hole in Workshop 15 (context 4331), was apparently reused as post-packing.

Craft activities

Although the assemblage is dominated by food processing and general purpose tools that could have been used for a range of everyday tasks, a few hint at more specialist tasks, such as the mould for use in non-ferrous metalworking. Smoothers are interpreted as hide processing tools (cf. Lane and Campbell 2000, 178, 179, 185). Three of the single-function smoothers and one combination tool with evidence of such use come from House 10, suggesting that hide-processing or leatherworking was taking place in and around this building. There is no evidence of textile production among the stone tools, with only one unfinished spindle whorl recovered (SF0584); this rarity is a regular phenomenon on later prehistoric sites (Hunter et al, 2018), perhaps because people tended to spin (and lose whorls) while they were out in the fields; in the house, a lost whorl would generally be found.

Numerous working and grinding surfaces are present among the assemblage, while several rubbing stones and cobble tools show expedient use as working surfaces. Many are deeply scarred and fractured from having been used with fairly vigorous physical force. The three grinding slabs, possibly used to shape or sharpen iron, bone or wooden objects, all come from around the cobbled surface 227, two (SF0238 and SF1226) from within post-holes, and one (SF0317), from a wall in House 4. The working surfaces are more prevalent in the western areas of the site with two (SF0519 and SF0670a) associated with House 10, and one (SF0464) from a post-hole associated with Workshop 16. A further example (SF1227) was recovered from a waste deposit to the north of hearth [2166] and may have been associated with metalworking.

Table 6.11
Distribution of stone artefact types by area and structure

	Food Processing			Tools								Household		Personal	Other		
Structure	**Saddle querns**	**Rubbing stones**	**Rotary querns**	**Grinders**	**Pounders**	**Smoothers**	**Multifunction**	**Whetstones**	**Sharpening stone**	**Grinding/ working surfaces**	**Misc tools**	**Pivot stone**	**Perforated stone**	**Shale bead**	**Basin**	**Whorl roughout**	**Palette**
2																	
3	SF147 SF222 SF428	**SF204/205 SF206 SF233 SF235**		SF209	SF219		SF223	SF244		SF238							
4			SF1007			SF335				SF317							
No structural association						SF323	SF247	SF247									
10			SF324 SF328/365/654 SF443 SF605 SF653 SF685	SF495	SF421a	SF432 SF529 SF1224	SF413 SF477 SF1225		SF329	SF519		SF725	SF527a SF527b			SF584	SF757
11			SF339 SF507 SF508												SF505/ 506		
13										SF599							
15			SF835 SF836										SF842				
No structural association		SF598	SF184 SF292 SF418 SF681			SF757				SF1226				SF822			
Industrial hearth 2166			SF630 SF631							SF1227							
Furnace 3790											SF1228 SF1229						
12							SF1032										
16			SF457/458 SF465/471							SF464							
17			SF476														
18		SF658															
Unstratified	SF707																

Many of the stones (10), particularly the cobble tools, are severely heat-affected and fire-cracked, suggesting reuse as pot-boilers or within furnaces or hearths.

Chronology and contextual analysis

Few stone tools are chronologically distinctive but the assemblage as a whole is consistent with the later prehistoric date of the structures, particularly the stone palette, the perforated whetstone and the rotary querns. The dates obtained provide valuable *termini ante quem* for many object types. Stone tools were found throughout the site, concentrated particularly around the cobbled surface 227 and House 4 on the east of the site and around House 10 (Table 6.11).

The majority of stone is associated with House 10/3, most from residual or secondary contexts. Some quern fragments and a working surface were reused in walls and post-holes as post-packing and four objects, a working surface (SF0519), a smoother (SF0529), a multifunction cobble tool (SF0477) and fragments of a rotary quern (SF0365), came from the main fill of the ring-ditch. Most of the stone associated with this structure came from post-abandonment or decay deposits overlying the structure. Only four objects may be directly related to its use: a possible grinder (SF0495), fragments of a rotary quern (SF0605) and smoother (SF1228) came from occupation deposit (context 2198), and a possible pivot stone (SF0725) was part of a paved surface within the structure (context 1979).

In two cases, fragments of a single quern were found in separate contexts. Several small fragments of a thin garnet-rich schist disc-quern (SF0328, SF0365 and SF0654) all derive from House 10/3 but came from several contexts and deposits, such as the fill of the ring-ditch, the fill of post-hole 2209 and the post-abandonment layer overlying the roundhouse. The fragments cluster in the south-west quadrant of the roundhouse.

Similarly, fragments of one bun-shaped quern (SF0465/0471) came from Workshop 16. One fragment, SF0465, came from the fill of a circular pit immediately behind the south-east entrance post (context 2238), while the joining fragment, SF0471, was recovered from the fill of another post-hole towards the back of the roundhouse (context 2253). The fragment from 2238 appears to be severely weathered, contrasting sharply with condition of the other piece, which is quite fresh, suggesting a significant difference in the treatment of the two fragments after the stone was broken. This adds to other evidence of quern having a post-use life, their treatment and deposition suggesting they were seen as significant objects (see Heslop 2008, 73–80).

Three fragmentary querns (SF0457/0458, SF0653 and SF0836) have evidence of heat damage and were associated with possible metalworking features. Fragments of one quern (SF0457/0458) were directly associated with a furnace feature [2246]; and one very friable fragment of this quern has carbonised material adhering to one face. The intense heat it was exposed to has severely degraded the strength of the rock. The burnt material adhering is neither vitrified nor magnetic, but may represent fragments of charcoal and ash from the interior of the smelting furnace. It is possible that this quern fragment therefore had been used to support a ceramic tuyère, with the notch from the central perforation forming a convenient aperture in the structure of the furnace, or had simply been reused within the furnace's stone lining. A further two rotary quern fragments were incorporated in an industrial hearth (Hearth 2166) (SF0630 and SF0631), but the lack of heat damage or adhering slag suggests that these were used as convenient building stones rather than a support for the tuyère or bellow.

A further significant concentration of stone comes from House 3, including saddle querns, rubbing stones, a multifunction cobble tool, a whetstone and a grinding surface. As discussed in detail above, all of the saddle querns (apart from one unstratified find) and the majority of rubbing stones from the site were associated with this structure. Although the majority of the querns and rubbing stones had been reused, either in walls or in post-holes as post-pads or packing material, the presence of so many saddle querns and no associated rotary querns suggests this structure is one of the earliest on site, confirmed by its Late Bronze Age/Early Iron Age radiocarbon date, 810–540 cal BC (2σ % age probability) (GU-21912 2565 ± 35 BP). The presence of so many of the saddle querns and rubbing stones within this single roundhouse suggests that they had been deliberately incorporated into the structure during construction, as symbolically charged objects (Hingley 1992), although no distinctive patterning or clustering was observed to indicate the deliberate placement of the stone within specific areas of the structure. Rotary quern stones do not appear to have been systematically treated in the same way on the site. Although rotary querns were associated with eight structures at Culduthel, no clear pattern of deliberate placement or structured deposition was observed. However, the potential significance of their association with furnaces in three instances has been discussed above, and the patterns of fragmentation noted with the joining fragments (above) point in these cases to the quern having an afterlife, which indicates the fragments were seen as significant.

Comparanda

Comparative analysis of the stone assemblage from Culduthel is faced with several problems, not least of which is the paucity of later prehistoric sites in northern Scotland (outwith Orkney and Shetland) that have been excavated using modern methods and techniques. This makes any detailed analysis of coarse stone use and deposition in Iron Age northern Scotland difficult, as the information from many earlier excavations is either insufficient to allow detailed analysis or difficult to interpret. In many early excavations, worked stone was not routinely retained and generally only unusual or decorative items were kept. All-encompassing terms such as 'hammerstones' were often used as a generic term for cobble tools with signs of use, and quern stones have typically been mentioned only briefly, making it difficult to conduct detailed comparative analysis.

The most comparable site in terms of scale of excavation, size and complexity of the settlement evidence is Birnie, near Elgin in Moray (Hunter [in prep]). Excavations at Birnie have focused primarily on a series of roundhouse structures and associated features. Since 1998, more than 750 items of stone have been collected through excavation and field walking. Post-excavation analysis of these finds is at an early stage and the figures quoted here are necessarily provisional, but a rapid assessment provides interesting comparable details to Culduthel. The substantial quantity of coarse stone recovered at Birnie is striking in comparison to the relatively conservative assemblage from Culduthel. The reason for this is not clear, as both sites had access to good quality, local stone. This may be due to chronology, with more intensive occupation in the Late Bronze Age to Middle Iron Age at Birnie, or simply a longer sequence of occupation with evidence of activity in the area from early prehistory through

to the medieval period. Alternatively, this could suggest distinctive approaches to stone use between the two sites.

Of the stone tools from Birnie, 70% have been provisionally classified into specific tool types such as querns and cobble tools, including grinders, pounders and whetstones. Among these identified tools, as at Culduthel, quern stone fragments have been found in quantity, with more than 50 saddle quern fragments and approximately 20 rotary quern fragments, dominated by disc-querns. Similarly large quantities of rubbing stones, used in conjunction with saddle querns, were noted (57). At Culduthel quern stones and rubbing stones represent over 45% of the stone assemblage, while at Birnie they comprise over 40% of the identified stone tools. A further consistent aspect of the Birnie and Culduthel stone assemblages is the relative lack of spindle whorls; only one has been recovered from the excavations at Birnie to date. As noted above, this fits broader patterns.

Despite these points of similarity, the cobble tool assemblage from Birnie stands in contrast to that at Culduthel, comprising over 55% of the identified stone assemblage, whereas at Culduthel, the cobble tool assemblage was limited, making up just over a third of the stone tools. The contrast between the quantities of possible whetstones is particularly striking; at Culduthel, only two examples are present, comprising less than 1% of the cobble tool group. At Birnie, over 100 examples have been recovered, comprising over 40% of the cobble tool assemblage.

Conclusions

Despite the limited range and quantity of stone artefacts from Culduthel, they comprise a significant and interesting assemblage. Grain processing tools in the form of quern stones and rubbing stones dominate the assemblage, many displaying extensive use. Wear patterns on the rotary stones in particular suggest that most were used until exhausted, or discarded due to damage through wear. Detailed geological examination of the querns indicates that the stones used were carefully selected, using garnet-rich schists or coarse schists with distinctive quartz-rich seams. There are also hints at deliberate deposition of quern stones, with the incorporation of several saddle querns and rubbing stones within one Late Bronze Age/Early Iron Age roundhouse. Their reuse within the structure, as post-packing and building stones, is interpreted as indicating some symbolic connection with concepts such as fertility and the agricultural cycle. Such a practice was not observed within any other structure at Culduthel, and it is interesting to note that rotary quern stones were not reused in this way. Symbolic associations between quern stones and metalworking are highlighted by the reuse of an unfinished lower rotary stone as a mould for non-ferrous metal casting, and the incorporation of some rotary quern fragments within metalworking features. The mould is one of the most significant and enigmatic objects from the site; the large 'fish-shaped' mould, interpreted here as a preform mould for casting a vessel, is unique. The reuse of a quern stone for a mould is likely to have had a significance beyond any purely functional qualities; the schist it is made of is not inherently better than the sandstones readily available from the surroundings.

The general lack of cobble tools from Culduthel is intriguing given the long period of occupation at the site and the scale of the excavation. The small quantities of whetstones and the lack of hammerstones is particularly interesting given the amount of metalworking that was taking place, where such tools might be expected to find a role. This is in stark contrast to the later prehistoric settlement site at Birnie, Moray (Hunter [in prep]), where cobble tools are common, whetstones making up a significant proportion of the assemblage. The small quantity and range of cobble tools from Culduthel is difficult to explain. It is possible that this is a reflection of different chronologies (with Birnie perhaps having an earlier 1st millennium BC evidence) or access to resources. Alternatively, the rich assemblage of iron and iron production at Culduthel could suggest that tool types commonly present in stone at other sites were here being made from iron. Future work could usefully compare and contrast assemblages from the area in more detail, as the results of other recent excavations become available.

Catalogue

Geological identifications are incorporated in the catalogue descriptions, with their wider significance discussed by Fiona McGibbon below.

Food processing equipment

Quern stones: saddle querns

Three saddle querns and one large saddle/trough quern were recovered. Only one (SF0428), a very small plano-convex example, is complete. A range of rock types have been used: schist, sandstone, microgranite and biotite granite. Three have been manufactured from large glacial erratics with limited shaping prior to use. The trough quern is likely to have derived from a local sandstone outcrop. Although this example takes advantage of naturally straight edges, the ends and surfaces have been extensively shaped prior to use. Three saddle querns were recovered from House 3: the fourth example was unstratified.

SF0147 Large sub-rectangular slab of coarse arkosic sandstone, worn on one face from use as a saddle/trough quern. The basal surface is naturally flat with only occasional peckmarks present along one edge from an attempt to flatten a rough, irregular patch and to make the stone more stable to work. Both longitudinal sides were originally straight (one has been damaged, resulting in the loss of one corner) and appear to take advantage of naturally straight edges. The ends are also squared; occasional peckmarks indicate that these have been shaped. They are high steep-sided ridges with rounded edges that curve towards the grinding face (undamaged edge H 133 W 48mm). One edge ridge appears to be higher than the other but it is difficult to confirm due to later damage. On the working surface, a wide linear U-shaped concave facet runs parallel to the elongated sides (L 440 W 240 D 35–80mm) with concentrated abrasion at the centre (L 290 W 250mm) from use perpendicular to the elongated edges. There is no corresponding ridge around the ends; the grinding surface extends to the very edges. L 460 W 370 T of grinding face 56–85mm. Possible wall base/collapse, context 796, House 3. (Illus. 6.15)

SF0222 Large sub-rectangular fragment of a biotite schist block. The edges are naturally rounded but irregular and the basal surface is angular throughout. The grinding surface is dished with distinct pitting from use. L 390 W 242 T 164mm. Possible wall base/collapse, context 796, House 3.

SF0428 Small plano-convex oval microgranite saddle quern produced from a glacial erratic boulder. The grinding surface is dished and lightly pitted with areas of polish visible towards both ends, one of which has been lost. The remaining end is rounded with some peckmarks, probably from manufacture. L 236 W 168 T 57mm. Fill of post-hole [1646], context 1647, House 3.

SF0707 Fragment of a large sub-rectangular coarse biotite granite slab, three rounded corners remaining, one edge lost. Some peckmarks on the edges remain from basic shaping. One face has been flattened and is slightly dished towards the centre where crystals have been planed off and abraded from use with associated polish. L 312 W 250 T 105mm. Unstratified.

Rubbing stones

Six rubbing stones are present, characterised by their smooth, rounded abrasion facets formed by grinding grain or other substances on a saddle quern. Contact with the dished face of the quern gives the rubbing stone its convex, rounded working surface which is sometimes polished from wear. One large rubbing stone, SF0204 and SF0205, has dark staining on one face, indicating that it was used to process something other than grain; it may have been used to grind pigment or iron ore. Five examined examples are complete, while one is fragmentary as the result of exposure to intense heat. All of the rubbing stones have been produced from locally sourced glacial erratic boulders, four of which were unmodified prior to use. Three have evidence of secondary use in the form of peckmarks and gouges from expedient use as working surfaces (SF0204/0205, SF0206 and SF0235) and one (SF0206) has a small pecked facet that may be from use as a pounder. Four were recovered from House 3: two built into the rubble foundations for a wall (context 723) and two incorporated into post-holes, perhaps as post-pads.

SF0204 and **SF0205** Four joining fragments of an ovoid amphibolite boulder, shape unmodified prior to use. Both faces are flattened through use, one more extensively than the other with a large oval area of abrasion and polish. Associated with this facet is a dark red-brown area of staining, indicating that this face, at least, was used to grind substances other than grain or foodstuffs. Small patches of bright red-brown residue adhere to the edges, suggesting that this might have been used to process ore prior to smelting. Irregular pitting on this surface cuts through the polished facet, indicating expedient use as a working surface. The opposite face also has a flattened abraded facet covering most of the surface but lacks associated staining and polish. L 337 W 216 T 120mm. Rubble foundation within cut [724] for wall of House 3, context 723.

SF0206 Irregular sub-rectangular boulder of coarse granodiorite. The shape, unmodified prior to use, is natural apart from an oval pitted facet on one rounded corner, which may be the result of use as a pounder (57 × 48mm). The grinding face is flat and smooth with well-developed use-polish. Concentrated towards the middle of this face, overlying the polish, is an irregular oval area of distinct pitting. Although some of these hollows are due to detached crystals, others appear to be deliberate peckmarks, suggesting expedient use of the face as a working surface. L 253 W 177 T 100mm. Rubble foundation within cut [724] for a wall of House 3, context 723.

SF0233 Plano-convex ovoid coarse granodiorite cobble, surfaces heavily pitted throughout from manufacture. The grinding surface is severely pitted from use with the large feldspar crystals planed off, particularly at one wide, rounded end. Elsewhere the crystals have been detached during use, resulting in a heavily pitted surface. L 249.5 W 130–185 T 65mm. Fill of post-hole, context 959, House 3.

SF0235 Irregular sub-square boulder of biotite schist, all edges naturally rounded with no evidence of modification prior to use. Both surfaces are rounded; one is natural, the other, the grinding face, has been smoothed and abraded from use. The surface has areas of polish, particularly around the edges, and the face is highly pitted from wear. Some deeper peckmarks (D 15mm) near the centre of the face may be the result of expedient use as a working surface. L 227 W 212 T 71mm. Cut of post-hole, context 962, House 3.

SF0598 Plano-convex ovoid rubbing stone produced from a glacial erratic garnet biotite schist boulder. Both smooth rounded ends have been abraded to shape; one has recent damage. The grinding face is flattened and pitted from use. L 226 W 180 T 73mm. Packing stones within post-hole [2912], context 2914, Workshop 13.

SF0658 Fire-cracked fragment of an ovoid psammitic schist cobble with one smoothed, flattened surface remaining, with an associated light sheen. The opposite surface is heavily sooted. The edges are fractured as the result of heat damage. L 76 W 91 T 60.5mm. Fill of pit [3599], context 3600, Workshop 18.

Quern stones: rotary querns

Twenty-nine fragments of 21 rotary querns are represented among the assemblage. Although rotary querns are typical finds from later prehistoric settlement sites in Scotland, their quantity, particularly in comparison with the limited cobble tool assemblage, is significant. Only four stones are complete (including an unfinished example), the rest being fragmentary. The majority of these fragments are from upper stones (13) with three possible lower stones present. The remaining fragments could not be classified due to a lack of distinguishing features. Contrary to the pattern expected for north-east Scotland (MacKie 1971, fig. 5), low bun-shaped querns dominate the assemblage, with only two definite disc-shaped upper stones identified. All were produced from locally sourced schists.

SF0184 Approximately 30% of an upper quern stone produced from biotite schist. Despite the thinness of the stone, this appears to be a shallow bun-shaped quern that has seen extensive use. The upper surface is rounded with peckmarks remaining from manufacture. A raised collar surrounds the biconical feeder pipe (D 37mm), which is then surrounded by a wide pecked groove (W 28.5mm). A conical vertical handle socket (D 17mm) can be seen in section on one broken edge and has worn through to the grinding face. This is likely to have caused a point of weakness in the stone and may have resulted in the stone fracturing and being discarded. The grinding face is convex through extensive use, with planed-off garnet/feldspar crystals and frequent pitting due to such inclusions detaching. Original D *c.*345 T 54.5–69mm. Spread of dark humic loam with abundant fire-cracked stones and ferrous metalworking waste, context 798, spread of burnt debris beside House 10/3. (Illus. 6.17)

SF0292 Approximately 20–25% of a rotary quern stone produced from coarse biotite schist. Very few original features of the stone remain; the edges have broken off, the grinding surface has been lost and no handle socket remains to confirm whether this is an upper or lower stone. The pecked central perforation, seen in section on the broken edge is *c.*25mm diameter. Due to the loss of the edges, the original dimensions are unclear but it must have been over 300mm in diameter. L 157 W 149 remaining T 62mm. Dumped deposit, context 1680 beside House 10/3.

SF0324 Complete low bun-shaped upper rotary quern stone produced from garnet-rich mica-schist with frequent talc inclusions. Although such a coarse-grained schist seems an unlikely and unsuitable rock type for such a purpose due to the frequent spalling and friable character of the stone, the grinding face has been produced parallel to the mineral alignment in the rock, showing a deliberate attempt to exploit the harder, denser layers of the stone. Much of this layer had been worn away. The central biconical feeder pipe (D 80mm) has a smoothed interior from use. One small edge fragment has broken off adjacent to a well-used conical vertical handle socket (D 32mm), presumably during use. It is likely that a replacement handle socket was not produced as the hard layer of stone used as the grinding surface had been almost exhausted. D 358 T 190mm. Post-abandonment/decay deposit overlying House 10/3, context 1671. (Illus. 6.16)

SF0328, SF0365 and **SF0654** Almost complete disc-shaped upper rotary quern stone of garnet-rich mica schist in seven fragments from three contexts; only one small edge fragment is missing. The upper surface is naturally irregular and uneven with no obvious attempts to flatten or smooth it. Some rough irregular pecking around the central feeder pipe appears to be an attempt to produce a shallow hopper but this is obscured by later post-fragmentation damage. Only small sections of the original edges remain but where present they are rounded and smoothed in places, while other areas have fairly straight natural edges which have seen little attempt to shape. The biconical central feeder is wide in comparison to most of the querns from the site (D 61mm) and two small shallow vertical handle sockets (D 23 and 24mm) are present, the second possibly a replacement for the primary handle, which looks damaged. The grinding face shows extensive use with planed-off garnet crystals and frequent pitting from detached crystals. D 368 T 51.5mm. SF0328 from post-abandonment/decay deposit overlying House 10/3, context 1671. SF0365 from main fill of ring-ditch [2215], context 2155, House 10/3. SF0654 from fill of post-hole [2209], context 2837, House 10/3. (Illus. 6.16)

SF0339 Intact unfinished ?lower disc-quern stone of biotite schist, slightly oval/sub-square in shape and reused on both faces as a mould for non-ferrous metalworking. There appears to have been little attempt to modify the shape of the stone; one squared end has a small oval area of peckmarks, while the other surfaces are naturally irregularly rounded. Similarly, there is no obvious attempt to dress the surfaces but an uneven oval biconical perforation has been pecked into the centre of the stone (50 × 46mm). The interior of this perforation is uneven and almost sub-square in shape, suggesting that it had seen minimal use, if any. One naturally rounded face has a disc and a bar ingot mould carved into the surface. The position of these moulds adjacent to the central hole confirms that they were added after the perforation had been made. The bar ingot mould has a smooth interior with carefully rounded ends (L 210 W 29–20 D 22–24mm). Slight spalling of the stone between the central hole and the edge of this mould may indicate damage in removing the cast ingot. In contrast, the disc mould shows no use, the uneven basal surface (D 101 Depth 16–18.5mm) suggesting it was unfinished. On the opposite surface (the intended grinding face), a more complex mould has been carved, centred on the central perforation. This mould (L 190mm) has a wide fan-shaped end (W 85mm) that tapers sharply, forming a narrow neck (W 34mm) that expands gently to a rounded vase-shaped body (W 115mm). This tapers to a narrow squared end (W 36.5mm). At the centre of the mould is a raised teardrop-shaped area (D 18mm), which is damaged from removal of the cast object. This raised area would create a depression in the casting, leaving a deeper casting around the edges and ends (D 22–24mm) only. It is suggested that this is one half of a two-part mould of a vessel, this one, the rim and the handle, sitting on top so that the molten metal could be poured into the mould using the central perforation as an ingate. L 361 W 362 T 93mm. Concentration of burnt material, context 1952, Workshop 11. (Illus. 6.17)

SF0418 Small flat wedge-shaped fragment of psammitic schist with one rounded original edge remaining. The slightly convex upper surface and both broken edges are coated in a glassy vesicular residue. This could be a reused fragment of rotary quern but there are no diagnostic features remaining to confirm that this. L 125.5 W 102 T 47.5mm. Hillwash, context 2101.

SF0443 Approximately 35–40% of a rotary quern stone produced from coarse talc/muscovite schist. None of the original edges remain. The grinding face, which is distinctly sloped towards the feeder pipe (D 39.5mm), has little evidence of wear except from smoothing of the talc crystals. The surface is severely pitted due to such minerals detaching through use. The opposite surface is flat and pitted with frequent detached talc crystals. Due to the loss of the edges, the original dimensions are uncertain, but it must have been at least 340mm diameter. T 75mm. Post-abandonment/dumped deposit overlying House 10/3, context 1671.

SF0457 and **SF0458** Three non-joining fragments of very friable, very unstable ?lower rotary quern stone produced from garnet-rich mica schist. Approximately 75% of the stone is represented. Very little of the original edges or surfaces remain, having been lost to heat damage. No handle socket remains. The central biconical perforation is approximately 59mm in diameter. It was found in a furnace and the field interpretation was that the central perforation acted as a bellows hole. The heat damage indicates that all of the fragments had been built into the furnace structure but worn fracture surfaces suggest that this was after the quern was broken up, destroying the perforation. One fragment has burnt deposits adhering to one face, which is severely degraded through exposure to intense heat, and the broken notch of the perforation may have supported a ceramic tuyère that has since degraded. Original diameter at least 330 T 59–57mm. Fill of furnace [2246], context 2288, Workshop 16.

SF0465 and **SF0471** Two conjoining fragments representing approximately 85% of a bun-shaped upper rotary quern stone produced from coarse talc mica schist. The upper surface has been carefully shaped to create a smooth rounded profile with occasional peckmarks remaining from manufacture. Significantly, the upper surface of one fragment (SF0465) is more coarsely weathered, suggesting differential deposition conditions. In contrast to the well-shaped surfaces is the irregular feeder pipe (D 67mm), which appears to have been bored or drilled at a slight angle from both sides, creating a distinct asymmetric notch at the narrowest point of the perforation (D 47.5mm). The grinding face is smooth and flattened from use with areas of polish, particularly around the circumference. No handle socket is present. D 360 T 86mm. SF0465 from Fill of pit [2238], context 2239, Area E. SF0471 from fill of post-hole [2253], context 2255, Workshop 16.

SF0476 Approximately 80% of a bun-shaped upper quern stone of coarse biotite schist in two joining fragments. The upper surface is gently rounded and evenly shaped with frequent shallow peckmarks remaining from manufacture. The central biconical feeder pipe (D 34mm) widens significantly at the upper surface to create a hopper (D 63mm). One vertical handle socket remains (D 43mm), showing signs of significant use as it is highly smoothed and polished and has worn down through to the grinding face. A small oval indentation (22 × 17mm) on the grinding face adjacent to the hole made from the handle socket may have been caused by the abrasion of the detached stone fragments. The grinding surface has areas of polish, particularly around the circumference and is lightly pitted from use. D 356 T 85mm. Spread of large stones in [2403], context 2404, House 17.

SF0507 Small fragment (approximately 25%) of an upper rotary quern stone of biotite schist with the remains of the feeder pipe (D 33mm) and shallow hopper (D 52mm) visible in section. Both the upper surface and grinding face have been lost due to the friable rock type, so the original dimensions are unknown. Original D at least 300mm, remaining T 14.5–32.5mm. Remains of a stone wall, context 2456, Workshop 11.

SF0508 Fragment of the upper stone of a rotary quern of biotite schist. This may be a further fragment of SF0507 as the rock type and colour are so similar, but no joins are present. The fragment represents less than 15% of an upper stone. None of the original edges remain but a slightly curved and smoothed notch on one edge is likely to be the edge of the feeder pipe. A further narrower notch on the adjacent break surface is from a conical vertical handle socket (D 25mm). A small crescentic notch on the opposite break surface may be a second handle socket. The upper surface is gently sloping with occasional peckmarks from manufacture. The grinding surface has been lost and the original thickness of the stone is unknown. Original D at least 340mm, remaining T 26–34mm. Remains of a stone wall, context 2456, Workshop 11.

SF0605 Approximately 50% of a highly degraded small disc-shaped upper rotary quern stone produced from biotite schist. Identification as a disc-quern is based on the proportions of diameter and thickness, although much of the thickness has worn away through use. The pecked biconical feeder pipe (D 57mm) and a vertical conical handle socket can be seen in section. The handle socket appears to have perforated the grinding surface, which suggests that the quern had seen extensive use, and which may have resulted in the fracture and discard of the stone. D 382 T 51.5mm. Occupation surface, context 2198, House 10/3.

SF0630 At least 15% of a bun-shaped upper stone of psammitic schist with a rounded upper surface, regularly pitted from manufacture. No central perforation remains but a narrow, ?drilled vertical handle socket (D 19mm) is present in section on one broken edge. It appears to have worn down through the grinding surface, creating a point of weakness and perhaps leading to the fracture of the stone in use. L 260 W 173 T 90mm. Industrial furnace [2166], context 2166.

SF0631 Approximately 45% of an upper bun-shaped rotary quern of psammitic schist. The upper surfaces are quite steeply rounded with distinct peckmarks remaining from manufacture. A slightly rounded pecked collar (W 35.5mm) defines a shallow hopper that surrounds a narrow biconical feeder pipe (D 28mm). The grinding face is coarse and pitted with severe damage, particularly around the circumference. Original D 305 T 85.5mm. Industrial Hearth [2166], context 2166.

SF0653 Approximately 30% of a possible adjustable lower disc rotary quern stone produced from garnet-rich mica-schist. Most of the original rounded lower surface or edges have been lost due to exposure to intense heat but where present, peckmarks are visible from manufacture. No handle socket is present, suggesting that this is a lower stone, as does the narrow conical central spindle socket (D 22.5mm) that perforates the stone. The grinding surface is distinctly dished and pitted from use with some concentric striations visible. The grinding surface has many hairline cracks and the edges are friable, suggesting it was exposed to high temperatures. Original diameter *c.*380mm, T 67mm. Remains of wall base, context 1853, House 10/3.

SF0681 Approximately 40% of a bun-shaped upper quern stone of biotite muscovite schist. Fragment of a short feeder pipe (D 29mm) and a narrow hopper remain in section. The edges and rounded upper surface are well shaped with peckmarks remaining from manufacture. No handle socket is present. Original diameter *c.*320mm, T 49–66.5mm. Packing within post-hole [3714], W of Workshop 13, context 3713.

SF0685 Approximately 20% of upper stone of a bun-shaped rotary quern stone produced from psammitic schist. The upper surface, originally rounded, is damaged but a slightly oval conical vertical handle socket remains (D 42mm, *c.*30mm deep). The interior of the socket is smooth from the rotational wear of the handle. The grinding surface is flat and polished in places with light pitting from use. Such a friable schist is not the best rock type for quern use due to the frequent shedding of mineral grains but the grinding surface, in this case, exploits a layer of dense quartzite-rich stone. Original D 350–370 T 84mm. Fill of post-hole [3549], context 3551, House 10/3.

SF0835 Approximately 40% of a rotary quern produced from a slab of coarse garnet-mica schist. All of the edges have been lost, as has most of the upper surface, leaving only grinding face and feeder pipe (D 37.5mm) identifiable. It is not clear whether this is an upper or lower stone. Original D at least 350mm,

remaining T 65mm. Fill of post-hole [4306], context 4304, Workshop 15.

SF0836 Approximately 15–20% of a rotary quern stone produced from coarse biotite schist. The well-used, flat, smooth grinding face and a fragment of rounded edge remain but the upper surface has been lost, possibly due to heat damage, making it impossible to confirm the quern's profile and whether it was an upper or lower stone. The central pecked perforation can be seen in section (D *c.*30mm) but no trace of handling system is present. Original diameter *c.*405mm, remaining T 36.5mm. Fill of post-hole [4306], context 4304, Workshop 15.

SF1007 Near-complete sub-oval low bun-shaped upper rotary quern stone produced from densely bonded garnet-rich mica-schist. One section of the edge is missing, resulting in its sub-oval shape; it would originally have been more circular in plan. Shallow collars encircle both the feeder pipe (D 52mm, collar W 18mm) and the vertical handle socket (D 27mm, collar W 31mm). The collar surrounding the feeder pipe creates a narrow, shallow hopper whereas the one around the handle socket has little functional use apart from giving the handle a little extra reinforcement. The grinding face is pitted and polished in patches from use, with a small narrow angled pecked band (W 17mm) encircling the feeder pipe and a shallow conical hollow (D 14mm) on the grinding face positioned directly under the handle socket on the upper surface. The purpose of these features is unclear but it is possible that the grinding face was originally designed to be the upper surface. D 380 T 80mm. Fill of cable trench, context 712, House 4. (Illus. 6.16)

Cobble tools

All of the cobble tools from Culduthel have been produced from local water-worn or rounded cobbles, sourced from local riverbeds or naturally occurring glacial erratics. None display any evidence of modification prior to use, with one possible exception (SF0413). Classification of tool types here is based on the nature of the wear, following the scheme used in the Howe report (Ballin Smith 1994, 196; Table 6.12). This approach is not without problems as it describes wear rather than function, and more experimental work is required to understand these tool types more directly. In addition, different stone types will wear differently due to their varying properties, and many tools display combinations of wear patterns indicating a range of functions. These are discussed after consideration of single-function tools.

Grinders

SF0209 Thin, naturally curved sub-square flake of arkose, formed from exfoliation weathering of a larger cobble. All four edges are irregular and fractured. One rounded edge and corner has been abraded from light use as a grinder. L 106 W 89 T 15mm. Possible wall base/collapse, context 796, House 3.

SF0495 Flattened spherical waterworn cobble of quartzite/psammite. The surfaces are weathered throughout, making identification of any wear difficult. One slightly smooth, flattened area may be the result of abrasion (29.5 × 26mm). L 91.5 W 85 T 40mm. Occupation deposit, context 2198, House 10/3.
(See also SF0223 and SF0477)

Pounders

SF09 Flattened ovoid quartzite cobble with a small oval pitted facet (46 × 18.5mm) on one edge towards one broad rounded end. L 100.5 W 89 T 70.5mm. Fill of post-hole [085], context 083.

SF0219 Flattened ovoid quartzite cobble with a band of light pitting (W 13mm) present around three-quarters of the circumference. L 83 W 78 T 57mm. Topsoil derived deposit sealing House 3, context 725.

SF0421a Possible pounder. Coarse psammitic schist cobble, the edges pitted throughout, possibly the result of use. L 107 W 81 T 57.5mm. Post-abandonment/decay deposit overlying House 10/3, context 1671.

(See also SF0206, SF0223, SF0477 and SF1032.)

Smoothers/polishers

Both smoothing stones and (more rarely) whetstones show surface smoothing and staining; they are differentiated here by the concavity of the surface as an indicator of whetting. This follows the criteria adopted at Dunadd, where a large number of smoothing stones/polishers were found (Lane and Campbell 2000, 178, 179, 185). The light polish and/or organic staining are interpreted as arising from animal fat used in hide processing.

SF0323 Small ovoid rounded cobble of dark-brown microdiorite. The surfaces are very smooth with a slight sheen throughout. One surface has become flattened and highly polished from use. L 71.5 W 58 T 45.5mm. Fill of pit [1863], context 1862.

SF0335 Ovoid quartzite or psammite cobble, with smooth rounded surfaces. The shape of the stone is unmodified but both rounded sides and ends are heavily stained, possibly from use. This is very similar to SF0757. L 96 W 59 T 39mm. Ring-ditch of House 4, context 1920 (1924).

SF0432 Small flattened ovoid quartzite pebble with one rounded and one dished face, both of which are smoothed and slightly polished from use. Patches of dark staining are associated with this use-wear. L 66 W 56.5 T 33mm. Post-abandonment/decay deposit overlying House 10/3, context 1671.

SF0529 Ovoid microgranite cobble, surfaces severely weathered throughout. In contrast to the rest of the stone is a small oval area of light abrasion and smoothing (40 × 31mm), possibly the result of use. L 83 W 75 T 61mm. Fill of outer ring-groove [1763], context 1764, House 10/3.

SF0757 Flattened ovoid psammitic schist cobble. The rounded edges and ends are smoothed and stained through use. Slight traces of abrasion are associated suggesting extensive wear. L 91.5 W 67 T 34.5mm. Fill of post-hole [4089], context 4090.

SF1224 Waterworn quartzite pebble, with one smoothed, slightly polished surface from use. L 49 W 45 T 33.5mm. Occupation deposit, context 2198, House 10/3.

(See also SF477 and SF1033.)

Multifunction tools

SF0223 Pounder/grinder. Flattened ovoid granite cobble with a small oval flattened pitted facet (49 × 41mm) at one end. The cobble is cracked and fractured from subsequent use as a pot-boiler. L 109 W 87 T 61mm. Secondary fill of post-hole [927], context 929, House 3.

SF0413 Whetstone/working surface or pounder. Flat ovoid psammitic schist cobble with rounded edges. Both faces are flat and smooth, one slightly dished from use as a whetstone. Many of the edges are pitted, either from use as a working surface or light pounder. A small flattened band of abrasion is present on one edge, suggesting that the edges had been shaped prior to use, but is now obscured due to secondary pitting. L 105.5 W 59.5 T 20mm. Post-abandonment/decay deposit overlying House 10/3, context 1671.

SF0477 Smoother/pounder/grinder. Ovoid quartzite cobble, one slightly concave face smoothed and stained from use, probably as a smoother or rubbing stone. One wide rounded end has an oval concentration of distinct peckmarks (27 × 20.5mm). The opposite blunt narrow end is slightly abraded from light use as a grinder. L 86.5 W 77 T 53.5mm. Main fill of ring-ditch [2215], context 2155, House 10/3.

SF1032 Whetstone/sharpening stone/pounder. Elongated ovoid coarse sandstone cobble, all surfaces modified by wear and severely heat-affected. One irregular rounded end has an oval faceted area of peckmarked wear (40 × 28mm) from use as a pounder; the opposite end has been lost. Both faces and edges are smoothed and abraded from use as a whetstone, particularly one face that has become severely dished from extended use. Overlying the whetting on one edge is a closely grouped series of parallel and overlapping linear sharpening grooves (23 × 22mm). L 93 W 45.5 T 30.5–26.5mm. Context 1110, Workshop 12. (Illus. 6.18)

SF1225 Smoother/working surface. Small ovoid microgranite cobble with patches of dark-brown and red-brown staining on one edge and adjacent face suggesting light use as a smoother. In the centre of the opposite surface is an irregular, indistinct narrow band of pitting running across the length of the stone, possibly from expedient use as a working surface. L 78 W 51.5 T 31mm. Cut of post-hole/pit, context 1882, House 10/3.

Whetstones

SF0244 Flat elongated rectangular siltstone cobble with naturally rounded corners. One surface is flat and fairly smooth, possibly from use, but is obscured by specks of dark-brown residue. This residue is present on all surfaces but is concentrated on the possible worked surface. L 162 W 48.5 T 24mm. Fill of pit [918], context 919, House 3.

SF0247 Fragment of a flat rectangular dark-brown siltstone whetstone with a small biconical perforation at the centre of one squared end that has been deliberately shaped by abrasion; the other end has been lost. Both faces and edges are slightly dished and polished from extensive use. L 59 W 15–19 T 9mm. Upper fill of pit [1615], context 1616. (Illus. 6.18)

(See also 413 and 1032.)

Tools: sharpening stone

SF0329 Irregular flat sub-rectangular fragment of microgranite, broken from a larger rock or outcrop. Two surfaces are weathered; one slightly convex face has a closely grouped series of seven diagonal, parallel incised sharpening grooves, varying in length (L 63–108mm) but consistent in thickness (2.5–3mm) and depth (1mm). L 197 W 126 T 58mm. Post-abandonment/decay deposit overlying House 10/3, context 1671.

(See also 519, 670a, and 1032.)

Grinding and working surfaces

SF0238 Grinding surface. Flat triangular slab of microgranite, broken from a larger natural slab. The edges and one face are irregular but unworked. Although slightly uneven with no obvious attempt to flatten prior to use, the other surface is smoothed and lightly polished in patches from abrasion. This polish has been cut through in places by small irregular peckmarks, indicating expedient use as a working surface. L 175 W 142 T 28.5mm. Fill of post-hole [958], context 959, House 3.

SF0317 Grinding surface. Large flat irregular sub-rectangular slab of fine-grained granite detached from a larger boulder or outcrop. Little attempt has been made to shape the stone beyond unifacial trimming of the ends to the desired length. One naturally smooth face has been smoothed and abraded with associated light polish. L 350 W 285 T 64mm. Stone tumble/wall base within ring-ditch, context 1822, House 4.

SF0464 Working surface/mortar. Large irregular microgranite erratic boulder showing little modification to the stone prior to use. Despite the uneven face, one surface has been smoothed, perhaps from use as a grinding surface, creating a slightly dished, highly polished surface. This is overlain with distinct but irregular, dispersed peckmarks from use as a working surface. The opposite

Table 6.12
Range of wear identified on the grinding and working surfaces from the site

SF no.	Context	Grinding	Pounding	Sharpening	Polish	Mortar	Heat-affected
238	959	×	×		×		
317	1822	×			×		
464	2308	×	×			×	
519	1853		×	×			
599	2902		×			×	
670a	3655	×	×	×	×		
1226	629	×			×		
1227	2165	×					×

face is naturally smooth with a distinct circular peckmarked hollow (57 × 51mm, *c.*17mm deep) towards one uneven edge, which is surrounded by an irregular spread of small distinct peckmarks, perhaps indicating use as a mortar. L 405 W 237 T 102mm. Fill of post-hole [2306], context 2308, Workshop 16.

SF0519 Working surface. Sub-rectangular microgranite boulder with naturally rounded corners and irregular surfaces. One face is severely fractured and pitted with frequent sub-circular and angular scars from detached flakes, suggesting that the surface has been subjected to heavy blows. Irregular but distinct circular peckmarks (D 2–4mm) are also present, some cutting through the flake scars. A series of six parallel and overlapping diagonal linear scores (L 16.5–49mm, W 2–2.5mm), possibly sharpening grooves, are present on the same surface, concentrated at one rounded corner. L 286 W 160 T 191mm. Remains of a wall base, context 1853, House 10/3.

SF0599 Working surface. Flat triangular fine arkosic sandstone block, the shape unmodified prior to use. One surface is naturally pitted and hollowed due to the erosion of softer mudstone darts within the sandstone matrix. In addition to the natural hollows, there are four man-made pecked circular hollows, three of which centre on and take advantage of natural mudstone inclusions. Three of the hollows are arranged in a row across the length of the stone, being 32mm, 42mm and 25mm in diameter respectively. A slightly more irregular hollow (25 × 18mm) is present at one rounded corner and peckmarks are present on the edge of a further natural dart hollow on the opposite corner. L 242 W 213 T 76.5mm. Packing within post-hole [2900], context 2902, Workshop 13.

SF0670a Working surface. Large flat irregular fine sandstone slab cleaved from a larger block along the bedding plane. The basal surface appears freshly broken but the opposite face shows smoothing from abrasion, possibly as a grinding surface/whetstone with a light sheen in patches. Cutting through this polish are a series of linear sharpening grooves (*c.*L 150mm, W 2mm) of which two are more distinct due to repeated use. Distinct peckmarks and gouges are irregularly distributed across the working face; one peckmark cuts across the sharpening grooves, suggesting that this was the latest use of this tool. L 275 W 272 T 16–51mm. Packing stones in post-hole [3653], context 3655.

SF1226 Grinding surface. Angular corner fragment from a sub-rectangular felsite/microgranite block with one squared end and edge remaining. One face is flat and smooth with a slight sheen from use. L 101.5 W 57.5 T 48mm. Fill of isolated post-hole [600], context 629.

SF1227 Working surface? Flat sub-rectangular slab of psammitic schist, highly fire-cracked, particularly on one face. Both ends and one side have been lost and the angular fractures suggest this is due to heat exposure. One face is slightly convex on both planes and smooth throughout with a concentration of dark staining in the centre of the face. The staining is sub-circular, suggesting it was formed by an object being placed on it. L 200 W 115 T 45mm. Waste deposit to the north of Hearth [2166], context 2165.

(See also SF0204–6, SF0235, SF0413, and SF01033.)

Miscellaneous cobble tool fragments

SF1228 Tool fragment. Small angular fire-cracked fragment of a microgranite cobble with a small smooth patch of light abrasion remaining, possibly from use as a rubbing stone or smoother. L 55 W 40.5 T 26mm. Ash fill of furnace [3790], context 3467.

SF1229 Tool fragment. Fire-cracked fragment from a coarse-grained microgranite or felsite cobble. Only one face, dished from use, and one rounded edge remains. This is likely to be a saddle quern or grinding surface fragment. L 86.5 W 36 T 53.5mm. Ash fill of furnace [3790], context 3467.

Household items

Pivot stones

SF0725 Flat irregular slab of biotite schist with mica-rich and quartzo-feldspathic layers. One edge is naturally rounded with two small indistinct circular pecked facets (D 17mm), the function of which is unclear. The naturally flat surfaces of the stone show no evidence of modification prior to use; one has a small shallow pecked hollow (D 39mm) adjacent to the straight broken edge. The interior of the hollow is smoothed, suggesting use as a pivot stone. L 313 W 234 T 74.5mm. Paved surface within House 10/3, context 1975.

Perforated stones

Three fragmentary perforated stones are present among the assemblage. Due to the lack of distinguishing features and their fragmentary condition, it has not been possible to identify their function. It is possible that they may have functioned as weights for holding down roofing material, loomweights or other household functions.

SF0527a Flat sub-square fragment of coarse talc biotite schist. Only one original face is present and all edges are broken, one with the remains of a perforation (D 29mm) seen in section. L 141 W 138 T 48mm. Occupation deposit to the east of House 10/3, context 1896.

SF0527b Very fragmentary perforated slab of biotite schist. Both surfaces have been lost and only one rounded edge remains. A well-formed drilled perforation (D 16mm) can be seen in section on the broken edge. L 195 W 121 T 60mm. Occupation deposit to the east of House 10/3, context 1896.

SF0842 Small irregular angular fragment of psammitic schist with the remains of a biconical perforation (D 37mm) seen in section on one broken edge. Only one small section of original edge and surface remain. The distance from the remaining edge to the perforation makes it unlikely that this is the feeder pipe or handle socket of a rotary quern. L 141 W 106 T 54mm. Fill of post-hole [4330], context 4331, Workshop 15.

Personal items

Shale bead

SF0822 Annular oil shale bead, tapered in section, with a central drilled perforation (D 3.5mm). The faces are barely modified, with only some abrasion to smooth them, but the edge

is highly polished with evidence of wear and use, including edge-flaking in one area. Given this, the unprepared state of the faces implies not that the object was unfinished but that they were hidden in use, since only the polished edge was seen when it was worn in a necklace; the tapered section is also consistent with a necklace, to fit better on a curve. The surface and signs of laminar cracking are consistent with oil shale. D 18, T 5.5–9.3mm. Hillwash, context 3720. (Illus. 6.18)

Other

SF0505 and **SF0506** Basin. Two joining fragments of an incomplete sub-rectangular basin with rounded ends, produced from a large block of coarse tectonised granite. The edges and ends have been carefully shaped, with large peckmarks remaining from manufacture. The basal surface is fairly angular and only initial shaping appears to have been attempted. The hollowed basin is sub-rectangular with rounded ends and steep pecked sides (L 455 W 160–220mm). The large feldspar crystals are slightly rounded towards the base of the hollow but not planed-off as would be expected if used as a quern or knocking stone. L 480 W 400 T 140mm. Remains of a stone wall, context 2456, Workshop 11. (Illus. 6.15)

SF0584 Spindle whorl roughout. Flat, angular fragment of fine sandstone or siltstone, very roughly flaked around three-quarters of the circumference in an initial attempt to shape. In the centre is a small biconical bored perforation (D 4.5–10mm), which is surrounded, on both faces, with a series of intersecting incised lines. They appear to mark out the intended position of the perforation rather than being an attempt at decoration. L 67 W 52 T 13.5mm. Post-pipe within post-hole [2873], context 2874, House 10/3. (Illus. 6.18)

SF0747 Palette fragment. Curved edge fragment from a thin stone disc, representing approximately 20% of the original palette, possibly used to grind pigments or other substances. Both surfaces have been flattened and smoothed prior to use. This appears to have been attempted with more care and success on one face, suggesting that only one surface was prepared for display and use; the thickness of the disc is uneven as a result. The remaining edges have also been abraded smooth. D 85–90 T 5–7mm. Post-pipe within post-hole [2869], context 3973, House 10/3. (Illus. 6.17)

The geology of the coarse stone artefacts

Fiona McGibbon

The geological setting

The 1:625,000 geological map (north sheet) shows the Culduthel site to be in an area of potentially outcropping Middle Old Red Sandstone strata. Such lithologies would typically be unmetamorphosed sedimentary rocks, specifically buff and grey sandstones and siltstones know as Caithness Flags, and indeed the 1:10,000 sheet confirms the presence of flaggy sandstones and thin silty mudstones in the area. These Devonian rocks have been deposited unconformably onto a complex metamorphic basement of metasedimentary Moine Supergroup rocks. The Moine rocks are exposed to the east and south-east of the site across a vast belt and comprise a wide range of rock types (summed up on the map as undifferentiated schists and gneisses), mainly schists and quartzites with intrusions of granite and diorite, which themselves are texturally complex depending on the timing of intrusion relative to the deformation history of the Moine rocks. The hardness contrast of the Devonian and Moinian rocks is responsible for the topographic contrast of this low-lying coastal site and the highland areas surrounding it. This geological setting will result in a wide range of lithologies potentially outcropping in the general area of the site.

A more specific description of the Moine follows and is included as it so perfectly describes many of the querns examined. The Moine are schists and pelitic gneisses that had their origins as bands of muddy and sandy sediments. They consist of 'Coarse flaky gneiss with wavy corrugated folia of felted black and white mica in large plates and filled with strings, lenticles and knots of quartzo-feldspathic material along the planes of foliation. The rock is also characterised in many parts by large rounded plates or spangles of muscovite at various angles to the bands of felted mica' (Horne and Hinxman, 1914). In finer grained varieties the quartz and feldspar component decreases or entirely disappears and the rock passes into a flaggy biotite or biotite/muscovite schist. Garnets are generally abundant, especially in the coarser grained rocks.

Topographically the Culduthel site lies in the coastal plain about a mile from the course of the River Ness. Such a low-lying area is unlikely to have much outcropping rock but would have been blanketed by glacial deposits as well as alluvial deposits from the nearby river. Inspection of the 1:63,360 series solid geology and drift maps show the area to be covered in boulder clay and undifferentiated drift. Glaciation in this part of Scotland has a long and complex history with three distinct phases of advance and retreat. At times this has been the site of large confluent glaciers such that material could have been glacially transported into the area from several directions although the overall general trend of glacial transport was from south-west to north-east. Glacial deposits in the area are up to 20–50 feet thick and are described as typical yellowish clay with boulders chiefly of Moine schists but also containing igneous rocks (e.g. granite and diorite) as well as Old Red Sandstone materials and clasts derived from Devonian conglomerates. This thickness will have been extensively reworked by glacio-fluvial and laterally fluvial action redepositing material according to the current topographic dynamic. Suffice to say, the early inhabitants of Culduthel would have had a wide variety of materials to choose from in the local drift deposits that surrounded them.

Discussion of the artefact lithologies

Eighty-seven stone items were inspected (some of which were natural and unworked) and are described within the archive catalogue. The most significant observation is that despite the large number of items and their lithological variety, all are expected rock types likely to be available locally in the fluvial and glacial drift deposits and are typical of glacial debris seen elsewhere in the Highlands. From a geological perspective the worked items can be sub-divided into three groups: larger items (querns and rubbing stones), cobble tools, and whetstones.

The rotary querns were almost exclusively crafted from schist slabs. Although five specific schist mineralogies were distinguished, they all share similar properties in being rich in large platy micas and all are likely local Moine rocks. The textural variety and mineralogical types of schist match that described earlier as being typical of the region. Schists are metamorphic rocks that are mineralogical transformations of layered sedimentary rocks, usually meaning that they change mineralogy and hence physical properties on a small scale. Many slab-like rotary querns have this quartz-rich and quartz-poor layering, with the more quartz-rich layers showing better mineral bonding and hence strength. Some schist querns that seemed made from entirely inappropriate materials when the top surface was examined, in fact had a quartz rich layer (effectively quartzite) on the grinding surface. This lithological variation within the schistose querns probably resulted in a limited lifespan for their use. It appears that many schist slabs were chosen and fashioned into querns with this more quartz-rich layer on the grinding surface, which was like a thin layer of quartzite, a rock type with excellent grinding properties. When this layer was worn away however, the more micacious lens would have been exposed, rendering the stone quite useless. This might explain the large number of querns in that the lithological variation eventually rendered an ideal stone useless. In some cases the useful surface might now be entirely absent, leaving the impression that very poor choices had been made. Even so, there would have been a great deal of mineral debris added to the flour and there is evidence of whole plucked garnet grains on some grinding surfaces. This shed material would have caused serious dental attrition. On the whole, schist seems far from ideal material for quern stones and it seems that this has been used due to local availability rather than appropriateness, even though attempts were clearly made to make the most of this material. It is likely that the slabs of schist were found lying detached in the local environment rather than quarried from outcropping rock although without ground truth this cannot be confirmed. The use of these non-ideal lithologies when a thicker quartzite slab or even sandstone slab might have been available not too far distant, suggests that only immediately local materials were used.

The textural heterogeneity of schist means that use wear will also be heterogeneous and needs to be interpreted with caution. In other words, a grinding surface that has quartz-ofeldspathic layers intermingled with more micaceous layers is likely to show heterogeneous wear with the well bonded quartz-rich layers able to take on a polish while the schistose micaceous zones are more prone to mineral loss due to this same abrasion. This leaves the use surface with alternating zones of rough and smooth finish.

One quern stone (SF0471) seems to be of a superior lithology and is considerably better shaped. Many others are talc rich and this may be a lithology that was exploited intentionally as this mineral would have had a lubricating effect on the grinding surface. The saddle and trough querns are less numerous but of the five mentioned only one is schistose, the others being of more homogeneous materials such as granite and granodiorite with one of arkosic sandstone. These more robust materials also dominate the rubbing stones. This material is likely to be available locally but as boulders rather than slabs. Granite is an ideal lithology for querns and given its likely local availability it is surprising that none of the rotary querns are fashioned from this material. It seems likely that it was unavailable in a useful shape, the flat slabs of schist being the easiest, most abundant local option.

The stone tool assemblage is dominated by water worn pebbles and cobbles. These would be abundantly available in the local environment in glacial drift, local river systems and their associated alluvia. As such, the assemblage is likely to be dominated by the lithologies that characterise these deposits. Without ground truthing it is impossible to state how the artefact assemblage compares to the lithological diversity of locally available pebbles and cobbles, but it can be said that the worked cobbles are of rock types that typically dominate such sources. These are dominated by robust rock types with well-bonded mineral grains such as quartzites and fine-grained igneous rocks such as felsite and microgranite that are strong enough to persist in an aggressively erosive environment. More than 50% of the stone tools examined were quartzites or psammites (a closely related and similar rock type), the remainder being fine-grained igneous rocks (microgranite, felsite etc.). As such, the stone tool assemblage also looks to have been entirely locally derived. The assemblage shows a clear preference for quartz-rich lithologies such as quartzite, a trend seen at sites across Scotland. Cobble shapes varied, and with a wide selection to choose from were probably picked to suit the use and user.

Of the four suggested whetstones two are siltstone, a rock type not seen in other artefact subsets at this site. This material is potentially local and should be abundant. It is an ideal whetstone lithology and again it is most likely that shape also played a major role in its selection as it is likely to be found as rod-like blocky pieces in the local drift.

Conclusions

In conclusion, a wide range of lithologies are represented in the artefact assemblage. All seem to have been sourced locally and most likely were picked up in the local environment rather than sought out and quarried from outcrops. Querns were fashioned from slabs of schist most likely lying loose, and an attempt was made to find slabs that had quartz-rich layers to be oriented as the grinding surface. Hand-held stone tools were chosen from locally available pebbles and cobbles that would have been abundant at this site near the course of a major river surrounded by thick glacial deposits. Among this subset, quartzite has been favoured and must result from active choice of this material as well as its local abundance. Whetstones have been made from rod-like stones and siltstone was preferred. This shows a familiarity with local materials and an astute knowledge of their properties and appropriateness for particular purposes.