



Three Forts on the Tay: Excavations at Moncreiffe, Moredun and Abernethy, Perth and Kinross 2014–17

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and Dawn McLaren



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Cover: An aerial view of Moredun fort on Moncreiffe Hill, taken in March 2015, with three circuits of fortification, and the annexe to the left, revealed by the raking light (© Crown Copyright: HES).

Back Cover: The proposed reconstruction of Castle Law, Abernethy, with its dramatic setting overlooking the Rivers Earn and Tay. Initial excavations in the 1890s revealed massive timber-laced walls, and high status finds and became the type-site of Childe's 'Abernethy Complex' (artist: Chris Mitchell).



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But this is usually the form of all the Gallic walls. Straight beams, connected lengthwise and two feet distant from each other at equal intervals, are placed together on the ground; these are mortised on the inside, and covered with plenty of earth. But the intervals which we have mentioned, are closed up in front by large stones. These being thus laid and cemented together, another row is added above, in such a manner, that the same interval may be observed, and that the beams may not touch one another, but equal spaces intervening, each row of beams is kept firmly in its place by a row of stones. In this manner the whole wall is consolidated, until the regular height of the wall is completed. This work, with respect to appearance and variety, is not unsightly, owing to the alternate rows of beams and stones, which preserve their order in right lines; and, besides, it possesses great advantages as regards utility and the defence of cities; for the stone protects it from fire, and the wood from the battering ram, since it [the wood] being mortised in the inside with rows of beams, generally forty feet each in length, can neither be broken through nor torn asunder.

Caesar's *Gallic War* 7:23

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1. Introduction

David Strachan

I could almost regret that the Society have undertaken the excavation of Roman 'Camps' in preference to our Native Forts. The secrets that lie beneath the ruins of the Caterthuns, Dunsinnan, and hundreds of other native fortresses, are no less worthy of being brought to light than the relics left behind by the Romans.

Christison 1900a: 12

1.1 Background to the project

The sentiments expressed by David Christison, leading light in early Scottish fort studies, illustrate how far our approach to the subject, and archaeology in general, has developed over the last 120 years. Less than 20 years earlier, Joseph Anderson's Rhind lecture of 1881 had bemoaned the lacuna of knowledge on the subject, and in response Christison pioneered research. Beginning with his Peeblesshire survey of 1885, by the publication of his own Rhind lectures of 1894, *Early Fortifications in Scotland*, he had created one of the most comprehensive datasets in Scotland (Christison 1898). In doing so, he also importantly recognised that understanding could only be improved through excavation (Christison 1898: 386). In the Tay estuary area, he was instrumental in two important excavations, encouraging exploration of Castle Law, Forgandenny by Edwin Weston Bell in 1892 (Bell 1893: 16; ID 26583), and completing and recording the important 'amateur' excavations at Castle Law, Abernethy (Christison and Anderson 1899).

Now some 120 years since these seminal studies, both sites have been revisited by modern excavators and there is something of a renaissance in Scottish fort studies. In the wider Tay region alone, and reported here, are the first excavations at two forts on Moncreiffe Hill, as well as re-excavation of Castle Law, Abernethy, while an extensive programme of excavation was also carried out by Glasgow University along lower Strathearn, to the west of the Firth of Tay, including re-excavation at Castle Law, Forgandenny (Poller forthcoming). Further north on the River Tay, the King's Seat, Dunkeld, has since been explored for the first time (Strachan *et al.* forthcoming; ID 27172), and Broxy Kennels (ID 26737), just north of Perth, has been fully excavated in advance of development. Further afield, research by Aberdeen University has contributed significantly to understanding in north-east Scotland (Noble and Evans 2019) while excavation is ongoing at selected forts further south (Gordon Noble

pers comm). The results of the excavations presented here, therefore, will contribute to what is becoming a relatively well studied part of Scotland in fort terms - an apt testimonial to Christison and Bell and their early work at both 'Castle Laws'.

The River Tay and its estuary, the Firth of Tay, has been an important hub for transport and communication since at least the Bronze Age (Strachan 2010). The hills surrounding it host an important concentration of forts (Lock and Ralston 2017) found to the south-west and south of the estuary along the Ochil Hills, and along the Sidlaw Hills to the north, and the three sites reported here belong to this 'Tay estuary group' (Figure 1.1). They comprise: Castle Law, Abernethy, where the Victorian excavations (Christison and Anderson 1899) have been widely discussed (Childe 1935a and b; Cotton 1954; Piggott 1965; Feachem 1966); and the twin forts on Moncreiffe Hill, the larger of which, Moredun, has for over half a century been mooted on morphological grounds as a potential 'nuclear' fort of early medieval date (Feachem 1955: 79-80; Alcock *et al.* 1989: 206-7; Alcock 2003: 189). Prior to the Glasgow University project of 2007-15, however, none of the Tay estuary group had been radiocarbon dated and considerable uncertainty remained about their date, and how, or if, they were related.

The potential for a programme of research to contribute to understanding of the group was recognised by the author during the development of the *Tay Landscape Partnership (TayLP)* scheme in 2010. Led by Perth and Kinross Heritage Trust, this £2.6 million initiative celebrated the unique natural and cultural heritage of the inner Tay estuary by conserving, restoring, and improving physical and intellectual access to a wide range of heritage features. Building on the popularity and success of previous community-based archaeological research projects by the Trust (Strachan 2013 and Strachan *et al.* 2019), the *Hillforts of the Tay* project was proposed to bring social and educational

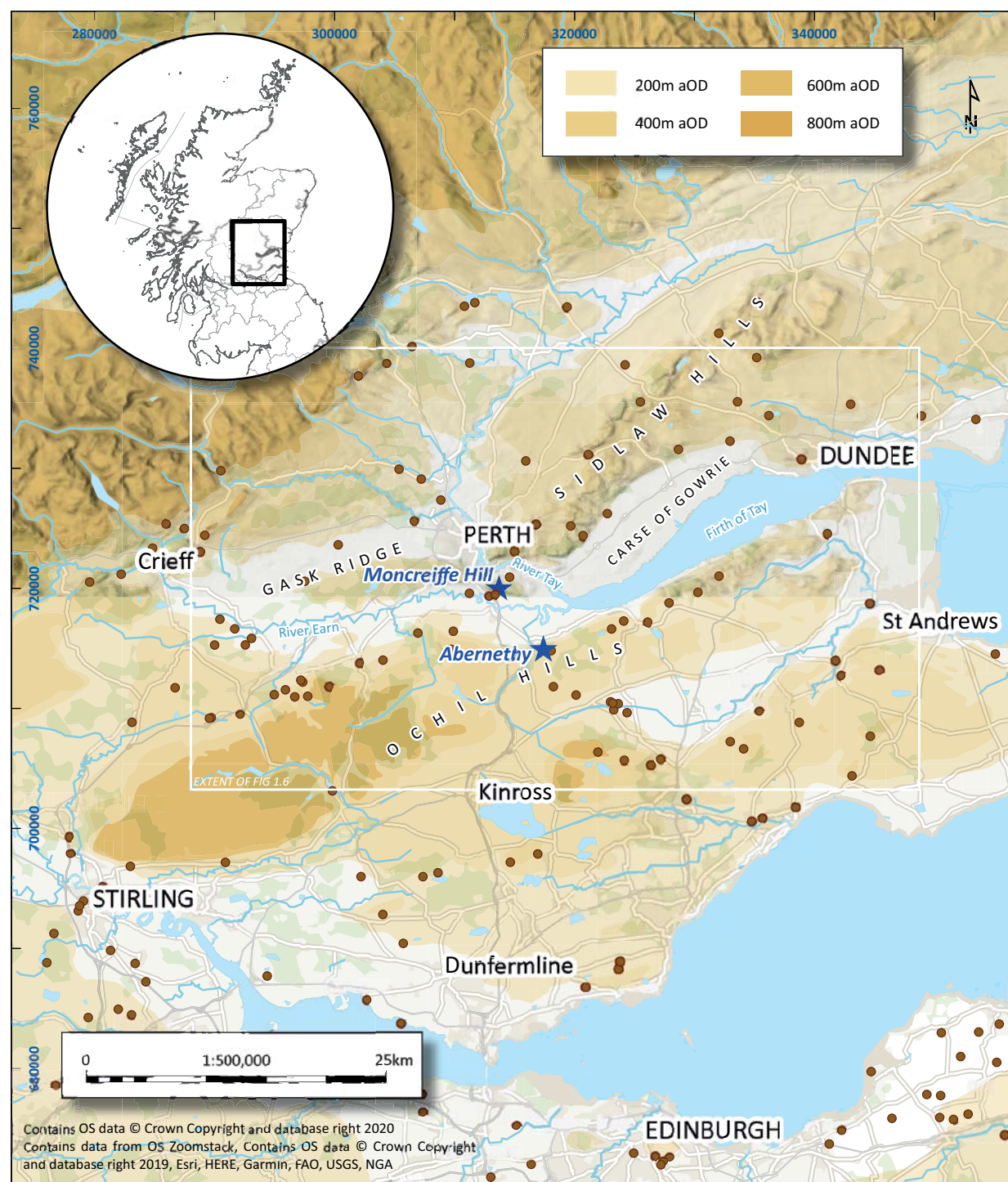


Figure 1.1: The central east coast of Scotland showing Moncreiffe Hill, Abernethy, sites from the Atlas of Hillforts of Britain and Ireland (Lock and Ralston 2017) and the extent of Figure 1.6 in white.

benefit, better understanding through much needed research, and improved management of the sites. The basis of the programme was the recognition that while these distinctive landmarks were often visited by the public, very little was known about them. Support for the proposal was confirmed through community consultation over 2011, with 33% of those responding

expressing an interest in participating in archaeological excavations and surveys. In addition, considerable potential for beneficial engagement with schools was recognised.

In addition to non-intrusive surveys, the *Hillforts of the Tay* included excavations at the three forts: Moncreiffe



Figure 1.2: Some of the 338 project volunteers with staff from Perth and Kinross Heritage Trust and AOC Archaeology Group in 2017 (George Logan/PKHT).

(2014–15); Moredun (2015–17); and Castle Law, Abernethy (2017). It transpired to be by far the most popular *TayLP* project in terms of community engagement, involving around 70% of all volunteers engaged within the entire scheme. Castle Law, Abernethy alone involved 38 individuals over 10 days, totalling 108 volunteer days, while those on Moncreiffe Hill, carried out over four years and including three, month-long seasons on Moredun, engaged 338 individuals totalling 1592 volunteer days (Figure 1.2). The project successfully fulfilled the *TayLP* objectives for social and educational benefit: bringing the local community together, with participants from further afield, to learn new skills in walkover and geophysical survey, excavation, and archival research. The project also engaged over 400 young people from 14 schools and uniformed groups, both in the field and in the classroom, and countless more through digital outputs. Reconstruction artwork in both traditional and digital virtual reality (VR) media was central to the interpretation provided to improve understanding by residents and visitors alike, through presentations, interpretation panels, a booklet, leaflets, and a website (www.taylp.org). In summary, the project succeeded in its ‘citizen science’ objective, to bring together members of the public to learn while engaging in meaningful research that has enhanced our understanding of Scotland’s past.

The project should also be seen against the background of (hill)fort research across the rest of the UK. The last two decades have seen excavation programmes in advance of development (e.g. Allen *et al.* 2009; Pettitt and Hession 2019), through university research, and through community archaeology projects. The latter

has included programmes of excavation through other Landscape Partnerships schemes, for example on multiple sites on the Clwydian Range (Griffith 2011) and the Cheshire Ridge (Garner 2016), and at individual sites elsewhere, such as Castle Hill, Oxfordshire (Allen *et al.* 2010). In Scotland these include Dun Deardail, Highland, through the *Nevis Landscape Partnership* (Cook, M.L. *et al.* forthcoming; ID 23727); East Lomond, Fife, through the *Living Lomonds Landscape Partnership* (O’Grady 2015; ID 29881); and most recently at Dunmore (ID 24375) and Auchenlaich (ID 24330) for the *Callander’s Landscape* partnership (MacIver and Douglas forthcoming). Most relevant to our project, however, is the University of Glasgow *Strathearn Environs and Royal Forteviot (SERF)* project, carried out over 2006–16, which included excavation at ten forts around lower Strathearn (Poller forthcoming). These, and the work at East Lomond are discussed further below. Finally, the *Atlas of Hillforts of Britain and Ireland* online database, compiled by researchers from the universities of Edinburgh, Oxford and Cork (Lock and Ralston 2017) was published during the life of the project and has proved an invaluable tool for analysis (Lock and Ralston 2019; Romankiewicz *et al.* 2019; Lock and Ralston 2022). In both formats it is hereafter abbreviated to the *Atlas of Hillforts*.

1.2 Topography, geology and rivers

Topography

Both the River Tay and the Firth of Tay are a key features of Scotland’s east coast geography. The estuary cuts inland 35 km from the coast, while its principal rivers, the Earn and the Tay, divide its hinterland to the west

and north-west respectively (Figure 1.1). As waterways they are the dominant natural lines of communication in the area, providing access to the sea from deep within the interior and *vice versa*. Conversely the estuary impedes terrestrial passage north and south, from Fife on its southern shore to Perthshire and Angus on the north (Strachan 2010: 19–26). All three excavations are on hills surrounding one focal point in this landscape: the confluence of the Rivers Tay and Earn at the head of the estuary near Carpow.

The estuary is overlooked on the south by the Ochil Hills (on which Castle Law, Abernethy is located) and on the north the Sidlaw Hills. Both these ranges rise to 200–300 m OD and form well-defined boundaries along the sides of the estuary. The low-lying ground at the foot of the Sidlaws, known as the Carse of Gowrie also continues west of the estuary into Lower Strathearn, along the flat bottom of which the River Earn meanders with its numerous oxbows. Here the Ochils extend westwards to form the southern flank of the valley, while on the north it is bounded by the Gask Ridge. Hence, the character of the landscape eastwards to the head of the estuary is one of a funnel, opening away to the coast, with flat expanses of the estuary and the Carse of Gowrie framed to the horizon by the Ochils and the Sidlaws (Figure 1.1). Moncreiffe Hill is the dominant feature at the confluence of the rivers at the west end of the estuary. It rises from around 50 m OD to a height of 223 m OD on the long tongue of land, formed by the

meeting of the Rivers Tay and Earn, called the Rhynd. This key geographical location provides control over both rivers, and crowned by its twin forts, the hill dominates and over-shadows the confluence of the rivers and is a prominent landmark from much of the estuary (Figure 1.3).

Solid geology

The estuary is formed of Quaternary deposits overlying Early Devonian andesitic lavas and related sedimentary rocks. These sit within a ‘rift’-like valley formed by ancient movements of the North and South Tay Faults. These fault-lines are roughly manifested in the topography in the southern and northern flanks of the Sidlaws and Ochils respectively. Both the Ochil Hills and Sidlaw Hills are composed of Early Devonian volcanic rocks known as the Ochil Volcanic Formation: a largely pyroxene-andesite igneous bedrock. To the south-west, Moncreiffe Hill is part of the formation of the Sidlaws, created by the narrow valley containing River Tay at Perth.

Both the low ground of Strathearn and the Carse of Gowrie are underlain by down-faulted Upper Devonian and Lower Carboniferous sedimentary rocks, which are largely concealed by thick Quaternary deposits. To the north-west, the Scone Sandstone Formation was also formed in the Early Devonian, while the Glenvale Sandstone Formation formed as a sedimentary bedrock



Figure 1.3: Moncreiffe Hill dominating head of the Tay estuary: a late 19th-century view from Newburgh (Culture Perth and Kinross Local and Family History).

between 383 and 359 million years ago during the Late Devonian Period (Figure 1.4). These different sandstone formations are subgroups of the Devonian age Old Red Sandstone (British Geological Survey 2023).

Both Moncreiffe Hill and Castle Law, Abernethy are of the Ochil Volcanic Formation, however the fact that they are also on the edge of the Glenvale Sandstone Formation is significant (Figure 1.4). The Glenvale Sandstone Formation includes brown-, red-, purple- and cream-coloured feldspathic sandstones, commonly containing bands of red siltstone and pebbles of silty mudstone (British Geological Survey 2020; 2023). The walls of Castle Law, Abernethy, and Moredun on Moncreiffe Hill, were found to include significant amounts of red/purple sandstone in their construction, occurring in large blocks in such numbers as to rule out glacial deposition. As they are not geologically *in situ* and so cannot be identified as being of Glenvale Formation with certainty, they are referred to throughout the remainder of this volume as Old Red Sandstone. It is considered very probable that the material was sourced relatively locally to the forts, at the foot of Moncreiffe Hill to the south and the foot of Castle Law, Abernethy to the north, below a height of c. 30 m above OD. It is of interest that significant amounts of Old Red Sandstone

were used, in a similar fashion, in the construction of Castle Law, Forgandenny (Tessa Poller *pers comm*), to the west of Castle Law, Abernethy.

Drift geology

The area was glaciated on numerous occasions over the Quaternary resulting in significant landscaping by both glacial processes and sea level change. Some of the ice-moulded features probably owe their form to the accumulated effects of more than one glaciation. All the evidence of glacial striae, erratics and drumlins shows that late-Devensian ice, advancing from the West Highlands, fanned out over east central Scotland and moved eastward across this area. Glacial deposits appear to relate exclusively to the last (Devensian) glaciation about 30,000 years ago, when till composed of a melange of clay, silt, sand and stone, was extensively laid down. From about 20,000 years ago, during the retreat of the ice, meltwaters deposited spreads of sands and gravels, mainly near the ice-margins. The emergence of high ground confined active glaciers to the major valleys for a further period. Marine deposits were also laid down during the glacial retreat and now occur well above present sea level as a consequence of glacio-isostatic readjustment. A series of shorelines

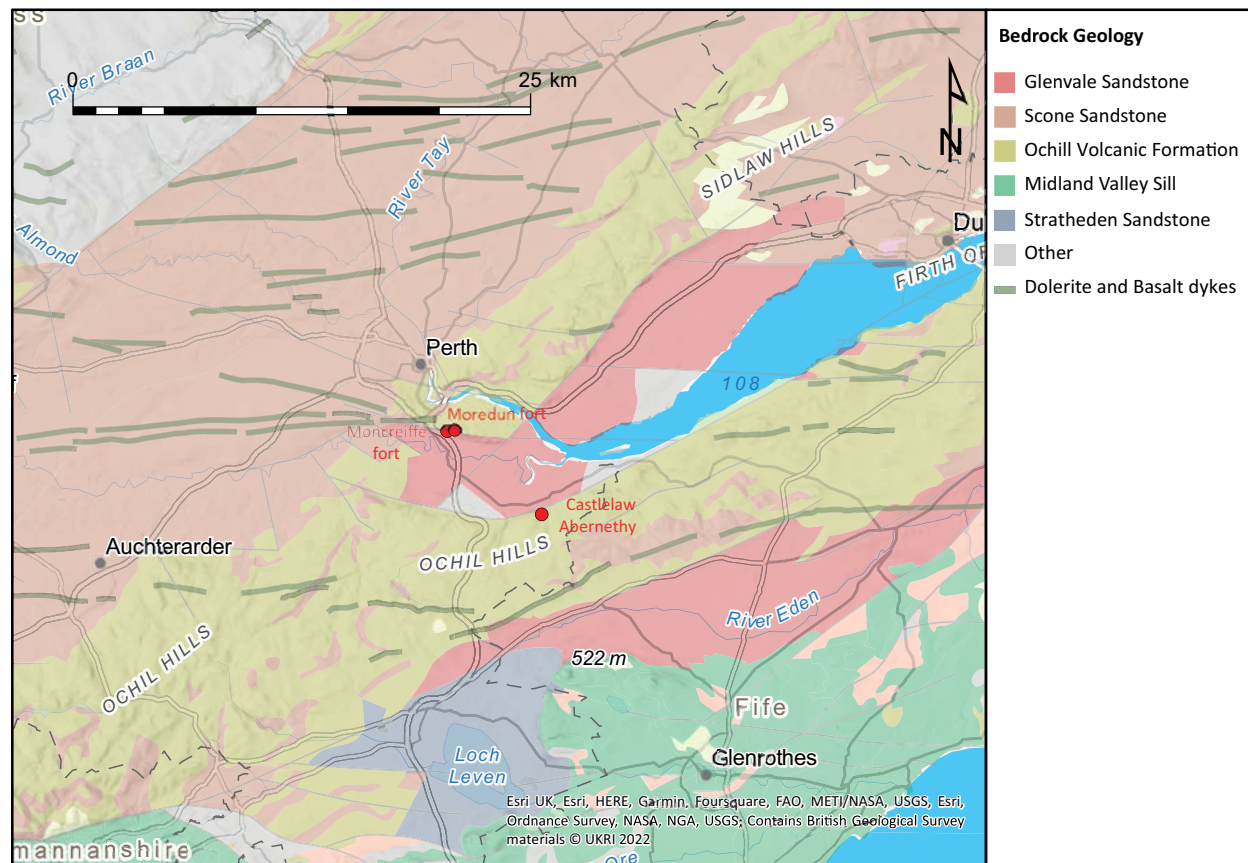


Figure 1.4: The solid geology of the area showing all three sites occurring on outcrops of the Ochil Volcanic Formation above Old Red Sandstone deposits of the Glenvale Formation (Contains British Geological Survey materials © UKRI 2023).

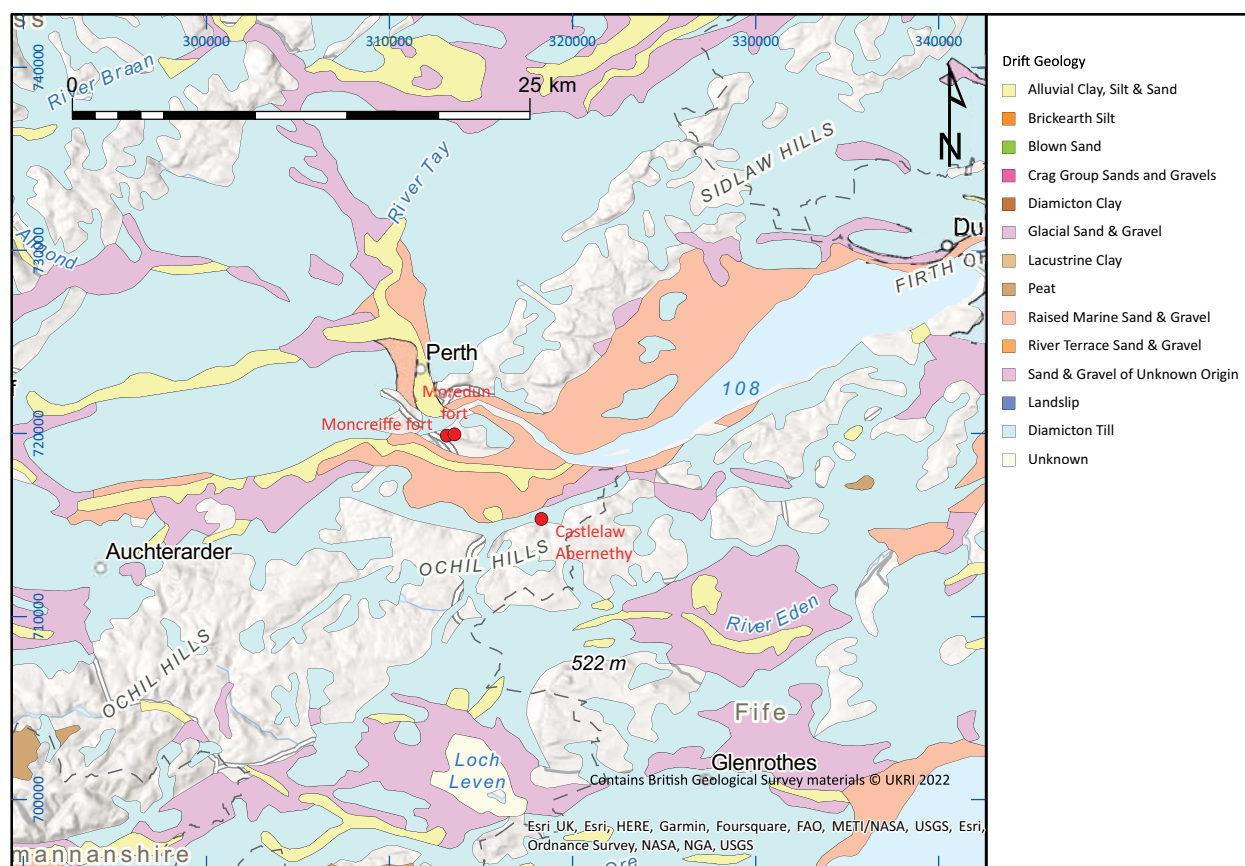


Figure 1.5: Complex drift geology with mainly glaciﬂuvial sand and gravel overlain by late glacial estuarine deposits at more than one height level, fronted on the lower ground by latest Devensian pink silts and sands. These are partially buried by the Holocene carse clay deposited at the highest level of post-glacial sea level rise (Contains British Geological Survey materials © UKRI 2023).

(notably visible along the southern edge of Strathearn up slope of Aberargie and Abernethy) mark the stages of this recovery. Around 15,000 years ago, when final clearance of ice was achieved, the local sea level was over 40 m higher than present.

The sea fell below present level during the re-advancement of glaciers in the west of Scotland between 12,800 and 11,600 years ago. Subsequently the sea rose, but a later fall resulted in a peat layer formed c. 8,000 years ago, while a later marine transgression culminating c. 6,000 years ago, c. 10 m above present levels, deposited the widespread carselands of Lower Strathearn and the Carse of Gowrie (Strachan 2010: 19). Subsequently the sea gradually withdrew to its present level. Because of the numerous fluctuations of sea level in late- and post-glacial times, the distribution of drift deposits in the area is highly complex (Armstrong *et al.* 1985; British Geological Survey 2023; Figure 1.5).

Rivers

The name of the River Tay may derive from either a pre-Celtic or Celtic root, such as *ta-* or similar. It is

possibly related to the names Thames and Tyne and thought to mean ‘silent one’ or ‘strong one’, or simply ‘flowing’ (Watson 1926: 51; Nicolaisen 1976: 244). It was first recorded by Tacitus as *Taus* in c. AD 98. At 193 km in length the Tay is Scotland’s longest river and the sixth-longest in the UK. Draining much of the lower region of the Highlands, it has the largest catchment in Scotland and the largest freshwater discharge of all rivers in the UK. This has resulted in the regular flooding of Perth, as in 1648 when bridges were lost (Bowler 2004).

The placename Earn is first recorded as *Eirenn* in c. AD 889 and is probably derived from another pre-Celtic or Celtic river name with the root-form *ar-*, indicating flowing water. It is found in other river names, such as the Deveron, and common in parts of France (Peter McNiven *pers comm*). Leaving Loch Earn at St Fillans, it flows east before turning south-east through upper Strathearn at Crieff, before again meandering eastwards through lower Strathearn to join the Firth. A smaller, meandering lowland river in comparison to the broad, shallow and fast flowing Tay, the Earn is also prone to flooding, and its banks are regularly breached after periods of prolonged heavy rainfall.

The combined waters of these two rivers provide the highest freshwater inflow into an estuary in the UK (Pontin and Reid 1975), however the lowest reaches of both rivers are tidal a considerable way inland, an influencing factor in water-transport since prehistoric times. The Earn is tidal to c. 10 km west of the confluence (Strachan 2010: 13), and prehistoric vessels, such as the Late Bronze Age Carpow logboat, very likely used the tides to ferry people and goods inland from the estuary and back (Strachan 2010: 172–177). The Tay is tidal to the confluence of the River Almond, c. 5 km north of Perth, a factor in the location of Bertha Roman fort (Woolliscroft and Hoffmann 2006: 147), while the Roman fortress at Carpow, was a base for seaborne invasion (Dore and Wilkes 2000: 570). Such sites illustrate the estuary's strategic importance to deliver goods transported by sea inland over prehistory. The success of Perth as an inland port was to continue throughout the Middle Ages until the Victorian period (Bowler 2004: 21) when it was ultimately eclipsed as Dundee emerged as a port with easier access for larger shipping.

1.3 The later prehistory of the area

Without the baseline data of a RCAHMS county inventory, Perth and Kinross has seen surprisingly little regional synthesis. An outline, however, is provided by overviews of prehistoric Tayside (Coutts 1970 and 1971; Stevenson 1999) and Sarah Winlow's (2010) review of the Late Bronze Age environment, settlement and monuments around the estuary. The RCAHMS *South-East Perth* volume (1994), offered an analysis of the archaeology of both the Sidlaw Hills and the Carse of Gowrie, focussed mainly on the dense cropmark record. This revealed numerous unenclosed and enclosed settlements, a distinctive element of which were the interrupted ring-ditches. These were thought to relate to souterrains (underground, stone-built chambers) which are also frequent in the area and indeed form a significant concentration in the national distribution (RCAHMS 1994: 59–68; 70). Most known fortifications were recorded as upstanding structures (RCAHMS 1994: 51–57), but it was difficult to relate them to other settlement sites with any certainty (RCAHMS 1994: 73). The survey did however discover Little Dunsinane broch on the north Sidlaw Hills (RCAHMS 1994: 51; ID 72098), which was to remain the only known broch within Perth and Kinross until the discovery of the example at Castle Craig, on the north Ochil Hills near Auchterarder (James 2011a and b; Poller forthcoming; ID 26048). Interdisciplinary study by Glasgow University has provided a similar level of analysis for the north Ochils (Given *et al.* 2019) as provided by RCAHMS for the Sidlaws. Again, apart from forts, other prehistoric structures are only infrequently visible, and it is argued that the prominence and monumentality of the forts

were used as terrestrial guides for specific routes across the Ochil Hills (Given *et al.* 2019: 96–97). Within the wider region, the majority of forts are found south of the Highland Boundary Fault (Lock and Ralston 2017), and while they do occur in the uplands north of this, the massive-walled monumental roundhouses and crannogs in this area may take their place in a more fragmented, less populated area (Strachan 2013: 114).

1.4 Previous fort studies in the area

Figure 1.6 shows the distribution of forts identified in the *Atlas of Hillforts* (Lock and Ralston 2017) highlighting those excavated. The selection criteria and terminology of the wider datasets have been recently reviewed (Halliday 2019a and 2019b) and can be summarised as sites which: take advantage of topography; have enclosing works designed to exclude or impress; and have a minimum internal area of 0.2 ha. If strictly applied, the last of these would have precluded the inclusion of forts such as Castle Law, Abernethy (0.06 ha), but exceptions were made for this and other sites that have played key roles in Scottish fort studies (Halliday 2019b: 68). The local contributions to the evolution of Scottish fort studies can be traced through the series of excavations below. While many remain undated, they serve to introduce the scale and nature of forts in the area and are presented in chronological order to provide a narrative of the history of study.

The 18th and 19th centuries

While it is possible that earlier excavations by antiquaries have passed unnoticed, the excavation record in the area begins with reference to the inland promontory fort at Hurly Hawkin, Angus, being 'Dug into' before 1794 (OSA 13, Liff and Benvie: 116; ID 32052). Subsequent excavations (Jervise 1866; Taylor 1982) revealed this fort of 0.14 ha, with twin ditches and inner rampart, to have a complex sequence of settlement in which the defences were superseded by a broch and souterrain.

The slightly later excavations at Dunsinane Hill on the Sidlaw Hills were probably inspired by its historical association with Shakespeare's *Macbeth*. With commanding views across Strathmore to Birnam Wood by Dunkeld, c. 22 km to the north-west, this small and heavily defended oval fort remains scarred by James Playfair's excavations of 1799, and those of the landowner Nairne in 1854, which were reported in the second volume of *The Proceedings of the Society of Antiquaries of Scotland* (Wise 1856; Brown 1872; Figure 1.7; ID 30660). The stone wall of its inner citadel (enclosing 0.01 ha) may have been up to 9 m thick and is further defended by two concentric outer ramparts with ditches, while a large outer enclosure takes in a

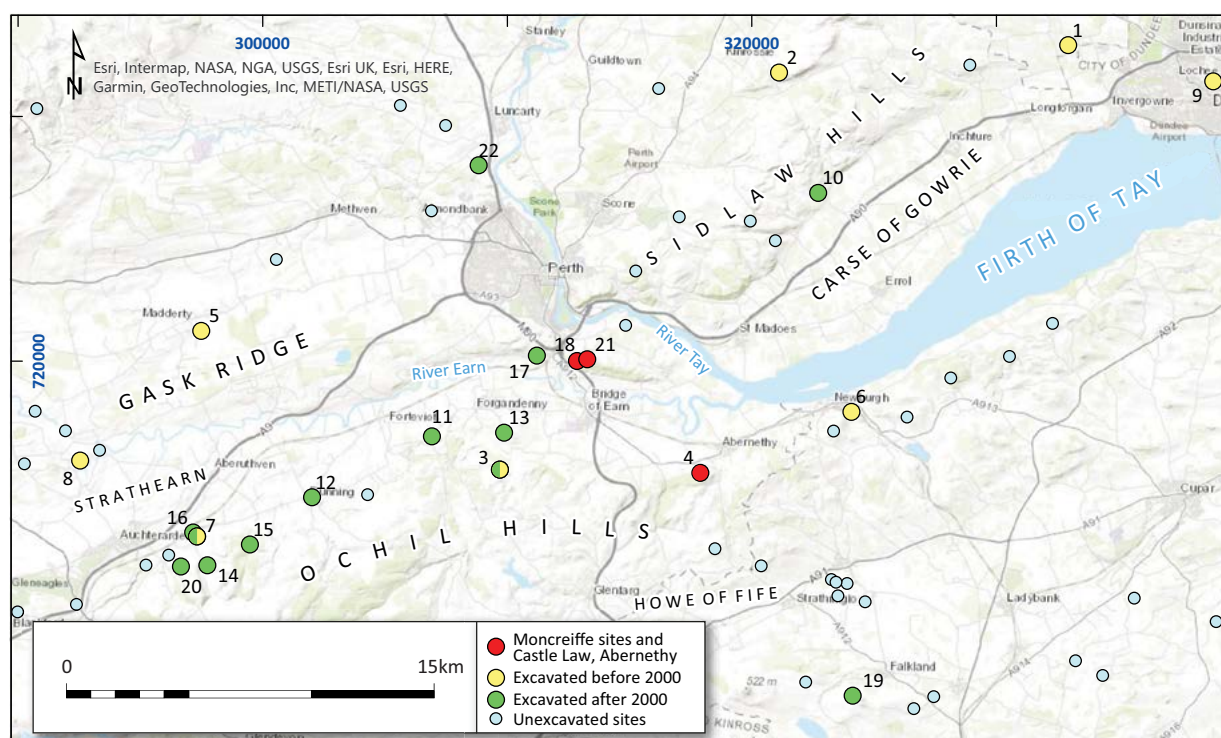


Figure 1.6: Sites from the *Atlas of Hillforts* (Lock and Ralston 2017) showing excavated examples in chronological order: Hurly Hawkin (1); Dunsinane Hill (2); Castle Law, Forgandenny (3); Castle Law, Abernethy (4); Drumharvie (5); Clatchard Craig (6); Castle Craig (7); North Mains (8); Dundee Law (9); Rait (10); Jacks chairs Wood (11); Dun Knock (12); Law of Dumbills (13); Ben Effrey (14); Rossie Law (15); Kay Craig (16); The Roundel (17); Moncreiffe (18); East Lomond (19); Ogle Hill (20); Moredun (21) and Broxy Kennels (22).

lower terrace to the south and smaller outworks may exist to the north and south-west (Lock and Ralston 2017). The reports of the early excavations are difficult to understand, in part due to the use of long slot trenches. They suggest two sunken chambers with corbelled roofs and connecting passages, which may be a misinterpretation of collapsed wall material. Very few finds were recovered but included three human skulls and other bones (Wise 1856: 96–7), a rotary quern and a bronze spiral finger ring (Brown 1872). Small-scale excavation was once again carried out at this intriguing site in 2022 by the University of Aberdeen.

The complex fort of Castle Law, Forgandenny, is of particular interest to this study due to the 1892 excavations by Edwin Weston Bell (1893), recent re-excavation by the Glasgow University (Poller forthcoming), and because its wide-ranging vista across lower Strathearn includes Moncreiffe Hill c. 5.8 km to the north-east. Bell's excavations were prompted by Christison's comment on forts that 'no really satisfactory progress can be made until surface observations have been supplemented by excavations' (Bell 1893: 16). The outer faces of the walls were located and chased in narrow trenches, which were left open to create the distinctive plan still visible on the ground and from the air (Figure 1.8).

The series of forts on its summit includes an elongated, sub-rectangular example of 0.12 ha (fort 1) set within an oval fort of 0.39 ha (fort 2), which itself is within a roughly oval enclosure of 0.93 ha (fort 3) that also encloses a lower terrace to the north-west. In addition, to the south and south-east of the summit, there are at least three lines of ramparts and ditches which may be annexes or outworks. The plan of the inner fort (1) was revealed in its entirety, along with much of that of fort 2 and a small section of fort 3. These revealed that while fort 1 had no entrance break in the line of its wall at ground level, the entrance at the east end of fort 2 had a complex arrangement in which the southern terminal of the wall turned sharply back into its interior. Both forts had massive timber-laced walls with detail of beam sockets in their faces and several small finds, including three cup-marked stones, were retrieved (Bell 1893: 21–22).

Excavations by Tessa Poller in 2013–14 confirmed the nature and scale of the timber-laced walls. That of fort 1 was c. 5.5 m thick and survived to a height of 1.4 m in places, suggesting an original height of at least 3 m, while the wall of fort 2 was up to 4.9 m thick. It was also confirmed that the in-turned wall at the entrance of fort 2 abuts the outer face of the wall of fort 1. The report on the 2013–14 excavations is in preparation



Figure 1.7: 'MacBeth's Castle' on Dunsinane Hill at 310 m OD. Scarred by early excavations, it remains undated, but has been re-excavated in 2022 (photo: D. Strachan 2001 © PKHT).



Figure 1.8: The complex series of forts on Castle Law, Forgandenny, at 275 m OD, range in size from 0.12 ha to 0.93 ha (photo: D. Strachan 2001 © PKHT).

and will hopefully reveal the dating and sequence of construction at the site (Poller forthcoming).

Bell's excavations no doubt inspired the exploration, four years later, of the small fort on Castle Law, Abernethy (Christison and Anderson 1899), which has played a role in Scottish fort studies out of all proportion to its diminutive size. An account of the early discoveries there are presented in Chapter 6.1, but having provided the classic photograph of beam-slots in a timber-laced wall, it later became the type-site of Professor Gordon Childe's 'Abernethy Complex' (Childe 1935a: 193–5, 236–7; 1940: 213–16), represented by a series of forts with massive timber-laced walls which he believed had been built by bands of warrior-farmers arriving from the continent, although there was little evidence for their date.

Around 1899, following the work at Abernethy, the ploughed-out fort of Drumharvie, which first appeared on James Stobie's map of *The Counties of Perth and Clackmannan* (1783; ID 26154), was located and excavated by Alexander Mackie on behalf of Christison (1900b: 119–20; 1901: 37–8, fig 12). The line of the c. 0.27 ha sub-oval enclosure can still be partly traced on the low hillock it occupies, but excavation confirmed dual concentric ditches with traces of internal ramparts. The inner ditch was broader, and a concentric palisade trench lay c. 3 m within its inner lip. They were traced from the north-east, round the north-west to the south-west, the latter forming the easiest line of approach where the ditch terminals of the entrance were found.

David Christison - pioneer of Scottish fort studies

As we have seen Christison was the stimulus behind many of these early excavations, and without doubt contributed most to the development of Scottish fort studies in the late nineteenth and early twentieth centuries. This was in part through his pioneering surveys, followed by excavation and systematic publication, but also significantly, in that he also produced the first national synthesis of results.

From 1885 through the 1890s he conducted the first serious programme of field-based research into forts and earthworks in Scotland, arguably the first comprehensive survey of forts over such a large area anywhere in Britain. Following his Rhind lecture series in 1894, he published the results as *Early Fortifications of Scotland* (Christison 1898), which became the model for subsequent regional and national analyses (Harding 2012: 35–6). This remarkable volume, with extensive use of plans and fold-out maps, is in many ways the Victorian precursor to the GIS-based online *Atlas of Hillforts* (Lock and Ralston 2017). Indeed, publication

of the *Atlas of Hillforts* has been described as the first occasion since Christison's work that the 'full record of ancient Scottish enclosures has been systematically examined' (Halliday 2019b: 54). In addition to presenting the results of field survey and previous excavations, the work also collated existing records and traditions, was prescient in warning against the assumption that all forts are prehistoric and was critical of the relative neglect of the 'native' sites in preference to Roman remains, a sentiment reiterated in his annual report to the Society of Antiquaries of Scotland in 1900 (Christison 1900a), an extract of which is the epigraph to this chapter.

Two years after his *Early Fortifications* Christison produced his 'tolerably exhaustive account' of *The forts, "camps", and other field-works of Perth, Forfar and Kincardine* (1900b). In this regional analysis, forts were considered under five classes of remains: earthworks; stone forts; sites with little remains; and two categories of 'dubious works', either marked as 'Fort' or 'Camp' on OS maps, or not (Christison 1900b: 46). Within our study area no fewer than 13 forts are described (Figure 1.6), including: Dundee Law (ID 31936), Dron Hill (ID 30626), Evelick (ID 28108), Rait (ID 30457), Carnac (Moredun), Ogle Hill (ID 26068), Ben Effrey (ID 26073), Rossie Law (ID 26046), and Jacksstairs Wood (ID 26551). There are also accounts of the early excavations at Dunsinane Hill, at Castle Law, Forgandenny in 1892, and at Castle Law, Abernethy over 1896–98. In addition to providing plans and sections of the latter two sites, he included details of their timber-laced walls and compared them through the illustrations (Christison 1900b: 76, fig 33 and 79 fig 36).

The paper presented a progressive degree of morphological analysis (Christison 1900b: 48 figs 1–11 and 73 figs 29–31) and further promoted the need for scientific excavation methods to provide accurate plans and sections to aid analysis and comparison. Nairne's work of 1854 at Dunsinane (Wise 1856) was described as 'the evil results of unskilled, incomplete and hasty excavations, undertaken too often with the object of proving preconceived theories' (Christison 1900b: 86). In comparison, Christison was the first in Scotland to recognise palisade slots, at the excavations at Orchill and Drumharvie (1900b: 117–120). In his conclusion he considers the sites by their class, considering factors such as frequency, altitude, location, morphology, water supply, finds, and, for the stone forts, the development of fortifications and the structures of the walls. This flurry of local activity ended with the excavations at Inchtuthil, where earlier palisades were also discovered at the small promontory fort, and with a few exceptions the study of forts in Perth and Kinross virtually ceased for a century.

The 20th century to the present

The only investigation in the inter-war years was on Deuchny Hill (ID 28217) in the west Sidlaw Hills, instigated by a stone mortar discovered following a celebratory bonfire to mark the end of WWI. The location was previously known as ‘The Seven Airts’, as the extensive views apparently offered visibility of seven counties (Boog Watson 1923: 304), which is perhaps why the bonfire was sited there. Boog Watson’s survey suggested an oblong fort of c. 0.3 ha, aligned north-west to south-east, and listed a number of small finds, including a stone lamp, hammerstones, and a fragment of a probable shale bracelet (1923: 306–7). Traces of the inner rampart are still visible, but the lines of outer walls he recorded were not found by recent survey as part of the wider project (AOC 2016). It is further considered in Chapter 7.2, 7.3 and 7.7, as it may belong to a distinctive group of oval forts.

No other excavation took place in the areas until after WWII and most of those in the second half of the 20th century were salvage operations. These began with what was undoubtedly the most significant fort loss in the region, that of Clatchard Craig, at Newburgh in Fife (ID 30074), which occupied a very prominent hill overlooking the Tay and controlling the pass of Lindores through the North Fife Hills. Completely quarried away by 1980, this complex site consisted of three enclosures. The innermost of c. 0.18 ha was sub-rectangular and occupied the rocky summit, while the larger, outer enclosures defended a series of lower terraces, the outermost with multi-vallate ramparts. Ministry of Works rescue excavations in 1953–4 and 1959–60, confirmed all phases of enclosure by timber-laced walls to be early medieval in date and recovered high-status small finds (Close-Brooks 1987). While the possibility of a more complex history of construction, including an earlier site, has been suggested (Lock and Ralston 2017), recent C14 dating of archived excavation material has refined the dating further and may suggest all phases were constructed and occupied over a short period of a few generations, ending in destruction by fire in the 7th century AD (Noble *et al.* 2022).

In the south-west of the area, quarrying in 1978 was also responsible for damage to an irregular fort occupying the steep-sided hill of Castle Craig, at the foot of Craig Rossie, near Auchterarder. This destroyed the terminals of two ramparts at the southern end of the fort and exposed pits containing animal bone within the interior (Sheriff 1984). The roughly 2.22 ha site includes a small inner enclosure of 0.06 ha on the summit, which on excavation turned out to be of medieval date. This was constructed over a demolished broch of c. 23 m diameter with walls c. 5 m thick that contained a rich artefact assemblage of the 1st to 2nd

centuries AD, including a Roman bronze patera (James 2011b; Poller forthcoming).

In 1987, the sub-circular bi-vallate fort of North Mains (ID 26000), recorded as cropmarks within a meander of the Machany Water as it joins the River Earn, was partially excavated (Barclay and Tolan 1990). Enclosing an area of 0.2 ha, the fort produced both Bronze Age (1740–1320 cal BC) and Iron Age (390–110 cal BC) dates, and while the excavator suggested the site dated to the former, the later Iron Age date has been suggested as more probable (Lock and Ralston 2017).

The 1990s saw excavation at Dundee Law, City of Dundee, which is arguably the most publicly visible fort in the area, overlooking much of the city and a landmark from across much of the estuary. Adapted in the 16th or 17th centuries as an artillery fortification, it was further disturbed by construction of the war memorial in 1923, which uncovered vitrified stones, and most recently by telecommunications. Mid 19th-century town plans show the artillery fortification set within a c. 0.18 ha sub-rectangular enclosure, and the excavation of 1993 suggested an Iron Age fort with a burnt timber-laced wall and activity in the 1st or 2nd century AD (Driscoll 1995).

The small promontory fort of Rait, on the southern Sidlaw hills, has also been heavily damaged, this time by sand and gravel extraction. Its defences consist of three ramparts with external ditches, the outer of which was revealed by excavation in advance of the most recent quarrying in 2000 (Cachart 2001). The tiny portion of the interior now surviving is deceptive as it may originally have enclosed as much as 0.15 ha.

The arbitrary nature of these development-led interventions contrasts with the Glasgow University *Strathearn Environs and Royal Forteviot* (SERF) project, a decade-long programme of excavation at over ten forts along lower Strathearn and the Ochil Hills. These included: Jacks chairs Wood in 2007; Dun Knock in 2008–09 and 2015; Green of Invermay in 2009; Law of Dumballs (2010); Ben Effrey in 2011 (Figure 1.9); Rossie Law in 2012 (Figure 1.10); Castle Craig (2011–12); Kay Craig (2013); The Roundel (2013); Castle Law, Forgandenny (2013–14); and Ogle Hill in 2015 (Poller forthcoming). Significantly, while the initial results suggest most were built or modified in the Early and Middle Iron Ages, at Rossie Law the earliest evidence for fort construction was from the Late Bronze Age (Given *et al.* 2019: 96). Of relevance to the present report was the discovery of a broch at nearby Castle Craig, and the work at Castle Law Forgandenny, with its massive timber-laced walls. The latter, being located due south-west, directly across the strath from Moncreiffe Hill, is of interest both due to its close proximity, and with respect to the timber-laced



Figure 1.9: The hilltop inland promontory fort on Ben Effrey, at 360 m OD, has three lines of ramparts enclosing 0.21 ha and has produced Early Iron Age dates (photo: D. Strachan 2001 © PKHT).



Figure 1.10: SERF excavations of the oval, uni-vallate hilltop contour fort of Rossie Law c. 2.3 ha at 324 m OD produced Late Bronze Age and Iron Age dates (photo: D. Strachan 2001 © PKHT).

walls, first compared to those at Castle Law, Abernethy by Christison, and for which we have a new comparator at Moredun (Chapter 3.2: The inner oval fort, Wall E).

With the SERF fieldwork complete, research elsewhere has notably included the fort on East Lomond Hill, Fife, by a considerable margin the highest within the study area at 445 m OD. It occupies a conical summit that is such a distinctive landmark in the middle of the Fife peninsular, and is visible from much further afield, including the top of Moncreiffe Hill. A complex series of fortifications includes at least three roughly concentric lines of defence, a substantial outwork on the south-west and a large annexe on the south. The smallest fort, on the summit, with extensive views across the region, encloses c. 0.15 ha and is set within an enclosure of c. 0.34 ha. Both these are contained within a partial enclosure of c. 1.6 ha, which appears to abut the middle rampart on the south-east (Lock and Ralston 2017). The date and sequence of construction of these inner ramparts is not well understood, but a Pictish stone slab with the incised outline of a bull was found within the fort in c. 1920 (Corrie 1926), suggesting that elements of the defences are early medieval in date. In 2014, through the Living Lomonds Landscape Partnership, small-scale excavation within the annexe to the south of the fort identified buildings, evidence of iron-working, and high-status artefacts (O'Grady 2015) and radiocarbon dates from the 1st – 7th centuries AD (O'Grady 2017). Further excavations, carried out in 2017 and 2019, are in the process of publication (Gordon Noble *pers comm*).

Finally, development led research has recently contributed significantly through comprehensive excavation of the multi-vallate oval fort of Broxy Kennel, which was situated on a sand and gravel ridge overlooking River Tay immediately north of Perth. It enclosed c. 0.3 ha and was previously known only from cropmarks, which showed a souterrain across one of the ditches. Initial evaluations produced a small charred-grain assemblage suggesting low level domestic cereal processing spanning the Bronze Age to the Iron Age (Pettitt and Hession 2019). The fort was stripped and fully excavated prior to destruction and publication of the results should help to improve our overall understanding of the development of forts across the region.

In conclusion, the forts of the Lower Strathearn and Tay estuary area (Figure 1.6) are now relatively well-studied, with 32 excavations at 22 of the 57 sites (i.e. 39% sample). Of these, 25 could be described as research driven, including the significant contribution of ten sites studied by Glasgow University, four have been carried out through community heritage initiatives, including the three contained in this report, and three as a result of development, two of which relate to quarrying. While the scale of investigation at each

site has overall been quite small, few areas in Scotland can boast such a concerted effort to explore this key component of the Iron Age landscape.

1.5 The nature of the Tay fort group

The distribution of the Tay group within the study area (Figure 1.6) occurs in five geographic areas: the dense concentration along Strathearn and northern Ochil Hills; a less dense cluster along the Sidlaw Hills; the series along the north Fife hills; the dispersed forts of inland Fife (including a small concentration around Strathmiglo); and a dispersed group running from the Gask Ridge north-east to Strathmore.

The distribution of forts has recently been considered through GIS spatial analysis to identify clusters by measuring the distance between pairs of sites at different distance thresholds (Maddison 2022: 367–371). Analysis of Britain and Ireland (Maddison 2019) has been followed by regional analysis which has included the east-central Scotland cluster as one of five comparative case-studies (Maddison 2022: 374–377; figs 8.2 and 8.3). The analysis revealed a strong correlation between clusters and topography and interestingly grouped the Strathearn and northern Ochil Hills group with those in the west Sidlaw Hills, but included Castle Law, Abernethy, with the Lomond Hills group in Fife, rather than with the south Tay estuary group along the north coast of Fife (Maddison 2022: 374–5; fig. 8.2). Further, while analysis identified key large sites, such as Norman's Law (ID 31814), within the north Fife coast group, the overall character of clusters of smaller forts (Figure 1.11) closely tied to the topography of the area, perhaps suggesting anarchic society of autonomous communities proposed by Armit (2019).

Indeed, the internal area of the forts is small and predominantly less than 0.5 ha, including several extremely small examples such as Ogle Hill (0.05 ha), Castle Craig 1 (0.06 ha) and Castle Law, Abernethy (0.06 ha). Only 11 sites were larger than 1 ha and only four larger than 2 ha (Figure 1.11). Using the *Atlas of Hillforts* categories, most were contour forts (66 %), followed by promontory forts (14 %) and level terrain forts (9 %). Most were either uni-vallate (30 %) or of mixed vallation (29 %), with slightly fewer multi-vallate (24 %) and bi-vallate (17 %) examples.

The relative size and morphology of selected forts within a 10 km radius of Moncreiffe Hill is shown in Figure 1.12. The top row shows smaller forts with principally one enclosing line of defence. Notable within this group is Castle Law, Abernethy, which is among the smallest in the area and has a distinctively elongated oval shape, similar to the innermost fort at Castle Law, Forgandenny, and is possibly also at Deuchny Wood. These appear broadly similar to the

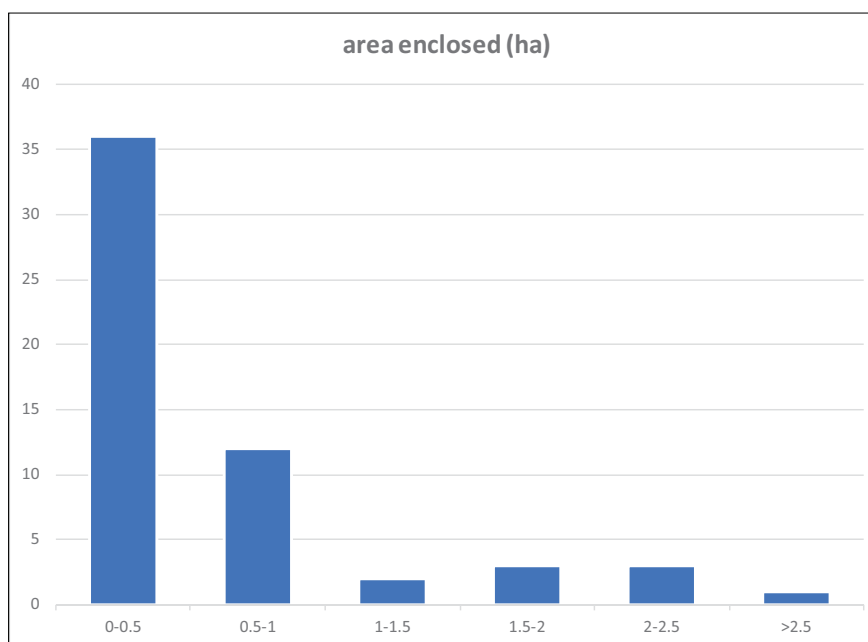


Figure 1.11: The internal area of forts shown in Figure 1.6 based on Lock and Ralston (2017). Note the area of sites discussed in this volume have been refined in GIS: Castle Law, Abernethy (0.06 ha); Moredun 1 (0.15 ha); Moncreiffe Hill (0.2 ha); Moredun 2 (1.2 ha) and Moredun 3 (1.8 ha); see also Figure 7.2.

innermost fort at Moredun, which is symmetrically oval, however is wider in plan rather than elongated. Together they belong to a recognised series of oblong, possibly entrance-less, forts found mainly in north-east Scotland (Feachem 1966; MacKie 1969; Armit 1997; Alexander 2002; Ralston 2006: 151) and are discussed further in the conclusions to Chapters 3 and 6, and more fully in Chapter 7.2, 7.3 and 7.7.

The second row shows multi-vallate forts with irregular curvilinear forms dictated by the terrain, including Moncreiffe and Broxy Kennels. The third row shows a series of more consistently symmetrical oval and sub-oval multi-vallate enclosures, which are also notably of a similar size. The final group consists of larger, complex examples, including Moredun and Castle Law, Forgandenny, in which bigger enclosures often contain smaller forts of the oblong series.

A broadly similar morphological range can be found across the wider study area, ranging from the small, heavily defended promontory fort at Rait, through a series of mid-sized multi-vallate examples to larger uni-vallate enclosures such as Rossie Law (Figure 1.13).

In terms of topographical setting, most sites were found on hilltops or smaller hillocks and knolls, with significant numbers on inland promontories or on cliffs/plateau-edges or scarps (Figure 1.14). In terms of altitude, most occur within 100–300 m OD range, with lesser numbers below 100 m OD and only five above 300 m OD. The sites on Moncreiffe Hill and Castle Law,

Abernethy, all fall within the first category (Figure 1.15).

Clearly chronology is critical in considering the distribution of sites shown in Figure 1.6, and as outlined above, full publication of all the recent work will allow us to better understand this group of forts in due course. It is worth noting that Clatchard Craig and East Lomond have only produced evidence of early medieval construction and activity, however this does not necessarily deny the possibility of earlier forts at these sites.

1.6 Wider Iron Age settlement evidence

While only the north-east quarter of the area (Figure 1.6) has seen systematic archaeological survey (RCAHMS 1994), this combined with national and local HER data reveals considerable evidence of other forms of probable Iron Age settlement. This is primarily through an extensive cropmark record in the lowlands, the majority of which consists of possible roundhouses that vary considerably in size and form. These include unenclosed ring-ditches and macula, some of which lie within tightly concentric enclosures (RCAHMS 1994: 43–48). In addition, some of the larger, uni- and multi-vallate enclosures, in both rectilinear and curvilinear forms, may be Iron Age, including small enclosures known as interrupted ring-ditches (RCAHMS 1994: 57–62). Souterrains are also a common component of the settlement record in the area, and while some have been excavated, the majority are known only as cropmarks.

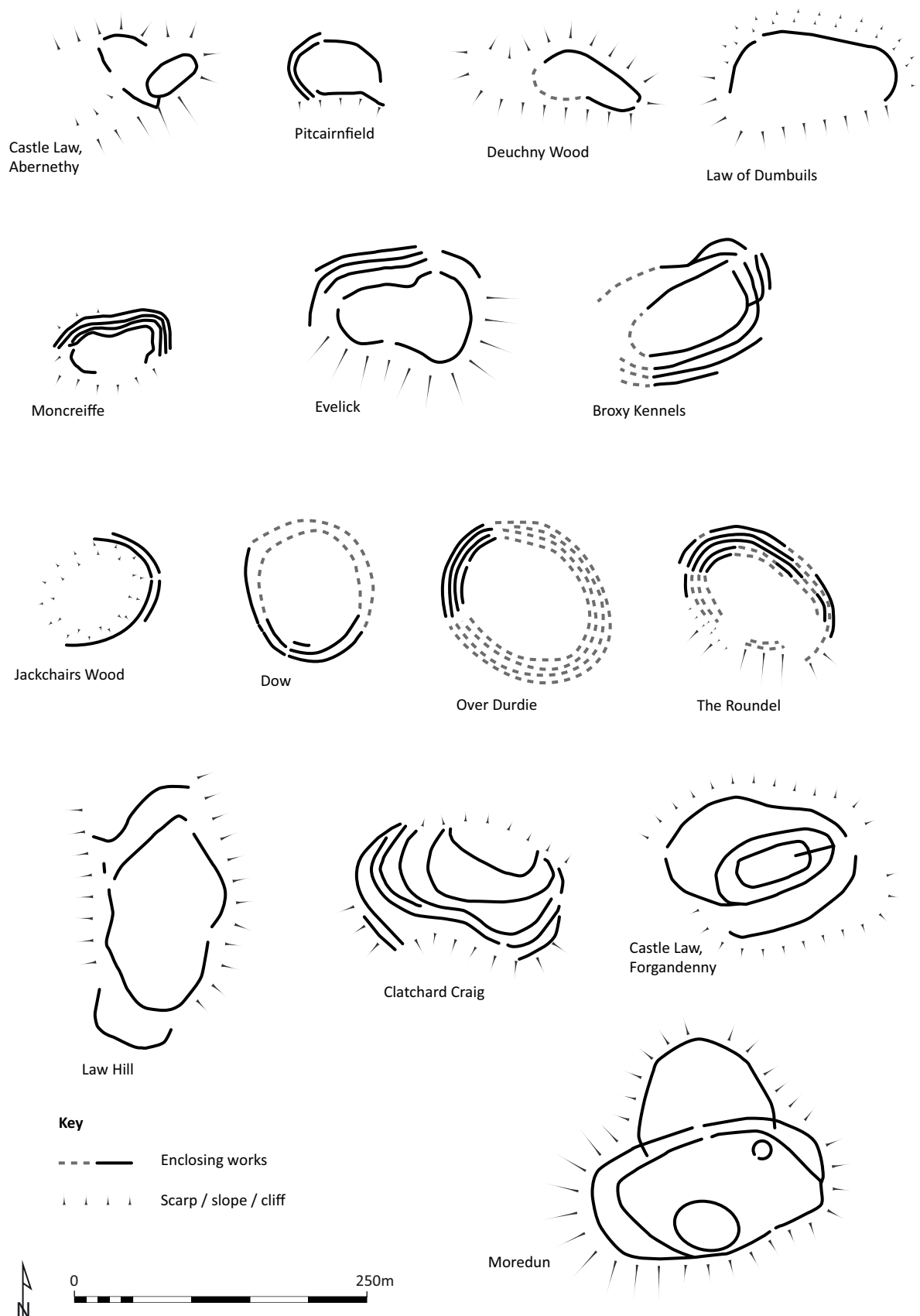


Figure 1.12: Comparative plans of selected forts within 10 km of Moredun fort (including Castle Law, Abernethy, Moncreiffe and Moredun).

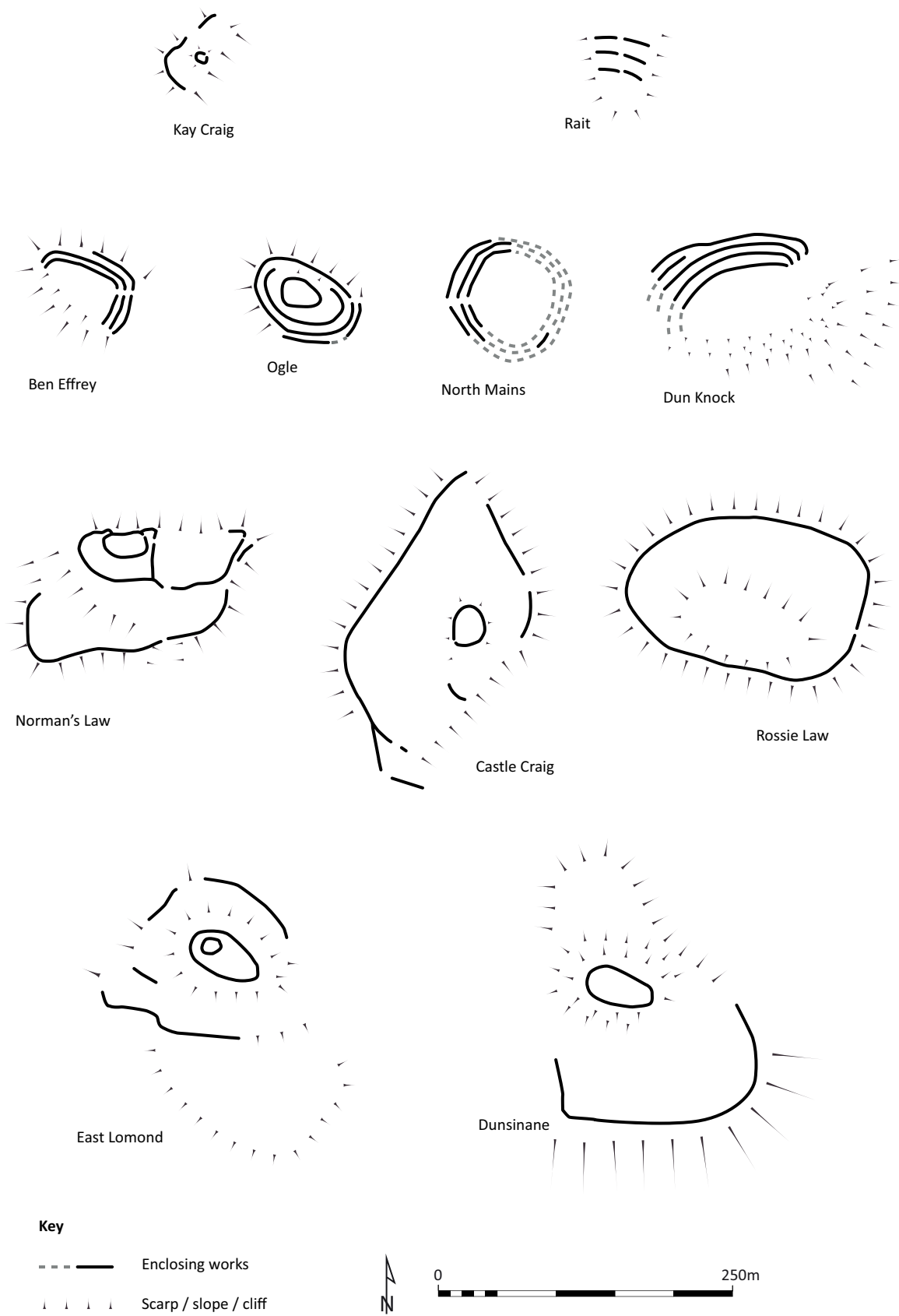


Figure 1.13: Comparative plans of selected forts shown in Figure 1.6 beyond 10 km of Moredun fort.

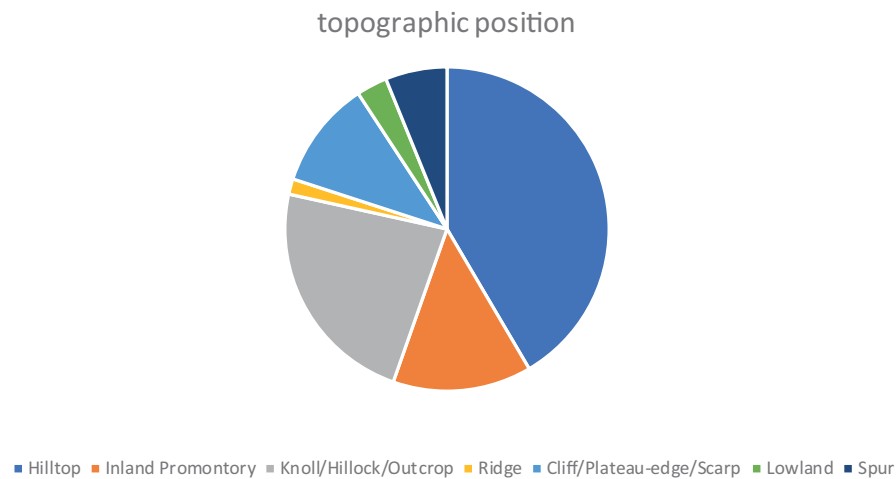


Figure 1.14: Topographic position of the forts shown in Figure 1.6.

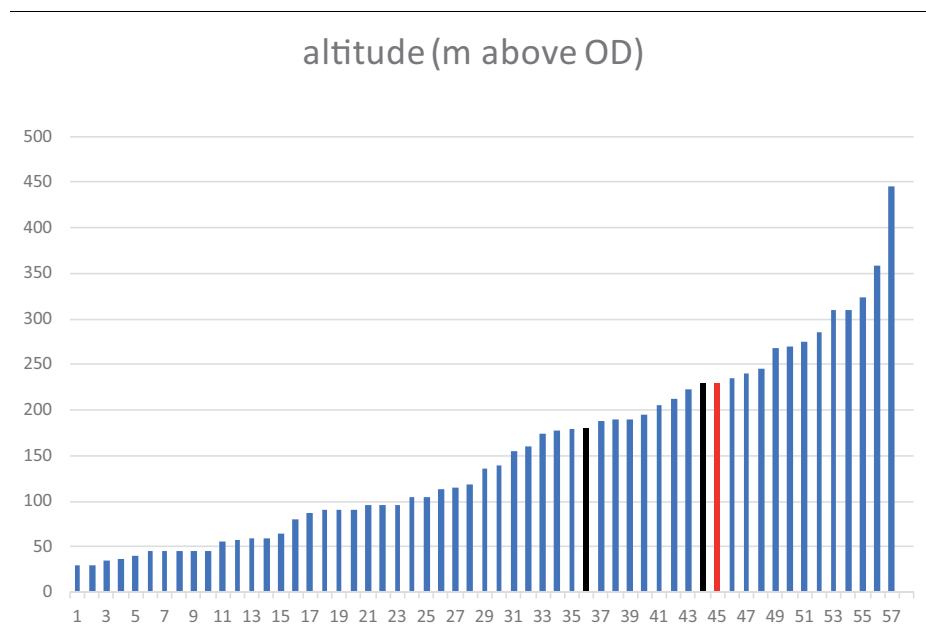


Figure 1.15: The relative heights above sea-level (OD) of the forts in Figure 1.6 with Moncreiffe (36) and Moredun (44) in black and Castle Law, Abernethy (45) in red.

These latter often occur in close proximity to the roundhouses and the interrupted ring-ditches, though their exact relationship remains unknown. Debate continues regarding their use and the degree to which a storage function may have included a ritual dimension, and likewise their relationship to the Roman military campaigns and the dating of their abandonment (Armit 1999; Coleman and Hunter 2002; Halliday 2006).

Apart from the forts, however, there are few earthworks in the uplands of the area that can confidently be dated

to the Iron Age. In addition to the broch found at Castle Craig fort, Auchterarder (Poller forthcoming), a second, unexcavated example has been proposed in the Sidlaws at Little Dunsinane, Collace (RCAHMS 1994: 51; 74). It has been heavily robbed and may have closer parallels in the monumental roundhouses found in the uplands of north-west Perthshire (Strachan 2013). Monumental stone buildings within forts are also known in Angus, to the east of the area: a post-fort broch Hurly Hawkin (Taylor 1982); and a proposed broch within Laws of Monifieth fort (Neish 1862 and 1865; ID 33450), although

Table 1.1: Locational and administrative details of the sites.

SITE NAME	NGR	NMRS	CANMORE	PKHER	Scheduled Monument
Moncreiffe	NO 131 198	NO11NW7	28058	MPK3203	9438
Moredun	NO 135 199	NO11NW23	28025	MPK5232	9440
Castle Law, Abernethy	NO 182 153	NO11NE12	27917	MPK3069	2477

the latter may also have closer parallels with those in highland Perthshire. Large buildings, though less monumental, are also known within forts in the north Fife hills, such as at Glenduckie Hill, near Newburgh (ID 30060). The relationship between these massive stone building forms and the forts is of particular importance with respect to the monumental roundhouse discovered within Moredun fort and described in Chapter 3.2 and 3.4. Radiocarbon dating suggests the Castle Craig broch as a Roman Iron Age structure of the early centuries AD, post-dating both the monumental roundhouse on Moredun and those of the uplands.

Chapters 2.1 and 6.1 present possible Iron Age sites within the environs of each of the forts investigated. As with the forts above, it is recognised that the dates of the majority have not been established. Rather they illustrate a range of site types and locations that may have been relevant to the forts discussed. Many of the unenclosed settlements may prove to be of Bronze Age date, for example, and while the souterrains post-date our period of interest, a number are clearly multi-phased. It is possible some of the sites outlined may represent part of a Late Iron Age expansion in lowland settlement in which the forts played a key role, and the timber-laced oval and oblong forts were at the apex.

1.7 Preliminary work

Project development included a desk-based and field assessment of forts around the upper Tay estuary, to identify suitable candidates for excavation (Strachan 2012). A review of their comparative plans showed considerable diversity of form, and recurring themes, such as multiple enclosures and geographical setting. The study highlighted Moredun as a large, complex site on a par with its neighbour, Castle Law, Forgandenny. Topographic survey of six sites was undertaken by Oxford North Archaeology to update and refine previous mapping of earthworks with a view to locating targets for excavation (Figures 2.5; 3.6 and 6.7). Desk-based research confirmed that while some sites were still in woodland, by far the majority were tree-covered on OS 1st edition maps of the 1860s. Tree cover and vegetation control remain the foremost management issues at all the sites discussed.

While the initial plan was for small-scale excavation at between six and eight forts, an advisory group was

established to consider this approach and recommended larger-scale excavation at one or two sites. As a result, Moncreiffe and Moredun were selected, primarily to establish the chronology of the various circuits of defences that are visible at Moredun, and to investigate the relationship between two forts found in close proximity on top of one distinct topographical feature. Excavation at Moredun also offered an opportunity to test the early medieval date previously posited (Feachem 1955: 79–80; Alcock *et al.* 1989: 206–7; Alcock 2003: 189). RCAHMS were approached to re-survey and provide annotated plans for both sites, and while they declined to survey Moncreiffe (Chapter 2.1) an interpretative plan of Moredun was produced in 2014 to inform trenching (Chapter 3.1). Geophysical survey was carried out at both sites by Peter Morris over 2014–15 to further aid the project designs that formed the basis of Scheduled Monument Consent applications (Strachan 2014a; 2014b).

The potential of revisiting the other strong candidate for excavation, Castle Law, Abernethy, fortunately became a reality as resources were made available within the wider TayLP scheme in 2016. Again, RCAHMS contributed a new survey to inform the project design (Strachan 2017b) which led to excavation in 2017.

Details of the sites excavated are shown in Table 1.1.

1.8 Research agenda

In addition to the project's community engagement objectives, the overarching research priorities were primarily designed in response to the Scottish Archaeological Research Framework (ScARF 2014a and b) and other recent and ongoing programmes of local research (Strachan 2013; Poller forthcoming) as well as wider discussions on fort studies (such as Collis 2010). The following ScARF research questions for aspects of Iron Age forts (2014a: 6 Enclosed Places) were identified as being of particular relevance:

- *‘The lack of dating evidence for enclosed sites is an issue across the board, as it is a severe constraint in understanding them. ‘Key-hole’ offers the prospect of obtaining at least an outline chronology in an area relatively quickly, but with the caveat that such approaches will inevitably simplify each site sequence and can only produce a first-stage model’*

- *'The lack of evidence for activities within enclosed sites, due to limited work in enclosure interiors, is a severe constraint, as are the difficulties in connecting interior activity to enclosure sequences. Geophysical survey offers a cost-effective approach to assessing enclosure interiors in favourable circumstances'*
- *'why did people choose to inhabit places such as hilltops...? There is a need not only to study the setting of sites but also to try to reach a better understanding of how landscapes were conceived'*
- *'There is no overall picture regarding the role of 'hillforts', whether as tribal capitals, (seasonal) meeting places, elite residences, or other functions and it is likely that their role varied across time and space. This impacts directly on social models for the Iron Age; regionally-based diachronic models are a key desiderata'*
- *'What lies behind the diversity of enclosure forms in some areas? A regionally-structured review of the classification and social context of enclosed places is required'*

As a result, dating of the construction of the forts was the primary objective. In addition to establishing phasing at multiple enclosure sites, it was hoped the evolution of construction methods, whether stone and earthen ramparts or timber-laced walls, could be identified. A secondary priority was on the nature of entrances and interiors. The site-specific research aims for each excavation are presented at the start of

Chapters 2.2, 3.2 and 6.2. These were revised annually on the basis of the previous year's results and as all three sites are Scheduled Monuments, consent for excavation was agreed through project designs incorporating these: Moncreiffe (Strachan 2014a; 2015a); Moredun (Strachan 2014b; 2015b; 2016 and 2017a) and Abernethy Law (Strachan 2017b).

In conclusion, the project aimed to contribute to a better understanding of the role, chronology and landscape settings of lowland forts around the Tay estuary. The Perth and Kinross Archaeological Research Framework (ScARF 2022) aims to develop a deeper regional understanding of the forts through both national and regional research priorities. There is significant potential for this through the synthesis of results from the SERF project (Poller forthcoming), development-led projects, and research by the author through the work of Perth and Kinross Heritage Trust. The latter has explored important site-types in the area and focussed on enclosure and settlement c. 1000 BC to c. AD 1000, including excavation of the Iron Age monumental roundhouse at Black Spout, Pitlochry (Strachan 2013) and early medieval Pitcarmick-type buildings in Glen Shee (Strachan *et al.* 2019). Such synthesis may begin to reveal local or regional trends through which to better appreciate the forts of the area. Such regional definition within key areas has been recognised as vital for progressing understanding of forts nationally (Lock and Ralston 2017 and 2022).

2. Moncreiffe fort

David Strachan, Martin Cook and Dawn McLaren

with contributions by Derek Hamilton, Fraser Hunter, and Rob Engl

2.1 Introduction: the site and its environs

Moncreiffe is the smaller of the two forts on Moncreiffe Hill and occupies the edge of a craggy prominence at c. 180 m OD on the south-west side of the hill. It is overlooked by a raised crest c. 150 m directly to the east, from which it is separated by a deep ravine running steeply downslope north-south. Elsewhere the ground drops away, on the south precipitously, and the views from the fort are extensive and unobstructed across the Earn valley to the south-east, south and especially to the south-west. The outlook on the west and north is more restricted, but only on the north-east and east is it completely obscured by the hill rising beyond the ravine to Moredun Top. As a result, while in part overlooked, the fort has a good defensive position with extensive visibility from the surrounding landscape. The much larger fort on Moredun Top (Chapter 3) lies c. 500 m to the east-north-east and crowns the summit of the hill at 223 m OD (Figures 2.1 and 2.2). Both sites sit on exposed pyroxene-andesite bedrock of the Ochil Volcanic Formation (Figure 1.4), with the drift geology of the surrounding area consisting of glaciofluvial till, gravels, sands and silts (British Geological Survey 2023; Figure 1.5).

The name Moncreiffe comes from the Gaelic words *monadh* and *craobh* meaning ‘Hill of the tree’, the latter suggested as a significant, perhaps tribal, tree (Watson 1926: 401). However, as the name occurs in AD 728 it is probably Pictish in origin; *monadh* is a loan-word from Pictish (or British) into Scottish Gaelic and Pictish probably had a close cognate of Scottish Gaelic *craobh* ‘tree’ (Peter McNiven *pers comm*). In AD 728 the Annals of Tigernach report the battle ‘of *Monid Craebe* between the Picts themselves, that is, Oengus and Alpine, it is they who fought the battle, and Oengus routed his foes and Alpin’s son was killed there, and Oengus took the royal power’ (Annals of Tigernach 728.4). The name next appears as *Moncreff* in 1361 (RRS vi no. 257), and then in various similar forms such as *Moncreif*, (1574), *Moncrieff* (1625), *Moncrief* (1683, c. 1750 and 1772) before being shown in a variety of forms in the *New Statistical Account* of 1845, including *Moncrieff*, *Moncrieffe* and *Moncreiffe* (NSA X, Dunbarney: 790–791 and 798). The OS *Name Books* (1859–62: Dunbarney 14) confirms the spelling of the House and the Hill as Moncreiffe through

the authority of Sir Thomas Moncreiffe, and that name appears on the 1st Edition mapping (Figure 2.3).

Figure 2.1 shows the immediate archaeological context of the forts on Moncreiffe Hill, where possible Iron Age settlement and activity is reflected in a variety of forms. Details of these sites can be found in Appendix A. As outlined in Chapter 1.3 and 1.4, while there is uncertainty regarding the dating of these sites, they are included to illustrate a range of site types and locations that may have been relevant to occupation of the forts. Those which can be ascribed to being at least broadly contemporary, are the two smaller forts in the immediate environs of Moncreiffe Hill. The Roundel (Figure 2.1: 3), is c. 2 km to the west of Moredun Top at 57 m OD on a hillock at Hilton House. Cropmarks revealed it is oval with at least five lines of ditches enclosing 0.27 ha (Lock and Ralston 2017) and it was excavated in 2013 (Poller forthcoming). Also c. 2 km from Moredun Top, this time to the north-east, another oval contour fort occupies the eastern summit of Dow Hill (Figure 2.1: 4) at 60 m OD, a similar height to The Roundel. Cropmarks here suggest at least two lines of ditches and ramparts, part of which survive in woodland, enclosing an area of c. 0.85 ha (Lock and Ralston 2017). The scale and morphological similarities of these sites is illustrated in Figure 1.12.

Cropmarks have also revealed two areas of unenclosed settlement occurring in close proximity to both curvilinear and rectilinear enclosures of presumed later prehistoric date. The first of these is along the river terrace of the Tay, at c. 50 m OD, to the south-east of Dow Hill fort. This includes the oval enclosure at Coates of Fingask (Figure 2.1: 6), which is not much smaller than Dow Hill. Also notable is the similar spacing between all four enclosures along the terrace. A broadly similar pattern occurs at the second area of cropmarks to the west of Bridge of Earn, with a series of unenclosed settlements and both curvilinear and rectilinear enclosures on lower ground below Law of Dunbuils fort (Figure 2.1: 5).

Aside from cropmarks, part of a shale bead used in a bracelet or necklace choker was found at Kirkton of Mailer (Figure 2.1: 26). Of possible Iron Age date, it is of particular interest given the recovery of similar

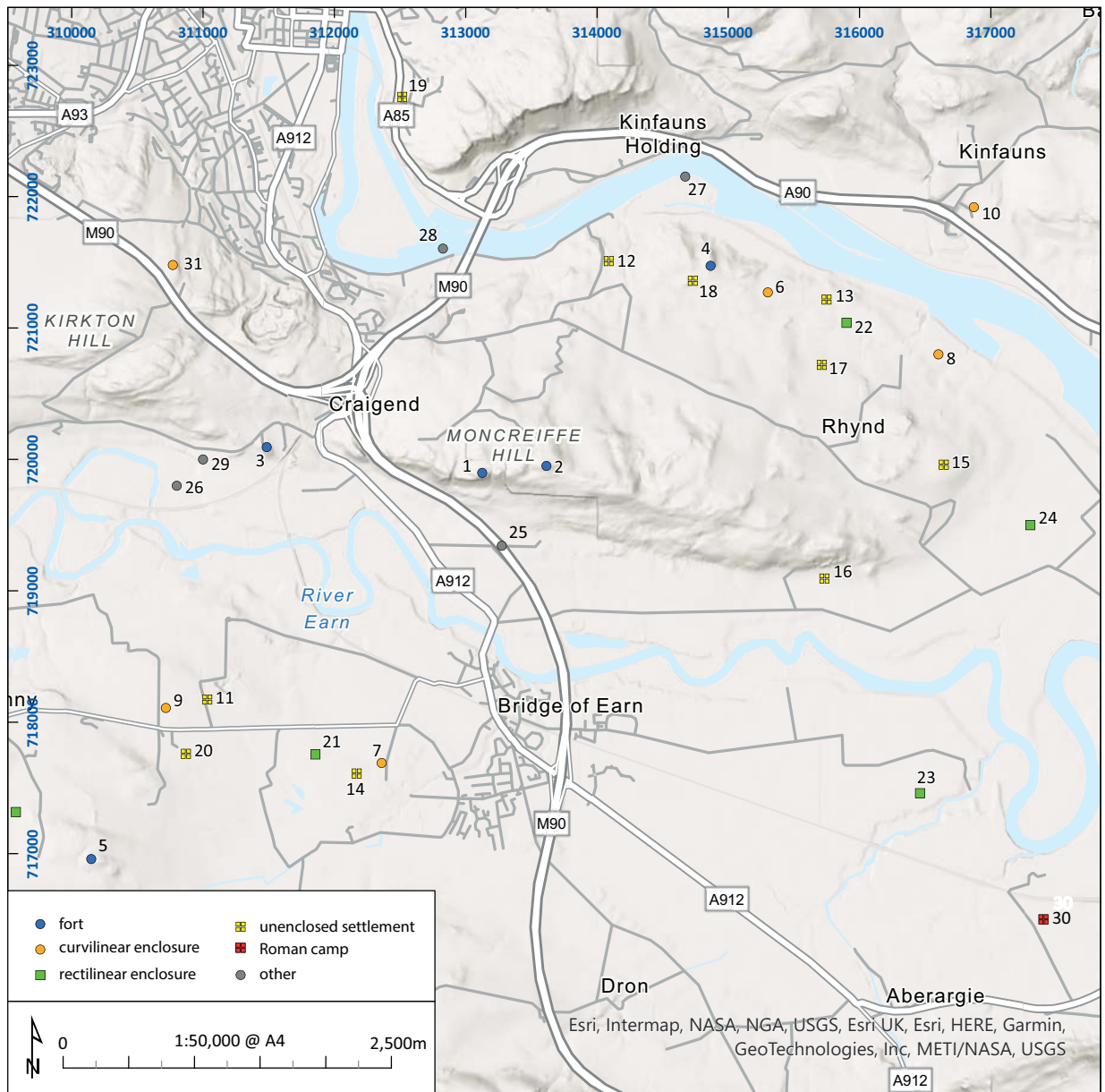


Figure 2.1: The location of the Moncreiffe (1) and Moredun (2) forts on Moncreiffe Hill, with possible Iron Age sites in the immediate area (Appendix A), including the forts The Roundel (3) and Dow Hill (4).

material from both Moncreiffe and Moredun forts (Section 2.4 below and Chapter 4.9). Excavations by Margaret Stewart in 1974 revealed industrial activity at Moncreiffe House henge and stone circle (Figure 2.1: 25), where a final phase of use saw metal workers casting leaded bronze and smelting iron (Stewart *et al.* 1987). Finally, the oak logboat (Mowat 1996: 78) recovered from the Tay at Sleepless Island (Figure 2.1: 27), while potentially of any date from the Mesolithic to early medieval period, is a reminder of the continued importance of the river across this timespan.

The first record of Moncreiffe fort occurs on the OS 1st edition 25-inch map, surveyed in 1859–60 and published in 1863, where it appears annotated as ‘Fort (remains of)’

(Figure 2.3). Christison found it ‘scarcely recognisable’ and after having ‘difficulty in finding any evidence of a mound or wall...at last discovered a distinct mass of rude masonry in a chance break in the ground’ (1900b: 79–80). The next record of investigation is in 1964 when resurveying by the OS Archaeology Division found only ‘slight remains’ due to Forestry Commission planting but importantly did recognise ‘an entrance from the SE and a possible entrance from the W’ which are depicted on the 1:2,500 map surveyed in 1965 and published in 1966 (Figure 2.4).

A subsequent visit by John Sherriff of RCAHMS in 1996 noted that while the tree cover had been removed, the site was ‘so poorly preserved that no further details



Figure 2.2: Aerial view of Moncreiffe fort, bottom right, and Moredun fort, top left (© Crown Copyright: HES).



Figure 2.3: The OS 1st Edition 25-inch map of 1863 (Reproduced with the permission of the National Library of Scotland).

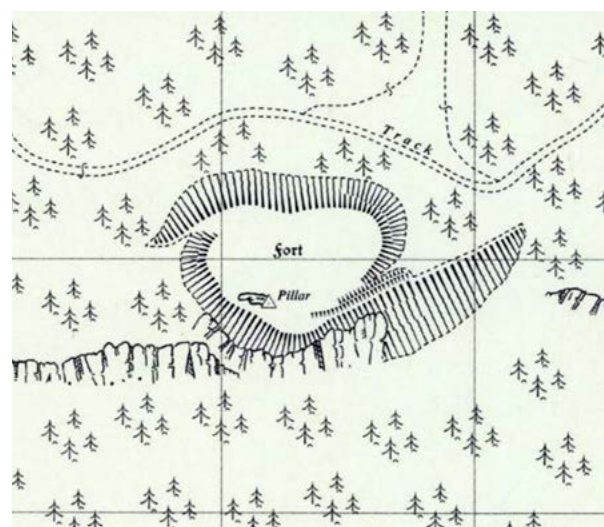


Figure 2.4: The OS 1:2,500 revision of 1966 first recognised the west entrance and suggested the east entrance to the north of the path (Reproduced with the permission of the National Library of Scotland).

can be added to the existing OS plan and description' (ID25058), however the site was designated as a Scheduled Monument in 2001.

Pre-excavation survey

A survey was carried out in 2012 by Oxford North Archaeology, during development of the *Hillforts of the Tay* project (Chapter 1.1; Figure 2.5). RCAHMS were subsequently asked to prepare a new survey and interpretive analysis of both forts on Moncreiffe Hill, but after a visit to Moncreiffe fort, the investigators were not convinced they could trace any ramparts around the hilltop (John Sherriff *pers comm*).

In 2014, however, a topographic laser-scan survey identified the slight remains of at least one enclosing rampart, possible internal structures, and the two possible entrances first identified by the OS (Figure 2.6). The faint traces of the western entrance appeared much as the OS had identified in 1966. The eastern entrance was found to correspond to a track on the OS 1st edition map (Figure 2.3) mounting the slope into the interior to the north of a later path mapped in 1966, both of which are still visible in profile (Figure 2.7). The irregular interior of the fort was found to measure c. 70 m east-north-east to west-south-west by 50 m transversely, enclosing an area of 0.2 ha rather than the c. 0.27 ha estimated for the *Atlas of Hillforts* (Lock and Ralston 2017).

Magnetic gradiometer and resistivity geophysical surveys were carried out with the aim of identifying sub-surface anomalies to inform trenching. While anomalies were recorded (Figure 2.8), neither dataset gave any clear indication of human activity, the magnetic data probably a result of the highly magnetic bedrock, while none of the resistivity anomalies were conclusively anthropogenic (Morris 2014a).

2.2 Excavation results

Methodology

There is no record of any previous archaeological excavation at the site. The preliminary non-intrusive surveys were followed by two seasons of small-scale excavation designed to determine the character, extent, condition, date and significance of any surviving archaeological remains. Specific aims outlined in the project designs (Strachan 2014a and 2015a) can be summarised as follows:

2014

- to establish presence/absence of evidence of a fort at the site

2015

- to date the enclosure rampart confirmed in 2014
- to assess the possibility of multiple lines of enclosure

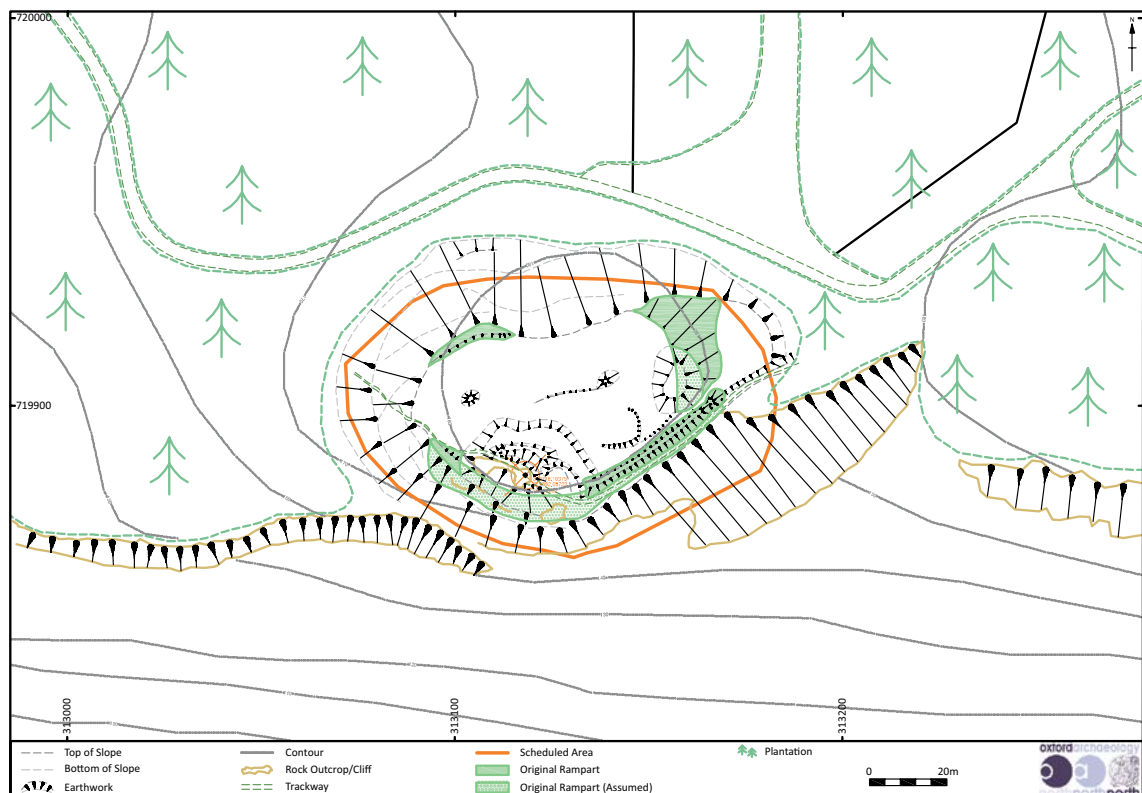


Figure 2.5: The Oxford North Archaeology survey from 2012.

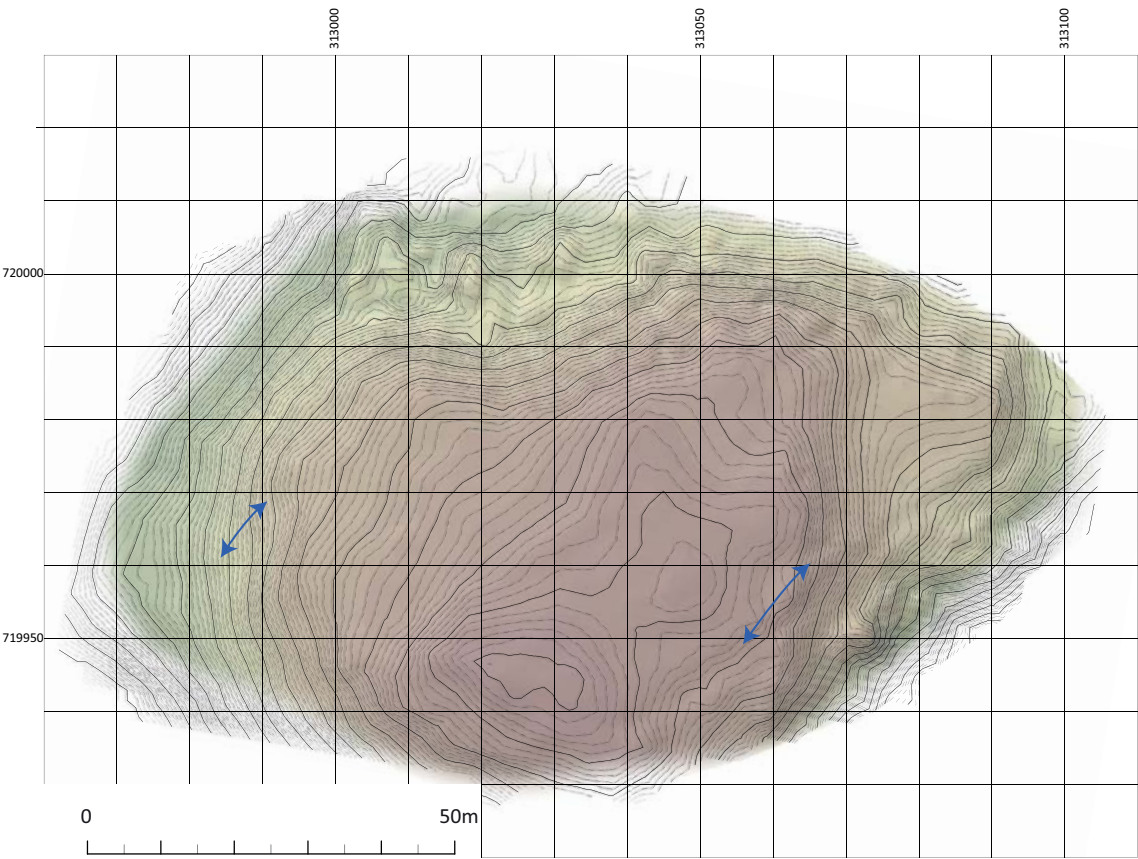


Figure 2.6: The 2014 laser-scan topographic survey indicating the lines of possible entrances identified.



Figure 2.7: View of the south-east of the fort, taken from the east, showing the modern path cut into the profile on the left and the proposed original entrance in the centre-left of the frame.

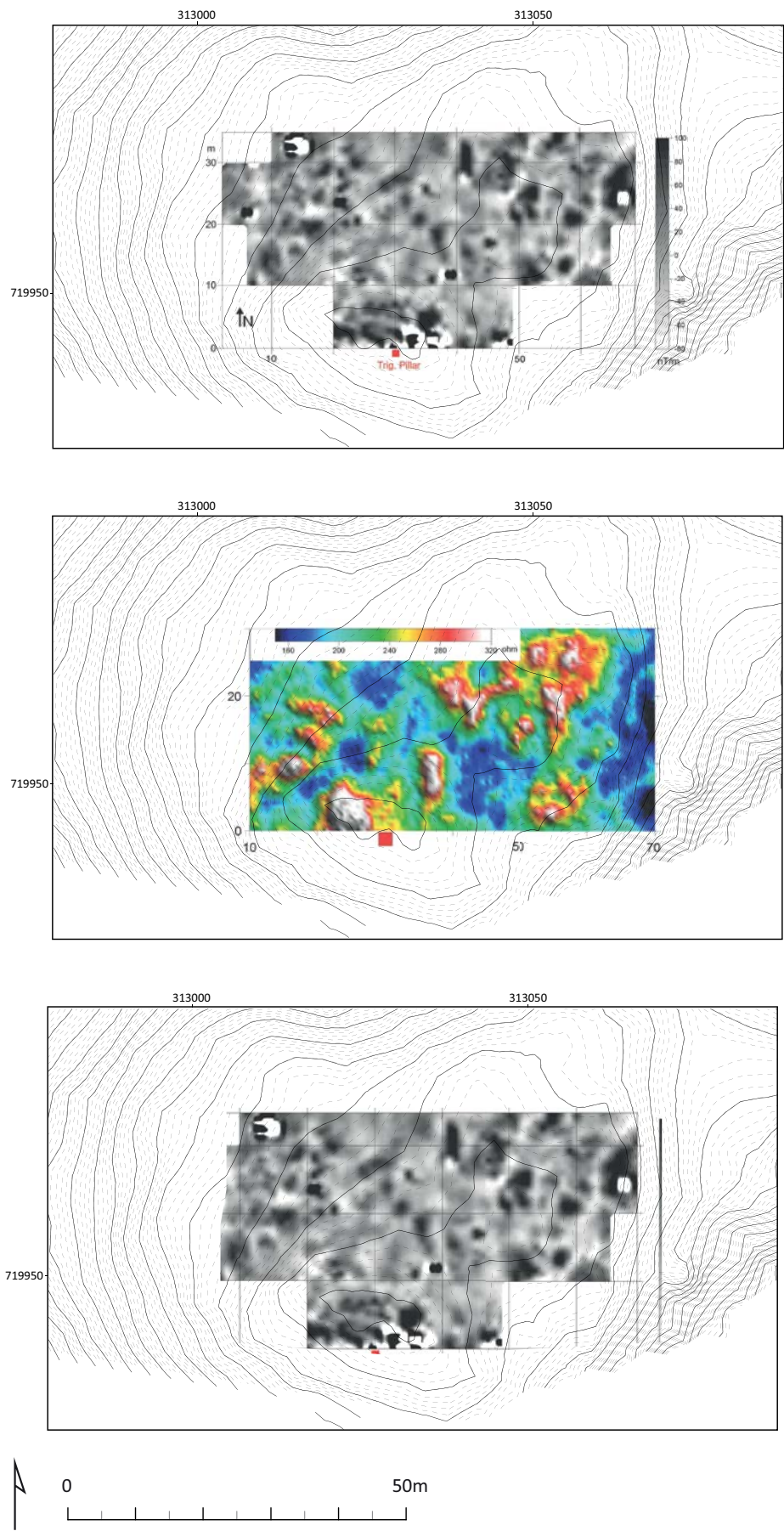


Figure 2.8: Geophysical survey results: magnetic (above), and resistivity (below).

- to assess the potential internal buildings
- to assess the nature of the probable entrances

Seven trenches were excavated: Trenches 1, 2 and 3 in 2014, and Trenches 1a, 2a, 4 and 5 in 2015 (Figure 2.9). The evaluation trenches of the first season (1, 2 and 3) revealed evidence of the innermost enclosing rampart, while the second season (Trenches 1a and 2a) confirmed the presence of three additional ramparts on the steep slope on the north-west and east. The ramparts were found to enclose the northern and eastern sides of the roughly flat hilltop, with the southern and south-western areas bounded only with natural cliffs by way of defence. Trench 4, excavated over the possible west entrance, confirmed its presence and found it was associated with a cut bedrock terrace leading

into the interior of the fort and a stone bank. Within the interior, Trench 5 excavated a scoop putatively identified as a house platform and revealed this feature to be of natural origin.

As outlined above, the fort was disturbed by subsequent land use, in particular forestry but possibly also landscaping by the estate, and many of the ramparts and associated features were heavily damaged and denuded.

The enclosing ramparts

Only a single, denuded rampart (Rampart A) was visible in places at the outset of the project, but a further three were identified through excavation (Ramparts B, C and

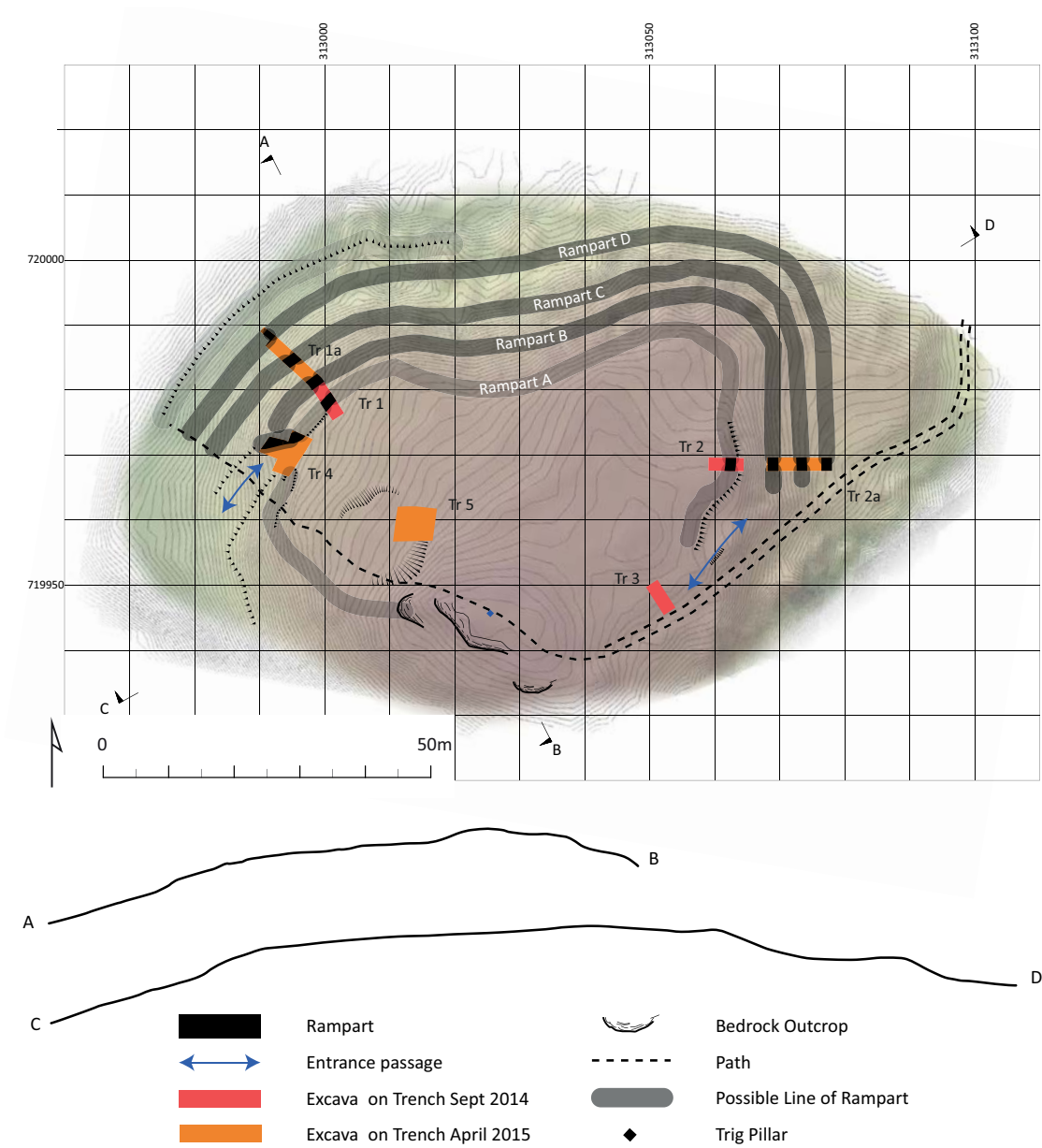


Figure 2.9: The topographic survey showing the trench layout and the lines of Ramparts A–D.

D: Figure 2.9). In total the innermost rampart enclosed 0.2 ha. The ramparts were investigated through Trenches 1, 1a, 2 and 2a.

Rampart A

Rampart A was evaluated in Trench 1 [119], Trench 2 [210] and Trench 4 [418/432] (Figure 2.9). Within Trench 1, which measured 10 m by 2 m, the rampart [119] was aligned north-east to south-west and survived up to 2.65 m in thickness and up to 0.50 m in height (Figure 2.10). Although much degraded, it clearly consisted of an inner [110] and outer stone facing [104], with an earthen core [106], possibly originally turf, built over a stone foundation [115] (Figure 2.11). The outer dry-stone façade [104] was constructed of sub-rounded to sub-angular stones up to 0.50 m by 0.40 m infilled with smaller angular stones, forming a distinct band 0.78 m wide by 0.59 m high, in which the interstices were filled with a light yellowish brown friable sandy silt (105). The stone foundation [115] was constructed of angular boulders between 0.20 m to 0.50 m across. Overlying the earthen core [106] was a deposit of angular stones [102] in a matrix of brown silty sand [103]. These deposits are interpreted as collapsed rampart material with fine material filling the boulder interstices. No suitable material was recovered to date the rampart in Trench 1 and no artefacts were recovered.

Rampart A was further evaluated in Trench 2, albeit while investigating the possible entrance identified at the eastern end of the site (Figure 2.9). The trench measured 10 m by 2 m in plan. As in Trench 1, the rampart [210] was built on the edge of the hilltop and consisted of an inner [209] and outer [203] stone facing with an earthen core [206] (Figures 2.11 to 2.14). The earthen core of the rampart was constructed of two main deposits of compact clay [206] and [208], with very few stones found in this area. A charcoal sample from [208] produced a date of 3340–3030 cal BC (95% probability SUERC-57072) and is likely to be residual material incorporated into the core. Measuring 3 m in thickness by 0.80 m in height, the rampart was built directly on to the natural bedrock [212] and subsoil [213]. It seems probable that the bedrock was cut to build the rampart, though no evidence was recovered to confirm this interpretation. The eastern element of the rampart had collapsed back into the fort. No other suitable material for radiocarbon dating was obtained from the rampart, but a series of later prehistoric artefacts were recovered. These include a fragment of a saddle quern (SF221) re-used in the outer stone facing of rampart [210], although its grinding surface was not visible, and two fragmentary rubbing stones (SF201 and SF411). The recovery of used and worn artefacts probably reflects earlier activity on the hill, and either material which has been incorporated into



Figure 2.10: Rampart A [119] outer face [104] in Trench 1.



Figure 2.11: Platform [110] and slot [112] to the right and collapse [102] and Rampart A in the centre, looking north-east across Trench 1.



Figure 2.12: Working shot of Rampart A [210] showing the inner stone facing [209] in the foreground with the outer stone facing [203] beyond.



Figure 2.13: The outer stone face [203] of Rampart A [210] in Trench 2.



Figure 2.14: The inner stone face [209] of Rampart A [210] in Trench 2.

the structure unknowingly, or perhaps items selected for deliberate placement.

Rampart A was also identified during the excavation in Trench 4 at either side of the proposed entrance [412], with deposits [418/432] forming the eastern terminal and [411] the western terminal (Figure 2.9). Measuring 1.60 m in thickness and up to 0.40 m in height, the rampart consisted of external [419] and internal [414] stone facing with an earth [420] and stone core [425]. Deposits of stones [414 and 424] probably represent tumble from the facing of this rampart. Two radiocarbon dates were obtained from the rampart here. The first, from the earth core [423] dated to 400–210 cal BC (95% probability, SUERC-61632). The second, from the earth core [420], provided a date range of 3370–3100 cal BC (95% probability, SUERC-61208). As with the similar early date from Trench 2, it almost certainly indicates the accidental incorporation of earlier material into the wall. The later date, however, provides a *terminus post quem* for its construction. Notable finds from this area of the excavation include a damaged stone maul (SF409) and a fragment of a stone lamp or mortar (SF412).

Deposits of stones identified on either side of the rampart are evidence of its collapse. Within the fort, this material forms a platform [110], measuring at least 1.30 m in width by 0.26 m in depth. In the early

stages of the excavation the angular flat stones forming this platform appeared to have been laid to form a flat surface and were interpreted as a possible house foundation, but in fact it represents the collapsed inner face of the rampart.

Rampart B

Rampart B was identified in three locations: Trench 1a [1018/109]; Trench 2a as a rock-cut terrace [2005] or step; and in Trench 4 at its terminal at the western entrance (Figure 2.9). Trench 1a measured 10 m by 2 m, and was extended at the lower end for a further 2 m at a width of 1 m. First identified as a buried ground surface in Trench 1 [109], Rampart B was subsequently fully investigated when this cutting was extended into Trench 1a and found to consist of a compact reddish-brown sandy clay [1018] (Figure 2.15), forming a bank 2.16 m in thickness and up to 0.35 m in height. A deposit of earth [1006] and stones [1005] downslope is likely the rampart's collapse and included probable facing-stones. No finds were recovered from the rampart. To the north-west, on the downslope side of and overlying undisturbed remains of Rampart B [1018], a series of deposits were identified [1005, 1006, 1010, 1011, 1012 and 1017] and interpreted as slumping or collapse of the rampart [1018/109].



Figure 2.15: Rampart B [1014] in Trench 1a looking to the south-east.



Figure 2.16: Rampart B [2004], Rampart C [2005] and Rampart D [2006] with terraced foundations of bedrock [2003] in Trench 2, looking west.

Within Trench 2a, which measured 10 m by 2 m, Rampart B was identified as a rock-cut step or terrace (Figures 2.16, 2.18 and 2.19). Measuring up to 1.0 m in depth at the rear by 1.0 m in width, this is one of two possible artificial terraces on the slope (Figure 2.15).

The terminal of the rampart was investigated within Trench 4 at the western entrance (Figure 2.9). The rampart [408] survived as a stone face [403] with an earthen core [426] and two basal layers of earth and turf [427 and 428], suggesting that the rampart was largely turf built. A radiocarbon date obtained from the foundation deposit [427] of rampart [408] gave a date range of 740–410 cal BC (95% probability, SUERC-61209) and provides a *terminus post quem* for its construction.

Rampart C

Rampart C was identified in Trench 1a [1014] and Trench 2a [2006]. Within Trench 1a, the remains of its core [1014] measured 1.15 m in thickness by up to 0.31 m in height and contained neither datable material nor artefacts (Figure 2.9). It was abutted by a mixed deposit of collapsed material consisting of earth [1009] and stones [1008], the latter likely to be the former stone facing. A series of collapsed or slumping deposits [1007,

1008 and 1009] lay downslope, on the north-west side of Rampart C [1014]. Of these both [1007] and [1008] consisted of stone tumble, possibly the remains of stone facings of the rampart. The collapse contained a series of artefacts including later prehistoric ceramics (SF1021, SF1022, SF1026 and SF1030) and Neolithic flint tools, amongst the latter an arrowhead (SF1017). The material was widely distributed and seems likely to have gathered in a silt trap rather than having been deliberately placed or stored.

The evidence for Rampart C in Trench 2 consisted of collapsed stone evident downslope from the stepped bedrock on which it was constructed. Measuring up to 0.9 m in depth at the rear by 2.0 m in width, it is the upper of two possible artificial terraces on this slope (Figure 2.16).

Rampart D

Rampart D was identified in Trench 1a [1015] and Trench 2a [2014]. In Trench 1a, it measured 1.86 m in thickness and no more than 0.17 m in height (Figure 2.17). A deposit of stones [1013] along the inner edge of the rampart might be the remnants of a collapsed inner stone facing of the rampart [1015]. A radiocarbon date

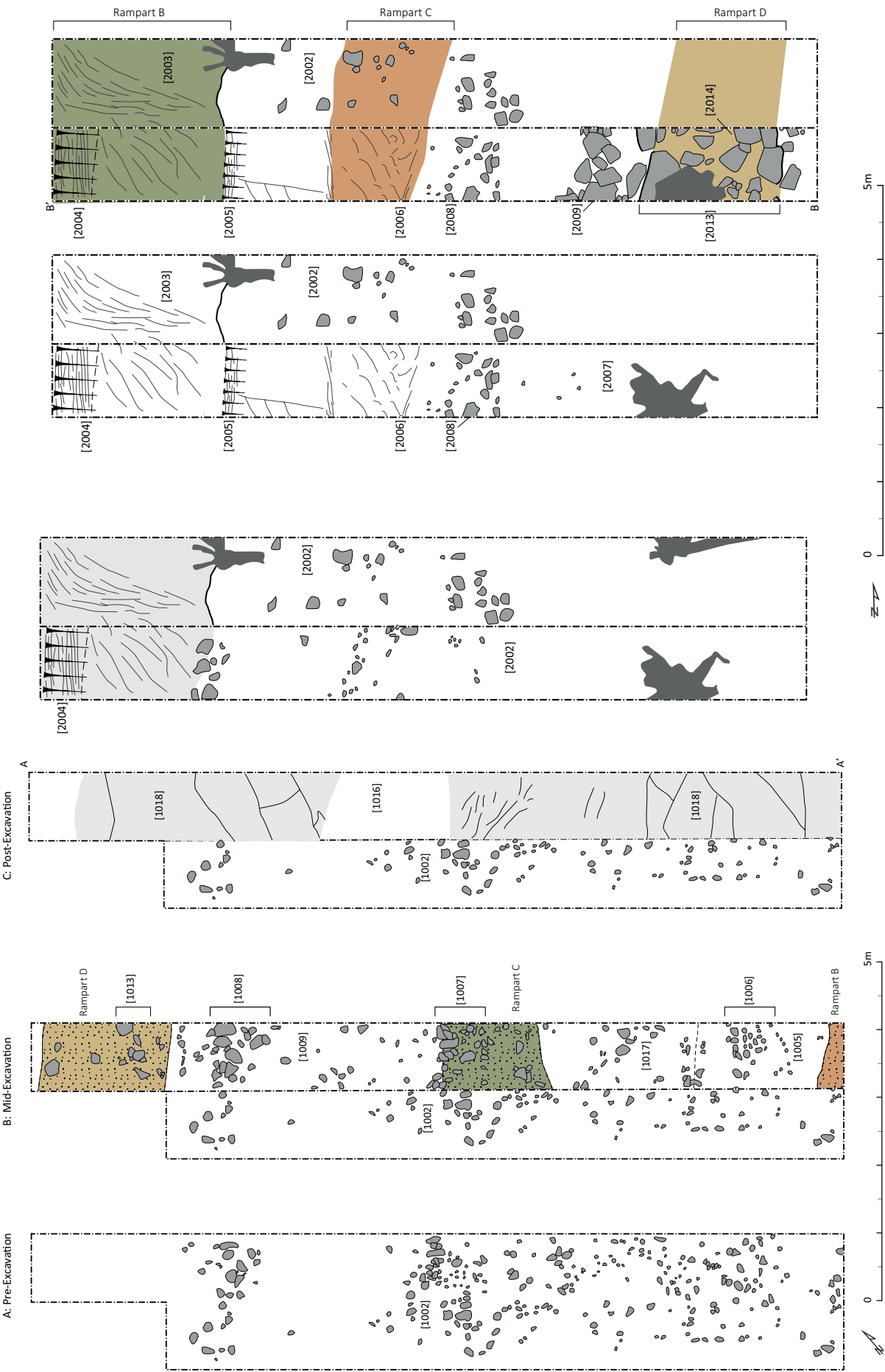


Figure 2.17: Plans of Trench 1a showing Ramparts B, C and D.

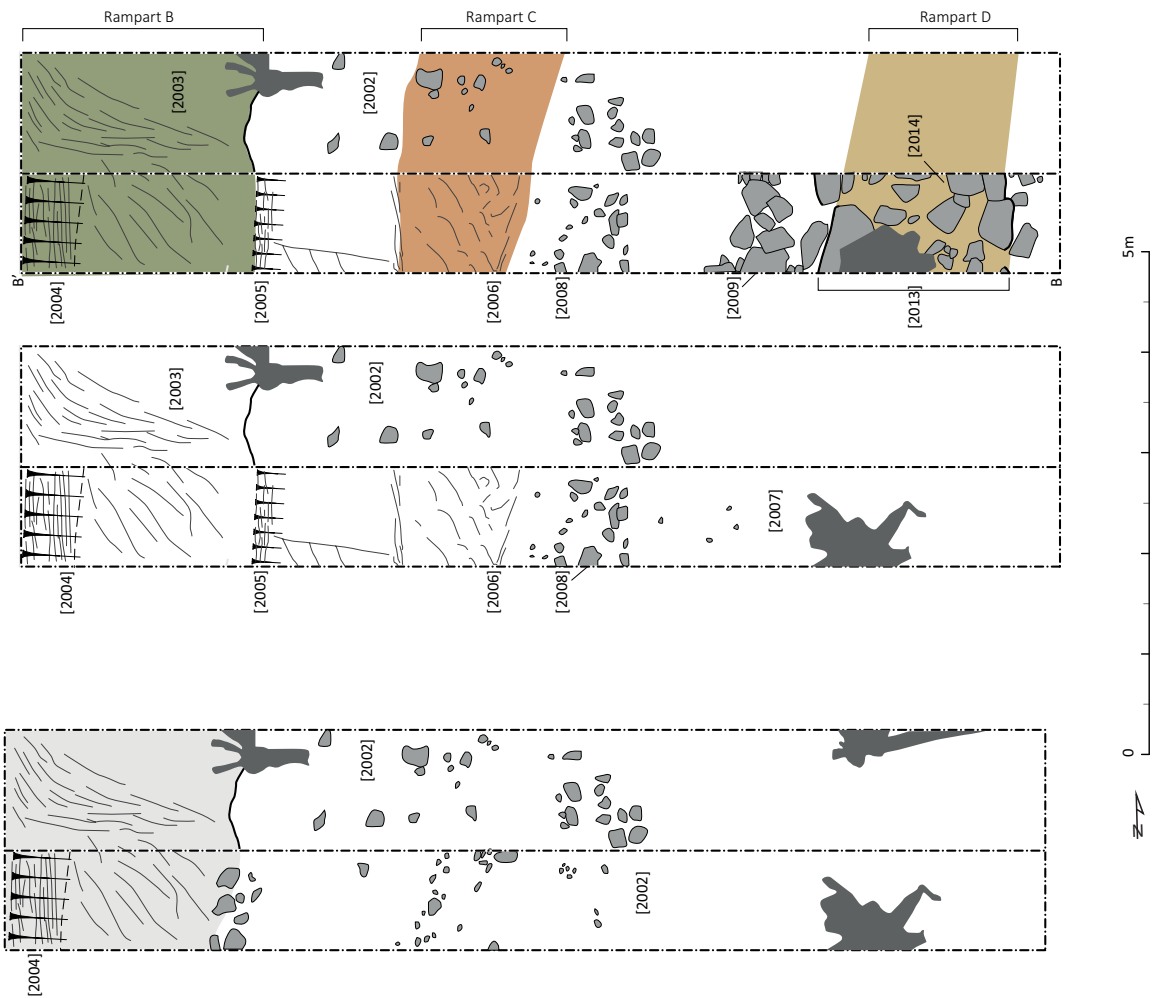


Figure 2.18: Plans of Trench 2a showing Ramparts B, C and D.

obtained from alder charcoal from within the rampart material [1015] provided a date range of 730–400 cal BC (95% probability, SUERC-61210) and a *terminus post quem* for its construction.

In Trench 2a, the rampart [2014] measured 2.2 m in thickness over stone faces up to 0.35 m in height (Figure 2.18). The outer [2012] and inner [2010] faces retained an earth [2013] and stone core [2011]. The outer face incorporated a possible dressed and squared block [2016], suggestive of a well-finished rampart façade. Preserved below the rampart was a buried ground surface [2017]. Two radiocarbon dates obtained from charcoal recovered within the earth core [2013] gave date ranges of 670–390 cal BC and 740–410 cal BC (95% probability, SUERC-61636 and -61211, respectively); these two represent *terminus post quem* dates for its construction. Two fragments of possible mauls (SF2009 and SF2010) were recovered from the core of the rampart and may have been used to manipulate the bedrock or dress facing-stones during construction.

To the rear of the rampart, the underlying ground surface had been cut away and the bedrock had been quarried to create the terrace [2006] that marks the line of Rampart C (Figure 2.19). Filling this quarry and overlying the remains of the rampart were deposits associated with the collapse/slumping of the upper ramparts [2015, 2009, 2008 and 2007]. Ceramic (SF2005) and flint (SF2004) small finds were recovered from these deposits. An unstratified whetstone (SF2002) and a spindle whorl (SF2001) were also recovered from Trench 2a.

Entrances

The topographic survey mapped two possible entrances (Figure 2.6) of which only the western was examined in any detail. There the inner end of the entrance passage was excavated in Trench 4. Trench 2 cut across the ramparts to the north of the east entrance, and though its lower end at Rampart D extended to the edge of the sunken passage suggested by the topographic survey (Figure 2.9), no structural features were recorded.

The western entrance was located at the top of a steep approach, marked by a terrace mounting the slope obliquely from the south-west. Over a distance of c. 10 m at the upper end, this terrace lay roughly parallel with the inner rampart (A), and the gradient must have served to emphasise the height of the inner rampart along this sector of the circuit. Traces of the two outermost ramparts (C and D) petered out below the terrace, but at the upper end Rampart B appeared to terminate and there was a gap in Rampart A (Figure 2.20). Trench 4 was placed to encompass the terminals of Rampart A and the passage between them, and

measured 6.00 m by 3.00 m, with a 2.00 m by 3.00 m extension added to the north-east and south-west to form a T-shape. On excavation of the entrance [412], an area of worn bedrock [410], was found to mark the floor of the passage through a gap in Rampart A measuring approximately 4 m in width. Rampart B [408] was present on the northern edge of the trench. Bedrock was exposed across the entire trench [405/402/410/415], but the smoothed surface [412] was no more than 1.20 m in width, extending east-west across the trench (Figure 2.21). At the south-west corner of the trench the bedrock had been cut [433] to form a scarp flanking the south-eastern edge of the entrance way [412]. The area of bedrock above this cut [411] was probably the foundation for Rampart A, though little trace of the rampart itself could be detected. Manipulation of the bedrock here had not only improved the entrance passage, but had created a near vertical face below the foot of Rampart A, further enhancing its height at the entrance. In summary, the ramparts at this entrance appear to be positioned to control the direction of approach, forcing traffic to mount the slope obliquely on a quarried terrace at the foot of Rampart A, thus exposing the right hand side of those entering the fort.

Although the eastern entrance was not identified by excavation, the topographic survey suggests that the lines of approach were controlled in a similar fashion. The outer ramparts appear to terminate on the edge of an extended sunken passage approaching from the north-east, funnelling traffic between the defences and with steep cliffs falling away to the south (Figure 2.6 and 2.7). At the inner end of the entrance the passage is overlooked by Rampart A for c. 15 m, the gradients again emphasising the height of the rampart and exposing the visitors right hand side on approach.

Internal occupation and deposit

Two trenches were excavated across surface features within the interior. Trench 3, which measured 10 m by 2 m, was excavated across a possible rampart observed on the south-east flank of the hilltop (Figure 2.9), while Trench 5, measuring 5 m by 5 m, was located over a scoop identified as a possible house platform; both features had been identified during the topographic survey (Figure 2.6).

On excavation it was clear that the possible rampart in Trench 3 was a deposit of upcast material [303/305] relating to the construction of a modern path [302], perhaps a landscaping feature originally created by the estate (Figure 2.22). The removal of the overburden [303/305] across the upper end of the trench revealed the bedrock [310], into which a shallow, steep-sided, flat based-channel was cut [306]. Oriented north-east to south-west, this channel extended for 4.5 m within

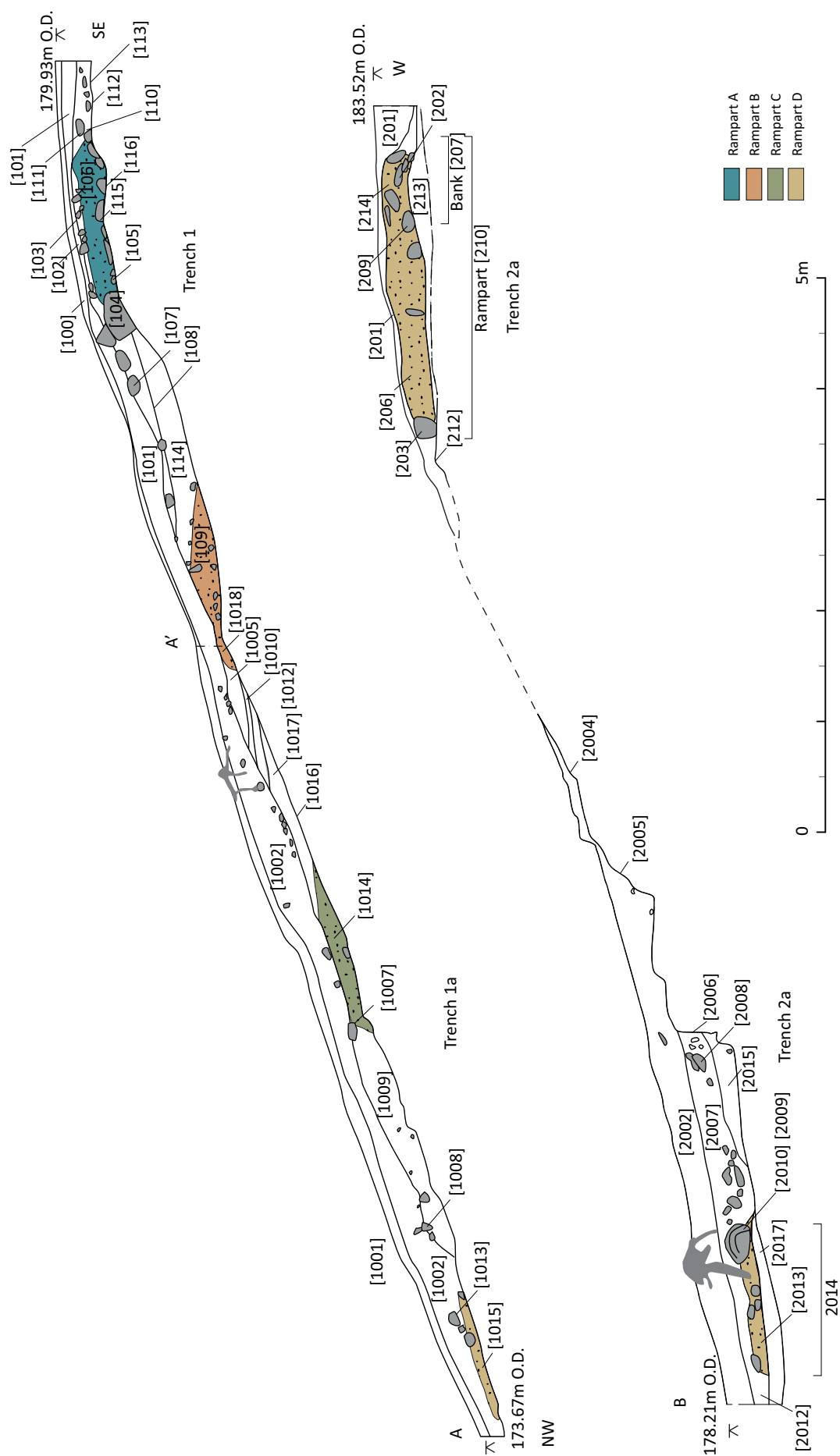


Figure 2.19: Sections through Trenches 1 and 2 detailing Ramparts A, B, C and D.

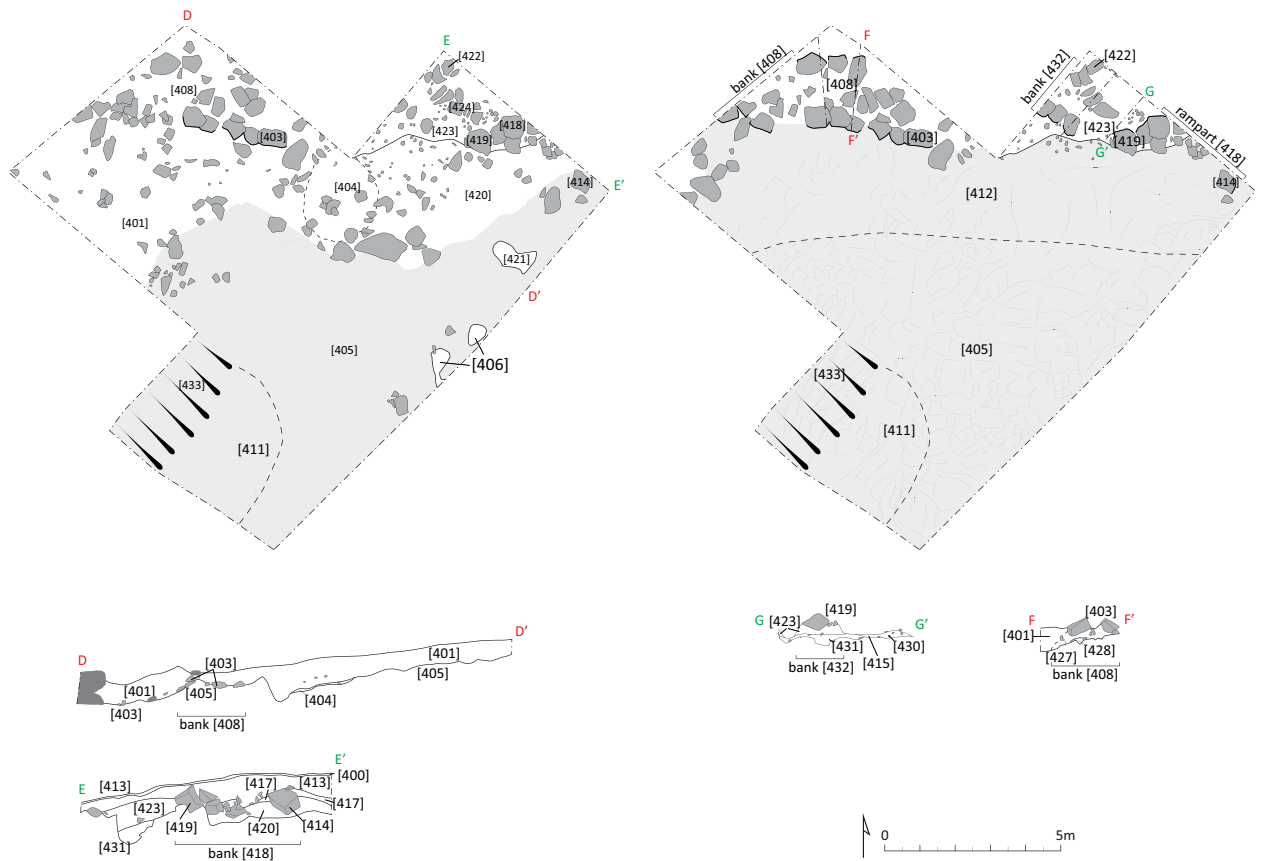


Figure 2.20: Trench 4 plans and section showing details of the manipulated bedrock entrance [412] with Ramparts A and B to the north.



Figure 2.21: The western entrance [412] showing cut bedrock [433].



Figure 2.22: Trench 3 showing the overburden [303] overlying a bedrock cut channel [306].

the trench; it was 0.6 m wide and 0.22 m deep and filled with two discrete deposits; that to the north-west [308] was a dark brown to black friable sandy silt containing burnt stones and frequent charcoal flecks, while [304] to the south-east was a mid-grey sandy silt with frequent charcoal flecks.

Set into deposit [308] were two possible fragments of paving [307 and 309] (Figure 2.23). Paving [307] consisted of two large angular sandstone blocks, while [309] lay immediately to the north of [307] and consisted of one large broken slab measuring 0.80 m by 0.40 m. Overlying the slabs [307 and 309] was a deposit of dark brown soft sandy silt with occasional charcoal flecks and burnt bone [303]. A radiocarbon date obtained from a charcoal-rich deposit [304] overlying the bedrock gave a date range of 410–230 cal BC (95% probability, SUERC-57073). Perhaps the two most interesting artefacts from the fort were identified in this context: a possible gaming piece (SF303) and a fragment of shale bracelet (SF302). While not enough material survived to allow confirmation of the nature of this context, it represents either midden-type material deriving from activity on the hilltop, or possibly levelling up of the bedrock with *in situ* paving, perhaps as part of a larger structure.



Figure 2.23: The area of possible paving [307 and 309] in Trench 3.

Trench 5, located over the scoop identified as a possible house-platform in the interior (Figure 2.24), revealed a simple stratigraphic sequence in which bedrock [502] or natural glacial till [504] was overlain by a colluvial hill wash deposit [503] including some larger stones and turf/topsoil [501]. No features of anthropogenic origin were identified, demonstrating that the scoop was of natural origin and no other internal features were identified as possible house platforms in the survey.

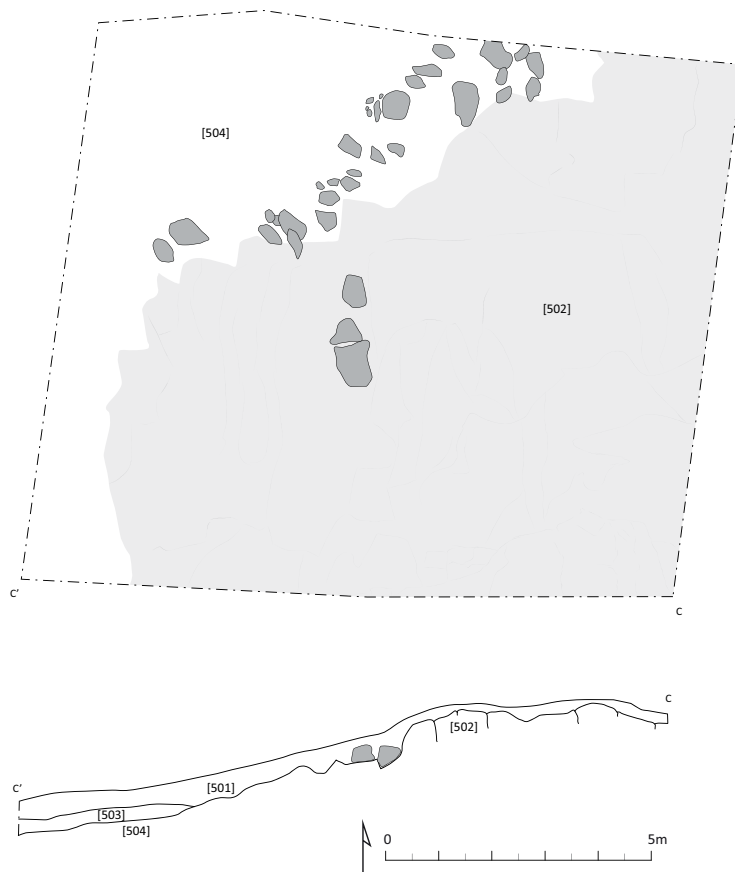


Figure 2.24: Trench 5 plan and section showing bedrock [502], glacial till [504], colluvial hill wash deposit [503] and turf/topsoil [501].

2.3 The radiocarbon dates

Derek Hamilton

The nature of the evaluation offered limited opportunity for an extensive programme of radiocarbon dating, and several samples were rejected by SUERC due to the poor quality of the charcoal. Charcoal and hazel nutshell from beneath Rampart A has identified Neolithic activity on the hilltop, dating to the late 4th millennium cal BC (SUERC-57072 and -61208). The remaining six radiocarbon results all indicate the hilltop enclosure is primarily dated to the mid-1st millennium cal BC, placing it in that ‘moment’ of extensive hilltop enclosure identified by Hamilton and Haselgrove (2019) at or just after 500 cal BC (Table 2.1).

The radiocarbon dates from Moncreiffe were used to estimate the start and end of the Iron Age activity on the hilltop, while also using the fact that any material recovered from within a rampart was a *terminus post quem* for their construction, even if the death and deposition of the material was very close in time to the construction. To do the latter, short sequences were constructed

Table 2.1: Radiocarbon dates recovered.

Laboratory code	Material	Context	Structure	Radiocarbon age (BP)	$\delta^{13}\text{C}$ (‰)	Calibrated date (95% probability)
SUERC-61208	Charcoal: Alder	420	Rampart A	4540±28	-25.2	3370–3100 cal BC
SUERC-57072	Nutshell: Hazel	208	Rampart A	4474±29	-24.2	3340–3030 cal BC
SUERC-61209	Charcoal: Alder	427	Rampart B	2424±29	-26.5	740–410 cal BC
SUERC-61211	Charcoal: Alder	2013	Rampart D	2426±29	-27.0	740–410 cal BC
SUERC-61210	Charcoal: Alder	1015	Rampart D	2403±29	-25.4	730–400 cal BC
SUERC-61636	Charcoal: Alder	2013	Rampart D	2372±29	-25.2	670–390 cal BC
SUERC-57073	Charcoal: Hazel	304	Occupation Trench 3	2308±31	-24.7	410–230 cal BC
SUERC-61632	Charcoal: Alder	423	Rampart A	2271±29	-28.1	400–210 cal BC

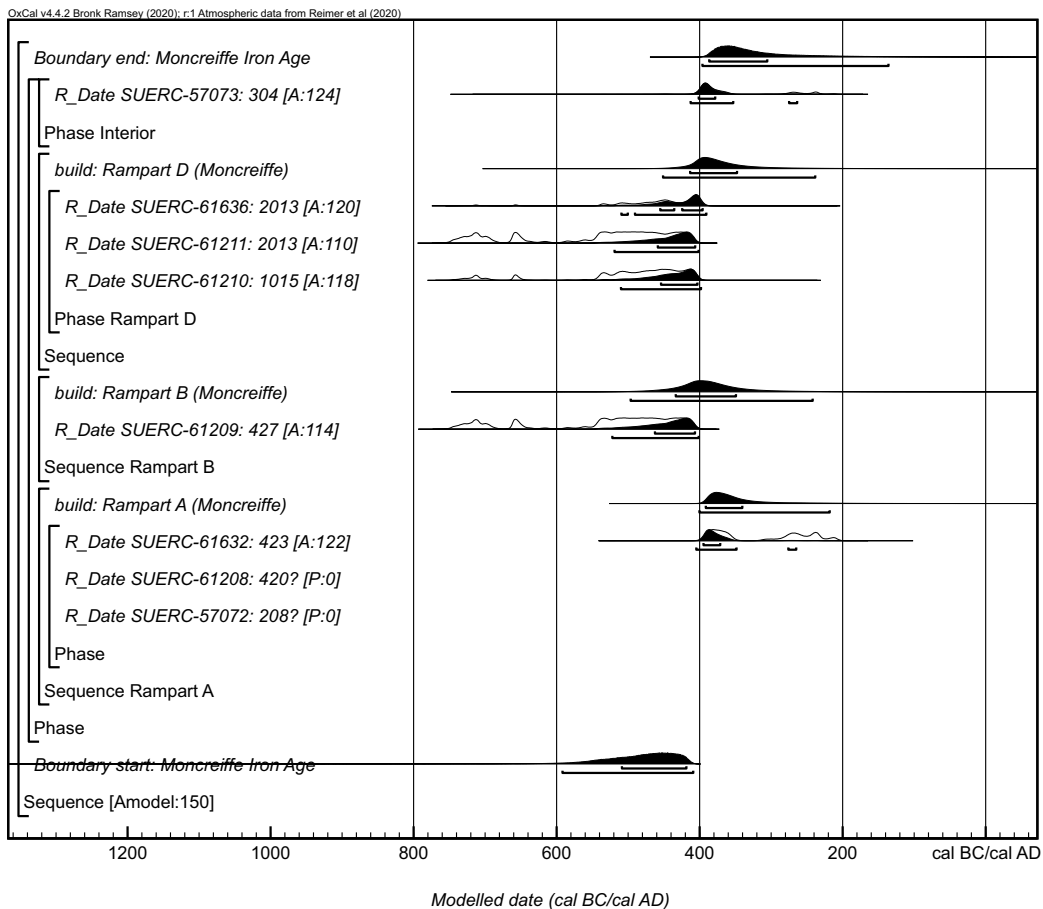


Figure 2.25: Chronological model for the radiocarbon dates from Moncreiffe. Each distribution represents the relative probability that an event occurred at some particular time. For each of the radiocarbon measurements two distributions have been plotted, one in outline, which is the result of simple radiocarbon calibration, and a solid one, which is based on the chronological model. The large square 'brackets' along with the OxCal keywords define the overall model exactly.

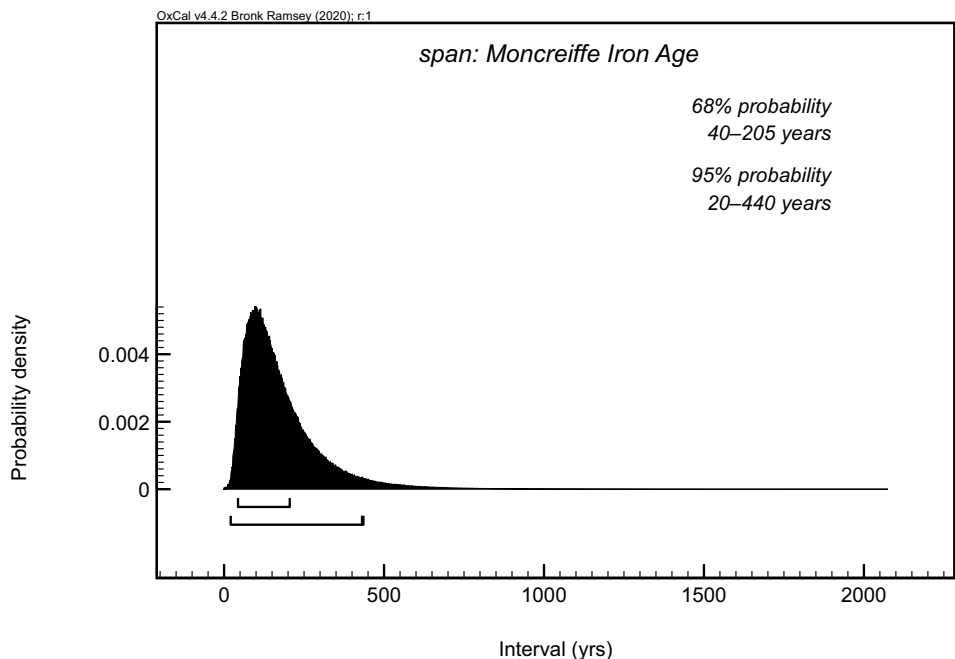


Figure 2.26: Span of the Iron Age activity at Moncreiffe. The probability distribution is derived from the chronological model shown in Figure 2.25.

within OxCal that contained the radiocarbon results in a grouping earlier than the construction 'event' date. The two Neolithic dates were excluded from the mathematical modelling, but are listed in the output figure (Figure 2.25) within the group of dates they formed a part of in the core of Rampart A. As there was no clear archaeological evidence for a hiatus in the middle of the Iron Age activity on the hilltop, these dates are considered as representing a single phase of relatively continuous activity. This is not to say there were no periods of inactivity, but that any periods were too short to identify archaeologically and so also with standard precision radiocarbon dating.

The model has good agreement ($A_{\text{model}}=150$) and estimates the fort activity began in 595–405 cal BC (95% probability; Figure 2.25; start: *Moncreiffe Iron Age*), or in 510–415 cal BC (68% probability). This dated activity ended in 400–135 cal BC (95% probability; Figure 2.25; end: *Moncreiffe Iron Age*), or 390–305 cal BC (68% probability). The overall span of the dated Iron Age activity was 20–440 years (95% probability; Figure 2.26; span: *Moncreiffe Iron Age*), or 40–205 years (68% probability).

2.4 The artefacts

A catalogue of the diagnostic artefacts can be found in Appendix B.

The ceramics

Dawn McLaren

A small assemblage of pot sherds deriving from coarse handmade prehistoric vessels was recovered from two contexts across the excavated areas. These consist of a total of 47 individual sherds, weighing 967.9 g, consisting of featureless undecorated body sherds from a minimum of two pots. The vessels represented by these sherds are thick-walled, coil-constructed, bucket- or barrel-shaped pots which have been crudely produced and irregularly fired. Although not closely datable, vessels of this form are broadly consistent with a Late Bronze Age/Early Iron Age date. A summary of the detailed catalogue from the archive is presented below.

Vessel 1 is represented by a single body sherd (3.6 g; SF415, not illustrated). It is abraded and very little of the original surfaces survive, limiting what can be determined about its original form or finish. The sherd's abraded and damaged condition suggests it had been exposed to the elements for some time prior to becoming incorporated into hill wash [416] within Trench 4, which was found to overlie Rampart A [418] flanking the western entrance into the fort.

Ninety-eight percent ($Q=46$; 964.3g; SF1021, SF1022, SF1026, SF1030) of the sherds came from a deposit [1005] that had probably collapsed from Rampart B [109] in Trench 1A. Several sherds have lightly abraded edges and surfaces, implying limited erosion or weathering prior to incorporation, and may represent a single deposit of material which was rapidly washed downslope. Despite the variation in condition – some sherds are lightly abraded on one edge or face whilst other edges are fresh – the lack of any rim or base sherds implies that a substantial portion of an already broken pot was discarded in a single event rather than this deposit representing an accumulation of waste built up over time.

These sherds could well derive from a single vessel (Vessel 2; Figure 2.27) as little variation in the fabric or wall thickness was observed, but their friable condition prevented any joining sherds being recognised to confirm this interpretation. Based on the curvature of the largest surviving sherd, which comes from the lower portion of the pot, it is possible to suggest a large bucket- or barrel-shaped pot with steeply angled thick walls (T 16–18 mm) and an internal diameter towards the base of at least 200 mm. There appears to have been little attempt made during production to mask or properly knit together the coil junctions, which has resulted in the pot splitting along the junctions after initial breakage. The pot is undecorated, but the external surface has been smoothed when wet to try to mask protruding grits and this has resulted in accidental surface impressions from grass stems and hair, as well as occasional finger smears.

The fabric is consistent across the assemblage, comprising a fine sandy-silt clay with frequent small natural mica and quartz flecks to which moderate quantities (20–30 %) of angular rock fragments and occasional organics (burnt out during firing) have been added. Based on the degree of oxidation and colouration visible across all the sherds, this fabric has fired hard but inconsistently. In terms of their fabric, this assemblage and the sherds recovered during excavations at Moredun (Chapters 3.4 and 4.2) appear to be manufactured from a common raw clay source.

In the absence of surviving rim sherds for either pot, classification of the form of the vessels is based on the body sherds alone, limiting the inferences that can be made regarding style and date. The thick walls, the large size of the original vessels as indicated by the size and curvature of the surviving sherds, and the moderately gritted fabric are all broadly consistent with other later prehistoric assemblages from south-eastern and central-eastern Scotland.

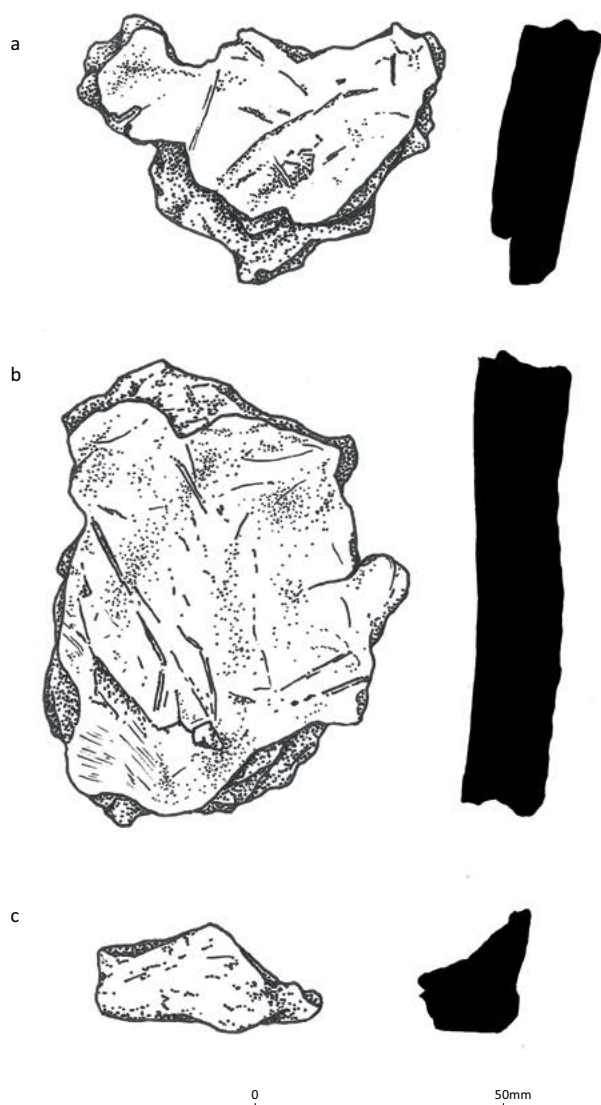


Figure 2.27: Sample of sherds representing Vessel 2 from [1005]: a) body sherd (SF1026), b) body sherd (SF1030), c) basal angle sherd (SF1030).

In discussing the large assemblage of later prehistoric pottery recovered from Broxmouth fort (ID 58800), East Lothian, Cool (1982) initially identified two broad groups of sherds based on size, thickness, form and fabric: Type 1 sherds were from thick-walled heavily tempered pottery; and Type 2 from vessels of medium wall thickness with less temper. Reassessment of this typology since (MacSween and Cool 2013) has shown that the initial grouping into only two broad types has not only masked idiosyncrasies within the Broxmouth assemblage itself, but in its turn skewed interpretations and comparisons that have been drawn in the assessment of more varied assemblages elsewhere (MacSween and Cool 2013: 248). It has also demonstrated that there is a considerable overlap in

the occurrence of both forms at Broxmouth. It remains the case that Type 1 sherds are more common in the early phases of the fort's occupation (Early to Middle Iron Age), but Type 2 pots appear to have a longer currency of use, becoming the predominant form and present in much larger numbers during the later phases of occupation (Middle to Late Iron Age) (MacSween and Cool 2013: 248, illus 10.9). As noted by MacSween and Cool (2013: 248), the typology at Broxmouth should be treated with caution. Nevertheless, it provides a useful framework around which discussions of comparable assemblages can be considered, particularly those like Moncreiffe, where no diagnostic sherds survive. On the basis of the Broxmouth typology, the Moncreiffe assemblage is consistent with Cool's Type 1 sherds associated with Phases 1 and 3 at Broxmouth (from c. 640/570 BC to c. 295/235 BC; Armit and McKenzie 2013: 18–19), the chronology of which is broadly consistent with the radiocarbon date of 730–400 cal BC (at 95%; SUERC-61210) returned from a sample of carbonised alder from context 1015, Rampart D, also from Trench 1A.

The coarse stone

Dawn McLaren

A total of 32 items of possible worked stone were recovered, consisting of a fairly restricted number and range of tools, fire-cracked and heat-affected stones, and occasional household items. Within this number, four stones (SFs 216, 410, 417 and 1020) have been identified as natural and will not be discussed further. The majority of the worked stone objects are hand-held tools with wear reflecting a variety of day-to-day tasks involved in household activities and crafts. They include cobble grinders, pounders and fragments of more robust saddle querns and grinding stones, as well as a stone spindle whorl, possibly unfinished, a whetstone and a possible lamp or mortar. More unusual items recovered include a heavy-duty stone maul or hammerstone and a small spherical gaming piece or trinket. While the assemblage is neither large nor comprehensive in terms of the range of tool-types present, it allows a useful glimpse into the resources available and activities undertaken by the community, and in some instances provides a valuable proxy record for items of material culture which have not survived.

Raw materials

Simple tools dominate the coarse stone assemblage. Most of these were water-worn and naturally rounded pebbles without any evidence of modification prior to their use, the exceptions being the saddle quern (SF221, Figure 2.28), the possible stone lamp or mortar (SF412, Figure 2.29a), the heavy-duty stone maul (SF409, Figure

2.30) and the spindle whorl (SF2001, Figure 2.29c). While it is likely the pebbles and cobbles used to make these objects were collected fairly locally, they were not from the hilltop itself but were sourced elsewhere and brought to the site for use.

Food processing

A fragment of a saddle quern (SF221, Figure 2.28), possibly used to grind grain into flour, was found amongst the stones of the inner kerb of Rampart A [202] in Trench 2. Saddle querns were in use from early prehistory to early medieval times, despite the development of the more efficient rotary quern in the Iron Age (Caulfield 1978). The saddle quern from Moncreiffe is fragmentary and the lithology is incredibly friable due to later heat-damage, but enough of the original surface survives to indicate that it was produced from a water-rounded boulder, presumably sourced from a nearby river or as a glacial erratic. A further two grinding stones, possibly fragmentary rubbing stones or grinding surfaces, are present; one (SF201), came from the same deposit [202] as the saddle quern just mentioned, and the second (SF411) was unstratified. Although rubbing stones were used in conjunction with saddle querns, the examples from the site do not include a matching pair.

The incorporation of these tools within the make-up of the rampart is of interest and follows a pattern noted across Scotland in the later prehistoric and early medieval periods, where querns (both saddle and rotary-types) are built into thresholds and boundaries (Armit 1999: 584; Hingley 1993: 41; Heslop 2006: 73–80). With such small numbers of tools involved here, it is unclear whether this is simply the expedient re-use of broken or exhausted tools as building materials or whether there is a more structured and symbolic mechanism behind their incorporation. The re-use of querns within site boundaries or recurring placement within specific areas of a structure is seen locally at Aldclune (Hingley *et al.* 1997) and Black Spout, Pitlochry (Strachan 2013: 30, illus 36), *inter alia*.

Cobble tools

The assemblage includes six cobble tools, each formed on water-rounded cobbles and displaying a range of wear-types indicative of a variety of functions and uses. While the small group size does not warrant detailed wear-pattern analysis, it is useful to consider the evidence of wear in a little more detail. In general, each tool displays only light wear as evidenced by poorly-developed use-wear facets. The only exception being a grinder (SF220, Figure 2.29b) which has a multi-faceted area of abrasion at one end. The abutting and overlapping areas of abrasion indicate that the tool was rotated and re-positioned several times by the

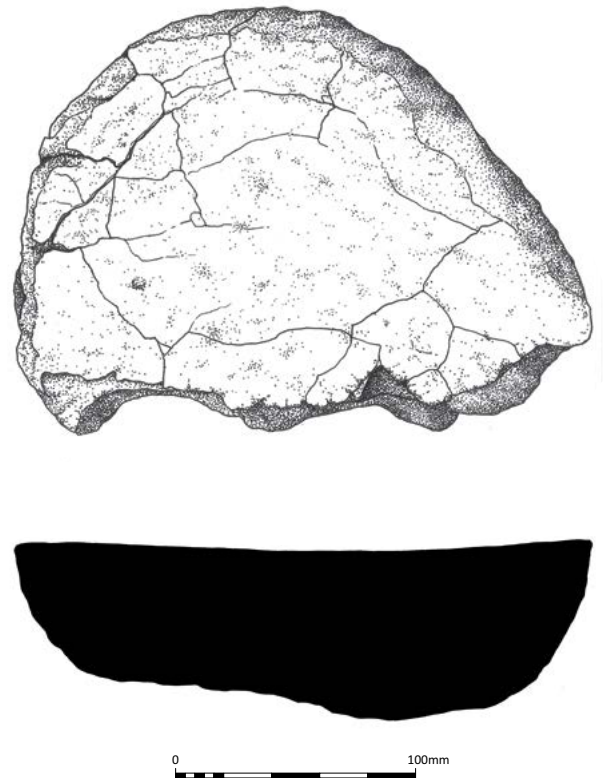


Figure 2.28: The fragmentary and heat-affected saddle quern (SF221).

user. It is not possible to quantify the duration or the number of episodes of use, but this well-developed abrasion implies it was used repeatedly. By contrast, the other cobble tools display only slight traces of wear suggesting perhaps a single episode of use prior to discard. In terms of the types of wear identified, abrasion is the most common on this group of hand-held tools. Three grinders (SF220), (SF223) and (SF402) were used as an abrasive at one end of the cobble (in one instance, (SF402), only one end survives) and a stone with an abraded face (SF1015) may have been used as a sharpening stone. Also recognised was a single lightly-used pounder (SF504) and a cobble with a discrete area of smoothed polish (SF504) on one face that may have resulted in its use as a smoother for hide processing (Lane and Campbell 2000: 179). In contrast to many other cobble tool assemblages, none of these items displayed evidence of more than one type of wear.

Notched hammerstone/maul

An unusual heavy-duty stone maul or hammerstone (SF409, Figure 2.30) was found adjacent to Rampart A [418/432] in hill-wash [404] at the west entrance.

It is a large sub-square water-rounded cobble with a shallow pecked crescentic notch at the same height on

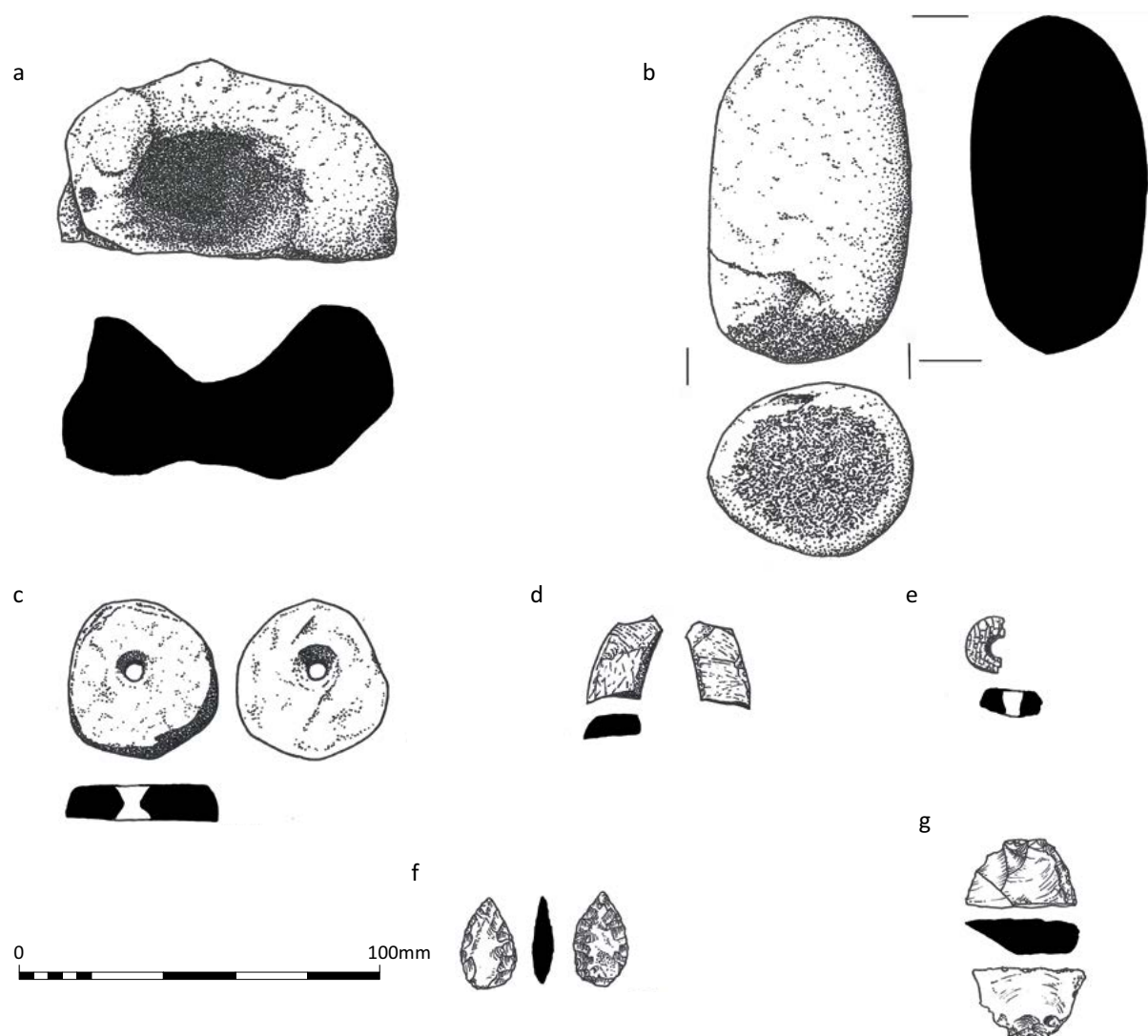


Figure 2.29: A selection of coarse stone, shale and struck lithics: a) stone lamp (SF412), b) grinder (SF220), c) spindle whorl (SF2001), d) shale bangle fragment (SF302), e) jet bead fragment (SF01), f) flint arrowhead (SF1017), g) core-rejuvenation flake (SF1018).

two opposing long edges to help secure the haft. One end of the cobble is extensively damaged as the result of use with heavy physical force, while the opposite squared butt is also pitted from wear but has not seen such vigorous action. The extent of damage to the tool is such that one face has cleaved off as the result of the stone cracking from the working tip through the thickness of the stone to the butt, presumably during use. The extent of damage and traces of wear imply that it was likely used to dress stone or quarry rock. The stone is likely to have been discarded after breakage as the tool would no longer have been functional. Although we would anticipate that heavy-duty hammerstones and mauls would have been a common component of the later prehistoric toolkit, used in the construction of buildings and fortifications, they are rarely recognised amongst excavated assemblages

in Scotland. They are known, however, in association with early mining and quarrying activities and are variously described in the literature as grooved stone mauls or hammerstones (Pickin 1990; Timberlake and Craddock 2003). The notches on two opposing edges of the stone are distinct but there are hints that similar notches may have originally existed on the other two long edges. These would originally have held in place an organic binding such as rope, sinew or twine. A band of polish from the soft binding rubbing against the faces of the stone during use can be observed and wear has also resulted in the softening of the peck marks made during manufacture in the interior of the notches. While this binding was probably to secure the tool in its haft in the manner of Bronze Age examples from Copa Hill, Cwmystwyth (Timberlake and Craddock 2003), the pitting on the unfractured end of the stone



Figure 2.30: Heavy-duty stone maul (SF409). Note pecked notches for hafting on opposing long edges.

tool is an interesting feature that may indicate that the maul was used in the manner of a large chisel – being held in place against the rock to be worked and driven with a wooden mallet. Alternatively, the pecking visible on the butt of the tool could simply be from less vigorous use of this end as a hammer. In addition to the maul just described, there are three angular spalls (SF2009), (SF2010) and (SF2012), which have detached from the faces of large heavy ovoid cobbles. Each has fractured from a percussion point at one end of the cobble, resulting in the stone splitting along its length and the spalls detaching. It is not certain whether this fracture damage is the result of use as a hammerstone, but the discovery of the notched maul confirms use of the technique on site and therefore supports this possibility.

Similar mauls, some with more developed pecked grooves for hafting running around the waist of the tool, are known amongst antiquarian finds from south-west Scotland, such as those from Barhullion, (Maxwell 1889: 213, fig 18; NMS: X.AK 158), Balcraig (NMS: X.AK 161) and Kirklauchline, Stoneykirk (NMS: X.AK 133). However, they are not common amongst excavated later prehistoric artefact assemblages in Scotland and are typically interpreted as possible ore-crushing and mining tools. That certainly appears to be the case for those listed above due to their proximity to potential sources of copper and lead, for which there is growing evidence of exploitation during the Bronze Age and Iron Age (Hunter *et al.* 2006: 50, fig.1). A stone with a pecked groove around its waist was found at Aldclune monumental roundhouse, Blair Atholl (Cool 1997: 443, ill. 30, no. 46), but its small size and lack of fracture damage to the tips suggest that it was intended as a suspended weight rather than a hammerstone.

Although the number of notched and grooved hammerstones or mauls recognised in Scotland remains small, sufficiently large numbers are known from England and Wales to allow them to be classified into six broad types (Pickin 1990: 39–40, fig 2). This classification is based on the extent of preparation and modification of the surfaces, with Type 1 at one end of the spectrum being unmodified prior to use, to Type 6 at the other, with multiple-grooved or notched surfaces. The more complete example from Moncreiffe (SF409) broadly conforms to Pickin's Type 3a, with deliberate pecked notches on both sides of the tool but lacks any area of surface pecking on the faces (Pickin 1990: 40). The other, more dubious, examples from the site, which are so fragmentary that they cannot be categorised confidently, are likely to derive from unmodified cobbles of Pickin's Type 1. Similar examples of both unmodified, notched and partially grooved hammerstones were found in association with a small to medium sized Bronze Age mine at Comet Lode opencast, Copa Hill, Cwmystwyth, but it was noted there that only 9% of the stone tools displayed evidence of modification for the purposes of hafting (Timberlake and Craddock 2013; Timberlake and Marshall 2013: 78, fig 3). At Moncreiffe, there is little to substantiate a mining or metallurgical connection, but the quarrying and dressing of the bedrock confirmed in Trenches 2A and 4, and the construction and maintenance of stone walls more generally, are activities for which such a tool would have been eminently suitable.

Hollowed stone

A fragment of a sub-square sandstone mortar or lamp was recovered from Trench 4 (SF412, Figure 2.29a) where it had been incorporated into Rampart A. It is a roughly shaped block of sandstone which has broken off-centre across a round-based conical hollow that covers the central portion of one face and has been pecked to shape. A second, shallower, peck-marked hollow is present on the opposing face. No obvious heat damage or discolouration from fire is present to indicate its use as a lamp but some staining on the surviving edges is noted. Softening of the outlines of the peck marks from manufacture, on the interior of the larger hollow, implies that the facet was probably used to grind foodstuffs, pigment or medicine in conjunction with a stone pestle. Several examples of stone pestles come from other forts, such as Broxmouth, East Lothian (Cool 2013: 357–59).

Spindle whorl

A single small flat disc with an off-centre perforation (SF2001, Figure 2.29c) was unstratified within Trench 2A. It may have been intended to have been used as a whorl but it is irregular in shape with distinctive

abrasion in evidence around the edges with no attempt to smooth or finish. The perforation has been made by boring from both faces of the stone creating a hole with an hour-glass cross-section, but in this instance they are misaligned and the perforation that has been produced is so narrow it is unclear whether the disc could have functioned as a spindle whorl.

Possible gaming piece

A small spherical waterworn pebble, possibly a gaming piece (SF303), was recovered from Trench 3. Clearly collected from further afield, it lacks evidence of working, but its water-rounded, smooth and slightly shiny surface suggests that it was deliberately brought to the site. While possibly no more than a beloved trinket collected from a riverbank or shore, its similarity to the shaped stone balls used as gaming pieces from southern Scottish forts (Cool 1982: 95–96), including Traprain Law (ID 56374) and Broxmouth (Cool and Baxter 2013), is intriguing. Such a purpose for its collection here cannot be ruled out despite the lack of any evidence of modification or wear. Cool's analysis of shaped stone balls suggests a fourth/third century BC currency for their use (Cool 1982: 95–7), but more recent finds, such as those from Traprain Law, suggest that this chronology may extend into the Roman Iron Age (Rees and Hunter 2000: 431).

Fire-cracked stones

In addition to the tools and household items described, several fire-cracked and heat-affected stones were recovered. These generally lack any evidence of modification or use beyond their fire-cracked surfaces (SF200), (SF209), (SF211), (SF225), (SF501), (SF1011), and general find (GF 001). The majority came from Trench 2 to the north of the eastern entrance. Most are water-rounded cobbles, probably sourced from a local watercourse, and are discoloured and fractured as the result of heat damage, probably from use as pot boilers to heat water or liquid-based foodstuffs. One of the cobble tools, a grinder (SF402), and a saddle quern fragment (SF221) were also fire-cracked suggesting secondary use once they had become redundant as tools. A further three stones are less straightforward to classify: SF407 [404] and SF1002 (unstratified) have heat discoloured surfaces but are otherwise unmodified; and SF404 (from topsoil) is fractured, probably as the result of natural frost-and-thaw shattering.

In summary, despite the limited size and range of the coarse stone assemblage, individual items evidence a variety of daily household tasks including food preparation and consumption, and textile production, while the fragmentary whetstone provides insight into aspects of material culture for which evidence has

not survived. Although the number of quern stones and grinding surfaces was small, their typical use for cereal processing probably attests to the consumption of grains and flour at the fort. Grain-processing tools serve as a tangible reminder that the fort functioned within a wider economic and social network beyond the hill itself. The items of coarse stone are types commonly encountered on later prehistoric sites across eastern Scotland and few are sufficiently distinctive to provide close dating beyond a broad Iron Age date. The most notable item is arguably the heavy-duty notched hammerstone or maul, probably used to roughly dress stone blocks and the bedrock itself during the construction. While not unexpected on a site of monumental construction with earth and stone walls, such tools are rarely found or recognised and the Moncreiffe example is a valuable addition to the small corpus of similar items known across Scotland.

The worked shale and related materials

Fraser Hunter

Two items in black organic-rich stone were recovered from Moncreiffe, while a larger assemblage of 21 items was recovered from Moredun (Chapter 4.7). Both assemblages include a range of unfinished objects, indicating elements of craft production at both sites. A more detailed discussion of the sources of the raw material, production techniques involved, finished products and the significance of this evidence of craft are explored in consideration of the Moredun assemblage (Chapter 4.7). A summary of only the Moncreiffe bangle fragment (SF302, Figure 2.29d) and bead (SF01, Figure 2.29e) is presented here.

The unfinished bangle fragment (SF302), broken during the latter stages of abrading it to its final shape was recovered from context [304] which dated to 410–230 cal BC (at 95.4% probability, SUERC-57073), a valuable chronological indicator for such items. The second item (SF01) is harder to contextualise: it is part of a bead, probably of globular form with flattened ends. The form is not distinctive, but the material is – the cracking pattern indicates it is made from jet. This would be exceptional in a Scottish Iron Age context, where jet was exceedingly rarely used, but the context is not secure, as it comes from topsoil. It is possible that it is disturbed from an earlier feature on the site, as jet was imported for jewellery in the earlier Bronze Age in particular, but its form is not characteristic of such items. It could also be a much later item, as jet was used for rosaries in the medieval period and for mourning jewellery in the recent past. While an Iron Age date cannot be excluded, the context means one cannot rest too heavy an interpretative weight on it.

The vitrified material

Dawn McLaren

Only two fragments of vitrified material were recovered during the excavations: neither was well stratified, and both came from Trench 2. One (SF210), is a small angular fragment of possible vitrified ceramic, heat affected on one face but displaying a spectrum of colour and texture from a red-brown, friable, heat-affected clay to a vesicular, dark grey glassy vitrified surface on the interior. It weighs a total of 12 g and is not magnetic. The second piece (SF2014) is a flattened ovoid lump of non-magnetic, heavily vitrified, low-density, silicate-rich material, which is light and vesicular and glassy in patches, and weighs only 25.4 g. This type of slag is typically referred to as unclassified vitrified material and is similar in consistency with fuel ash slag, a product of a high-temperature pyrotechnic process but with no demonstrable characteristics to indicate a connection to metal-working (Bayley 1985: 41).

Both fragments are clearly heavily heat-affected resulting in portions of the surfaces melting, fusing and altering in texture, but neither is diagnostic of a particular industrial process.

The chipped stone

Rob Engl

A total of 71 pieces of chipped stone were recovered in addition to two imported water-worn pebbles. The assemblage comprises principally naturally occurring granular grey and white quartz, but includes ten pieces of east coast (Buchan) till flint. Only two secondarily modified tools were recognised amongst the assemblage, which is dominated by flakes, and shattered natural fragments, but the presence of the small flint assemblage and a limited number of items of worked quartz confirm early prehistoric activity on the hilltop. This report presents a summary of the main components of the assemblage and a catalogue of the diagnostic artefacts can be found in Appendix B; a full and detailed inventory of the assemblage is presented in the archive.

The raw material

The assemblage consists of 61 fragments of quartz, 10 items of flint and two water-worn pebbles. Where the original cortex of the material survives on both the quartz and flint it is smooth and rolled, indicating that the raw material was principally water-worn cobbles and pebbles. As with the coarse stone tools found on the site, the raw material required to produce these tools would not naturally have been found on the

hilltop so must have been brought there deliberately from a nearby water source. The flint pieces show a range of colours typically associated with east coast Buchan gravel deposits, with examples present in both red and grey flint. Most of the fragments of quartz are heavily fractured and abraded, probably due to modern forestry activity.

The flint

Only a small number of the flints display evidence of secondary retouch. The most significant of these is a small leaf-shaped arrowhead (SF1017, Figure 2.29f) of Early Neolithic date that conforms to Green's (1980) type 4a-g. Also recognised from the same area of excavation was a core-rejuvenation flake (SF1018, Figure 2.29g). One burnt flint or chert tool (SF224, not illustrated) has possible retouch along one edge and may have been used as a scraper for preparing animal hides. The remainder of the flint artefacts consist of a secondary flake, two tertiary flakes and a flake fragment; all are of probable Neolithic date. Apart from (SF224), which was unstratified in Trench 2, the other diagnostic flints were recovered from hill wash [002] in Trench 1a.

The quartz

The quartz assemblage is dominated by fractured angular chips and chunks which may have resulted from plough damage probably related to the planting and establishment of woodland on the site in the recent past. Amongst this background of recent quartz shatter are three deliberately modified quartz flakes, two of which were tertiary (SF1023) and (SF1024) and made on translucent quartz of good quality. The third example was unstratified. Also present is a small amorphous quartz core (SF401) made on translucent quartz, which is of probable early prehistoric date. Like the flints described above, these pieces of worked quartz were all recovered from hill wash [002] in Trenches 1a and 4.

Discussion of the chipped stone

Limited information can be gleaned from this small assemblage but the recognition of diagnostic items of both flint and quartz indicates an early prehistoric presence on the hill, mostly likely occurring sometime during the Early Neolithic period, an estimate based on dated comparators of the leaf-shaped arrowhead and the core-rejuvenation flake. The hilltop would have afforded a view of the surrounding landscape, providing a valuable aspect for scouting and hunting opportunities. The presence of the quartz core and the flint core-rejuvenation flake also indicate that expedient tool production took place on the hilltop at this time, with the knapping of flint and quartz pebbles brought from a nearby water source.

Overview of the finds

Dawn McLaren

The greater part of this small but interesting assemblage of artefacts recovered from Moncreiffe is domestic in character but amongst the more prosaic objects some are of note, including the organic-rich shale bangle, the fragmentary jet bead, and the unusual notched hammerstone or maul.

Black organic-rich stone bangles are not uncommon on Iron Age sites in the region, but this example is of particular interest as an unfinished example, abandoned in the process of manufacture. In that sense it compares with finished and worn, and unfinished bangle fragments in the assemblage from Moredun, but in this case it was the sole item in this material and no working waste was retrieved. Although the source of the raw material used in the production of these ornaments has not been established with certainty, it is likely to be in east-central Scotland. In contrast, the bead fragment recovered from Trench 1a is of jet, perhaps imported from Yorkshire. Although not closely classifiable in terms of form or date, the use of jet to produce ornaments is more typical of the Early Bronze Age, or much later in the medieval and post-medieval periods, than the later prehistoric date suggested by the bulk of the rest of the assemblage. The bead was recovered from a surprisingly rich series of deposits associated with the denuded ramparts on the northern side of the fort (Trench 1a), including substantial pottery sherds from at least two vessels. From the encrusted residues surviving on the interior of some of the sherds it is probable that the pots were used as cooking vessels. The recovery of a Neolithic leaf-shaped arrowhead from this same area demonstrates that the fort was the focus of activity spanning thousands of years, from the Neolithic to the Iron Age, probably encompassing several episodes of archaeologically invisible activity until the site was formalised with the construction of the ramparts. This mixture of objects, which is diagnostic of multiple prehistoric periods, was found within the deposits of Trench 1A and implies a high degree of mixing of archaeological soils in this area of the fort, with residual early prehistoric material culture being found alongside pottery and coarse stone tools of probable Late Bronze Age or Early Iron Age date. Finds from across these multiple periods also indicate the mixing of the deposits within the substantial soil content of each rampart. As a result, the small finds and radiocarbon dates are likely to be, to some extent, residual.

Elsewhere on site, a possible unfinished spindle whorl and a fragment of a whetstone provide useful proxy evidence of material culture that has not survived in

the archaeological record. The whorl, used in textile production, attests to the spinning of yarn, while the whetstone demonstrates the use of metal blades. Neither of these objects or the day-to-day tasks that they represent are surprising for later prehistoric sites in eastern Scotland and they are commonly encountered amongst fort assemblages. More unusual is the notched heavy-duty hammerstone or maul. Although such heavy tools are not unexpected, they are rarely encountered or recognised, and where found they are typically in association with Bronze Age or later mining or quarrying sites. No metallurgical association can be evidenced here, but the presence of modified areas of the bedrock at the entrance on the west of the fort (Trench 4) and attempts to amplify the gradient of the ramparts on the eastern flank (Trench 2) provide scenarios for the application of such tools at the site.

In general, the artefact assemblage from Moncreiffe is both more limited numerically and restricted in its range than that recovered from Moredun fort (Chapter 4), although of course far more of the latter was excavated. Yet, similarities can be noted, suggesting access to common resources of clay for potting, stone to produce tools and household items, and hints of wider networks of exchange and contact, as demonstrated by the presence of an item of black organic-rich stone jewellery. The scale and scope of manufacture is discussed in more detail concerning the Moredun assemblage.

2.5 Discussion of the excavation results

The most important result of the excavation was to confirm the existence of a fortification on this minor summit, which had been questioned at the outset of the project. In addition, the excavations have improved our understanding of the site in five key areas.

Location

The work has highlighted the fort's dramatic location, which has raised some questions as to how and why it was used. The site had panoramic views across areas of rich agricultural land in lower Strathearn, as well as the wetland floodplains, which held their own value as exploitable resources. In return, this location would have been highly visible from the valley floor, appearing above the rocky cliffs which form its southern defences. It remains highly visible from the modern village of Bridge of Earn, the key historic crossing of the River Earn to the south. Intervisibility was more restricted to the north and obstructed to the north-east. Indeed, the site was completely overshadowed by the main body of the hill to the east-north-east. While protected by a deep ravine on this side, it is only the line of cliffs along

the southern flank that completely block access from the valley floor, a vulnerability that may have been a factor in multi-vallation of the site.

To some extent this position, overlooking lower Strathearn, like that of another small multi-vallate fort, The Roundel (Poller 2013a), controls the important terrestrial route to the west of Moncreiffe Hill that connects lower Strathearn to the River Tay to the north (Figure 2.1). The relationship of Moncreiffe with other forts, and contemporary sites in the landscape is further developed in the discussion of Moredun fort in the next chapter.

The nature of enclosure

While first identified in the 19th century, the fort was almost completely lost to the modern surveyor. Centuries of disturbance has impacted the fort, with perhaps the worst damage being completed more recently by historic and modern woodland, the latter similar to that demonstrated at, for example, Kilearnan Hill, Sutherland (McIntyre 1998: 196). Woodland shown on Stobie's map of 1783 and the OS 1st edition (Figure 2.3) may have already significantly degraded the profile of the ramparts, and explain Christison's difficulty in locating the fort in the late 19th century (1900b). Stone-robbing may also have had an impact, and while the extent and date of this remains unclear, it is possible stone was moved to later forts on Moredun Top. Finally, landscaping by the estate has altered the site with the addition of a path to the OS triangulation pillar for visitors to enjoy the view.

Prior to the project the slight upstanding remains suggested no more than a simple uni-vallate fort and the first objective was to confirm the presence of a rampart. Unexpectedly, the excavations confirmed multi-vallation that took advantage of the topography: enclosing the north, west and east, apparently with the south of the enclosure left open above the steep cliffs. At least four circuits of ramparts were found to enclose the hill, all roughly concentric (Figure 2.9). While they cannot be shown to all be contemporary, the construction of each respects its neighbours. On the north-west of the fort the innermost in the series (Rampart A) is suggested as a stone-faced, earth and rubble cored rampart, while the ramparts below (B–C) were either simple earth dump ramparts, or potentially stone-faced earth terraces as shown in Figures 2.31 and 2.32. The Bayesian model for the radiocarbon dates assumes that all the ramparts were built in a single phase of activity, but if the latest of those dates, from Rampart A, was taken at face value to indicate a later phase of construction for the innermost circuit, then it would be possible that the stone for its construction was robbed from the lower ramparts (B–D). The ramparts

on the east were less well constructed, with the lines of Ramparts B and C marked by little more than exposed rock-cut terraces (Figures 2.16 and 2.19). This may have parallels with, for example, White Castle, East Lothian, where ramparts were only present on the south of the enclosure (Connolly *et al.* 2021: 30). There is no doubt that massive quantities of stone were required to build the larger circuits on Moredun and the Moncreiffe defences may have provided a convenient quarry for these – for either logistical or symbolic reasons, or perhaps a combination of both.

Changes in the details of their construction revealed in the separate trenches should be expected. Larger scale excavations have demonstrated that construction can vary along a rampart, probably because different sections were built by different work gangs at different times (Harding 2012: 89). This has been shown, for example, at Crickley Hill, Gloucestershire (Dixon 1994), and while no evidence for such definition has been identified at larger forts in Scotland, Feachem has identified various smaller forts that had been built in sections, such as Castle Knowe, Midlothian (1971: 19–31; ID 51873).

Multi-vallation in Britain and Ireland is particularly common in south-east Scotland and Northumberland and is noticeably absent in Highland and western Scotland (Lock and Ralston 2022: 153–4). It is often regarded as evidence of multi-phase construction (Harding 2014; ScARF 2014a) suggesting a long-lived monument adapted over time. This is generally the case for larger and more complex sites such as Broxmouth, however, there are also many examples of forts that may have simpler, and shorter occupations, such as Gillies Hill, Stirling (Rideout 1992: 127–138; ID 46246) and the recently excavated Knock of Alves, Moray (Noble *et al.* 2020; ID 16214).

The function of enclosure has long been discussed, but it is now generally accepted to result from both utilitarian and symbolic drivers (Collis 1996: 88–90; Dunwell and Strachan 2007: 92). Multi-vallation may represent improved defence and has been suggested as a response to attack by missiles, including slingshot, where both height and multi-vallation offered advantage to those defending (Avery 1993: *passim*; Robertson 2016: 35–6).

On the other hand, multi-vallation may also have served a non-utilitarian function, enhancing the status of those allowed within, defining boundaries within communities and increasing social isolation (Dunwell and Strachan 2007: 92; Bowden and McOmish 1987: 77; Lock 2011: 355–62). At Broxmouth, the act of continual modification of the ditches and ramparts may have had social value beyond the resultant monument (Armit and McKenzie 2013: 86). Unfortunately, there are no

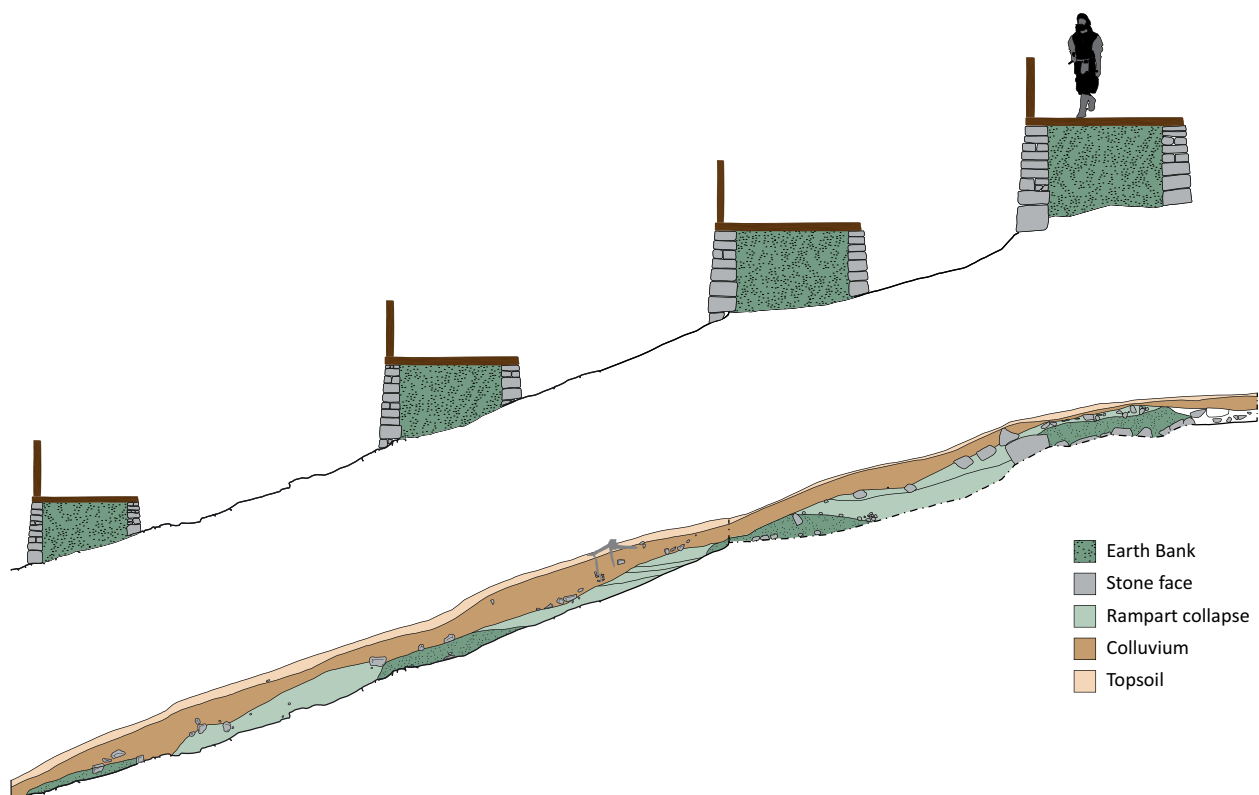


Figure 2.31: A suggested reconstruction of the sequence of ramparts A–D based on Trench 1.



Figure 2.32: A reconstruction of the fort: multi-vallate with two entrances and in a dramatic location overlooking lower Strathearn (artist Chris Mitchell).

direct stratigraphic relationships between the four lines of ramparts on Moncreiffe to demonstrate any sequence of rampart construction.

Access

The topographic survey suggested the west and south-east entrances took a broadly similar form; at the western the outermost lines, Ramparts C and D, overlapped the oblique approach of the entrance passage to create a form of hornwork, while on the south-east an extended passage apparently led past the terminals of the three outer ramparts to a simple gap through the innermost Rampart A (Figures 2.6 and 2.7). In both cases, however, in the final approach the visitor was turned to expose their right-hand side at the foot of the innermost rampart. No dating evidence exists for the construction of either entrance and it is assumed that both were in use at the same time. The west entrance would have been most easily approached from the north-west and north of Moncreiffe Hill. While this is also the case for the east entrance, it also served an approach from the south, through a break in the cliffs directly to the east of the fort, which today carries a steep footpath climbing out of the valley (Figure 2.1). Finally, it is possible that both entrances were protected by additional outworks around relatively flat areas to the west and east of the fort (Figure 2.6). Survey did not reveal any additional outer ramparts however tree cover, in part hampered this, and the possibility of excavation.

Internal use

No structures were revealed by topographic and laser scan surveys within the fort. One relatively flat area considered as a possible roundhouse site was targeted, but no remains were encountered (Figure 2.9: Trench 5). While no clear evidence of a building was recovered, the features excavated in Trench 3 evidently relate to some form of occupation on the hilltop, though whether this was directly contemporary with the defences or perhaps pre-dates them is less certain (see below).

The artefacts recovered do demonstrate domestic activity on the hilltop. Most of the material is utilitarian and represents everyday household tasks, such as food processing. Burnt animal bone confirms that animals were present, or at least brought to the site, presumably both as food and for their hides. Ceramics suggest foodstuffs were stored and cooked on site and a single smoothed cobble suggests hide processing. Evidence of crafts include the spindle whorl and vitrified material, while the whetstone demonstrates the use of metal tools. While no prestigious artefacts were recovered, the possible gaming piece may offer insight into leisure pursuits, while the shale bracelet and jet bead illustrate the importance of personal adornment, and suggest

access to networks of exchange, perhaps not available to the wider population.

All of the artefacts recovered were *ex situ*, however, and similarly, the taphonomic processes for radiocarbon samples within the ramparts is also secondary. Their construction incorporated material from a wide range of contexts and so they can provide only a *terminus post quem*. On balance, while it is probable that the evidence for occupation on the hilltop relates to fort's enclosing works, as presented in the Bayesian chronological model of the radiocarbon dates, it is possible that much of the material derives from an unenclosed phase of occupation, perhaps followed by a brief phase of enclosure.

Chronology and phasing

While the hilltop clearly saw sporadic activity from the Neolithic onwards, as evidenced by both Neolithic artefacts and two radiocarbon dates (Table 2.1), we cannot determine the nature and scale of activity based on available evidence. It may, however, have been limited to sporadic hunting or some other temporary activity.

The modelled date from the foundation deposit [427] of Rampart B [408] suggests the sample was incorporated into the core after 525–400 *cal BC* (95% probability; Figure 2.25; SUERC-61209: 427). Similarly, the two radiocarbon dates obtained from the earthen infill [2013] of Rampart D gave modelled ranges of 510–390 *cal BC* and 520–400 *cal BC* (95% probability; Figure 2.25; SUERC-61636: 2013 and SUERC-61211: 2013, respectively). A third date obtained from Rampart D [1015] provided a modelled date range of 515–395 *cal BC* (95% probability; Figure 2.25; SUERC-61210: 1015). Leaving aside the issues of the taphonomy of these samples, and assuming they relate to the construction of these ramparts, then Ramparts B and D could have been built in the 6th to 5th century BC and were perhaps contemporary. In contrast, a radiocarbon date obtained from the earth core [423] of Rampart A [432] produced a date range of 405–345 *cal BC* (94% probability; Figure 2.25; SUERC-61632: 423), suggesting later construction within the existing circuit of defences. This latter date is statistically the same as that from the *in situ* occupation deposits in Trench 3. No date was obtained for Rampart C. This would provide a chronology for the fort with two phases of enclosure over a modelled period of 20–440 years (95% probability) or 40–205 years (68% probability). Bayesian analysis of the Broxmouth dates suggest even a large, complicated fort may only have had a lifespan of less than 240 years (Armit and McKenzie 2013: 86). It is perhaps unreasonable to anticipate that a simpler structure such as Moncreiffe was occupied continuously

for such a long time and that spans at the shorter end of the Bayesian model should be preferred.

This analysis, however, is predicated on the assumption that the taphonomy of the samples can be tied down precisely to the construction of individual ramparts. The Neolithic date from Rampart A, however, signals that the earthen cores of all the ramparts incorporate a range of residual materials, including both the carbon samples and artefacts that span potentially all previous periods of activity on the hilltop. In this scenario, the key date is the latest, from Rampart A, providing a *terminus post quem* for its construction in the 4th–3rd centuries BC. Unfortunately, we cannot demonstrate that the ramparts were all contemporary, but the topographic position of Rampart A on the crest of the slope around the hilltop, particularly on the east, the weakest sides, suggests that it occupies the key position from which to either defend against or impress anyone approaching the fort. While this is hardly conclusive, when taken with the rough concentricity of the circuits, it suggests they belong to a contemporary scheme, possibly short-lived and no earlier than the 4th–3rd century BC radiocarbon date from Rampart A. As this date is a *terminus post quem* for the construction of Rampart A, at earliest, this places the enclosure of the hilltop at the very end of the modelled span, and possibly after it. By implication, the residual character of the samples indicates a period of activity on the hilltop preceding the construction of any of the known defences.

2.6 Conclusions

The excavations were successful in their overarching aim; to confirm the presence of a fort at the site and as a

result have substantially increased our understanding. As at other small-scale excavations at forts (Dunwell and Strachan 2007; Cook 2013; Noble *et al.* 2020) the scope of work inevitably limits the extent of evidence uncovered. Despite this, the other main objectives, in assessing the character, condition and dating of the fort were also achieved to varying degrees. Rampart A, confirmed in 2014, was dated, and multi-vallation with multiple entrances was conclusively confirmed. While it was not possible to demonstrate the presence of internal buildings, it is reasonable to assume their existence. The remains probably represent two phases: the earlier being possibly of unenclosed occupation; the later of enclosure in the Early Iron Age between the 6th and 2nd centuries BC. Construction of the fort was a collective act that represented an important community in the area, probably led by a chief. It must have had close links with other settlements within c. 2 km, especially to the north, west and south. This may have been a dominant role within a hierarchy of settlements in the area, or perhaps the site was in common use by the wider community. The relationship of Moncreiffe with the recently excavated multi-vallate fort, The Roundel, c. 1.5 km to the west, is of particular interest and will be enlightened initially by dating from that site (Poller forthcoming). As will become clear in the next chapter, 8th–5th century BC construction and occupation at Moncreiffe would suggest it was built before its larger neighbour on Moredun Top, to the east. Whether it was simply superseded by this new development, or whether there was overlap in activity and they may have acted as one site, will be further considered in Chapter 7.

3. Moredun fort: survey and excavation results

David Strachan and Martin Cook

with contributions by Peter Morris, Derek Hamilton, and Ian Ralston

3.1 Introduction: the site and its environs

David Strachan

Moredun is the larger of the two forts on Moncreiffe Hill (Figures 3.1 and 3.2). As with its neighbour, Moncreiffe fort (Chapter 2), it sits on exposed pyroxene-andesite bedrock of the Ochil Volcanic Formation, surrounded by drift geology consisting of glaciofluvial till, gravels, sands and silts (British Geological Survey 2023; Figures 1.4 and 1.5). The hill is a key geographical feature in the landscape, located at the meeting of the Rivers Tay and Earn, and so dominates the lower straths of both rivers and the head of the estuary to the east (Figure 1.3). The surviving monument is relatively large for the region, with a total footprint of 2.2 ha, and prior to excavation, the surviving earthworks suggested a multi-period complex consisting of a series of at least three successive forts, with traces of possible buildings within the interior (Figure 3.2). The forts crown the summit and upper slopes of Moredun Top, which at between 190–225 m OD, is the highest part of the hill. Their location exploits the naturally defensive cliffs on the south face of the hill and affords extensive views of the surrounding landscape in all directions, truly commanding the terrestrial and riverine landscapes at the confluence of this important river system (Figures 1.1 and 1.3).

The name Moredun, which first appears in 1358 (RRS vi), is derived from Gaelic *mòr* + *dùn* meaning 'big fort'. The word-order is unusual, however, and is more commonly found as *dùn mòr*, as in Dunmore near Callander (Peter McNiven *pers comm*). The name clearly references the scale of the remains, and perhaps specifically the large oval fort that is later called 'Carnac'. The name appears in various spellings, including *Moordoun hill* (Adair 1683), *Mordun Hill* (Pennant 1776: 532), *Morduntop* (Stobie 1783) and *Mordun* (OSA 8, Dunbarney: 401), and on OS 1st edition mapping of 1863 as *Moredun Top* (Figure 3.3).

In his first tour of 1769, Thomas Pennant called the view from Moncreiffe Hill 'the glory of Scotland' (1771: 51) and in his second journey of 1772, while assuming Abernethy to have been the Pictish capital, noted that 'on Mordun Hill, is a fastness, formed by a bulwark

of rude stones, surrounding about 2 acres of ground' which he suggests 'might have been the citadel of Abernethy, the refuge of its inhabitants in time of war' (1776: 532–3).

While the author of the *Old Statistical Account of Scotland* simply notes that the 'view from the top of Moredun is extensive, various, and grand' (OSA 8, Dunbarney: 401–2), in 1842 the Rev Alexander Cumming, in his entry to the *New Statistical Account* for the parish of Dunbarney, noted that on 'Moncrieffe or Moreden hill, (i.e. the large hill) the distinct traces of a fortification may be seen. There is a circular fosse about sixteen yards in diameter; in its centre stood Carnac fort, which belonged to the Picts, whose monarchs during the eighth and ninth centuries fixed their capital at Abernethy...' (NSA 10, Dunbarney: 810).

While erroneously describing the fort as 'sixteen yards' (14.6 m) in diameter, the reference more importantly records the first use of the name 'Carnac'. This name probably derives from Gaelic *càrnach* meaning 'stony or rocky place'. While it is tempting to suggest the name may have lost its fricative ending (i.e. –ch) in reference to the famous French prehistoric site, the use on Moncreiffe Hill pre-dates the first extensive excavations at Carnac by the Scottish antiquary James Miln (1881) in the 1860s (Peter McNiven *pers comm*).

Surveying for the OS 1st edition 25-inch map, which annotates the site as 'Carnac fort (Remains of)' occurred over 1859–60. Published in 1863 (Figure 3.3), its depiction on the map is accompanied by an informative description in the contemporary OS *Name Book*: (1859–62: Dunbarney 13):

'This name applies to certain remains of Fortifications on Moredun top. They consist of an irregular fosse which runs nearly a complete circle, leaving an open space of about 50 yards in the centre (erroneously stated 16 yards in Statistical Account). The South face of this fort presents an almost impregnable appearance being an almost perpendicular Rock or precipice about 150 feet high, on the west Side the remains of Two rings or ditches appear, but both appear to be about the Same level. About 70 yards north of these remains and a little

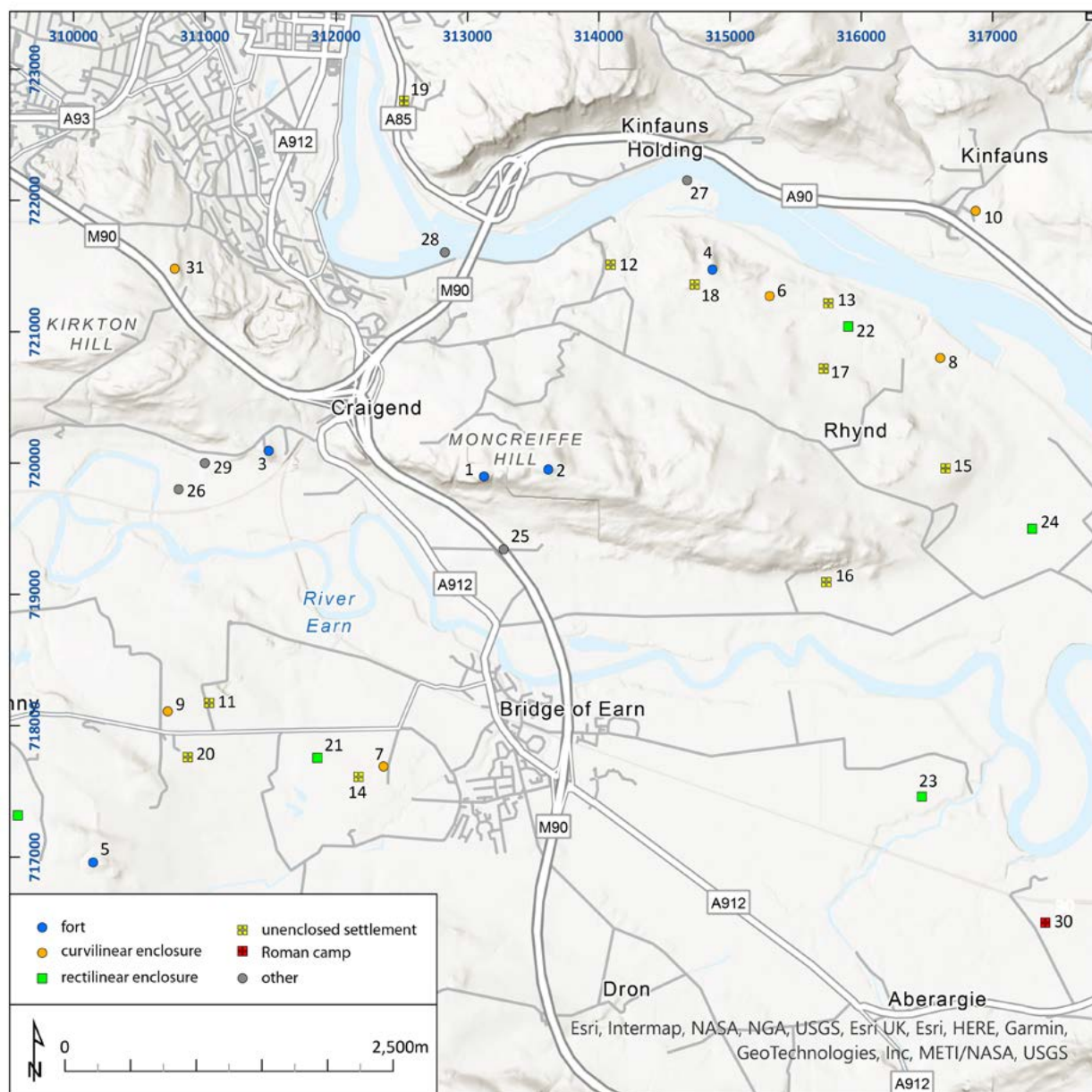


Figure 3.1: The location of Moncreiffe and Moredun forts on Moncreiffe Hill, and possible Iron Age sites in the immediate area (Appendix A).

towards the East is a rather Strange little Mound or Hill. It is now entirely covered with turf under which the mound seems to be entirely composed of Small Stones, as if it had once been a Cairn, or place of interment, or which is as likely a spot at which Signal fires etc might have been lit. There is an extensive view from this fort. to all the Surrounding remains of fortifications both in Strathearn, Carse of Gowrie, Kinnoul. Perth etc'.

David Christison was the first to recognise a second line of defences around the oval fort, and while he described the fort as 'comparatively well-preserved' he noted also that the 'remains are so dilapidated and overgrown that it is difficult to plan them'. He described the main wall

as 'double' and this is reflected in his sketch plan of the inner oval fort, which contains 'several small, round, saucer-shaped hollows', within a larger enclosure 'at a somewhat lower level' (1900b: 81 and fig.37; Figure 3.4).

The first detailed survey of the site, by the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS), followed just over 50 years later in 1953. This recognised a third enclosure, running roughly concentrically to the outer mapped by Christison, as well as the 'D-shaped' annexe to the north, and a circular pond at the east of the area enclosed by the outer ramparts of the two larger forts (Figure 3.5). While the depiction on OS mapping was



Figure 3.2: Aerial view of Moredun showing successive circuits of fortification (© Crown Copyright: HES).

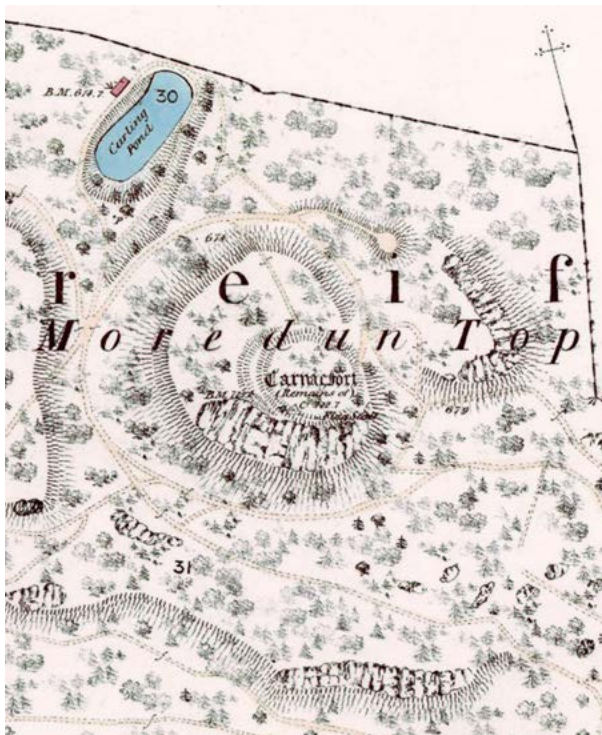


Figure 3.3: The OS 1st edition map of 1863 showing only the inner enclosure and with a path leading to the 'Strange Little Mound' recorded in the Name Book entry (Reproduced with the permission of the National Library of Scotland).

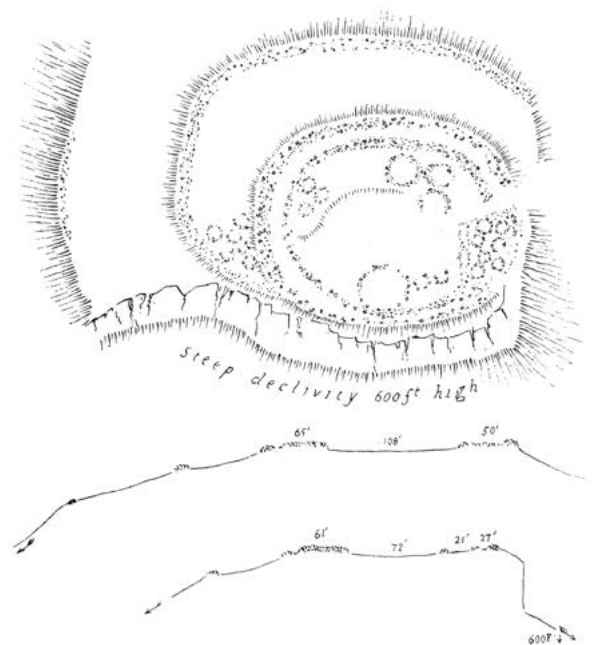


Figure 3.4: The site as mapped by Christison (1900b: 81, fig. 37; Reproduced by kind permission of the Society of Antiquaries of Scotland).

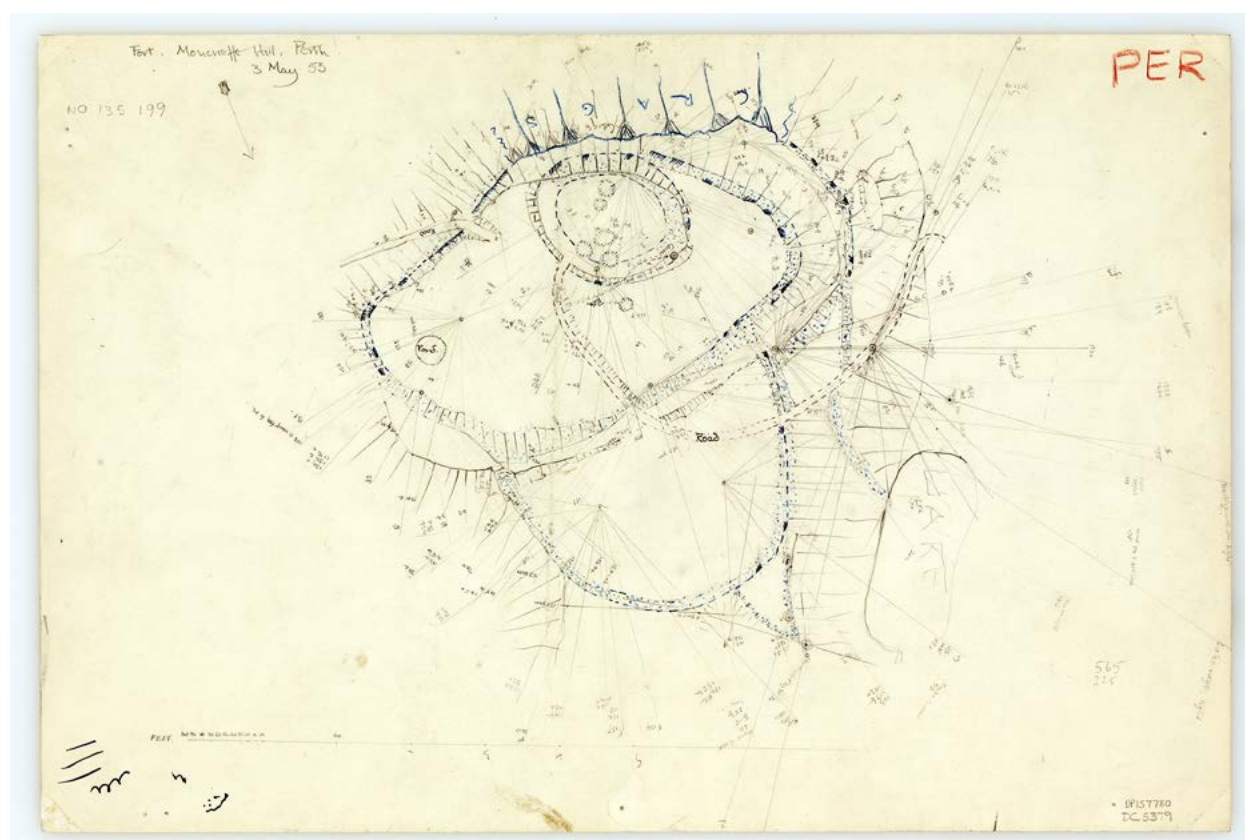


Figure 3.5: The RCAHMS survey of 1953. Note direction of north in the top left corner (© Crown Copyright: HES).

revised at 1:2,500 scale in 1963, the overall plan of the site has altered little since, but a subsequent visit by John Sherriff of RCAHMS in 1996 noted that ‘previous plans...have only hinted at the extent of the surviving remains and a modern plan is required to set in context not only the sequence of rampart construction, but also the remains of roundhouses, some of which are clearly later in date than the final period of the defences.’ (ID28025).

The plan provided by the RCAHMS survey prompted Richard Feachem to initially propose Moredun Top as a ‘nuclear’ fort (1955: 79–80) of the type first described by R.B.K. Stevenson (1949: 187). These were hierarchical strongholds of the early medieval elite, characterised by an inner fort on the summit of the hill with a series of out-works on descending terraces (Harding 2004a: 207–9, 234–5). Feachem acknowledged the inner oval ‘citadel’ to be a later phase to the enclosure on which it sat, and suggested it, and the annexe to the north, to have been constructed over an earlier contour fort, referencing the battle of *Monad Croib* in AD 729 as additional evidence of a Pictish date (1955: 80; Chapter 2.1). He was later more circumspect in his identification of ‘nuclear’ forts, realising configurations with inner and outer enclosures were also a feature of Iron Age fortified sequences (Stratford Halliday *pers comm*). He revised his description of the inner oval fort at

Moredun as a ‘dun-like structure’ constructed over the larger enclosure ‘possibly in fully post-Roman times’ and in noting that the putative roundhouses identified by Christison appeared to post-date both structures, suggested these represented ‘an occupation in later Roman times at the earliest’ (Feachem 1963: 145). Leslie Alcock, in his series of papers on ‘Reconnaissance excavations on Early Historic fortifications and other royal sites in Scotland’, endorsed the morphological reading of Moredun as an early medieval ‘nuclear’ fort, set within an earlier Iron Age structure, and included the site in a series of comparative plans (Alcock *et al.* 1989: 206 and 210; illus 11). This interpretation was reiterated by Alcock (2003: 189) and absorbed into more general publications (e.g. Foster 2004: 34 and 42). Indeed, this narrative was also fully embraced in the Scheduled Monument documentation when the site was designated by Historic Scotland in 2001:

‘evidence for use dating from both the Late Iron Age and the Early Historic period. The first phase is a large roughly oval enclosure...[a] second, inner, rampart may also date from this phase. The summit of the hill is enclosed by a double set of stone ramparts or walls. These define another roughly oval area approximately 50m NW–SE by 35m transversely. A further rampart following the natural contours of the hill on the N side encloses a large semi-circular “court” or annex,

reminiscent of Early Historic sites throughout Scotland. Traces of possible footings for circular buildings have been recorded on the hill summit, but it is not clear if these relate to one or both of the phases of defensive activity. In addition to the physical remains, the site may also have historic associations. In AD 728 a significant battle in the struggle for control of the Pictish Kingdom was fought at *Monad Croib*, also known as *Monad Craebi*.⁷

The potential relationship between the fort and the historic battle may have been overplayed in the past and a connection assumed, however. The reference is brief and unspecific compared, for example, to that in the *Annals of Ulster* to the besieging of Dundurn in AD 683 (Alcock *et al.* 1989: 192), and the battle site remains unknown. Clearly archaeological evidence of early medieval fort construction or occupation would be of considerable interest in this regard.

Pre-excavation survey

As at Moncreiffe fort, development of the *Hillforts of the Tay* project included resurvey at Moredun by Oxford North Archaeology in 2012 (Figure 3.6). This was followed in 2014 by the RCAHMS, who prepared a survey and interpretive analysis of the type they noted was

required as a result of their 1996 visit (Figure 3.7). Their accompanying notes (RCAHMS 2014) drew attention to the large Mound A, previously described in the OS *Name Book*, suggesting it could be a cairn. Based on observed stratigraphic relationships at the intersections of ramparts, the investigators suggested the earliest fortification to be the outermost circuit of defences, an oval enclosure (Rampart B), with a second phase of fortification built within its interior and represented by a sub-oval enclosure (Rampart C). The annexe (D) appeared to overlie Rampart B and was suggested as either contemporary with, or to post-date, Rampart C. A third phase of enclosure was then suggested in the comparatively small but thick-walled fort (Wall E) enclosing the very summit of the hill, within which a phase of unenclosed settlement was represented by four hut-circles (Unenclosed Settlement F). In addition, two features from the previous RCAHMS survey of 1953, were plotted, namely a substantial bank (G) on the north-west flank that did not appear to be part of the defences and a platform (H) that was confirmed as a quarry. Moreover, the survey highlighted extensive small-scale quarrying across the site, of both the solid bedrock and in the form of shallow pits to remove loose rubble from archaeological features. This included evidence of trenching along the lines of walls, possibly a result of unrecorded antiquarian investigations. This



Figure 3.6: The 2012 survey by Oxford North Archaeology showing the scheduled area.

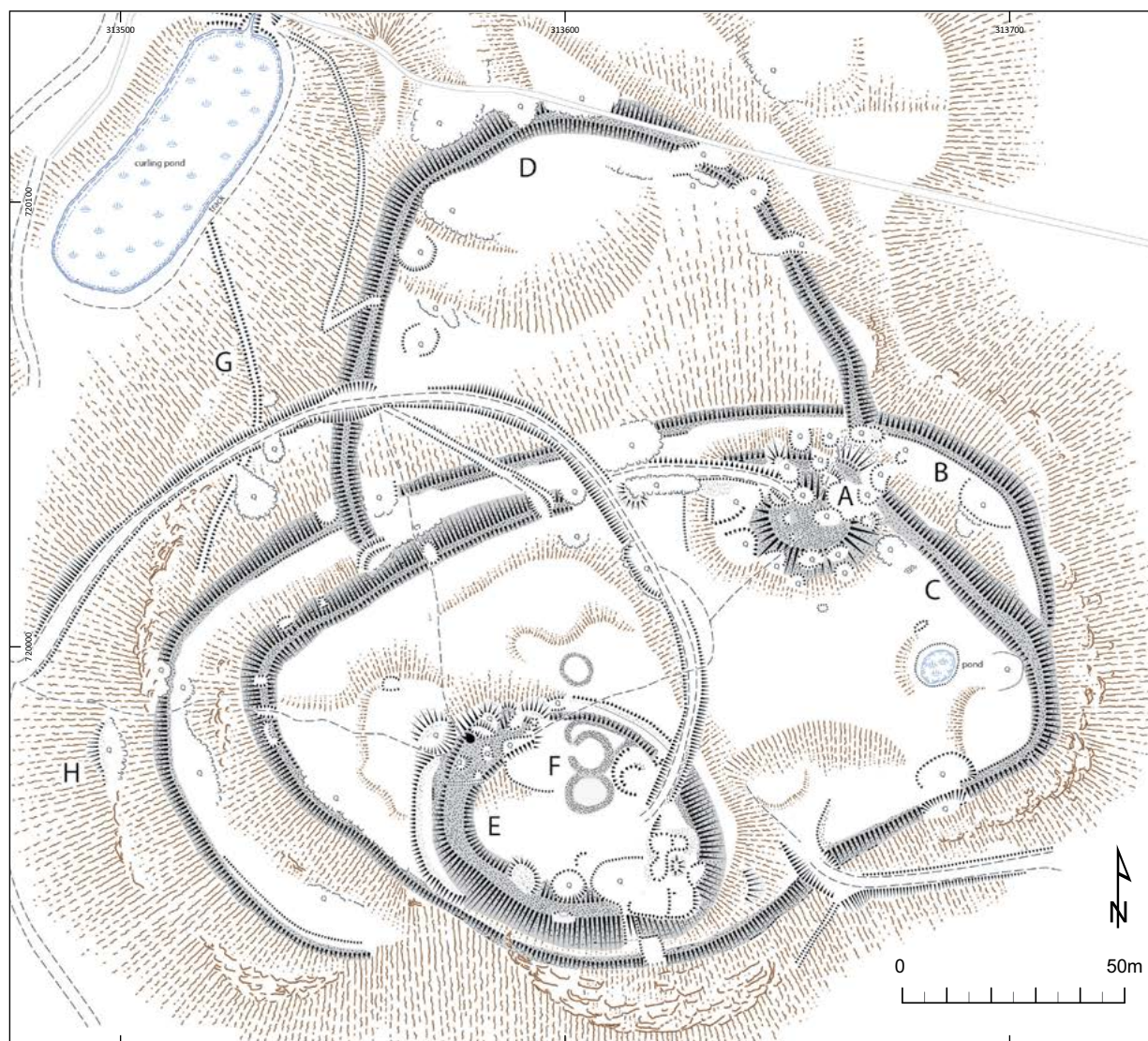


Figure 3.7: The 2014 RCAHMS survey annotating archaeological features as used in the text (© Crown Copyright: HES).

latter was found to be most noticeable at the west of the summit fort enclosed by Wall E.

Geophysical survey

Peter Morris

Both magnetic and resistivity surveys were carried out over 2013–14 (Morris 2014b) with the aim of identifying anomalies to assist with the siting of trenches. While it was recognised that, with bedrock formed from lava flows, this was not a promising target for archaeological magnetic prospection, however, the magnetometer survey revealed various anomalies, including some areas of high amplitude resulting from the bedrock (Figure 3.8). The results, when combined with the topographic survey suggested that Mound A might not contain the heavy stone content that had been assumed

and indicated an area of extreme magnetic value at the south-west of the mound (Figure 3.8: M1). At least two other areas produced values so high as to suggest that they were not simply in response to bedrock, but perhaps because of heat-affected stone or bedrock, or possibly vitrified material. One of these (Figure 3.8: M2) was at the west end of the inner oval enclosure of Wall E, while the other (Figure 3.8: M3) was to the north of that enclosure over an area in which the topographic survey recorded a roundhouse.

Resistivity also revealed several well-defined anomalies, while potential features identified through magnetometry were absent (Figure 3.9). The former included Mound A (Figure 3.9: R1), revealed as a circular feature with high resistance around the perimeter and low resistance in the centre. This confirmed the magnetic results, suggesting an enclosure rather than

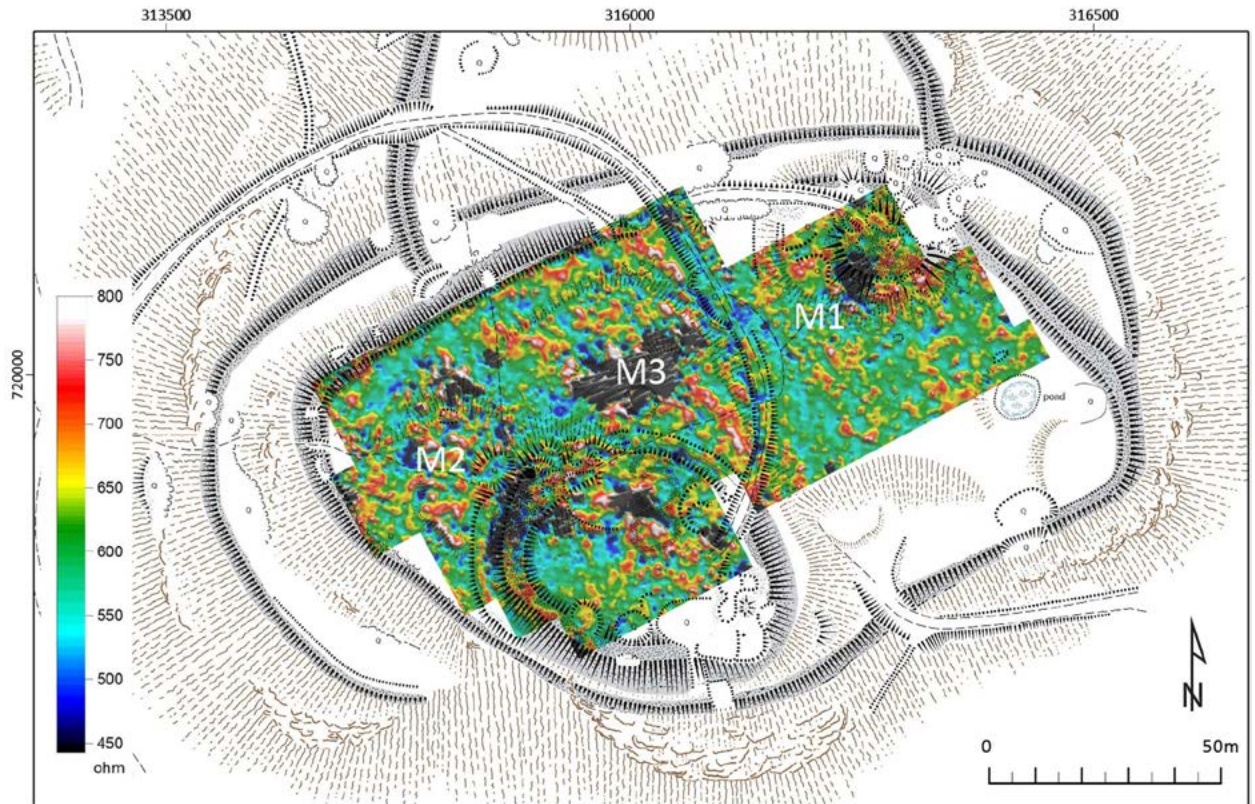


Figure 3.8: The magnetic survey of 2013-14 highlighting key anomalies discussed in the text (background image © Crown Copyright: HES).

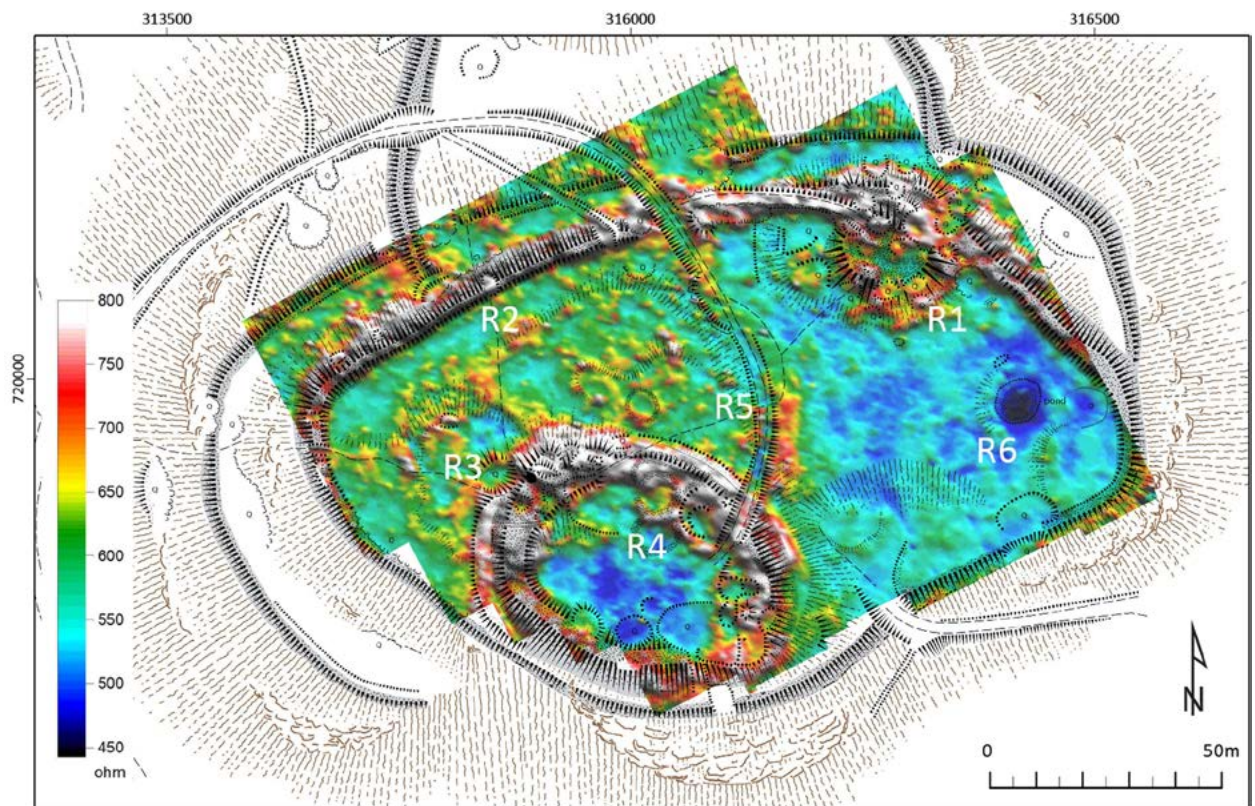


Figure 3.9: The resistivity survey from 2013-15 highlighting key anomalies discussed in the text (background image © Crown Copyright: HES).

a stone cairn. Rampart C (Figure 3.9: R2) and Wall E (Figure 3.9: R3) were also well delineated, with a clear gap to the north-west of the latter suggesting an original entrance. Some of the earthwork features recorded within and to the north of this enclosure (RCAHMS F) produced anomalies supporting the possibility that these were the remains of circular buildings (Figure 3.9: R4 and R5). Finally, low resistivity anomalies suggested damper deposits within the inner enclosure of Wall E and around the pond at the east end of the interior within Rampart C (Figure 3.9: R6). Notably, in contrast to Rampart C, Rampart B was not identified.

3.2 Excavation results

Martin Cook and David Strachan

Methodology and objectives

The overarching objective of the excavation was to establish a chronology for the development of the

complex and to confirm whether there was evidence for early medieval construction or activity. To achieve this, the cumulative project designs (Strachan 2014b, 2015b, 2016 and 2017a) proposed excavation of eight areas through nine trenches (Figure 3.10).

The specific targets were the RCAHMS Mound A, the ramparts of each phase of fortification (RCAHMS B–E), and features within the interior of the forts enclosed by Ramparts B and C. The three seasons were planned with a series of initial targets and an iterative process responding to the results of the previous year. The first, in 2015, involved six evaluation trenches, focussed on establishing the character of Mound A, the nature of the enclosing ramparts, and the Unenclosed Settlement F (Figure 3.10: Trenches 1–6). The second, in 2016, opened a larger area over Unenclosed Settlement F, a further small roundhouse to the north of these, Mound A and the pond (Figure 3.10: Trenches A, B, C and D). The final season in 2017 sought to answer questions raised over 2015–16, specifically regarding

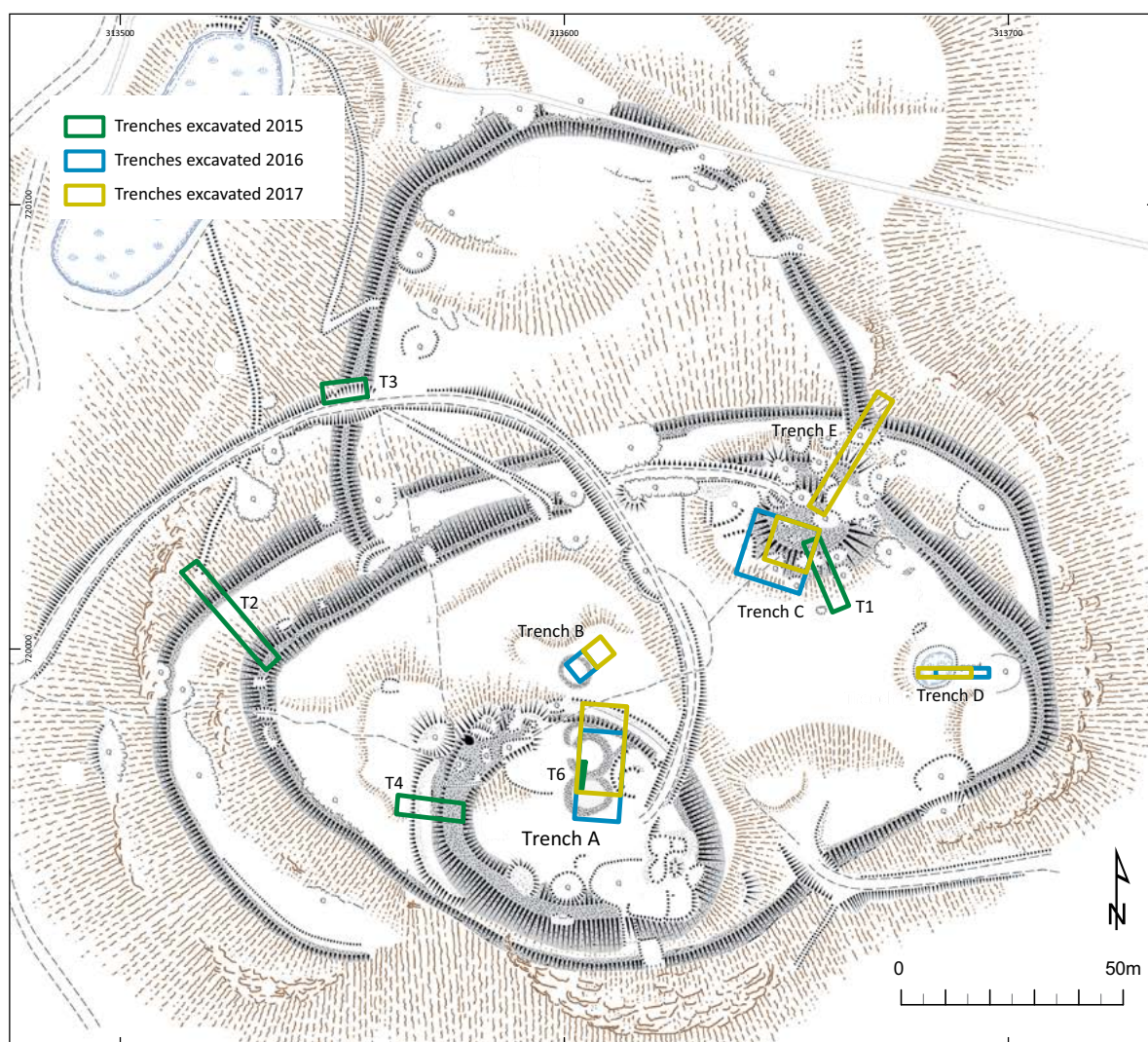


Figure 3.10: The trench plan 2015–17 (background image © Crown Copyright: HES).

the nature of the timber-laced Wall E, identified in plan in 2016, the small roundhouse to the north of this, the interior of the monumental roundhouse revealed in Mound A, the pond area, the relationships between the monumental roundhouse and Rampart C, and the relationship between Rampart B and Annexe D (Figure 3.10: Trenches A, B C and D respectively):

2015

- Trench 1: assess Mound A
- Trench 2: assess the ramparts of Ramparts B and C
- Trench 3: assess the rampart of Annexe D
- Trench 4: assess the Wall E
- Trench 5: to assess the Rampart C (not excavated)
- Trench 6: assess the proposed Unenclosed Settlement F

2016

- Trench A: excavate the possible roundhouses of Unenclosed Settlement F and assess their relationship to one another and to Wall E
- Trench B: excavate the single proposed roundhouse identified within Ramparts B/C
- Trench C: excavate the monumental roundhouse identified in 2015 within Mound A to identify its nature and date of construction
- Trench D: assess nature and date of the pond

2017

- Trench A: to determine the nature of construction and date of the timber-laced Wall E identified in 2016
- Trench B: to further investigate the roundhouse confirmed in 2016 to determine its date if possible
- Trench C: to further investigate the interior of the monumental roundhouse confirmed over 2015–16 within Mound A, to better understand the nature and date of its construction and occupation
- Trench D: to investigate the nature and date of the pond
- Trench E: to investigate the series of ramparts to the north-east of the monumental roundhouse and to clarify any relationship between these through inspection of any junctions; and to assess the relationship between Rampart C and the wall of the monumental roundhouse

The results are presented below, beginning with Mound A followed by the Ramparts B and C, the Annexe D rampart, Wall E of the innermost oval, Unenclosed Settlement F, and the pond and its associated features. This is followed by the radiocarbon dates and a general discussion. The artefacts are presented in Chapter 4 and the environmental evidence, including soil micromorphology, environmental and human remains,

and off-site palynological and sedimentological analysis, in Chapter 5.

Mound A: the monumental roundhouse

The prominence of the flat-topped, sub-circular mound, first mapped by the OS and described by them as a 'Strange Little Mound' was again highlighted by the 2014 RCAHMS survey. This suggested a potentially early feature as it appeared to be respected by Rampart C (Figure 3.7). It measured c. 32 m east to west by 25 m transversely and up to 2.5 m in height, with a flat top measuring c. 18 m by 10 m. Although interpreted by RCAHMS as a possible cairn, the discovery of the broch in 2011–12 within Castle Craig fort, near Auchterarder (Poller forthcoming) offered a timely possible alternative hypothesis. This was supported by the resistivity survey which suggested a large circular feature with an open centre rather than a single dense mound of stones (Figure 3.9), while the magnetic survey indicated an area of very high readings (Figure 3.8: M1) at the south-west of the mound, possibly the result of burning. The top and flanks of the mound were marked with numerous small hollows suggestive of quarry-pits post-dating use of the forts. Indeed, a path leading to the mound on the OS 1st edition map (Figure 3.3) may have been related to this quarrying.

The mound was excavated over three seasons through three trenches: Trench 1; Trench C; and Trench E (Figure 3.10). These revealed the remains of a monumental roundhouse measuring c. 15 m in diameter within a wall more than 5 m in thickness. Trench 1 (2015) was 15 m in length by 4 m in width and orientated north-north-east to south-south-west. It extended downslope across the southern flank of the mound from and revealed the wall of the roundhouse towards the top of the mound (Figures 3.11 and 3.12). Trench C, measuring 15 m by 15 m was opened in 2016 to build on the results from Trench 1 (Figure 3.13). Being immediately west of Trench 1 it exposed the south-west quadrant of the roundhouse and explored the enclosing wall, a sector of the interior, and the high magnetic reading at the south-west of the mound (Figures 3.8 and 3.9). In 2017, Trench E excavated the north-east flank of the mound to investigate the rear of the structure and its relationship to Rampart C and, if possible, Annexe D.

In summary, the south-west quadrant of the stone-built, sub-circular monumental roundhouse was uncovered. It was constructed directly onto a pronounced outcrop of bedrock, which had been cleared and modified through quarrying to produce a stepped effect most evident in Trench 1 (Figures 3.11, 3.13, 3.14 and 3.15). The wall was c. 5.8 m thick in this quadrant, survived to a maximum height of 0.7 m, and would have enclosed an internal area of c. 15 m in diameter (Figure 3.11). A west-south-west facing entrance [C008/2016] was revealed and

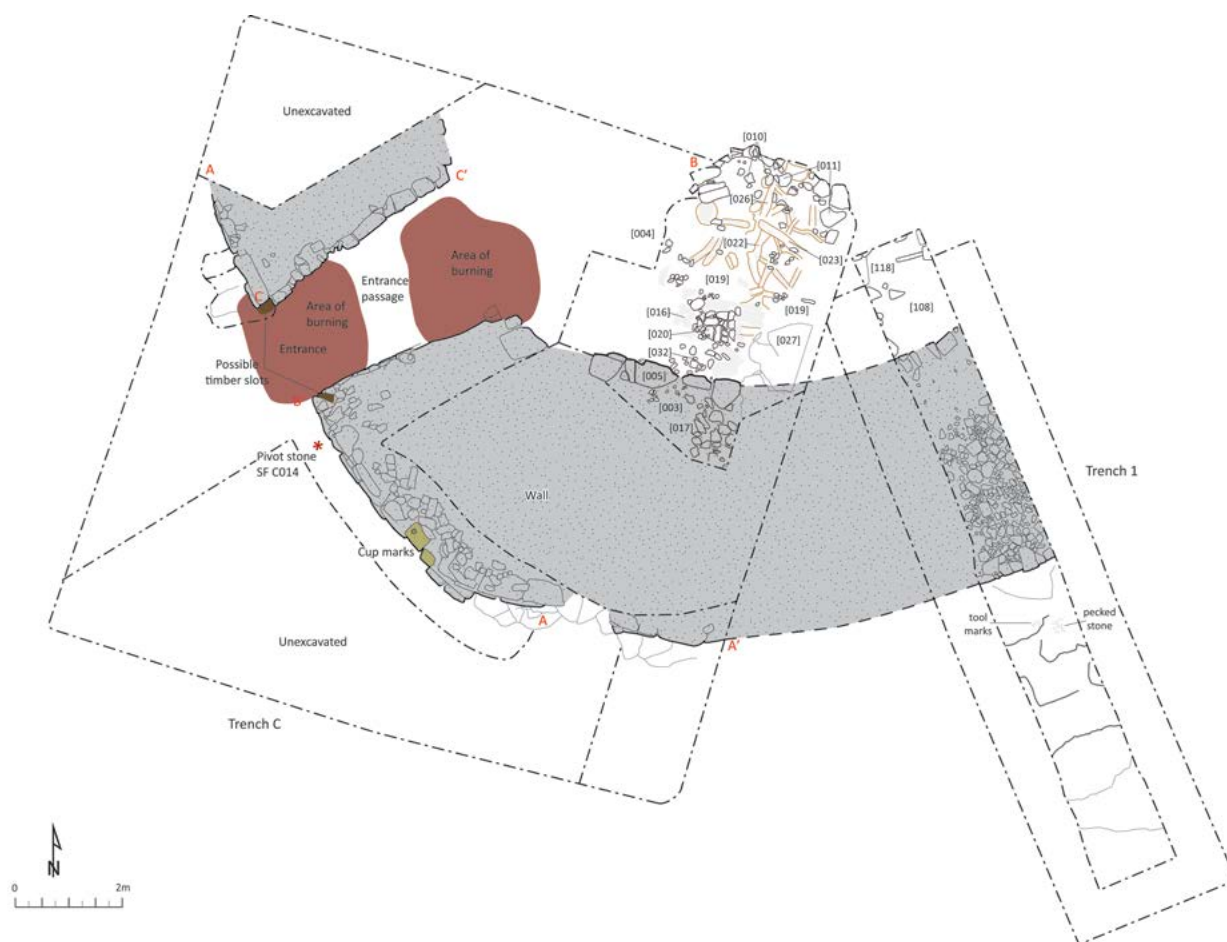


Figure 3.11: Plan of the monumental roundhouse in Trench 1 and Trench C.

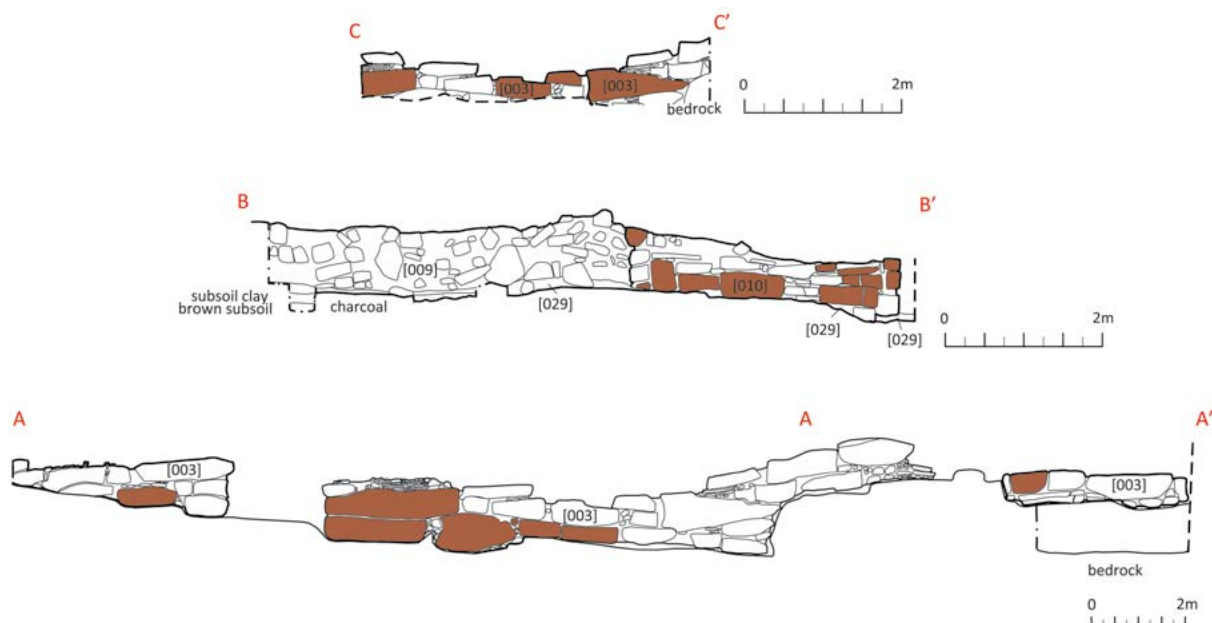


Figure 3.12: Elevations of the surviving walls of the monumental roundhouse in Trench C.



Figure 3.13: Trench 1 in 2015 showing wall [124] with external terraced bedrock to the left.



Figure 3.14: Trench C in 2016 showing the outline of the outer face of the wall [C003/2016 and C010/2016] and the entrance containing an area of burning [C018/2016] identified by the geophysics (photo: Ken Ward).

found to include an area of extensive burning, the source of the geophysical anomalies (Figures 3.8 and 3.9). As to be expected in a collapsed, stone building, the *in situ* remains were covered by a series of deposits including tumbled stones [102/105] and topsoil [101]. Possible collapsed organic structures were uncovered in the interior [118/C018], and a possible destruction layer was found overlying *in situ* floor or occupation deposits [119/120] (Chapter 4 *passim*) and a sub-rectangular hearth [C020/2017].

The monumental roundhouse wall

Prior to construction, the small knoll was cleared of soil to provide a secure foundation for the wall, which was built directly onto the bedrock. In Trench 1, the bedrock [108] had been quarried to create a series of terraces descending from the summit of the outcrop in pronounced steps over 8 m to the south-east (Figures 3.13 and 3.15). This activity was evidenced by areas of pecked tool marks on the exposed surfaces (Figures 3.16 and 3.17) and a deposit of quarried stone debris found *in situ* at the base of the mound (Figure 3.18). Quarrying would both have won construction material for the building and visually emphasised the height of the structure, making it appear taller and so more impressive (Figures 3.15 and 3.19).



Figure 3.15: Terraced bedrock in Trench 1 (2015) with lower courses of surviving wall [124] at the top.



Figure 3.16: Detail of pecked bedrock in Trench 1.



Figure 3.17: Detail of pecked bedrock in Trench 1.



Figure 3.18: The deposit fine quarry rubble [114] at the base of the terraced bedrock [108] in Trench 1 (2015).



Figure 3.19: The external façade of the monumental roundhouse wall [C010/2016], constructed onto bedrock [C011/2016] above a cut step, in Trench C.

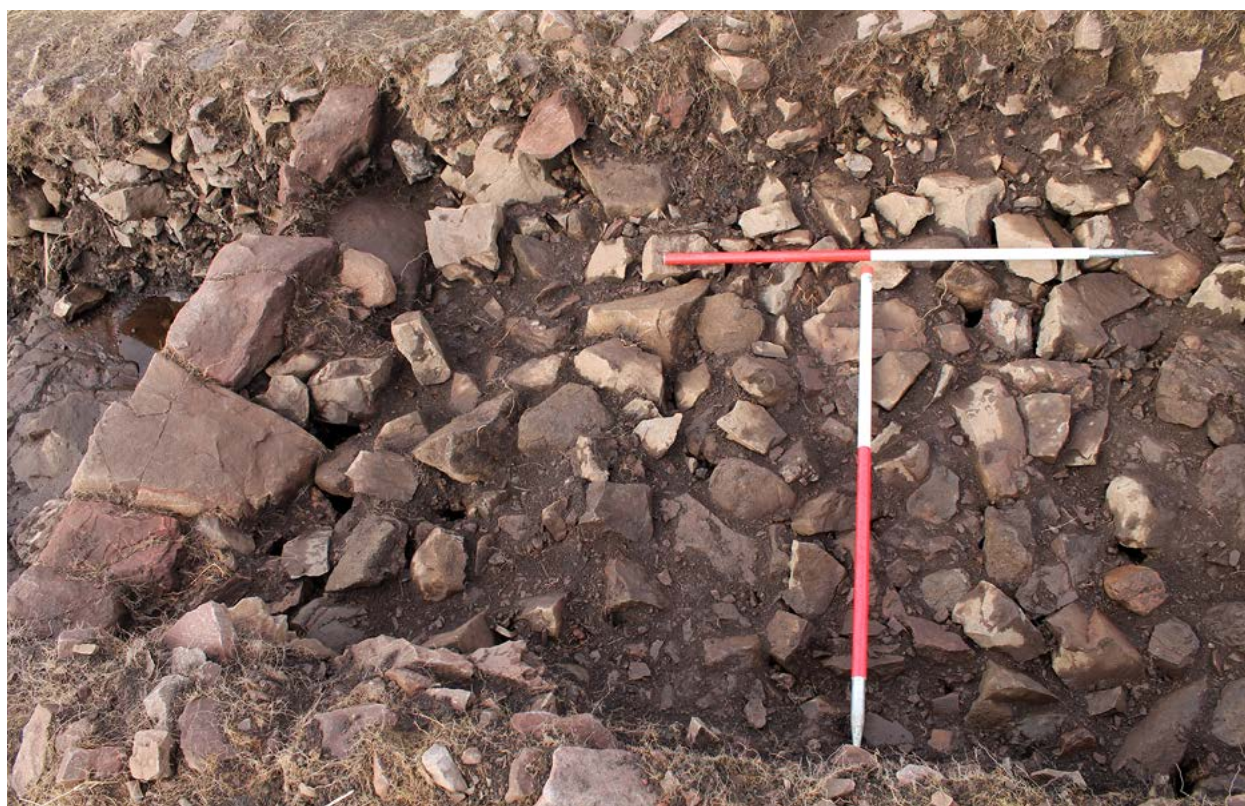


Figure 3.20: Detail of the surviving outer wall-face [103] on the left and core material [116] in Trench 1.



Figure 3.21: Detail of the surviving outer wall-face [103] in Trench 1.



Figure 3.22: Wall tumble [C006/2016] above the bedrock in the east section of Trench C in 2016 showing manipulation of the bedrock [C011/2016] into a stepped form.



Figure 3.23: External face of the monumental roundhouse wall [C010/2016] showing incorporation of cup-marked stones [C014 and C015/2016] with other possible rock art.

Excavation in plan within Trench C confirmed that the interior of the building is roughly circular, but the wall is noticeably thicker at the entrance on the south-west. As a result, the plan of the inner and outer wall-faces appears as two off-set, rather than concentric, circles (Figures 3.11 and 3.14), as also found at the Black Spout monumental roundhouse near Pitlochry (Strachan 2013: 19).

Investigation of the wall in three sections, with varying levels of survival, confirmed a consistent method of construction: a dry-stone wall [C003/2016, C010/2016 and C001/2017], built directly on to the bedrock, with inner [110 and C005/2017] and outer [103 and C002/2017] faces of larger blocks, and a rubble core made up of smaller stones of varying size and type [103 and C003/2017] (Figure 3.20). The external face [103] (Figure 3.21) was constructed using large, roughly squared and dressed blocks laid in rough courses with up to three or four courses surviving *in situ* (Figure 3.12). It is difficult to estimate the original height of the wall, but some indication is provided by the large quantity of

debris found collapsed both internally and externally (Figure 3.22). The stones of the external face [103] were up to 0.8 m by 0.4 m, with smaller pinning stones. In addition to material from the bedrock, the faces included a significant number of Old Red Sandstone blocks, not naturally present on the hill and which must have been imported from the valley floor (Figure 3.12). No surviving bonding material was identified. Two re-used cup-marked stones [C019] were incorporated into the external face of wall [C010/2016] both with the cup marks facing upwards (Figure 3.23). These would not have been visible once the next course of stone was added, but their recognition and concealment may have been significant to the builders. A pivot stone (SFC014), (Chapter 4.9, Figure 4.28), was recovered from rubble immediately in front of the entrance and may have been part of a door or gate. The rubble core [116] of the wall [124] consisted of large rounded and sub-angular stones in a matrix of sandy silt. The internal face [110/C005] to the wall was also composed of large squared and dressed blocks, mainly of Old Red Sandstone with smaller pinning stones between. Construction of the

inner and outer faces was of a similar type and quality. Underlying the wall was a natural grey silty clay [123] sitting on the bedrock [108].

The north-east wall of the monumental roundhouse, investigated in Trench E, was found to have been severely truncated by the subsequent activity and collapsed material from the monumental roundhouse wall appears to have been re-used in the construction of Rampart C [E019]. The excavation of shallow surface shallow here also indicates disruption from either much later quarrying or antiquarian relic-hunting.

The monumental roundhouse entrance

The roundhouse had a large entrance [C008/2016] aligned west-south-west (Figures 3.11, 3.12 and 3.24). Constructed across undulating bedrock between the two wall terminals, the entrance passage was c. 4.5 m in length measured c. 2 m in width at the exterior and c. 3 m wide at the interior. The faces of the entrance passage [C005/2017, C006/2017 and C007/2017] were constructed of coursed, medium to large, rectangular and sub-rectangular blocks, mainly of Old Red Sandstone (Figures 3.12, 3.25, 3.26, 3.27 and 3.28). While no door jams or intra-mural features were identified, the exterior of the passage was of unusual construction. Rather than marrying the masonry of the passage and the outer wall face with large quoinstones, they were brought together in an approximately 90 degree mitre using a series of blocks of broadly triangular plan. This unusual arrangement left a vertical space at each outer corner of the entrance (Figures 3.25, 3.29 and 3.30). Traditional construction principles would generally place larger rectangular blocks (quoinstones) at the external corners of entrances, as the gap of the entrance is an inherently weak point in the overall structure and so requires additional weight to retain the wall's structural integrity. In this case, this weakness was most probably addressed by a composite construction incorporating vertical timbers into these slots, and the features are interpreted as an external entrance frame, which may have included timber lintels across what is a wide entrance passage for such monumental structures. That the entrance was used to 'monumentalise' the roundhouse, is in part confirmed by the construction of the walls at this point. The wall varied in thickness across its construction, measuring 5.8 m at the south-west, but reducing to 3.2 m toward the 'back' of the building in the north-east quadrant, where the outer wall face [013] was revealed in Trench E, and the inner face recorded in the topographic survey (Figure 3.7). Evidence of *in situ* burning [C015/2016] both within the passage (Figure 3.26) and within the building interior at the entrance were identified (Figures 3.31 and 3.32). The latter took the form of reddish heat-affected stones and soils and was presumably the cause of the geophysical anomaly recorded (Figures 3.8 and 3.9).

It is possible that the unusual form of the entrance is the result of a modification to the original design. This may have involved the reconstruction of both the entrance passage and the external façade either side of the outer entrance, perhaps in part to increase the wall thickness at the entrance (Figures 3.11 and 3.14).

The interior of the monumental roundhouse

The interior, partly excavated in 2015 and in Trench C over 2016 and 2017, was covered by extensive debris from the collapse of the superstructure (Figure 3.33). Beneath this, extensive areas of burnt material uncovered indicated a large and probably catastrophic fire. The mound of material covering the wall [124] and the interior was made up of deposits associated with the abandonment, collapse and subsequent decay of the structure (Figure 3.33). Deposits of tumbled stones were found both within [102, 112 and 113] and outside [105] the wall, while deposits of smaller stones in a matrix of sandy silt [107 and 111] were found above the wall, and to the exterior. There was no definitive evidence that the wall was deliberately dismantled following the fire, and it may simply have gradually collapsed over time. The extent to which the surviving walls were levelled, however, suggests human interaction at some point; to remove the remains of the building to reuse the area, to recover and re-use the stone, or possibly both.

The central area contained the following stratigraphic sequence: topsoil (for example [101]) overlying tumbled stone deposits [102, 105, 111 and 112] from the collapsed walls (for example [C003/2016 and 124]; beneath this a burning layer [113] overlay *in situ* floor or occupation deposits [119 and 120], which in turn overlay a levelling or foundation deposit [C027/2017 and C029/2017] of reworked waste material from the hearth and building (Chapter 5.2) laid directly onto bedrock (Figures 3.34 and 3.35).

On removal of the material relating to the gradual collapse of the walls, evidence of the internal structure of the roundhouse was revealed. The collapsed wall material consisted of a layer of debris up to 0.5 m in depth, which was spread across the interior and mixed with later deposits of collapsed and slumped material [111/112] and [C012/2017] and C014/2017]. This layer contained large, partially dressed, blocks of sandstone [C004/2017] and [C010/2017] up to 1 m by 1 m (Figures 3.34 and 3.36). A series of finds were recovered from the collapse [C012/2017 and C014/2017], demonstrating possible continued activity within the structure following its destruction. These included: animal bone fragments (SFC008) and (SFC009); a small sub-spherical pebble; burnt bone fragments (SFC013; Figure 3.37); a small stone disc (SFC015); and a small ceramic sherd (SFC016).



Figure 3.24: Detail of entrance [C008/2016] of the monumental roundhouse during excavation.



Figure 3.25: Entrance [C008/2016] showing the north-facing entrance passage [C008/2016] with possible vertical timber slot at the corner with the building's external façade [C010/2016] to the right, and wall core [C007/2016] above.



Figure 3.26: The north-facing façade of the entrance passage [C008/2016] detailing the use of both Old Red Sandstone and local stone built, with the wall constructed directly onto the bedrock.



Figure 3.27: The south-facing entrance passage façade [C008/2016] during excavation, detailing use of Old Red Sandstone and the possible vertical timber slot towards the external face of the building [C003/2016] on the left-hand side.



Figure 3.28: The interior corner of the north-facing entrance passage [C006/2017] and internal face of the roundhouse wall [C005/2017].



Figure 3.29: Detail of the possible vertical timber slot at the southern outer corner of the exterior of the entrance [C008/2016] with heat-affected stone in the entrance passage.



Figure 3.30: Detail of the possible vertical timber slot at the north entrance corner [C003/2016].



Figure 3.31: Charcoal deposit [C015/2017] to the west of entrance [C008/2017].

Underlying the rubble collapse [111/112], but overlying the *in situ* deposits of the floor, was a ‘destruction layer’ [113 and C013/2017] consisting of mottled mid-brown sandy silt with patches of burnt orange and charcoal-stained black soil, with occasional patches of discrete charred timber (Figures 3.34, 3.35 and 3.36). A series of burnt timbers, possibly roof timbers, were identified across the interior (Figure 3.38), including [C013/2017], [C016/2017], [C016B/2017] and [C016F/2017]. Two radiocarbon dates were obtained from these timbers [C016B/2017] providing date ranges of 360–140 cal BC (95% probability; SUERC-76162) and [C016F/2017] 390–200 cal BC (95% probability; SUERC-76163). Cremated human bone fragments were also found in this context [C014/2017, C017/2017, C018/2017, C020/2017, C029/2017 and C013/2017]. That these human remains were identified below the collapsed wall, suggests they were deposited, probably as a collection of already cremated remains, into the partially upstanding roundhouse following the fire event, but prior to complete collapse of the structure. The human bone was radiocarbon dated to 200–40 cal BC (95% probability; SUERC-77003): later than the construction date for the structure implied by the dates of the burnt timbers.

Within the central area of the structure, a black, charcoal-rich deposit [118] was found with frequent large pieces of roundwood alder charcoal, pieces of larger carbonised wood (SF133) suggestive of structural timbers, and a bone disc (SF132). The deposit probably represents the *in situ* remains of structural timber elements of the roundhouse. A radiocarbon date obtained from hazel charcoal from this material provided a date range of 380–180 cal BC (95% probability; SUERC-65160). Underlying the roundwood charcoal layer [118] were two further layers of *in situ* burning [119/120] of hazel charcoal-rich sands and silts; probably the burnt remains of the roundhouse floor surface. Below the burnt floor layers were two silty deposits, which were probably earlier occupation deposits [121/122] collected against the internal face of the wall (Figures 3.35 and 3.36).

Six burnt bone points (SFC012; Figure 3.37) were discovered immediately below the destruction deposit within layer [C014/2017], and a worked stone cobbles tool (SFC028) was found in the interface between the stone tumble [C011/2017] and the internal destruction layer [C013/2017].



Figure 3.32: Area of burning and heat-affected soils and stone [C018/2016] at the interior of the entrance passage in 2016.



Figure 3.33: Tumble across the interior of the monumental roundhouse, abutting the internal face [C005/2017] of the wall [C001/2017] visible in the top right.



Figure 3.34: Mid-excavation of the internal face [C005/2017] of the wall [C001/2017] in background, showing the hearth [C020/2017] to the right of the section line, and material underlying the hearth [C024/2017] to the left.



Figure 3.35: Post-excavation showing the internal wall face [C005/2017] and the hearth [C020/2017] overlying burnt in situ floor deposits [C019/2017] and levelling deposit [C027/2017] overlying the bedrock.



Figure 3.36: Post-excavation showing the internal wall face [C005/2017]; hearth [C020/2017]; floor deposits [C019/2017]; levelling deposit [C027/2017] and flat stones [C028/2017] overlying the bedrock.



Figure 3.37: In situ burnt bone points (SFC012) below the possible destruction layer [C013/2017].



Figure 3.38: Detail of charred timbers [C016B/2017] from beside the hearth, possibly the remains of a timber roof.

Further evidence of burnt and collapsed timbers (Figures 3.34 and 3.36) was identified overlying a small hearth [C020/2017]. Sub-rectangular in plan, the hearth consisted of medium sized (0.2 by 0.2 m) closely set, flat-based stones, retained on three sides by upright stones. Soils surrounding this feature were charcoal-rich, and there was an *in situ* charcoal deposit within a loamy soil immediately above the stones of the hearth [C021/2017] and a charcoal-stained stoney soil [C032/2017] between the internal wall face [C005/2017] and the hearth. Burnt soils were also visible under the hearth [C024]. Bone fragments (SFC032), a copper alloy fragment (SFC037) and vitrified material, possibly fuel ash slag (SFC038), were recovered from this layer. A radiocarbon date obtained from hazel charcoal from the hearth produced a date range of 380–190 cal BC (95% probability; SUERC-76165; Table 3.1).

Underlying a charcoal-rich deposit [C016/2017] in the interior of the building, was a mottled spread of bright red-orange burnt sandy soil, within a mid-loamy dense soil with dark charcoal-rich lenses [C019/2017] (Figure 3.35). This was found to extend across a 4 m wide sondage in the north-east half of the trench, abutting the hearth [C020/2017], and contained *in situ* charred alder and hazel timbers, [C022/2017, C023/2017, C026/2017 and C031/2017], possibly the remains of floor planks. A

radiocarbon date obtained from hazel charcoal from the floor provided a date range of 360–110 cal BC (95% probability; SUERC-76170; Table 3.1).

Underneath these charred timbers was an alignment of flat stone slabs [C028/2017] c. 8 m from the south-west trench edge, above which a fragment of a wooden bowl with a copper repair plate (SFC060) was recovered. Underlying the *in situ* charcoal of the timbers but above the bedrock, the flat slabs appear to have provided a base for a wooden floor (Figure 3.36). Within this possible levelling deposit, underlying [C019/2017], there was a loose medium brown soil [C029/2017] where the bedrock dipped away at a steep angle. This was much darker in colour than the levelling deposit noted beneath the floor in the south-west corner of the trench [C027/2017] and may represent a dump of redeposited natural material and hearth material to build up internal floor levels. A fire-cracked stone (SFC047), burnt bone (SFC050) and worked stone tools (SFC048) and (SFC049) were recovered from this deposit. A discrete deposit of clay [030] was also aligned with the set of stones [C028/2017].

A levelling deposit [C027/2017] of crumbly, loamy soil, red-brown/grey in colour, was noted (Figures 3.35 and 3.36); this overlaid and filled voids within the bedrock,

and contained a few inclusions of small charcoal flecks. A collection of small quartz pebbles (SFC041) was recovered from this deposit, and although they appear unworked, their presence is notable due to the absence of such pebbles elsewhere in the roundhouse.

Exterior of the monumental roundhouse

Immediately outside the roundhouse, overlying the quarried bedrock and the quarry chippings [109] were several deposits [104, 106] of dark charcoal-rich silts (Figure 3.18). Finds from [104] included a bipolar core (SF110) and an iron hoop or ring (SF111), and from [109] a damaged red sandstone disc-bead (SF120). These charcoal-rich silt deposits underlay the rubble from the destruction of the roundhouse and are probably associated with the use and occupation of the structure.

The enclosing ramparts: B and C

The two outer ramparts, B and C, enclose the main body of the hill, with the later Annexe D extending down the northern slope (Figure 3.7). The topographic survey suggested they represent two successive phases of enclosure; the inner, upslope Rampart C appearing to overlie the lower, downslope Rampart B where they merge on the east side. Trench 2, excavated on the north-west of the fort in 2015, aimed to investigate the nature of, and chronological relationship between the two ramparts (Figure 3.10). It was set out at right-angles across the ramparts from north-west to south-east and measured 30 m by 4 m. Both ramparts were also investigated in 2017 on the north-east in Trench E, which measured 30 m by 4 m and was aligned north-east to south-west (Figures 3.39 and 3.40).

Rampart C

The upper of the ramparts, this extended around the shoulder of the summit of the hill to enclose a relatively flat area of c. 1.2 ha (Figure 3.10). Measuring up to 4.05 m in thickness and standing to a maximum height of 1.80 m (Figure 3.40), the rampart [203] comprised an inner [209] and outer [208] stone face with a rubble and earth core [210] (Figure 3.39). The inner face (Figure 3.41) of roughly squared and dressed blocks up to 0.4 m by 0.3 m by 0.2 m was laid in uneven courses, with up to three surviving within the trench. No bonding material was found, and no sockets for timber-lacing were identified. The outer face (Figure 3.42) was better constructed with the stonework making up the face comprising roughly dressed sandstone/greywacke blocks up to 0.6 m by 0.3 m and smaller pinning stones in the gaps. The outer face was built directly upon the bedrock [211] (Figure 3.42). The rubble core [210] was composed of angular and sub-angular stones of varying lithologies, set in a loose matrix of dark grey, silty clay.

The largest of the stones incorporated into the core measured 0.5 m by 0.4 m and 0.4 m in thickness (Figures 3.39 and 3.40). The rampart had collapsed downslope, with large blocks settling immediately outside the structure (Figure 3.43).

The inner face of the rampart was built within a possible construction trench [223] cut through a deposit of charcoal-rich silt [225]. A reddish-brown colour, this firm, sandy silt was up to 0.5 m deep (Figure 3.44). This deposit extended throughout the width of Trench 2 upslope from the rampart and on the slope below (Figure 3.40). While it is possible that this represents an earlier phase of rampart construction, the lack of formal structure, or indeed evidence that it formed a discrete bank, suggests it is more likely to be a deposit of colluvial material. Underlying deposit [225] upslope from the rampart, a charcoal-rich, silty sand [229] occupation deposit was identified (Figure 3.40). Birch charcoal from this returned a radiocarbon date of 350–60 cal BC (95% probability; SUERC-65166). Subsequent collapse of the rampart produced a tumbled stone deposit [201] which extended downslope for some 15 m and overlay Rampart B.

The rampart was also identified during the investigation of the relationship between the monumental roundhouse and the outer defences of the fort in Trench E (Figure 3.45). Here, the rampart [E011] comprised an outer stone facing [E005] (Figure 3.46), an inner stone facing [005] and a core, the latter divided into upper [E001] and lower [E010] layers (Figure 3.46). The lower layer was built directly onto an original ground surface [E017]. The stone face was formed of large, sub-rounded and squared boulders aligned east to west, approximately 1.2 m high, running the full width of the trench. Underneath this lay a deposit of shattered stone [E016] 0.20 m in depth (Figure 3.46). The lower layer [E010] of the rampart was a deposit of large angular stone rubble, in the top of which a displaced timber [E006] had been laid north to south. This was likely re-use of material from another structure [E019]. Following the demise of both the monumental roundhouse and Rampart C, the latter formed a trap for material from the former that had collapsed and moved down slope, with deposit [026] containing a burnt layer of timbers and debris from deposits/structures upslope and [E008], a layer of burning containing vitrified waste.

Rampart B

Rampart B lay on the slope below Rampart C on the east, north, and west flanks of the hill, enclosing an overall area of c. 1.8 ha (Figure 3.10).

In Trench 2, Rampart B [204] was covered by a layer of collapsed stone [202] and sandy clay [207], both of

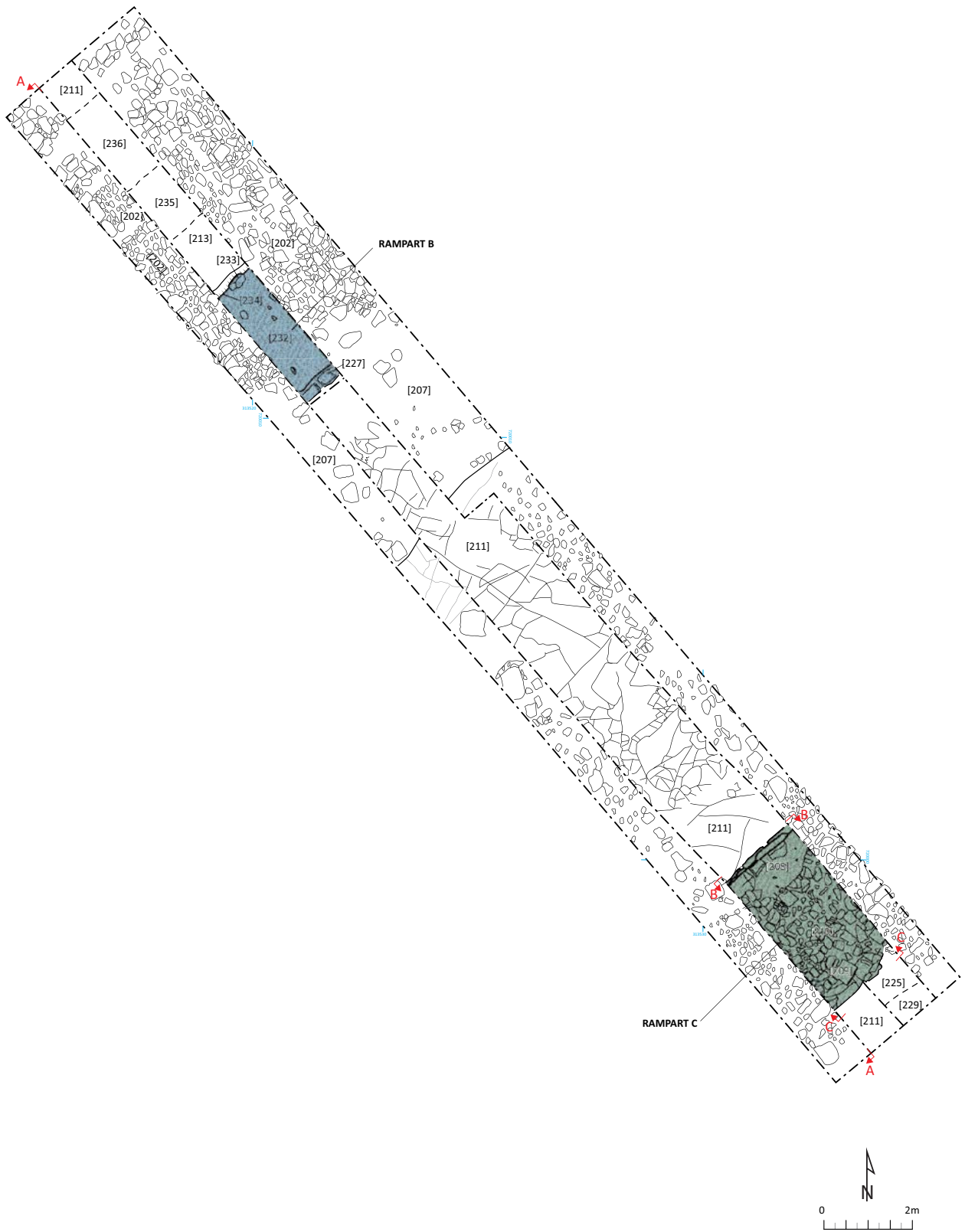


Figure 3.39: The plan of Trench 2 showing Ramparts B and C.

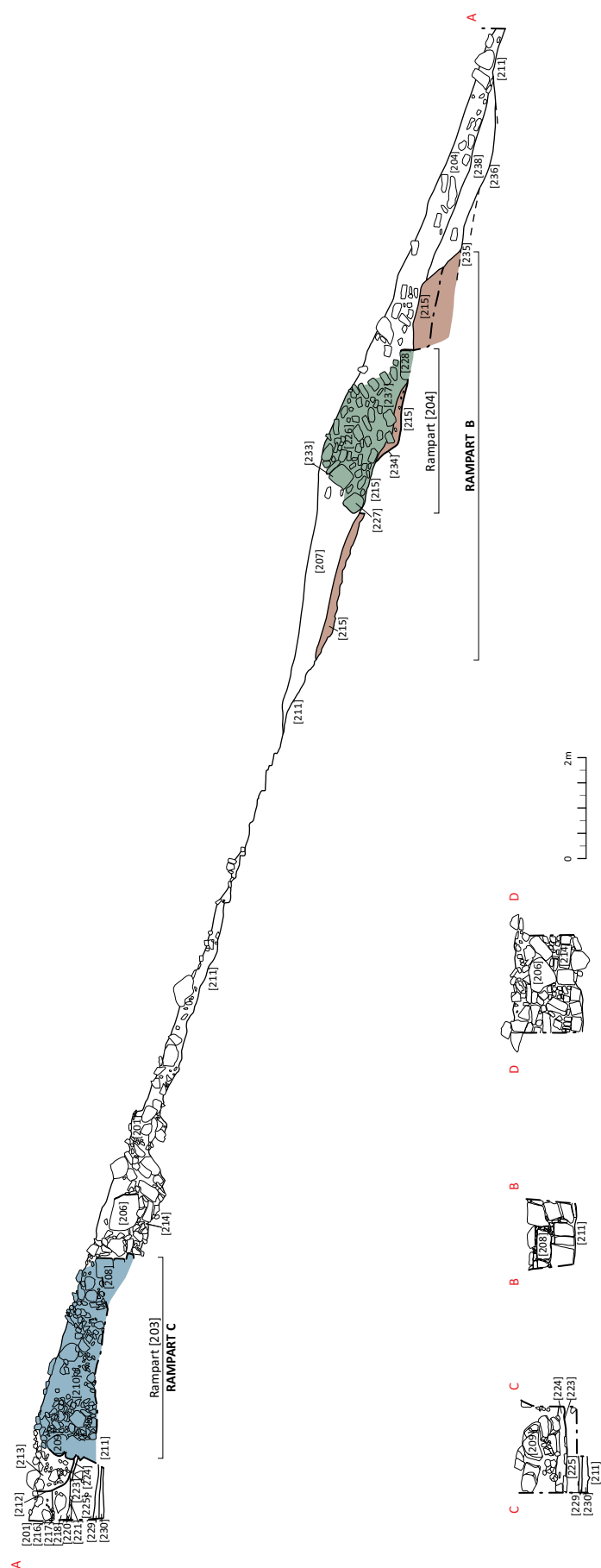


Figure 3.40: Section through Trench 2 showing Ramparts B and C.

which had eroded from Rampart C [203] and collapsed downslope. Rampart B (Figure 3.40) comprised inner [227] and outer [228] stone faces with a stone [233] and soil core [226]. Overall Rampart B was 3.25 m thick and a maximum of 1.7 m high, this latter measurement taken vertically from the base of the outer face to the top of the stone and soil core.

Less well-preserved than Rampart C, Rampart B contained fewer surviving facing-stones. The inner face [227] comprised a single course of squared sandstone blocks up to 0.6 m by 0.3 m by 0.3 m in size (Figure 3.47), but only a single block of the outer face [228] survived. The stones in the rampart core were sub-rounded to sub-angular, measuring up to 0.5 m by 0.3 m by 0.3 m, and set in a sandy silt matrix [226]. Elements of oak, hazel and birch were identified from environmental samples and have been suggested as the remnants of a possible timber superstructure (Chapter 5.3). While no other evidence was identified for this, it is possible that the rampart included a timber element, and perhaps a timber palisade built into the wall head. A radiocarbon date obtained from alder charcoal from the core [226] of the rampart provided a date range of 360–110 cal BC (95% probability; SUERC-65165).

The entire rampart was built over a homogenous deposit of sandy silt [215], which extended back up the slope above the rampart over 8.05 m (Figure 3.40). Upslope from the line of the inner face this deposit was overlain by the sandy clay [207] which had built up against the rear of the collapsed rampart. Beneath Rampart C this deposit [215] overlay a thin patch of charcoal-rich soil [235] which overlay the bedrock [211]. While it is possible [215] is the remains of an earlier, collapsed earthen rampart that was built over, it could equally represent an original ground surface. A radiocarbon date obtained from cherry charcoal in the charcoal-rich soil deposit provided a date range of 400–210 cal BC (95% probability; SUERC-65164).

The bedrock [211] and glacial till [236] were identified beneath the collapsed soil and rubble [204] in front of the rampart (Figures 3.40 and 3.37). While no obvious cut was identified, the bedrock may have been modified to enhance the external stature of the rampart.



Figure 3.41: The inner face [209] of Rampart C [203], overlying the old ground surface [202] and bedrock.



Figure 3.42: The outer face [206] of Rampart C [203] constructed directly onto the bedrock.



Figure 3.43: Collapse [206] of Rampart C [203] located on a tumbled stone deposit [214].



Figure 3.44: A charcoal-rich occupation deposit [229] directly underlying deposit [225], which was apparently cut away for the construction of Rampart C.

Annexe D rampart

The rampart of Annexe D drops down from Rampart C to enclose a lower, uneven terrace of the hill to the north of the main fort (Figure 3.10). The topographic survey suggested that it sprang from Rampart C on the north-west, crossing over the remains of Rampart B, and returned on the north-east downslope from the monumental roundhouse to enclose an area of about 0.68 ha (Figure 3.7). It was examined both in Trench 3 and Trench E. Trench 3 was excavated on the west of the annexe, just to the north of a modern path which passes through a probably modern gap in the annexe rampart to curve south onto the summit. Trench E examined the relationships between the ramparts below the monumental roundhouse.

Trench 3 measured 10 m by 4 m and was aligned east and west and aimed to determine whether the gap taken by the modern path was a formal entrance or a later breach (Figures 3.48 and 3.49). Removal of up to 0.15 m of turf and topsoil [300] from the eastern end of the trench, within the annexe interior, revealed modern upcast from construction of the path. This formed a mound consisting of rounded stones [301] up to 0.4 m in diameter within a fine sandy silt matrix [302]. Underlying the upcast was a series of deposits [303, 304, 306, 307, 308 and 309] interpreted as collapsed material from the rampart [325]. Further excavation was limited to a 2 m wide sondage extending down the centre of Trench 3 (Figures 3.48 and 3.49).

In this trench the rampart [325] measured 4.6 m in thickness, with substantial inner [313] and outer faces [305] that both survived to a maximum height of just over 1 m (Figures 3.50 and 3.51). The faces were built of a mixture of angular and rounded stones up to 0.7 m in diameter, placed directly onto a thin layer of what was either natural subsoil or the original ground surface [328] overlying the bedrock [326] (Figure 3.48). No construction cut was identified. The lower part of the outer face [305] had been severely impacted by the construction of the path with even some of the larger blocks shattered. The stones forming both faces were neatly dressed on their external faces while the surviving rampart core comprised sub-angular stones [324] up to 0.3 m in diameter, within mid brown clayey silt [318] up to 0.5 m in depth.

Within the core of the rampart, a truncated median face [319] of sub-angular stones up to

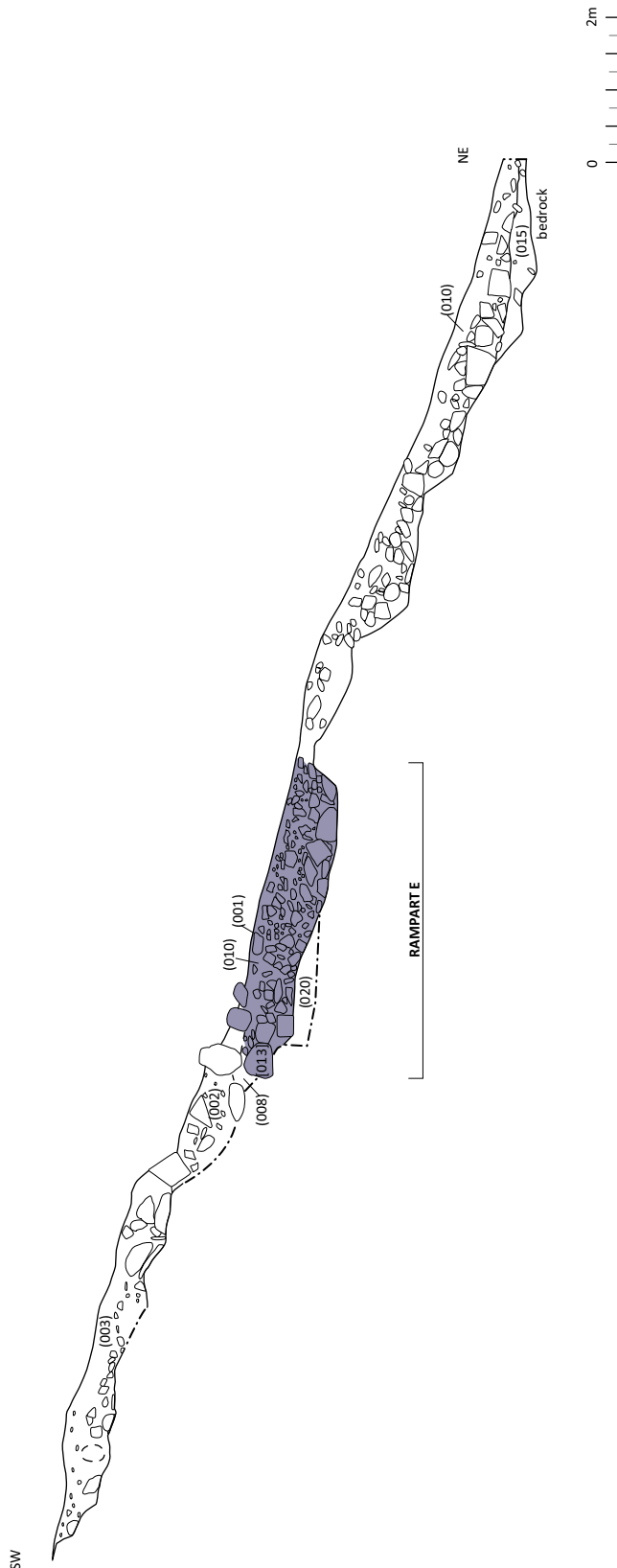


Figure 3.45: Section through Trench E detailing Rampart C, with upper deposit [001] and lower deposit [010].



Figure 3.46: Internal face [E005] of Rampart B [E011] showing crushed stone [E016] and base of the stone facing.



Figure 3.47: Rampart B [204], showing the inner facing [227] and stone core [226].



Figure 3.48: Plan and sections of the rampart of Annexe D in Trench 3.



Figure 3.49: Aerial of the rampart of Annexe D in Trench 3 showing the inner, median and outer faces from left to right (photo: Ken Ward).

0.4 m across, was found to run broadly north-north-east to south-south-west (Figures 3.48, 3.49 and 3.52). While only 2 m of this feature was exposed, its façade appeared to be inward facing, however it was not possible to demonstrate whether this was the inner face of an earlier rampart [327], incorporated into the core of an expanded rampart faced internally by [313]. Alternatively [319] may have been a constructional device to stabilise the core of the structure.

A deposit of dark, orangey-brown silty clay [320] up to 0.3 m in depth with occasional charcoal flecks and pebbles underlay the rampart [325]. Interpreted as a base layer of anthropogenic material, it pre-dated the rampart [325]. A radiocarbon date obtained from alder charcoal from this deposit provided a date range of 380–180 cal BC (95% probability; SUERC-65167).

The rampart was abutted to either side by deposits derived from a combination of slump/collapse, hill-wash, and modern detritus including bottle glass (Figures 3.48 and 3.49). On the inner side, however, these included a thin deposit of dark orangey-brown, sandy silt [316] up to 0.05 m in depth, overlying the natural silt [323]. This included a large quantity of sub-angular pebbles and stones, and contained small pieces of charcoal, occasional flecks of burnt bone and part of



Figure 3.50: The internal face [313] of the rampart of Annexe D [325] in Trench 3, from the east.



Figure 3.51: The external face [305] of the rampart of Annexe D [325] in Trench 3, from the west.



Figure 3.52: The internal face [313] of the rampart of Annexe D on the left, with the median and outer faces in the centre and right respectively. Trench 3 from the north-east.

an animal jawbone (SF002) and (SF006). It is interpreted as an occupation deposit relating to the use of the annexe.

In Trench E, very little of the annexe rampart could be identified. An alignment of large sub-squared stones with rounded edges [E025], up to 0.30 m thick was all that could be interpreted as the probable remains of the rampart (Figure 3.53). This alignment appeared to post-date the monumental roundhouse collapse and Rampart B [E011].

The inner oval fort, Wall E

The RCAHMS survey showed that the innermost Wall E enclosed a roughly oval area measuring c. 53 m from north-west to south-east by 38 m transversely, enclosing some 0.15 ha (Figure 3.8). RCAHMS interpreted this as the last phase of fortification on the hilltop. As noted above, it has previously been proposed as the citadel of an early medieval ‘nuclear’ fort (Feachem 1963: 145; Harding 2012: 170), and thus a key target of the research.

Wall E was excavated in all three seasons and was the most intensively investigated of all the defences; this

included clearance of the wall-faces, an examination of superficial deposits overlying the wall core, and partial examination of the wall core itself. A buried ground surface was reached in a sondage and appears to run under the inner, southern, face of the wall. No finds or dating material were associated with this ground surface.

In 2015 Trench 4 (Figure 3.54; measuring 15 m by 4 m) was cut across Wall E on the west. In 2016 Trench A (Figure 3.55; measuring 20 m by 10 m) focused on the proposed hut-circles of the Unenclosed Settlement F that appeared to be overlying the interior enclosed by Wall E on the north (Figure 3.56) but also revealed the line of Wall E. Trench A was reopened and extended north in 2017 to reveal the full thickness of Wall E (Figure 3.10) and it was only through this large area excavation that the true character of the wall could be properly understood. This highlights the conclusions of previous and long-standing discussions on ‘keyhole’ excavation in comparison to large-scale investigation (Haselgrove 2009; Clarke 2001: 293–6).

Both Trench 4 (Figure 3.54) and the extended Trench A (Figure 3.55) exposed the full thickness of Wall E,



Figure 3.53: The truncated remnants of the Annexe D rampart in Trench E.

demonstrating that it was the most substantial of any of the defences constructed on Moncreiffe Hill (Figure 3.57). In Trench A, it measured at its thickest 5.85 m by up to 2.20 m in height (Figure 3.55), and while neither trench was fully excavated, both here and in Trench 4 it appeared to have been built directly onto an original ground surface [420, A124] overlying the natural bedrock [425] (Figure 3.55). A linear cut [A127] was identified to the interior of the wall (Figures 3.55 and 3.58). Only partially exposed, the feature may represent either a drainage feature aligned along the back of the wall or perhaps a construction cut for the wall itself. A radiocarbon date obtained from birch charcoal from the fill [A128] provided a date range of 340–50 cal BC (95% probability; SUERC-76160; Table 3.1).

The initial evaluation in Trench 4 confirmed that previous excavations had taken place, in the form of ‘wall chasing’ (Figures 3.59 and 3.60). It is not clear whether this was an unrecorded antiquarian investigation, or the result of quarrying for stone. The excavators had worked along the base of the wall but had not excavated into the surviving structure. In Trench 4 (Figure 3.54), the wall [410] comprised an outer [402 and 419] (Figure 3.61) and inner stone face [410] with a rubble core [409 and 421] in a soil matrix

[411] (Figure 3.54). The surviving outer face consisted of large, rounded boulders up to 1.2 m in length by 0.7 m in height, interspersed with smaller pinning stones (Figure 3.61) and was built directly on to the bedrock (Figure 3.62). This face comprised up to three courses at c. 1.8 m in height. As with the ramparts explored on Moredun, there was extensive evidence of collapse; and the upper courses of both faces had slumped outward [415 and 416], followed by the core materials to form tumbled stone deposits [403, 414 and 418] (Figures 3.54 and 3.63). Several pieces of vitrified stone (SF409) and slag (SF407) were recovered from the core, presumably derived from earlier activity on the hill, as there was no evidence of *in situ* burning. A radiocarbon date obtained from hazel charcoal from the buried ground surface [423] provided a date range of 540–380 cal BC (95% probability SUERC-65168; Table 3.1). Overlying this buried ground surface was a discrete charcoal-rich deposit containing several large pieces of charcoal [422].

In Trench A, the wall was found to be of similar construction, comprising an inner [A108] and outer [A110] face with a rubble core [A109] (Figure 3.64). Both façades were fairly horizontally coursed in roughly-squared and dressed stone blocks.

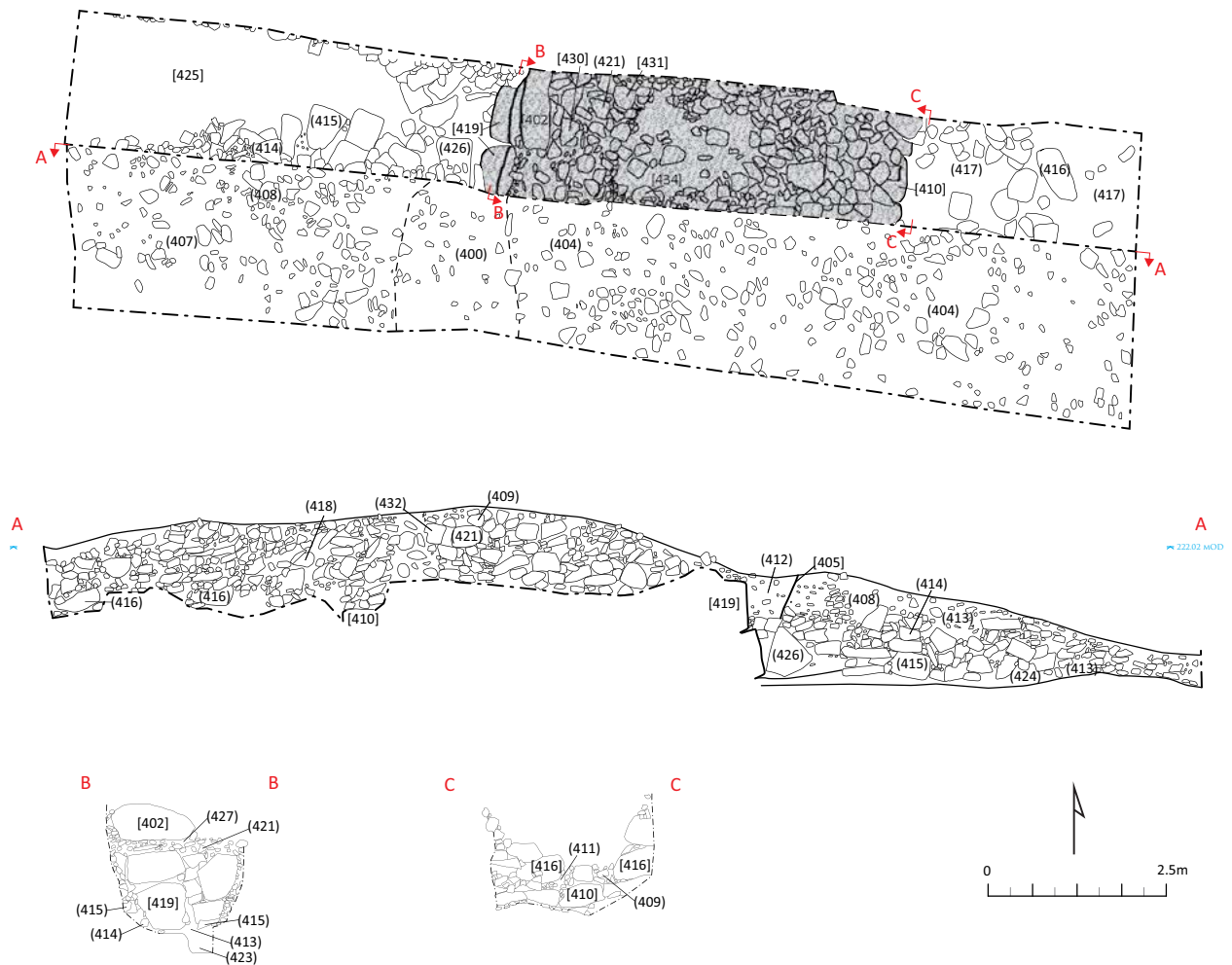


Figure 3.54: Post-excavation plan and sections of Wall E in Trench 4.

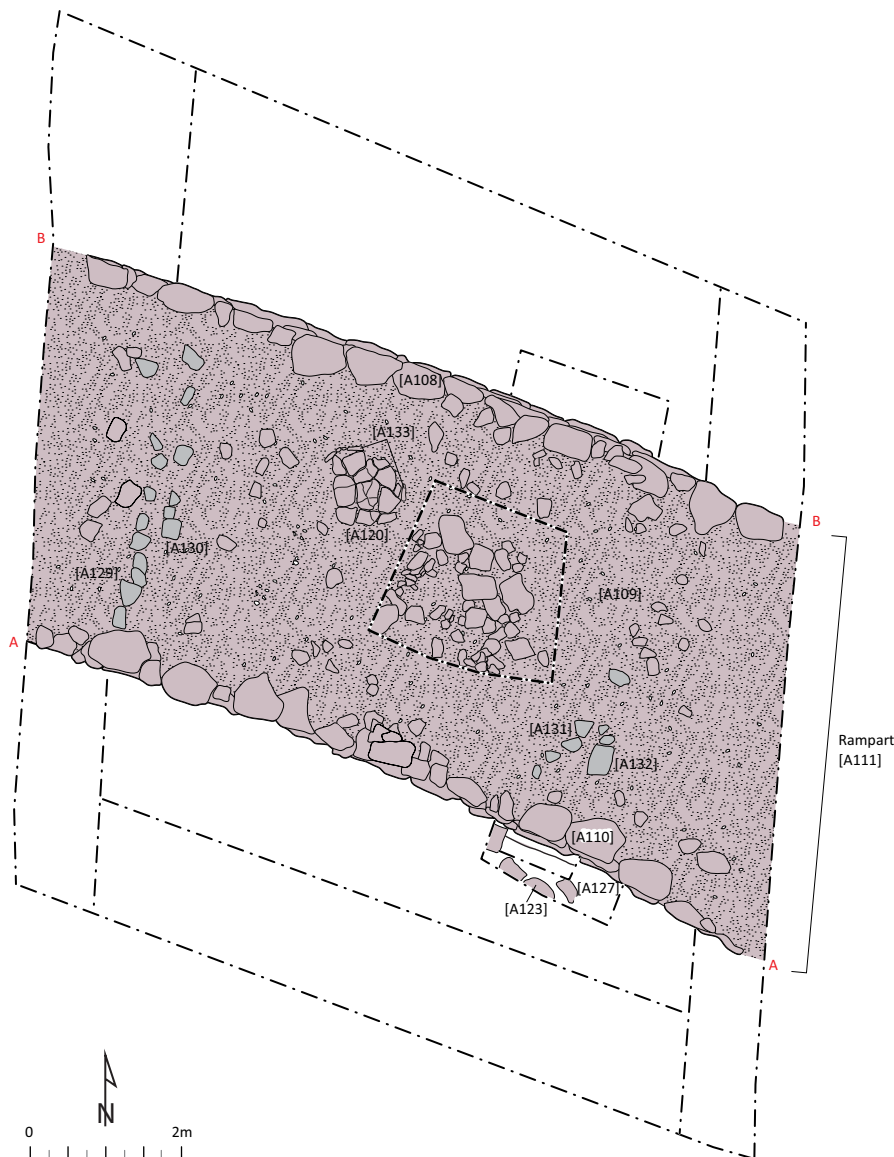
The surviving external face consisted of five main courses, each c. 0.5 m in height and composed of blocks of mixed lithology measuring up to 1.2 m in length (Figures 3.65, 3.66 and 3.67). A concentration of Old Red Sandstone was found in the lower two courses, and another along the middle course, which may indicate a design preference, or perhaps episodes of construction. A noticeable batter was observed, with the blocks sloping inwards through successive vertical courses (Figure 3.68). The surviving inner face also survived to five main courses and included one concentration of Old Red Sandstone in the upper half.

Examination of both exposed faces also revealed evidence for composite construction using structural timbers. This consisted of a near-horizontal row of voids in the external wall face, and two similar rows in the internal face (Figure 3.65).

In the external façade, the single row of voids was found below the surviving upper two courses at an average height of 220.55 m OD but being slightly higher to the

east and lower to the west (Figure 3.65). A sondage confirmed at least three courses of large stone blocks below this line. During excavation, the row of voids appeared to form an almost continuous horizontal slot, but with clear voids running into the wall core set c. 0.25 m apart that measured c. 0.25 m square. It is assumed these were sockets for horizontal transverse timbers through the core of the wall. The character of the stonework between the voids was not that of the massive blocks forming the main courses but consisted of panels of smaller stones and slabs between the voids in the horizontal slot. In places, smaller pinning stones were firmly wedged in place between the blocks forming the courses both below and above, while other smaller stones filling the slot may have slumped out from within the wall core or have been derived from the external tumble. During excavation, it was assumed that these smaller stones had collapsed into place as the timbers rotted and the structural integrity they provided was lost, thus creating the impression of a near continuous horizontal slot in the face. In places, stones in the course above the row of voids certainly appear to

Figure 3.55: Plan of the surviving Wall E in Trench A showing the internal and external faces, the area of paving, and sondages excavated.



have slumped down into this horizontal slot to contact the stones in the course below. Reconsideration since the excavation, however, has raised the possibility that the slot in the face had held horizontal timbers exposed in the façade; and this idea is developed further below (Ian Ralston: codicil).

The inner face was of broadly similar construction to the outer, but included two rows of voids, again near-horizontal. In both cases the features were less well-preserved than in the external façade, with the upper surviving, or distinguishable, over only a little more than half the length of the façade as exposed. Also as with the external face, the line of the voids in both rows of the inner face appeared as almost continuous horizontal slots, again filled with occasionally placed pinning stones alongside other smaller stones of less certain origin. The lower of these rows of voids occurred at an average height of 220.08 m OD, but was slightly higher at the east end and lower to the west. It

occurred directly above the two courses of stonework, the lowest of which was confirmed by a sondage as being constructed onto bedrock. Above this row, was another two courses of massive stone blocks, and above this, the second line of voids at an average height of 220.70 m OD (Figures 3.65 and 3.69). This indicates multiple layers of transverse timbers, possibly carried up in a regular pattern of two stone courses, one timber, two stone, one timber etc. Again, reconsideration since the excavation raises the same possibility: that these two near continuous horizontal slots in the inner face represent the positions of horizontal timbers exposed on the façade. This is further developed below (Ian Ralston: codicil).

It was beyond the resources of the project to dismantle the wall and explore the internal timber structure in more detail. Nevertheless, the relative levels of the ends of the transverse beam sockets were measured, demonstrating that the upper row on the internal face



Figure 3.56: Plan of Trench A pre-excitation, detailing possible hut-circle features identified in survey.

(at an average height of 220.77 m OD) is around 15 cm higher than the single row in the external façade (at an average height of 220.55 m OD). This may suggest that horizontal, transverse timbers ran across the full thickness of the wall, the difference of c. 15 cm over the c. 5.85 m being *de minimis* and could easily have resulted from subsidence during collapse of the wall as the timbers rotted. Any height difference fallen across the wall was clearly within the tolerances demanded by builders who required only an approximate level in the construction. It is possible that the height difference was by design however, as a wall-head sloping, even slightly, outwards would act as a run-off for rainwater, ensuring this was dispersed outside the fort rather than being drained into it.

It is equally possible, however, that the height difference does not indicate that the transverse timbers ran the full wall thickness, but were shorter, perhaps no more than 3–4 m in length, overlapping in staggered rafts in the middle of the wall. This argument might be supported by the lack of a corresponding row of sockets in the external face (at c. 220.08 m OD) to match the lower row on the internal face.

While there was not capacity to dismantle Wall E, the surface of the wall core was exposed, revealing several features. A sub-circular area of flat paving slabs [A120] (Figures 3.70 and 3.71) was constructed directly onto the *in situ* rubble core [A111], possibly within a shallow scoop with a cut edge [A134] (Figures 3.55 and 3.71). The feature measured 1.05 m by 0.95 m and originally consisted of six or seven stone slabs, which had subsequently fractured, bounded by edge-set stones on the north-west and east [A133]. It was tentatively identified during excavation as a temporary hearth built onto the top of the surviving wall core after the upper works of the wall had been reduced to its



Figure 3.57: A vertical aerial view of the innermost oval fort E with Trench A over Wall E open in 2017. The external (north-facing) façade is to the top with the inner face below. The earthworks of unrecorded wall-chasing are visible to the exterior of the enclosure wall on the west (left) (photo: Ken Ward).



Figure 3.58: Area of paving [A123] and linear cut [A127] exposed abutting the inner face of Wall E in Trench A [A111].



Figure 3.59: Mid-excavation view of Trench 4 showing the Wall E [406] at the top of the frame, with upcast material [405] from the earlier, unrecorded excavation.



Figure 3.60: Section through the upcast material [A106] from the earlier excavation in Trench 4.



Figure 3.61: Detail of the external face [402 and 419] of Wall E [401] in Trench 4.



Figure 3.62: The external face [402 and 419] of Wall E [401] with bedrock foundation.



Figure 3.63: The external facing [402 and 419] of Wall E [401] with collapsed core material [403] to the exterior (left).



Figure 3.64: The internal face of Wall E with the core material (central) and outer face (left) in Trench A.

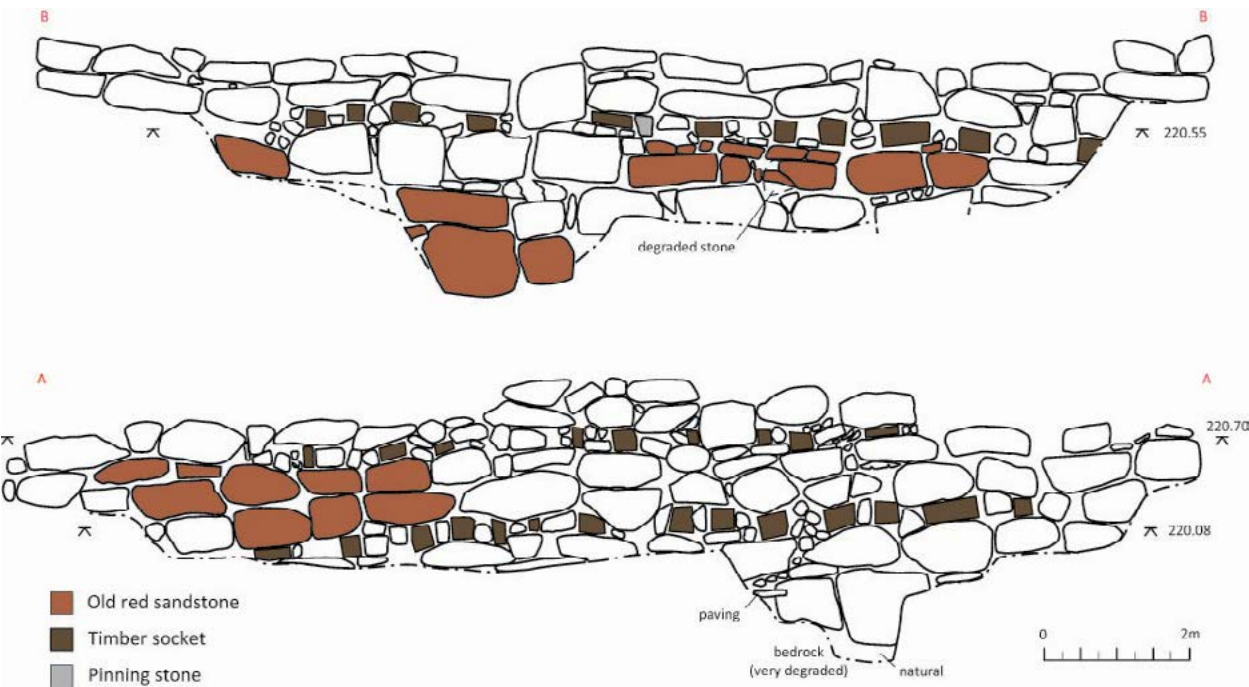


Figure 3.65: Elevations of the external (above) and internal (below) faces of Wall E in Trench A, detailing the use of Old Red Sandstone, the timber sockets and the bedrock foundation.



Figure 3.66: The external face of the wall of Wall E in Trench A showing the use of Old Red Sandstone and the horizontal slot indicated by the supporting timber pegs.



Figure 3.67: Detail of the external face of Wall E in Trench A illustrating the use of Old Red Sandstone, the sockets of transverse timbers and the possible horizontal slot, and the sondage to identify the foot of the wall.



Figure 3.68: The notable batter on the external face of the Wall E in Trench A.



Figure 3.69: Detail of the internal face of Wall E in Trench A, showing bedrock at the base, and sockets for transversal timbers.

present level. However, the lack of any evidence of *in situ* burning or heat-affected stones makes this unlikely. It is more probably a surviving structural element of the wall, perhaps a post-pad to support an upright timber encased in the original wall-head, or related to a timber walkway or other superstructure. Alternatively, it could represent a working platform for an unknown purpose constructed after the collapse or demolition of the top of the wall.

In addition, in the top of the undisturbed wall-core, two pairs of roughly parallel linear features, roughly aligned north-south were identified [A129/A130] and [A131/A132]. Defined by small, angular stone cobbles these were tentatively interpreted as chocking stones of former transversal timbers, though neither could be traced to a socket in either face of the wall (Figure 3.55).

Several flat slabs [A123] were found at the base of the inner face, overlying an east-west aligned linear cut [127] (Figures 3.55 and 3.58). The cut [127] had a sharp break of slope leading to steep sides and breaking gently to a concave base. The function of the stones remains unclear, but it is most probably a levelling foundation

for the wall itself, but could potentially relate to flooring of an internal, or earlier structure. Too little was exposed of the cut to determine its function, and whether it related to the foundations of the wall or perhaps was a contemporary drain immediately to its rear.

The standing remains of Wall E were enveloped by a massive spread of rubble derived from the collapse of its upper structure, which pre-dated the proposed Unenclosed Settlement F constructed over the interior of the fort (see below). The deposits that overlay the surviving top of the wall core, which included horizons of rubble, were also present outside both faces of the wall and contained several artefacts, primarily coarse stone tools. Further artefacts, including iron, fragments of shale bracelet, slag and a pottery sherd as well as more coarse stone tools were recovered from deposits overlying wall collapse.

Indeed, this general spread of rubble beneath Unenclosed Settlement F contained several deposits, for example [A103, A104, A105, A113 and A116], that included the densest concentration of artefacts encountered anywhere on the site. These artefacts related to both domestic and industrial activity, but their taphonomy is less clear. The deposits must either represent redeposited material, previously contained within the core of the wall before its partial collapse/demolition, or material introduced during, or after, the wall had collapsed. In the absence of any contemporary associated structures, it is assumed that these deposits and the artefacts they contain originated in the core of the upper part of the wall and found their way to their present contexts in a secondary process as the fabric of the wall collapsed or was demolished. The deposits are summarised below.

Among the deposits overlying Wall E were: several stone rubbing tools (SFA103), (SFA107), (SFA109) and (SFA110); a hammerstone (SFA104); bone (SFA102); and a whole quern (SFA106) and two fragments (SFA106) and (SFA111). A possible shale bracelet roughout (SFA105) was also discovered above the wall [A105], while two ceramic fragments (SFA115) and (SFA129) were found in collapsed rubble to the exterior [A104] and interior [A103] of the wall respectively. A further deposit [A114] within the interior on the south side of the wall [A111] was also artefact-rich, containing: iron fragments (SFA113), (SFA118), (SFA126) and (SFA132); stone tools (SFA119), (SFA125), (SFA127) and (SFA131), including a pebble-like knife sharpener (SFA130); quantities of bone (SFA123) and slag material (SFA128); a piece of pottery (SFA122); and pieces of shale (SFA112), (SFA016), (SFA017) and (SFA120), of which (SFA112) and (SFA120) were fragments of manufactured bracelets. These layers were bound by a loose arc of sub-angular stones 0.4 by 0.5 by 0.5 m situated on a slight plateau on the

wall collapse [A103, A104 and A105], and may represent a later working area built over the collapsed wall.

Deposit [A116] overlay the *in situ* remains of Wall E and extended to the exterior and the artefacts it contained are likely to represent earlier material incorporated into its core. The deposit consisted of a mix of sub-angular stones c. 0.4 m by 0.5 m by 0.5 m situated in a loose matrix of sandy silt. This layer contained various fragments of bone and teeth (SFA135), (SFA140), (SFA150) and (SFA154), including some possible burnt bone (SFA141). Shale fragments (SFA134), a hammer stone (SFA133) and rubbing stone (SFA141) were also found, along with a piece of a hazelnut shell (SFA138). Within another rubble deposit [A117] above the surviving Wall E were iron objects (SFA153), bone and teeth fragments (SFA155), (SFA156) and (SFA172) and a sharpening stone (SFA157). Finds in the rubble to the exterior [A118] were mostly bone (SFA136), (SFA137), (SFA143), (SFA145) and (SFA152), but a stone hammer (SFA139) and possible polisher (SFA124) were also found, along with some slag material (SFA151).

A charcoal deposit [121] identified below the rampart collapse, is considered likely to represent burnt

structural timbers. A single piece of vitrified stone was also recovered from the wall core but there were no other signs of vitrification; the absence of indications of heating in the vicinity indicate that it may have been gathered elsewhere and re-employed in the core.

Charred hazel recovered from the context [A119] directly overlying the paved area [A120] produced a date of 380–190 cal BC (95% probability; SUERC-76156). If the hazel was in a primary context, such as a hearth, it might suggest the wall was built before about the 4th or 3rd century BC. Alternatively, and perhaps more likely, the charcoal is derived from the same earlier source as the artefacts described above and is no more than secondary material that was built into Wall E; in this scenario the wall is later than the 4th or 3rd century BC. A second calibrated date of 340–50 BC (95% probability; SUERC-76160) is from birch charcoal from the fill of the cut running parallel with the southern wall-face.

The internal occupation of the forts

The interior of the forts enclosed by Ramparts B and C contained a series of artificial features, identified in the 2014 and previous surveys. The majority of these



Figure 3.70: A vertical aerial view of Wall E in Trench A in 2017, showing the internal and external wall faces (below and above respectively) and the area of paving [A120] on top of the surviving wall (photo: Ken Ward).



Figure 3.71: Stone setting of paving [A120] on top of Wall E [A 111] in Trench A.

appear to relate to quarrying, concentrated around the fort enclosed by Wall E and the monumental roundhouse within Mound A. Three, however, were identified as having potential to demonstrate occupation: Unenclosed Settlement F within the circuit of Wall E (comprising at least two suggested conjoined roundhouses); a smaller roundhouse directly to the north of Wall E; and the pond at the east end of the interior enclosed by Ramparts B and C. Trenches 6, A, B and D were excavated to explore these and establish, if possible, their origin, chronology and relationship to the sequence of forts (Figure 3.10).

Unenclosed Settlement F (Trenches 6 and A)

A pair of proposed roundhouses, and possibly adjoined, that were first sketched by Christison (Figure 3.4) and mapped in 2014 (Figure 3.7), were investigated in Trenches 6 and A in the northern part of the interior of the Wall E enclosure. The resistivity survey supported the presence of the northern, which appeared to overlie Wall E (Figure 3.9). In 2015, Trench 6 was excavated over the shared upstanding banks of the posited roundhouses but proved to be inconclusive. In 2016 Trench A was laid out across a larger area over both structures. Removal of topsoil [A001] revealed two circular arcs of stone, one to the north [A003] and the other to the south [A004] (Figures 3.56, 3.72 and 3.73). On investigation, however,

the features were ephemeral and poorly defined, comprising little more than loosely consolidated layers of stones. The relationship between the two structures at their intersection could not be demonstrated.

The line of the northern stone arcs suggested a feature c. 10 m in diameter within a bank of angular stones [A006] surviving to no more than 0.2 m in height. Most of the stones were fine-grained and matched the local outcropping stone (Figure 3.72), but they included occasional erratic glacial boulders, water-smoothed cobbles and Old Red Sandstone blocks. No entrance or internal features were identified and there was no evidence of a floor or any associated occupation. Nevertheless, the structure overlay two artefact-rich deposits [A012 and A017]. Deposit [A012] was an ephemeral compact deposit of dark brown silty sand and lay within the east-north-east quadrant of the interior. It contained various artefacts including coarse stone tools (SFA024), (SFA027), (SFA048) and (SFA063); a possible whetstone (SFA029); a fragment of shale bangle roughout (SFA012); and a piece of slag waste (SFA043). Underlying this was a deposit of loose to semi-compacted, small, shattered stones with a loose dark brown silty soil matrix [A017]. This contained numerous animal bones (SFA054), (SFA057), (SFA061), (SFA069) and (SFA071) and a possible quern fragment (SFA072). Subsequent investigation revealed this to be

the *in situ* core material [A032] of Wall E, which had also been exposed beneath the underlying rubble on the north side of the structure. Various lenses of soil were identified below the material from the collapsed wall, and included [A029], a deposit of burnt orange sand that contained flecks of copper alloy. In addition, a rock-cut hollow [A038], within the bedrock was identified. The full feature was not exposed, and its function remains unclear.

The southern of the two structures also measured c. 10 m in diameter within a 1 m wide stone bank that proved even more ephemeral than its neighbour to the north (Figure 3.73). This was composed of no more than two layers of loose blocks and angular stones (A007), with a similar mix of the local outcropping rock, occasional erratic glacial boulders and water-smoothed cobbles. The structure was also built over tumble from Wall E [A025].

Further to excavation the confirmation of either of these structures as a roundhouse is uncertain at best. No evidence of a floor surface, or any other internal features, were identified and there was no evidence of any associated occupation. Their date is equally uncertain though as they both overlay rubble deposits

derived from Wall E, and the northern overlay the wall itself, they are relatively late. While this provides a *terminus post quem* at the end of the Iron Age, they may yet be of relatively modern date, and may perhaps be no more than rims of upcast around shallow quarries or antiquarian investigations.

Stone-built roundhouse to the north of the Wall E fort (Trench B)

The third proposed roundhouse, first identified by RCAHMS in their 1953 survey (Figure 3.8), was located on a roughly flat terrace to the north of Wall E (Figure 3.7). It was in an area of a high magnetic anomaly (Figure 3.8: M3) and was partially identified by the resistivity survey (Figure 3.9). Partial excavation took place over 2016–17 in Trench B, which initially measured 7 m by 7 m (Figure 3.8) but was extended north-eastwards by a further 7 m in 2017 (Figures 3.74 and 3.75). The structure appeared smaller than those investigated by Trench A and was excavated with the aim of confirming the nature of its construction and chronology, and for comparison with the larger proposed examples.

In contrast to other areas excavated, the topsoil [B001] was relatively rich in artefacts, with a chert flake



Figure 3.72: Mid-excavation view of the northern possible roundhouse [A003] and [A006].



Figure 3.73: Mid-excavation view of the possible southern roundhouse [A004] and its interior.

(SFB001); a worked lithic core (SFB002); two pieces of prehistoric pottery (SFB003) and (SFB004); and a piece of slag waste (SFB005) recovered in 2016, and a glass bead (SFB019); a ceramic body sherd (SFB003); and flint tools (SFB006) and (SFB008) found in 2017. The topsoil overlay a circular bank of stones [B003] (Figure 3.76) measuring up to 2 m wide. This lay directly over a more formally constructed wall [B005 (2017) and B010] (Figures 3.74, 3.75, 3.77 and 3.78). Measuring up to 2 m in thickness and exposed over 5 m, this arc of wall was constructed with an inner and outer face surviving to a height of c. 0.25 m, with up to two courses and a rubble core [B005]. The wall was constructed directly onto the bedrock, although there was an internal deposit of sandy silt [B011] within the structure. Both the interior and exterior of the structure was investigated. Internal deposits [B004, B005 and B006] abutting the wall were removed to reveal an anthropogenic layer rich in charcoal and bone [B0009] and containing a fragment of a shale bracelet (SFB022), before reaching natural bedrock [B012]. The interior also produced a typically domestic assemblage of finds. Underlying the topsoil, a charcoal-stained sandy silt [B002] with charcoal inclusions extended for around 4 m to the east of the wall [B005]. This contained worked stone and coarse stone tools (SFB001), (SFB010) and (SFB015–7), including a flint blade (SFB015) and a hammerstone

(SFB017). In addition, ceramic pottery sherds were found (SFB002), (SFB007) and (SFB011), including three with linear decoration (SFB007) discovered in the transition between the topsoil [B001] and this layer [B002] immediately adjacent to the wall. A spindle whorl (SFB013) and a carved stone lamp (SFB014) were uncovered in this deposit. An original ground surface [B009/B013] extended across most of the trench beneath deposit [B002], in places overlying the bedrock to a depth of 0.2 m.

Located immediately outside the wall, a series of deposits included another rich in artefacts [B007]. A total of ten finds were recovered from this context (just under half of the finds for the whole of Trench B). These included: bone (SFB017) and (SFB019); ceramic sherds (SFB012), (SFB013), (SFB016) and (SFB021); a fragment of unidentified vitrified material (SFB020); and a complete, though broken, Early Iron Age cast bronze decorated ring-headed pin (SFB014) and (SFB015) (Chapter 4.5).

The size of the structure and inclusion of Iron Age material in such quantities suggests a small domestic roundhouse, which perhaps developed a ritual dynamic at the time the pin was deposited (Chapter 4.5).



Figure 3.74: Plan of the stone-walled roundhouse in Trench B.

The pond and associated features (Trench D)

First recorded by RCAHMS in 1953 (Figure 3.5), the pond is located within the lower, east side of the forts enclosed by Ramparts C and B (Figure 3.8) and was excavated over two seasons. In 2016 Trench D, measuring 10 m by 4 m, explored the edge of what the RCAHMS 2014 survey identified as a quarry scoop (Figure 3.7). In 2017 this trench was extended to the west by 4 m. The combined trenches aimed to understand the nature and chronology of the pond and identify any associated features. In summary, features identified included a rock-cut cistern [D109/D111]; an enclosing wall or bank [D107/D004]; and a palisaded enclosure [D105] and [D008] (Figures 3.79 and 3.80). The excavation evidence when combined with the topographic survey suggests that both the wall and palisade may have enclosed the pond.

The entire trench was covered in a layer of dark black/brown loose topsoil [D001] which contained inclusions of burnt bone and artefacts, including: a worked (possibly pecked) stone (SFD002); a rubbing stone (SFD003); a possible struck agate flake (SFD004); and a small, modern, steel toy pistol (SFD001). The deposits in the pond were waterlogged and consisted of an upper layer of dark brown/black material [D002] overlying a dark black/brown clay-rich soil [D003], and there were occasional burnt bone inclusions throughout. The scatter of large angular stones lying within the pond had probably tumbled into the hollow by accident rather than design. Once the bedrock was exposed, the mouth of a rock-cut feature [D109/D111] was identified (Figures 3.81 and 3.82). This measured at least 1 m by 1 m, and up to 2 m in depth, and contained an upper fill [D110] and a lower fill [D112] (Figures 3.79, 3.80), which contained some possible worked wood (SFD009).

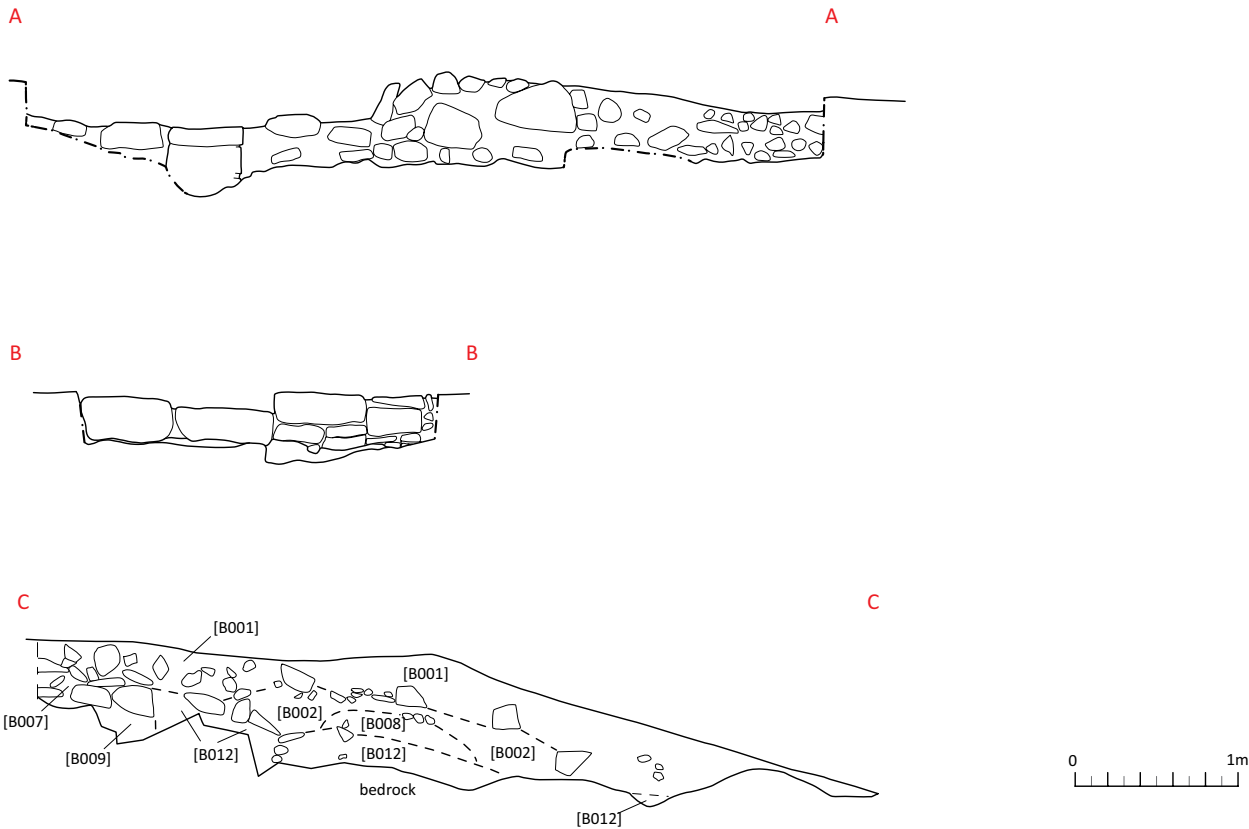


Figure 3.75: Sections through the roundhouse in Trench B.



Figure 3.76: The arc of the roundhouse bank in Trench B [B003] with the soil deposit [B006] within the interior (left) and collapsed tumble [B005] to the exterior (right) as detailed on Figure 3.74.



Figure 3.77: The exposed external face of the roundhouse wall [B005] showing slippage at north end (left).



Figure 3.78: The inner wall face of the roundhouse wall [B010] revealed in the east side of Slot B1.

(Chapter 4.10). It is interpreted as a rock-cut cistern, similar to that excavated at Castle Law, Abernethy (Chapter 6 *passim*). The rock-cut cistern is at least in part responsible for the modern pond that forms here in wet conditions, marking out a low area in the eastern half of the interior. Whether it was originally excavated solely for this function, is more ambiguous, however, as the bedrock had been quarried in other areas of the trench. A radiocarbon date obtained from willow charcoal within the lower fill [D112] provided a date range of 340–50 cal BC (Calibrated to 2σ, SUERC-76171).

Trench D also revealed a spread of collapsed stone [005] (Figure 3.83) overlying a stone-built wall surrounding the pond (Figures 3.79, 3.83 and 3.84). Measuring 1.30 m in thickness and surviving up to 0.40 m in height, the wall [D107/D004] had collapsed and tumbled eastwards, creating a raised platform of rubble [D108]. The wall was relatively well-built, consisting of well-dressed flat stones, measuring between 0.30 m and 0.40 m across in size. It was constructed on mid-greyish brown sandy silt [D114], interpreted as a foundation or base of the wall. No artefacts were recovered from either the wall or the foundation feature.

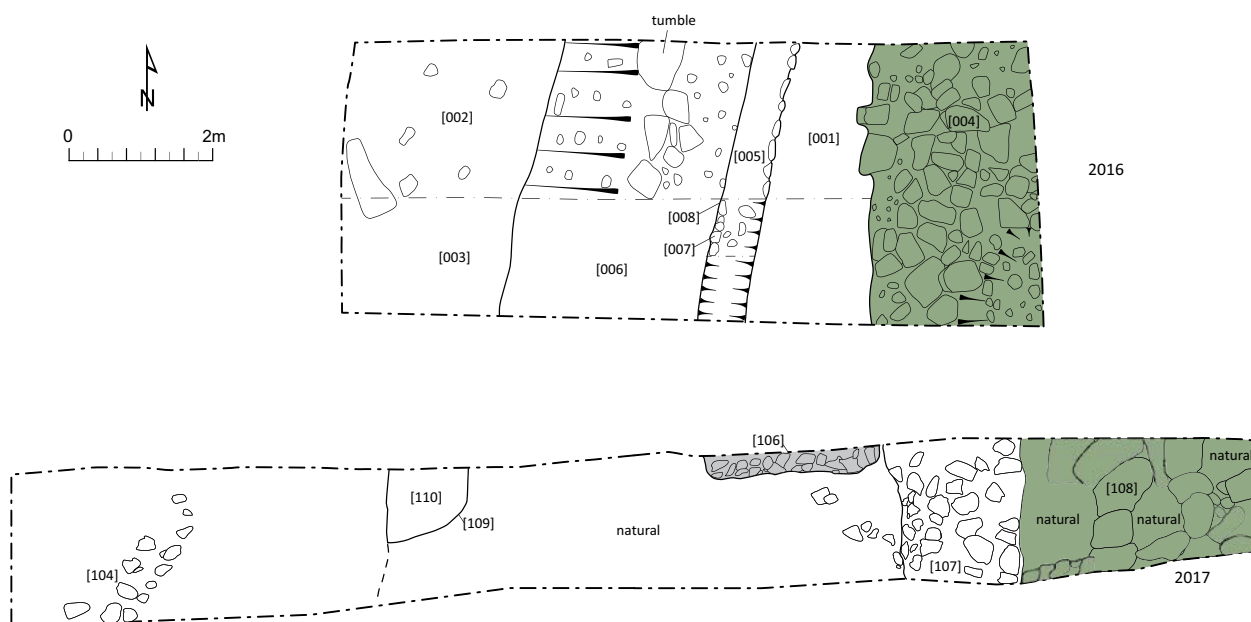


Figure 3.79: Plan of Trench D, including a rock-cut cistern [D109/D111]; an enclosing wall or bank [D107/D004], and a palisaded enclosure [D105] and [D008].

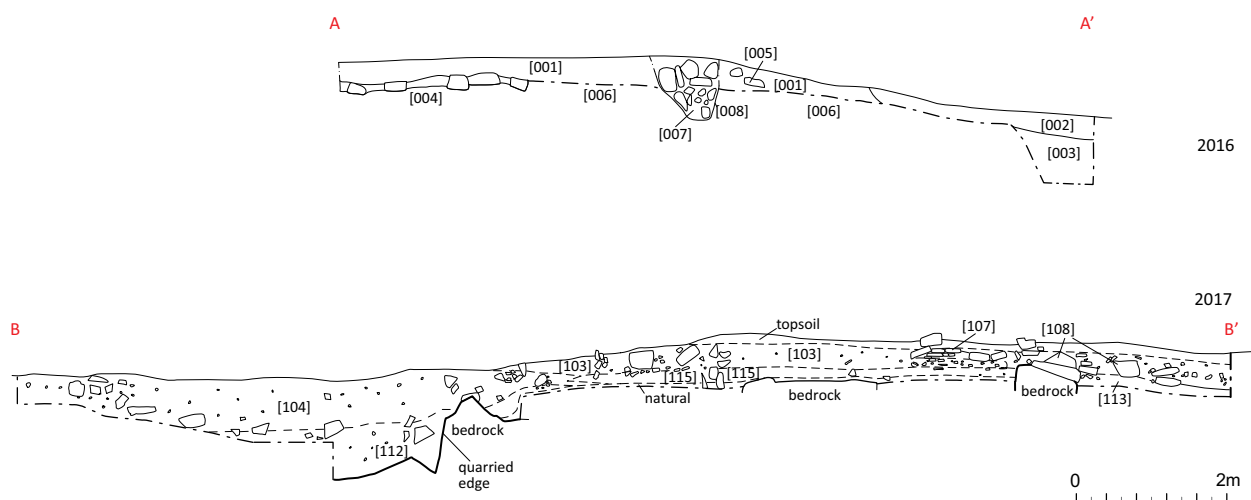


Figure 3.80: Sections of Trench D detailing including a rock-cut cistern [D109/D111], an enclosing wall or bank [D107/D004], and a palisaded enclosure [D105] and [D008].



Figure 3.81: Detail view of rock-cut cistern [D109].



Figure 3.82: Rock-cut face of the cistern [D109] in Trench D.



Figure 3.83: Pre-excitation spread of tumbled stone [005] at the west end of Trench D.



Figure 3.86: Detail of the collapsed wall [D004] and possible stone platform [D108] at the east of Trench D.



Figure 3.84: The possible enclosure wall [D107] around the rock-cut cistern [D109] excavated.



Figure 3.85: Spread of tumbled stone [D005] and palisade slot [D008] in Trench D.

Measuring up to 0.60 m in width by 0.40 m in depth, the possible palisade slot [D008] had steeply sloping sides and a flat base (Figure 3.85). The fill [D007] was a greyish brown clayey silt with frequent angular stones, and frequent charcoal and burnt bone inclusions. The angular stone inclusions were interpreted as remnants of packing to support posts set in the slot [D008], though no post pipes were identified in the short sector examined.

3.3 The radiocarbon dates

Derek Hamilton

A total of 18 radiocarbon dates were obtained from charred organic material across the excavated areas (Table 3.1), targeting specifically stratigraphically secure and probably *in situ* contexts to provide chronological resolution to the features uncovered. A specific aim was to understand the chronological sequence of construction, use, modification and abandonment of the major structural elements identified, specifically the ramparts/wall and the monumental roundhouse. The radiocarbon dating also sought to test the theory expounded prior to the current phase of investigation, that the site, or at least structures within the complex, were of early medieval date.

The radiocarbon assays provide a concise sequence confirming activity between the late sixth and mid-first centuries cal BC. The majority of dates returned, particularly those derived from Wall E and the monumental roundhouse, demonstrate activity in these areas concentrating between the fourth and second centuries cal BC.

This confirms the view, evolved over excavation largely due to the artefacts recovered, that the proposed early medieval date for the site, is not borne out by

Table 3.1: Summary of the radiocarbon assays from Moredun.

Laboratory Code	Material	Context	Structure	Radiocarbon age (BP)	$\delta^{13}\text{C}$ (‰)	Calibrated date (95% probability)
SUERC-65168	Charcoal: Hazel	423	OGS underlying fort E	2357±30	-26.1	540–380 cal BC
SUERC-76166	Charcoal: Alder	C022	Charcoal plank in monumental roundhouse	2344±29	-27.1	520–370 cal BC
SUERC-65164	Charcoal: Cherry	215	OGS under Rampart B	2287±30	-26.2	400–210 cal BC
SUERC-76172	Charcoal: Alder	E006	Timber within Rampart B	2271±29	-26.2	400–210 cal BC
SUERC-76163	Charcoal roundwood: Hazel	C016F	Collapsed burnt roof material, monumental roundhouse	2248±29	-29.2	390–200 cal BC
SUERC-76161	Charcoal: Alder	B007	Deposit associated with roundhouse [B003]	2247±27	-26.5	390–200 cal BC
SUERC-76164	Charcoal: Alder	C021	Deposit from hearth [C020] monumental roundhouse	2242±29	-27.7	390–200 cal BC
SUERC-76156	Charcoal roundwood: Hazel	A119	Deposit overlying surviving wall of fort E	2223±29	-27.5	380–190 cal BC
SUERC-76165	Charcoal roundwood: Hazel	C021	Deposit from hearth [C020] monumental roundhouse	2222±29	-27.4	380–190 cal BC
SUERC-65167	Charcoal: Alder	320	320 Rampart D	2216±30	-25.4	380–180 cal BC
SUERC-65160	Charcoal: Hazel	118	Destruction layer within monumental roundhouse	2211±30	-27.6	380–180 cal BC
SUERC-76170	Charcoal roundwood: Hazel	C026	Deposit of <i>in situ</i> floor plank in monumental roundhouse	2178±29	-28.5	360–110 cal BC
SUERC-65165	Charcoal: Alder	226	Earth core of Rampart B	2177±30	-27.1	360–110 cal BC
SUERC-76162	Charcoal roundwood: Alder	C016B	Collapsed burnt roof material in monumental roundhouse	2183±27	-27.5	360–140 cal BC
SUERC-65166	Charcoal: Birch	229	OGS underlying Rampart C	2151±30	-25.2	350–60 cal BC
SUERC-76160	Charcoal: Birch	A128	Fill of cut [127] fort E	2128±29	-26.6	340–50 cal BC
SUERC-76171	Charcoal roundwood: Willow	D112	Fill of cistern [D111]	2121±25	-26.9	340–50 cal BC
SUERC-77003	Cremated: Human rib	C013-17	Monumental roundhouse	2102±24	-27.1	200–40 cal BC

the excavation evidence. Rather, construction and occupation of all the structures appear firmly in the Iron Age, with the sequence of site development comprising: the construction of the monumental roundhouse, either before or within Rampart B, followed by Rampart C, the Annexe Rampart D and finally Wall E (see Section 3.4 below: Discussion of the excavation results).

The 18 radiocarbon results from Moredun have all been modelled as a simple bounded phase (see Hamilton

and Kenney 2015 for a fuller description of this basic chronological model type). The radiocarbon results from the core of Rampart B (SUERC-65165) and the buried ground surface (SUERC-65168) have been included as *termini post quem* (*tpq*) in the model. The model has good agreement ($A_{\text{model}}=98$) and estimates the Iron Age activity at Moredun began in 480–260 cal BC (95% probability; Figure 3.87; start: Moredun Iron Age), or 440–385 cal BC (68% probability). The earliest probability from the dates from the monumental roundhouse was

calculated and suggest construction by either 420–345 cal BC (80% probability; Figure 3.87; first: Moredun monumental roundhouse) or 325–240 cal BC (95% probability). The overall span of use for the structure ranged from 65–315 years (95% probability; Figure 3.88; span: Moredun monumental roundhouse), or 195–295 years (68% probability).

The activity on the hilltop ended in 325–15 cal BC (95% probability; Figure 3.87; end: Moredun Iron Age), or 165–90 cal BC (68% probability). The overall span of the dated Iron Age activity on this hilltop was 85–400 years (95% probability; Figure 3.88; span: Moredun Iron Age), or 230–355 years (68% probability).

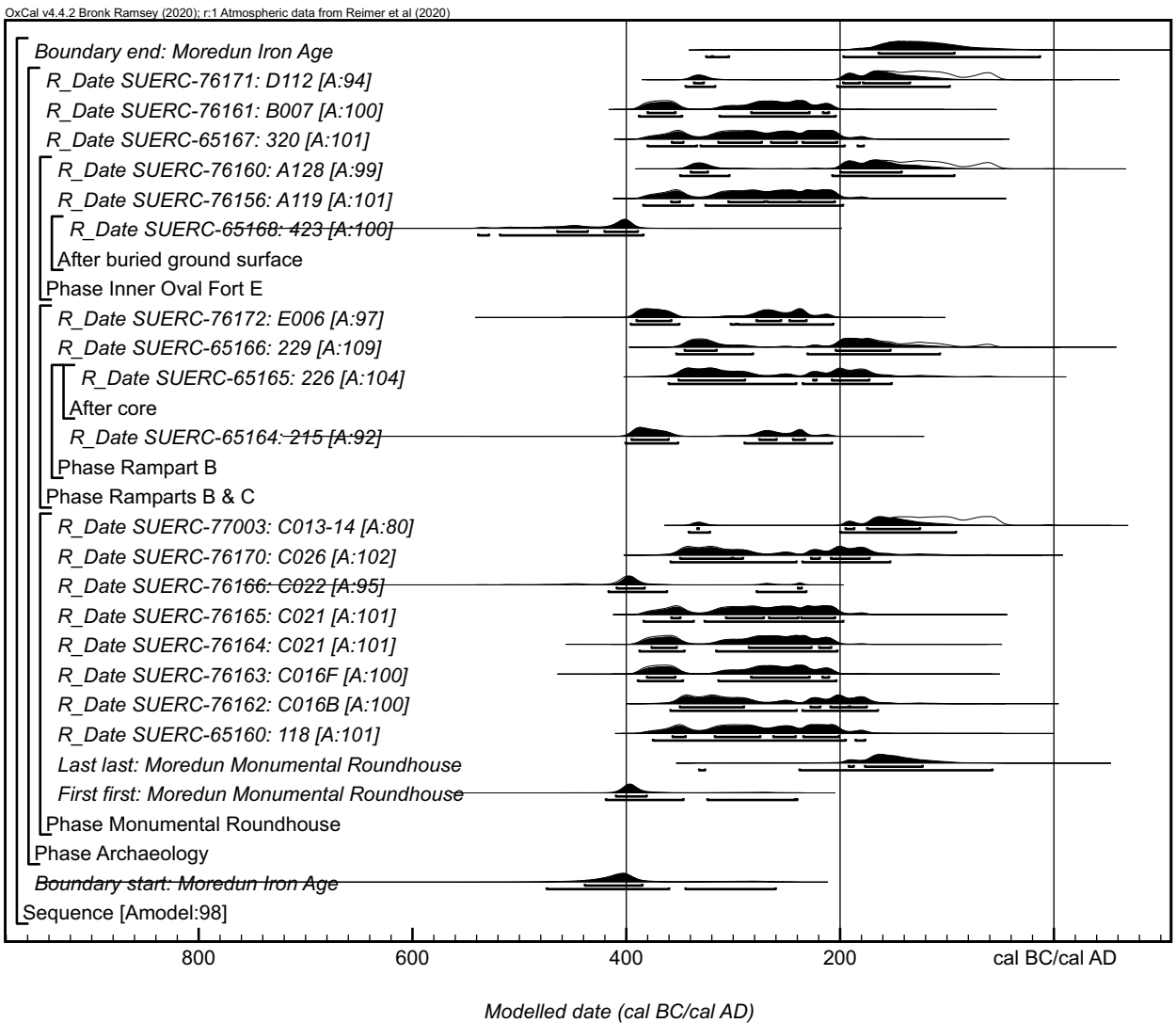


Figure 3.87: Chronological model for the radiocarbon dates from Moredun. The model is as described in Figure 2.25.

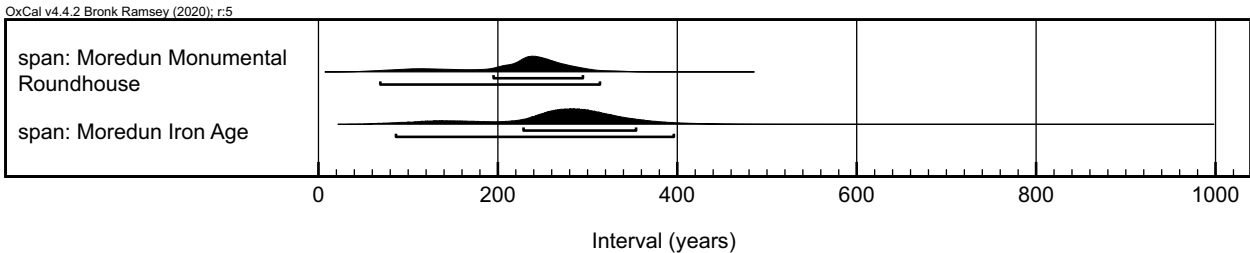


Figure 3.88: Span of the Iron Age activity at Moredun. The probability distribution is derived from the chronological model shown in Figure 3.87.

Thirteen of the radiocarbon results from Moredun calibrate to the period c. 400–200 cal BC, a period that is characterised by a large ‘wiggle’ in the calibration curve. As a result, many of the results are bimodal in their probability distributions. Both the monumental roundhouse and dated contexts relating to Rampart B contain material that is slightly earlier than this period and slightly later. This suggests either these two areas represent activity that persisted for two or three centuries, or that one or both suffers from the dating of reworked material that is either residual or intrusive. The knock-on effect of this is that the modelling as presented is only able to provide a broad chronology for the activity on the hilltop, and the character of the archaeological deposits must be used to infer the longevity of the use of the monumental roundhouse and to suggest any refinement in the chronology of the different phases of the fort. Unfortunately, the radiocarbon dates that exist, from arguably the most secure deposits on the site, are not sufficient to produce a more nuanced chronological framework for interpretation.

3.4 Discussion of the excavation results

The most important results were in identifying the variation of enclosure represented by Ramparts B and C, Wall E, and Rampart D forming the annexe, and in confirming the nature of Mound A as a monumental roundhouse. In addition, one smaller roundhouse was confirmed and explored (Figure 3.7). Significant also, has been the dating of all these structures to the Iron Age, with no evidence of early medieval activity. The results contribute to improving our understanding of the site in six key areas.

Location

The project has emphasised the importance of the fort’s dominating location on top of Moncreiffe Hill, a key landmark widely visible from across the estuary and surrounding environs (Figure 1.3). Control of the hill would have extended to control both the rivers Tay and Earn in the area, and their confluence, as well as the main north-south terrestrial route to the west of the hill (Figure 3.1). This prime location, along with its morphology, size, and complexity, has prompted suggestions of its importance both as an Iron Age and early medieval site over the years. Moredun is c. 500 m east of the smaller and earlier Moncreiffe fort (Chapter 2) and the benefits of this ‘new location’ can be considered in the context of both topography and in relation to potentially contemporary sites in the area, which are shown in Figure 2.1 and listed in Appendix A.

Topographically Moredun offered two main advantages over the location of Moncreiffe. First, its hilltop position afforded better all-round visibility and was not

overlooked, a factor which made Moncreiffe somewhat vulnerable on its east side. Secondly, and perhaps more significantly, Moredun offered a much larger platform for enclosure: Moredun B (1.8 ha) being nine times larger than Moncreiffe (0.2 ha).

In terms of wider, broadly contemporary sites, Moncreiffe’s primary area of influence was over lower Strathearn to the south, west and north of the hill. In addition to this, Moredun oversaw land to the north-east, along the southern bank of the Tay, and to east of the hill, where the tongue of land formed by the confluence of the Tay and Earn is called the Rhynd (derived from the Scottish Gaelic for ‘point, promontory’). Along with lower Strathearn to the south, the increased area of control may be reflected both in the much-increased size of the forts on Moredun, and in their relationship to contemporary sites (Figure 3.1). As outlined in Chapter 1.4, several other forts in the area have been recently excavated, including Law of Dumbuils (Poller 2010); The Roundel (Poller 2013a) and Castle Law, Forgandenny (Poller 2013b and Poller and MacIver 2014). While publication of these (Poller forthcoming) will no doubt further enhance our understanding of their relationships, several interim observations can be made with the information currently available.

On the Rhynd, the forts of Moredun, Moncreiffe, and The Roundel occur in relatively close proximity but at different altitudes (223 m, 180 m and 57m OD respectively), while Dow Hill is set above the River Tay at 60 m OD (Figures 3.1 and 3.89). In addition to sharing a similar altitude, The Roundel and Dow Hill are also similar in size and morphology (Figure 1.12), which may suggest a similar date and/or function. The significant height difference between The Roundel and Dow Hill on the one hand, and Moredun and Moncreiffe on the other, literally sets the latter forts apart and may indicate a difference in date, or perhaps function. Notably this altitudinal ‘stratigraphy’ is mirrored on the Ochil Hills to the south of Strathearn, with the hilltop crested by the large, multi-phased Castle Law, Forgandenny (275 m OD), and with Law of Dumbuils at 105 m OD below (Figure 3.89). Interestingly, Law of Dumbuils is not multi-vallate, like Moncreiffe or The Roundel, however, and is morphologically more reminiscent of Moredun B or C (Figure 1.12), which may suggest morphology, and altitude are less informative attributes.

While the cropmark evidence for possibly contemporary sites in the environs remains undated; it may indicate the nature of settlement in the lower surrounding areas over the Iron Age. Further, it may also reveal the transfer from unenclosed settlement to enclosed settlement, and at two locations the development of curvilinear to rectilinear enclosures. To the west of Bridge of Earn, above the flood-plain to the south of the River Earn, there are three unenclosed settlements,

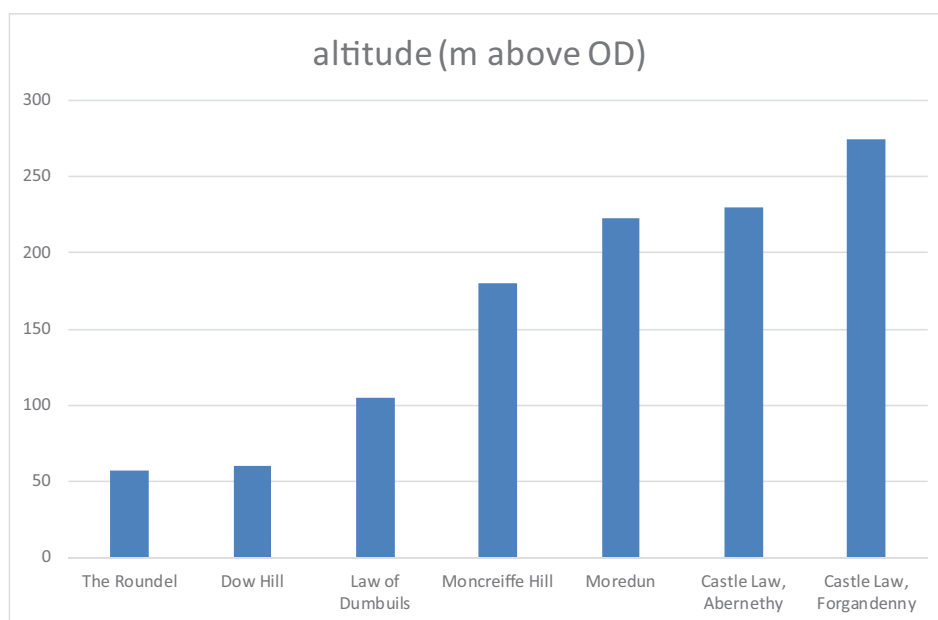


Figure 3.89: The relative altitude (m above OD) of sites in the environs of Moncreiffe Hill. The Roundel (57 m); Dow Hill (60 m); Law of Dumbuils (105 m); Moncreiffe Hill (180 m); Moredun (223 m); Castle Law, Abernethy (230 m); Castle Law, Forgardenny (275 m).

two curvilinear enclosures and a rectilinear enclosure (Figures 3.1). They include the close juxtaposition of a curvilinear and rectilinear enclosure with unenclosed settlement at Kilgraston (Figure 3.1: 7, 14 and 21) within an area of potential influence of the fort at Law of Dumbuils (Figures 3.1: 5 and 1.12). To the south and much higher, on the top of one of the Ochil Hills, is Castle Law, Forgardenny; a fort of similar scale, complexity, and altitude to Moredun (Figure 1.12). While clearly no confirmation of such relationships can be made without a programme of comprehensive dating, it is possible such grouping of forts and settlements may offer a glimpse of potential hierarchy: power-centres with satellite settlements which have developed and evolved over time. While it is equally possible that none were in fact in contemporary use, the re-occurrence of settlement forms at, for example, Kilgraston, suggest that some locations were preferred over relatively long periods of time. Intriguingly, a very similar pattern of settlement evidence exists on the lower terraces of the River Tay along the north of the Rhynd. Here, within 2 km of the multi-vallate Dow Hill fort (Figures 3.1: 4; and 1.12), again both unenclosed and enclosed settlement occur, the latter in both curvilinear and rectilinear forms (Figures 3.1). Notable here are the oval (Figure 3.1: 6) and sub-square (Figure 3.1: 22) enclosures at Coates of Fingask, occurring on the same ridge contour above the river.

Control of the rich arable land, and the population it supported, must have been a key factor in both the development and location of the forts. Arable productivity in the area is reflected in the 14 confirmed

and possible souterrains within the areas shown in Figures 2.1 and 3.1, albeit that these very probably post-date fort activity. In this respect, contemporary settlement within the immediate environs of forts, whether unenclosed or enclosed, should be considered part of the wider 'community' of the fort (Harding 2012: 7–8). It is possible, if not likely, that some of the settlements represented in the cropmark record were part of the wider social group that constructed the forts and endured an ongoing relationship with them. At the extreme end of this model, rather than the transfer from Moncreiffe to Moredun representing the occupants of the earlier fort moving to a secondary site, construction of both forts drew upon this much wider social group and rather than being occupied by separate communities, the forts were occasionally occupied by the wider population at certain times and for certain reasons. Indeed, it is possible that both sites were in use at the same time, if only for a short period, and may have functioned as one 'site', as suggested for the Brown and White Caterthuns (Dunwell and Strachan 2007: 91).

The basis of the social dynamics behind construction and use, let alone their nuances, will remain hypothetical, even after comprehensive excavation across multiple sites. It is reasonable, however, to suggest that the development of Moredun reflects a thriving Iron Age 'community' that had outgrown its initial Early Iron Age fort. The move of location may indicate increased social command of the surrounding areas, from lower Strathearn only to include the wider environs of the Rhynd. Control of additional resources

may also have been reflected in the growing wealth of the community. The distribution of larger, hilltop forts, such as Moredun, Castle Law, Forgandenny and Castle Law, Abernethy, may represent both control within a hierarchy of local sites, and a heterarchy of territorial governance maintained by a network of broadly equal parties. Such a nexus may have seen only minor ascendancies to dominance by individual units, and perhaps only for relatively short periods of time.

Pre-enclosure hilltop occupation?

The discovery of the monumental roundhouse within mound A was a significant result. It is early and pre-dates Rampart C, but may also have predated Rampart B, and if so represents pre-enclosure settlement on the hilltop. However, it could equally have been built, or at least occupied, within the fort enclosed by Rampart B. The closest comparanda are the monumental roundhouses found in highland Perthshire west of the Tay (Watson 1915; Taylor 1990; Strachan 2013) and the architectural similarities include internal diameter and the scale and nature of the construction of its massive stone wall. The Moredun wall was up to 5.8 m thick enclosing an internal area c. 12–15 m in diameter. It was clearly roofed, as evidenced by the collapsed oak timbers and thatch within the interior, and had an interior floored by oak and alder timbers which supported a hearth. Like the upland examples, it produced a domestic assemblage of small finds indicating residential occupation and can be seen as the home of an extended family of some importance.

The predominant feature of the buildings is their monumental stonework, and while the scale and nature of the Moredun wall is broadly similar to the upland examples, there are also differences. Primarily, the Moredun entrance passage is somewhat wider than the upland examples. It is also without the rebated door jambs or intra-mural cells that commonly feature in both the upland sites, such as the Black Spout, Pitlochry (Strachan 2013: 30–2) and in broch architecture (Romankiewicz 2011). Instead, the stonework indicates an external wooden gate or door, an unusual configuration that may indicate the need for more extensive use of timber rather than stone, possibly above and across the entrance passage. The incorporation of the timber at the external corners of the entrance passage is an inherently weak method of construction and in such corners generally employ blocks of sufficient mass to retain the load of the wall on either side. The use of timber may have been a restriction of available stone and no massive lintel stones were recovered from near the entrance. There was also no evidence of an intra-mural stair to an upper floor, another feature of broch architecture, though only one quadrant of the wall was uncovered.

The incorporation of cup-marked stones in its wall (Figures 3.11 and 3.23) is also of interest. This may simply reflect the pragmatic re-use of quarried bedrock or may be a deliberate re-use and acknowledgment of earlier monuments. Cup-marked stones are known at several forts in the region, including Castle Law, Forgandenny (Bell 1893: 22); Dunsinane (RCAHMS 1994: 56; ID 30660); and Barry Hill (RCAHMS 1990: 26 and 29; ID 31061); and the White Caterthun (Dunwell and Strachan 2007: 77; ID 35007); Finavon (ID 34813) and Turin Hill (ID 34899) (Sheriff 1995: 22) all in Angus. In some instances, they are on small, portable stones, possibly transported to be incorporated within the walls and held some significance, as at Finavon (Dunwell and Strachan 2007: 88). In other cases, they are in the bedrock, and illustrate a special significance of the hilltop at a much earlier date. The quarrying of bedrock in the construction of the Moredun monumental roundhouse may have produced cup-marked stones included, and the most convincing case for some symbolic reverence in their placing is that in both cases the art was exposed when added to the wall, as they would have been when discovered.

The inclusion of rock art in monumental structures occurs from as early as the Neolithic. For example, at the Ness of Brodgar complex in Orkney, key spaces were enhanced through incised and pecked decoration, with cup-marked stones in Structure 10 being only partially visible and suggested as votive offerings after their visual designs ceased to have meaning (Card and Thomas 2012: 121–122). While from a very different geography at a very different time, this example illustrates processes at play which may also have occurred in the Iron Age. There are good parallels for the re-use of rock art at other Iron Age monuments in the region, notably the souterrains, possibly related to ancestry and fertility (Hingley 1993: 29). These include their display at souterrain entrances at Tealing, Angus (Jervise 1875) and Grantown Road, Forres, in Moray (Cook, M.L. *et al.* 2016: 11), and in a destruction fill at Carlungie (Wainwright 1953: 221; 1963: 86). The display of rock art was also a feature of the broch at Hurlly Hawkin, Angus, where a cup-and-ring marked stone was used as paving within an intra-mural cell, as well as within the souterrain (Taylor 1982: 218). Similarly, a cup-and-ring marked stone was ‘set into’ the wall of Hut 1 at Ardestie (Wainwright 1963: 64; Plate XIII) while at Torwood, Stirling, *in situ* rock art was constructed into the stairs to be clearly displayed, while other *ex situ* material may have been used as building material (Cook, M.J. *et al.* 2019: 43).

In contrast, the use of cup-marked stones at Moredun, rather than being for display, were an act of concealment. Parallels for such activity may be seen in the concealment of a quern stone at the entrance

to the intra-mural cell at the Black Spout monumental roundhouse (Strachan 2013: 30). Querns have also been incorporated in the lowland brochs of the Fairy Knowe (Main 1998: 307, 389) and Leckie (MacKie 2016), both in Stirling area, and at a building at Kintore (Cook, M.L. and Dunbar 2008: 220–21). While not demonstrably deposited within the wall at Moredun, a fragment of a shale bracelet (SF004), uncovered immediately to the inside of its inner face, may also be a deliberate act of concealment, as at sites such as An Dunan in the Western Isles (Church *et al.* 2013).

Beyond the monumental stone structure, there are a variety of options for the internal configuration and roof (Strachan 2013: 94–104) and the recovery of probable remnants of these features is important as they have not survived in the upland examples excavated to date. In addition to architectural similarities, the location of the Moredun is similar to the upland examples; high ground, associated with pasture, controlling a pass (Strachan 2013: 63–5). Overall, the parallels are compelling and suggest an impressive, prestige building engaged in a mixed subsistence economy, perhaps with a focus on rearing and herding cattle.

The discovery of the human remains (Chapter 5.4) was also significant as Iron Age burials remain rare in Scotland (Armit and Ginn 2007; Cook, M.L. *et al.* 2018). There are parallels with similar deposits within ditches, walls and floor deposits at other Iron Age buildings, especially stone built structures such as duns, but also forts (Armit and Ginn 2007). At Moredun, parts of at least two bodies were deposited within the building, probably as already cremated remains, after the fire event but prior to the collapse or dismantling of the structures wall. That the remains post-date the main phase of occupation is key to the understanding of the chronology of the structure and may suggest a ritual dimension to at least the end of use of the site. There are two main possibilities regarding their disposition. They were either deposited as a collection of cremated bone after the fire event, but before the wall collapsed; or, less likely, they were the victims of the fire event itself. There is evidence for human remains being inserted into disused Iron Age buildings elsewhere (Armit and Ginn 2007) and while perhaps not a closing deposit, those who buried the remains in the centre of the building, clearly had knowledge of its history.

The cause of the destructive fire remains unknown as there is no evidence to confirm whether this was accidental or a deliberate act. The survival of some *in situ* material, such as the bone points, may suggest a rapid, accidental event after which the building was left largely undisturbed, perhaps only to be subsequently quarried for stone resulting in the removal of much of the building material. The recently excavated Clactoll broch, Assynt, in Highland, appears to have burnt

accidentally and similar domestic items were recovered from its floor (Cavers 2022: 204–5). Alternatively, it could have been a deliberate and meaningful act which was meant to be witnessed, as suggested for the firing of walls at vitrified forts. Many Iron Age structures were deliberately destroyed and dismantled, not only the walls of vitrified forts, but also souterrains, such as Newmills, Redcastle or Grantown Road (Armit 1999; Cook, M.L. 2016). Albeit later in date, brochs such as Leckie (MacKie 2016); Fairy Knowe (Main 1998) and Castle Craig (Poller forthcoming) also all include evidence for dramatic and unequivocal destruction events. A total of 2051 g of vitrified stone was recovered from the collapsed tumble from the core of Wall E [407, 409, 412 and 421], a further 18.8 g from the old ground surface [420/422] below the wall and 247.6 g from the inner facing stones of the wall [A022]. The presence of vitrified stone in this context, with no traces of burning or heat damage to the *in situ* wall or tumble, may indicate that already burnt material was transported from the abandoned monumental roundhouse to build the later Wall E. Or much less likely, that vitrification was very localised and occurred in the wall above its surviving *in situ* deposits.

While early medieval dates were proposed for monumental roundhouses in highland Perthshire (Stewart 1969; Taylor 1990) the Black Spout was dated to the late 3rd–late 2nd centuries BC, but appears to have been re-used, if not reoccupied, in the early medieval period (Strachan 2013: 36–37). Similar sites at Aldclune, Blair Atholl, were dated to the 2nd to 1st centuries BC and 2nd to 3rd centuries AD (Hingley *et al.* 1997), and also attracted early medieval activity. Construction of the Moredun example c. 420–345 BC, with occupation no longer than between 420–240 BC, would make it an early example. If the parallels drawn with the monumental roundhouses found in the uplands is correct, then Moredun is also important a geographical outlier to the known group, being the first example found south of the Highland fault line. Combined with the early date, this could add significantly to our understanding of the development of the site type and related monuments.

Monumental roundhouses and brochs are found throughout Scotland, although are more common in the north and west. Their size, construction and function can vary and while there is no clear chronology for their development, they can date from the 2nd centuries BC to the 2nd centuries AD (Harding 2004a: 187). The Tay is within the northern periphery of the ‘lowland group’ of brochs (MacInnes 1985; Romankiewicz 2011) and the discovery of a demolished broch within Castle Craig fort, near Auchterarder, is also significant. There, a full broch, structurally viable due to the quality of the local stone, was burnt and levelled and found to contain a rich assemblage of 1st–2nd centuries AD artefacts, including fragments of glass vessels and

bronze objects, including a patera (James 2011a and b; 2012). Publication will offer insight into connections between the broch community and the Roman Empire (Poller forthcoming), as seen at other lowland brochs such as Leckie (MacKie 2016) and Fairy Knowe (Main 1998), both in Stirling area. Radiocarbon dating of Castle Craig fort (ID 26048) indicates several phases of activity over the periods 400 BC to AD 50, AD 50–400 and post AD 800 (Tessa Poller *pers comm*); the later dates confirm the continued importance of the site and relate to fortification over the levelled broch.

While later, the re-occupation of Castle Craig after destruction of the broch, has clear parallels with the Moredun sequence. More significant is the potential connection between the earlier monumental roundhouses and the development of the lowland brochs of the Roman Iron Age. Castle Craig broch echoes the monumental roundhouses in contexts such as Moredun, albeit separated in time by perhaps half a millenia. In some respects, this is reminiscent of the re-introduction of forts in the early medieval period after a similar amount of time.

The nature of enclosure

As at most forts, the enclosing ramparts and walls are the most impressive features visible today, and both their scale and the areas they enclosed were statements of status and power (Harding 2012: 89). While multiple lines of ramparts or walls were occasionally conceived in the initial design, they more commonly reflect the development of successive works (Harding 2014: 11). Both the stratigraphic relationship implied by the 2014 survey, and the re-use of space suggest this to be the case at Moredun. The earliest and largest fort enclosed by Rampart B followed a natural break of slope on the east, north and west flanks of the hill to take in an area of c. 1.8 ha. It appears to have been replaced by the slightly smaller fort enclosed by Rampart C, which occupied much of the same space on the hilltop and followed a second break of slope slightly higher on the hill enclosing c. 1.2 ha. The D-shaped annexe to the north of this represents a third phase, butted onto the north side of Rampart C fort and crossing Rampart B in both the north-west and north-east quadrants of the enclosure (Figure 3.7). The Annexe D rampart encloses an uneven area of c. 0.68 ha. Finally, Wall E of the innermost, oval fort on the summit represents a fourth and final phase of fort building, enclosing a more regular oval area of c. 0.15 ha. Unfortunately, the available radiocarbon dates cannot confirm whether Ramparts B and C were in use concurrently, though this is unlikely to have been the case after construction of the annexe. While the area enclosed by Rampart C is smaller than that by Rampart B, the addition of annexe D would have increased the overall area in use. This suggests a mid-phase increase

in area enclosed on the hill, rather than a trend simply from large to small. Wall E is so noticeably larger in scale to Ramparts B, C and D, but encloses a much-reduced space that suggests a different function with restricted access, whether or not it was used alongside the larger enclosures of Ramparts C and D.

Ramparts B and C and Annexe D were constructed using the same technique; two external faces of roughly dressed stone blocks enclosing a rubble and earth core. No evidence for vertical timbers or horizontal lacing was found; however, given excavation sample, their absence cannot be taken as conclusive. In the areas inspected, the largest fort (B) had the thinnest rampart at c. 3.25 m thick, followed by Rampart C, c. 4 m thick, and the Annexe D rampart, which was c. 4.6 m thick, though this may represent two phases of construction. They all survived to between 1 m (D) and 1.8 m (C) in height, but their original height was probably closer to their relative thickness. In character, Ramparts B and C were similar, while Rampart D was more formal with more courses of smaller stones (Figures 3.90 and 3.91). Ramparts B and C may have been rebuilt, as both were constructed over soil deposits that may be the remains of earlier earth dump ramparts, although no structural evidence of this was recovered. The replacement of dump ramparts would have been labour intensive and generally avoided (Harding 2012: 53).

The resources required to construct each circuit are worth consideration. Construction of the smallest fort, enclosed by Rampart C, may have been as labour and material intensive as for the larger Rampart B fort; as its rampart was thicker, and therefore probably higher. The reason for the larger rampart of Annexe D (Figure 3.91) is intriguing and unknown, though may reflect the nature and increased availability of stone on the lower terrace, or perhaps a different function that required more robust enclosure, such as the retention of livestock. The length of rampart excavated was unusually aligned downslope, however, and it is possible this challenge required additional superstructure to provide structural viability. This may explain the median wall, the internal face running parallel to the line of the rampart. The technique of *murux duplex* construction involves an internal revetment designed to strengthen a wall and allow higher construction. It is commonly found in continental Europe and in the British Isles is best known at Worlebury Camp, North Somerset (Dymond and Tomkins 1886); Crickley Hill, Gloucestershire (Harding 2012: 69; Dixon 1994); and at Brough Law, Northumberland (Jobey 1971: 71–93). At Moredun, it is possible that additional internal strength was required due to construction of the rampart downslope. The alternative option: that it represents the remains of an earlier phase of construction subsequently almost doubled in thickness, perhaps after a collapse, seems

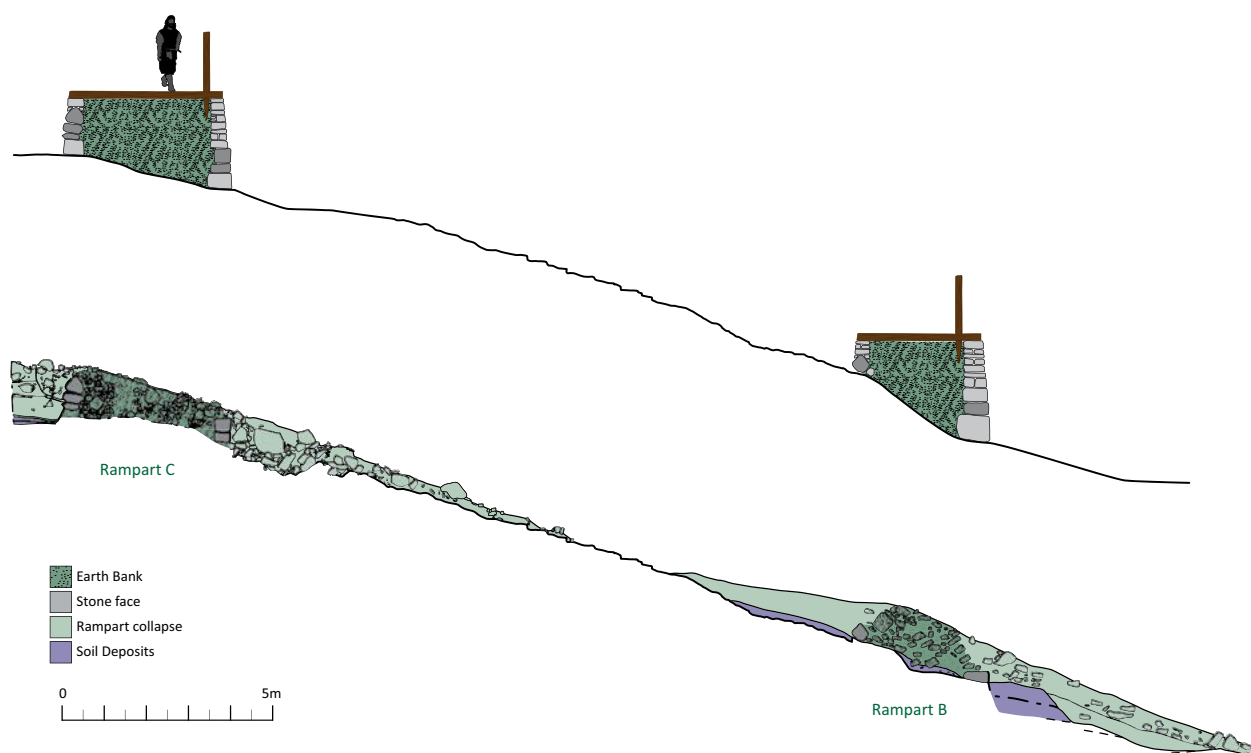


Figure 3.90: A suggested reconstruction of Ramparts C and B based on Trench 2.

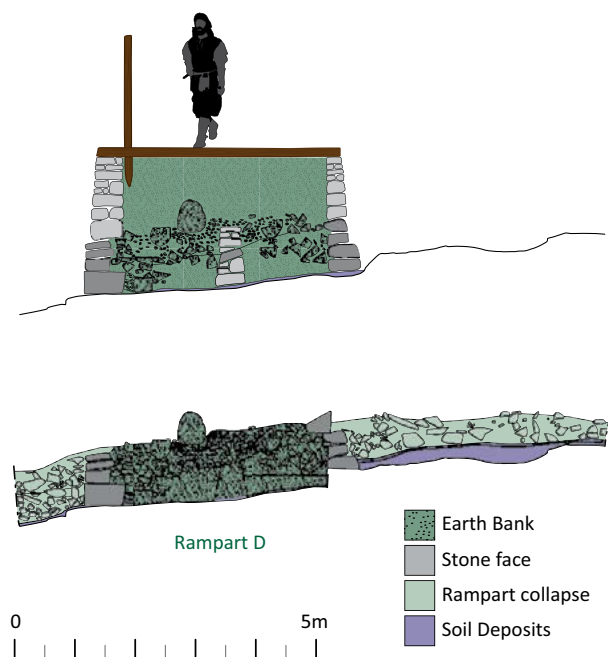


Figure 3.91: A suggested reconstruction of rampart D based on Trench 3.

less likely. Only further excavation, at different points on Rampart D can clarify this.

In contrast to the stone-faced soil and rubble cored Ramparts B and C, the Wall E of the inner, oval fort was built using a different method; a timber-laced wall, faced with large dressed stone blocks containing a mass of small stone hearting material within (Figure 3.92). While being the smallest fort (0.15 ha) it had by far the largest enclosing work, the wall being 5.85 m thick and surviving up to 2.20 m in height in Trench A. This is consistent with the relationship between enclosed area and rampart size for the Rampart B and C forts: larger ramparts on smaller-sized forts.

Timber-lacing is not chronologically diagnostic in Scotland where it is a feature of both Iron Age and early medieval fort construction (Cook, M.J. 2010: 72–92; Lock and Ralston 2022: 164), as demonstrated recently at Dun Deardail (Cook, M.L. *et al.* forthcoming; ID 23727) and Burghead, Moray (Gordon Noble *pers comm*; ID 16146). Stratigraphically, Wall E was constructed over an Iron Age deposit, and included an Iron Age finds assemblage, albeit deposited into its construction. Above this was an *in situ* assemblage of finds representing a working platform for shale items, which could date from the Bronze Age to the medieval period. This, and the absence of any diagnostic early medieval material, strongly suggests an Iron Age chronology for construction of

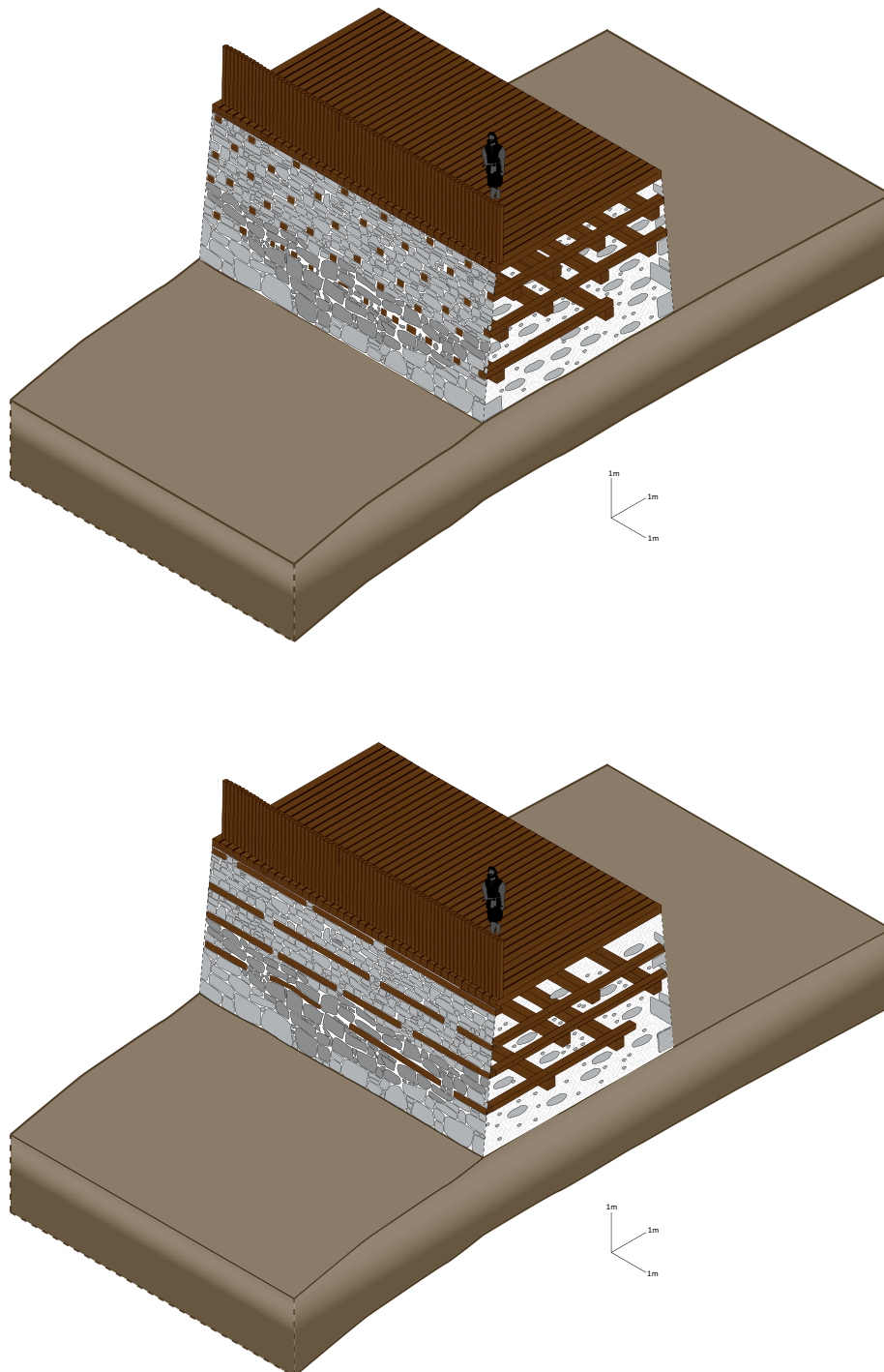


Figure 3.92: An isometric reconstruction of the external face of Wall E showing the excavated façade in Trench A (dark grey) and suggested structural timbers (brown).

the wall, rather than the early medieval date previously proposed (Feachem 1963: 145; Harding 2012: 170).

Wall-faces of timber laced walls are generally not well-preserved, with the decay, firing or dislodging of the timberwork contributing to their collapse over time. The relatively good preservation of the wall-faces in Trench A is of particular interest as it demonstrates

the inclusion of structural timberwork in Wall E. The British evidence for structural timberwork in such walls, sometimes referred to as ‘wall-and-fill ramparts’ falls into two major series, of which there are variants (Lock and Ralston 2022: 163–170). The first main type are the timber-framed examples, which include vertical wooden posts, in either the outer or inner wall-face, and much less frequently within the wall core. These

are set in post-holes and secured with horizontal timberwork, which can also vary in configuration, but timber-framed walls also require horizontal timber anchors fixed into the wall-core. The second main type are timber-laced walls, which have horizontal transverse timbers incorporated in the wall-core, set at right-angles to the wall-faces, and often also internal longitudinally timbers running parallel with the wall-faces. Timber-laced walls lack the vertical posts that are characteristic of the timber-framed series, though there are a few hybrids known in Britain and on the nearer continent. The evidence from Trench A suggests Wall E was of the latter type, a timber-laced wall (Figure 3.92) and may reflect a use of transverse timbers only, or more probably transverse timbers in combination with internal longitudinal timbers, as found at Castle Law, Abernethy (Chapter 6.2 and 6.5). Perhaps unsurprising in the absence of more extensive investigation, no evidence of internal longitudinal timbers within the wall core was identified. However, it is possible that Wall E was of a more unusual variant, with external longitudinal timbers also exposed on the inner and outer facades, as presented in the codicil to this chapter. Irrespective of its configuration, this composite construction is employed to provide structural integrity, as the timber and stone would have settled to create a strong and robust single entity. In his description of the *murus gallicus* Caesar noted that their 'appearance and variety, is not unsightly, owing to the alternate rows of beams and stones, which preserve their order in right lines; and, besides, it possesses great advantages as regards utility and the defence of cities; for the stone protects it from fire, and the wood from the battering ram' (Caesar 1869: 7.23).

The shift from the stone-faced, earth and rubble Ramparts B, C and D, to the timber-laced design of Wall E may simply reflect changing architectural fashion. As outlined, due to the increased scale of construction, the human resources required for each phase of rampart construction may have been relatively similar, despite the very different size of the area enclosed. However, the timber-laced stone wall clearly required considerably more timber and stone than the stone and earth-based ramparts, which presumably had no more than simple timber breastwork. The collection and transportation of these materials, which included importing large blocks of Old Red Sandstone from the bottom of Strathearn, is therefore likely to have made the construction Wall E the most demanding in terms of both material and human resources.

The general trend of reduction in fort size may suggest changing social function, from larger, more communally used spaces to a more exclusive, hierarchical, and high-status *caput*.

Access

No original entrances, to any of the forts, were identified with any certainty during the 2014 survey. This is perhaps unsurprising given the propensity for collapsed wall material to fill entrance passages, as demonstrated in the monumental roundhouse, and the extent of subsequent activity that has potentially disguised original entrances and created new ones. The topography of the hill provides some indication of where entrances are likely to have been, as while a degree of difficulty may have been considered beneficial for defence, ease of access for a functioning settlement would have been required. There are steep inclines on the west, east, and south-west, while the gentlest approaches are from the north-west, north-east, and south-east (Figure 3.7).

There are several breaks through the ramparts that afford access for modern paths which follow these desire lines, but there is no evidence for their age and the line of only two main paths merit discussion. The first path, from the west of the site, cuts successively through Ramparts D on the west of the annexe, through B and C as it mounts the slope, and through Wall E on the east side the small summit fort. It follows a strong desire line across the contour of the slope to the west of Annexe D, and so is a possible candidate as an original entrance for the annexe, along with two of the three gaps on the north-east interpreted as quarrying on the 2014 survey (Figure 3.7). It then takes advantage of a natural cleft on the summit plateau, most noticeable where it cuts Rampart C to access the lower, eastern terrace of the plateau. This sort of topographical choice is encountered at the entrances to many forts and so cut of the modern path through Ramparts B and C on the north are also considered likely original entrances for these forts. However, the line of the modern path up onto the higher western side of the summit plateau cuts obliquely across the wall on its east side in a hollowed passage plainly cut through the spread of rubble and therefore of more recent date. Many of the oblong forts of north-east Scotland are suggested as being entrance-less, the assumption being access was afforded through a lintelled passage at a high level, or over the walls, and in the immediate area, both Castle Law, Forgandenny (Poller forthcoming) and Castle Law, Abernethy (Chapter 6.6) are of this type. While this is also possibly at Moredun, the resistivity survey does suggest a narrow gap in the wall on the north-west of its oval plan, along with a much wider gap to the south-east that appears to be the result of quarrying (Figure 3.9). The possibility that this indicates an entrance passage may be supported by a high magnetometry anomaly (Figure 3.8), potentially indicating an area of intense burning, as was found in the entrance of the monumental roundhouse.

The line of the second ‘modern’ path enters directly through Rampart C on the south-east (Figure 3.7) and was uncovered during tree clearance by the project in 2015. It takes advantage of a similar cleft in the summit plateau, probably with the same geological origin, to again entering the lower eastern terrace of the plateau, but in this case overlooked from Wall E on the summit (Figures 3.7 and 3.93). Here, a sunken area within the interior is much wider than the modern path and suggests extensive use over a long period and this is proposed as an original entrance.

Internal use

As at Moncreiffe, the artefacts recovered suggest possible periodic activity on the hilltop from as early as the Neolithic. At Moredun, however, in addition to confirming later Iron Age construction of the forts, there is also some minor structural evidence for occupation within the interior, albeit no more than a single roundhouse. While there is no structural or artefactual evidence for early medieval occupation, the pollen record does suggest activity on the hill over this period (Chapter 5.5).

Various hut-circles have been proposed within the forts ever since Christison’s survey (Figure 3.4). One of these, directly north of the circuit of Wall E, was confirmed as a small roundhouse [B003], producing artefacts indicative of domestic use. It has been confirmed as being broadly contemporary with the forts, though as the sole visible structure within the Rampart B/C forts it is difficult to

be certain that it does not represent a separate phase of limited occupation after those defences had fallen out of use. The evidence for the hut-circles of Unenclosed Settlement F (Figure 3.7) overlying Wall E was at best inconclusive, and the surface earthworks recorded may have resulted from quarrying, similar to other shallow circular quarries that can be seen, particularly within the ruin of Wall E, but also within the Rampart B/C forts and Annexe D. We know almost nothing about the interior of fort E, and while the geophysics may suggest an entrance at the west, it clearly had much restricted access, and potentially may not have been primarily domestic.

Evidence for occupation at Scottish forts varies, and while many sites show no indication of internal buildings, some, such as White Meldon, Scottish Borders, contain concentrations of roundhouses suggestive of a small town (Harding 2012: 95; ID 51528). Evidence of circular stone structures is most found in south-east Scotland and across the border into Northumberland, though by and large these relate to settlements that demonstrably overlie the defences (Lock and Ralston 2022: 274, fig 6.8). Within Tayside, however, no such settlements have been identified and traces of platforms for timber buildings are relatively rare; Castle Law, Forgandenny, on the opposite side of Strathearn being one of the exceptions.

While there are no visible traces of artificial platforms within the Rampart B/C forts, their interiors contain several level terraces that would make suitable stances



Figure 3.93: The probable original entrance through Rampart C on the south-east of the fort revealed during tree clearance by the project in 2015.

for houses (Figure 3.7). In contrast, the interior of Annexe D slopes down to the north and is more uneven, perhaps suggesting an alternative function, such as industrial activity or the retention of livestock. As with other Iron Age settlements, including non-fortified sites, we might reasonably assume that occupation would have consisted of residential buildings, facilities for the storage of agricultural produce, either below ground or above, and perhaps industrial structures. No structural remains were identified for these, but that is unsurprising given the sample size of the interior investigated. The need for agricultural storage, albeit slightly later in the Iron Age, is indicated by the frequency of souterrains at unenclosed settlement in the environs of the fort (Figure 3.1) and while the interpretation of four- and six-post structures as granaries is predominantly a feature of English and Welsh hillforts (Loch and Ralston 2022: 278–80), some equivalent would have been necessary at Moredun.

While internal structural evidence is limited, the artefact assemblage confirms domestic occupation, and demonstrates craft activities, including hide- and metal-working and shale adornment production (Chapter 4 *passim*). The environmental record and animal bone assemblage is also illuminating as, until recently, few forts have yielded much of this material, if only because of the acid soils on which so many are located. Broxmouth (ID 58800), situated in an area of underlying limestone, provided a wealth of information demonstrating a mixed economy at the site however (Armit and McKenzie 2013 *passim*). By comparison, while the faunal remains from Moredun are extremely limited, they do confirm the processing of animals. The scale of the Rampart B/C forts would allow for the retention of large herds of livestock within the interior, but Annexe D with its uneven terrain may have been reserved for this purpose. A parallel may be found at the annexe at Castle O'er, Dumfries and Galloway, which may have functioned as a protected assembly point for cattle, where selected herds could be organised in safety (Mercer 2018: 199; ID 67376). Castle O'er is suggested as having two main phases; the first as a fort and second focussing on cattle production to furnish the Roman army (Mercer 2018: 234). Albeit prior to the Roman presence, the use of the annexe at Moredun for cattle may date to the occupation of fort E, which like Castle Law, Abernethy, has very limited internal space.

The provision of water is another important indicator of domestic occupation, and the evidence of wells and cisterns is well represented in Scottish forts (Lock and Ralston 2022: 295). Important find assemblages have been received from similar rock-cut cisterns at Castle Law, Abernethy (Chapter 6.4) and Finavon, Angus (Childe 1935b: 67–70). The small rock-cut cistern beneath the pond at Moredun could have held a minimum of c. 1,570 L of water (a cylinder 1 m in diameter and 2

m deep has a volume of 1.57 cubic m). In addition to providing an adequate water supply for the occupants, and offering mitigation during sieges, the demands of livestock would have been considerable. A single source may not have catered for the demand, and it is possible that there were other cisterns in the fort that have remained buried and not resulted in ponds. At Castle Law, Abernethy, for example, no pond had formed as the cistern was located on more level ground. Water may also have been collected above ground within the fort, and a variety of organic vessels could have held water for daily use. It may also have been sourced from outside the fort, and the low-lying area to the north-west of the fort, transformed into a Victorian curling pond (Figure 3.7), is a contender as a larger water source for cattle and livestock. Castle Law, Abernethy (Chapter 6), Castle Law, Forgandenny, and Barry Hill, by Alyth, all include outer-works that dam streams or springs and have created ponds (Loch and Ralston 2022: 298) and such a feature may have been an early predecessor of the Moredun curling pond. The evidence of probable enclosures around the cistern/pond at Moredun, by a stone wall and possibly a palisade (potentially at different times), suggests controlled access to what was a valuable resource. This may have been no more than a pragmatic measure to restrict access by animals, but enclosure may also have held a ritual dynamic, as found for example at the possible Iron Age enclosure at Deskford, Aberdeenshire, where a bog contained votive offerings, including the well-known carnyx, dating from between c. AD 80 and 250 (Hunter 2019). Limited excavation of the Moredun cistern precluded artefact recovery to support such an interpretation, and only larger-scale excavation can clarify the nature of the features around it. The deposition of artefacts in the cistern at Castle Law, Abernethy, however, reviewed in Chapter 6.4, may add some weight to this possibility.

Chronology and phasing

The potential date of Moredun has been widely discussed, in particular the suggestion of the inner fort of Wall E as a 'citadel' of an early medieval 'nuclear' fort (Feachem 1955: 79). This interpretation was based on comparison of the morphology with known early medieval forts such as Dunadd (ID 39564), Argyll and Bute, and Dundurn (ID 24873), near St Fillans. More recently, in recognition of the complexity and potential chronological span of forts, the suggestion of an early medieval structure with a larger, earlier Iron Age enclosure has gained more currency (Harding 2012: 170).

Prior to excavation, the 2014 survey suggested Mound A as the earliest structure, followed by Ramparts B, C and D, followed by Wall E (Figure 3.7). As at Moncreiffe fort, the taphonomic contexts of the charcoal samples, for example from rampart cores and old ground

surfaces, have all produced dates relating to the same broad period and do not allow any refinement of this sequence with an absolute chronology. The relative chronological position of the monumental roundhouse is in part confirmed by the excavation, in that it was found to pre-date the construction of Rampart C. The radiocarbon dates suggest it was occupied between the 4th and the 1st centuries BC. However, while it could represent pre-enclosure settlement, and be discussed as an individual structure, it could equally have been a feature of the fort enclosed by Rampart B (Figure 3.94). The date of the destruction of the building remains unknown, also whether it was deliberately destroyed. However, it must have had a complex history after its destruction, and this appears to include the dismantling of surviving masonry after the initial collapse. This may simply have been a safety measure to allow the site to be re-used, but was probably also driven by the need for stone to build later ramparts or Wall E. It also appears to have been the focus of ritual activity through the deposition of the human remains.

Post-dating use of the monumental roundhouse, Ramparts C and D, although not chronologically

diagnostic, produced material from the 4th to 2nd centuries BC. The 2014 survey suggests Annexe D post-dates fort B, but the timeframe is unclear. The survey also suggests Annexe D is either contemporary with, or post-dates the Rampart C fort, as it is constructed up against the line of Rampart C on the northern side of the fort. The radiocarbon dates do not necessarily agree with or contradict this, as statistical analysis is unable to distinguish the sequence: a salient reminder of the issues of taphonomy regarding rampart construction as further discussed in Chapter 7.7. Construction of Rampart C re-used collapsed material from the monumental roundhouse, but the radiocarbon dates cannot refine this relationship further. Similarly, the suggestion that fort enclosed by Wall E was built within the pre-existing forts B/C cannot be confirmed by the radiocarbon dates.

While the resolution of the radiocarbon dating has not been sufficient to provide a detailed chronology for the development of the site, it has at least bracketed the period within which the observed sequence of events took place. The radiocarbon assays suggest Iron Age activity of no more than 300–400 years, which raises

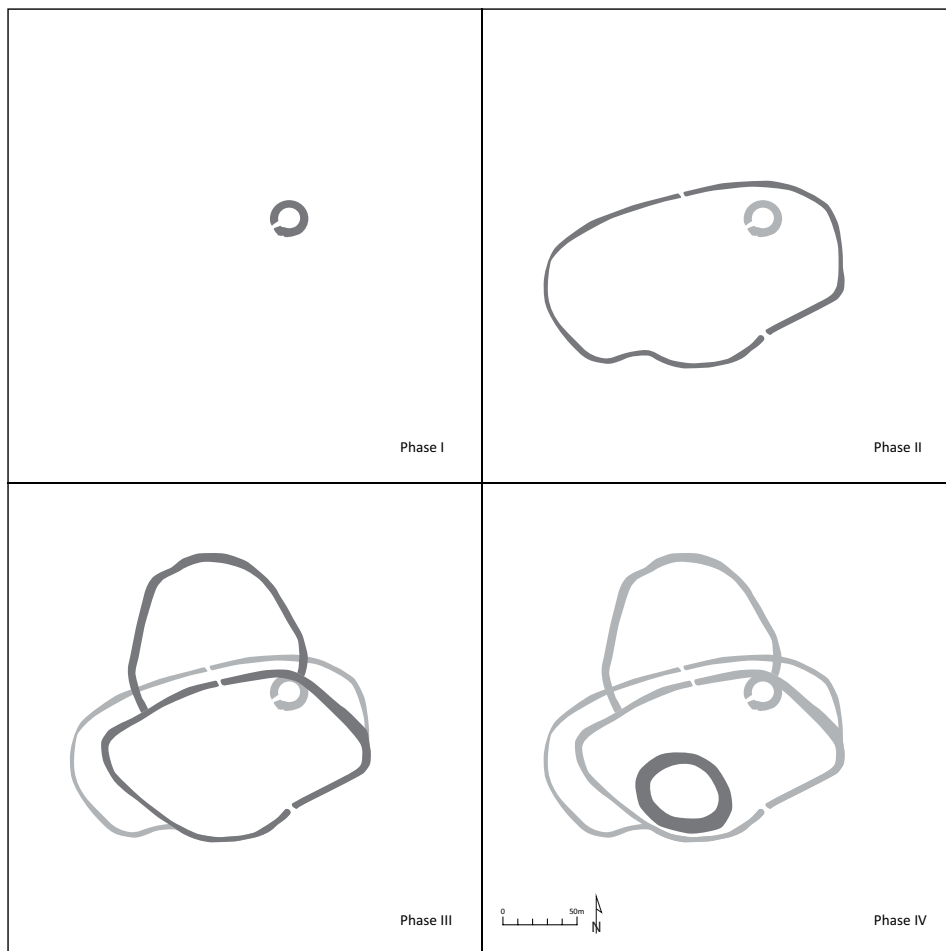


Figure 3.94: Possible phasing of Moredun. However it is equally possible that the initial phase saw the monumental roundhouse enclosed within Rampart B.

questions of continuity and whether the same social group developed the site. Given their similar internal areas, the Rampart B and C forts probably fulfilled similar functions, but the contrast with the monumental roundhouse and the smaller oval fort behind the massive timber-laced Wall E is striking. While the large Rampart B and C forts suggest a communal character, the small massively constructed Wall E fort is more restrictive, perhaps only by an elite with command over the local area. To a lesser extent, the same can be said of the monumental roundhouse, another elite residence for a small group. These structural shifts may suggest a changing role, perhaps from a seasonal meeting place and/or communal settlement to a power centre, perhaps acting as local tribal capital. At Turin Hill, Angus, a large, oval, bi-vallate fort of 2.9 ha, shown to be of Early Iron Age date was overlain by a smaller oblong fort set within it (O'Driscoll and Noble 2020) and may offer a useful comparator for Moredun.

The final phases of activity are represented by small-scale quarries across the Moredun forts, the construction of the 'modern' paths to the summit, and the erection of a flagpole on the rubble of Wall E overlooking Moncreiffe House at the foot of the hill. While these all clearly post-date the Iron Age monuments, their actual chronology is less certain, other than the perforated slab forming the base of the flagpole and the paths to the summit were in place by the mid-19th century. The chronology of quarrying, however, may be of greater antiquity. The surface remains indicate quarrying was focussed on Mound A and Wall E, shown by excavation as the features incorporating the largest walls with the most stone. The re-use of materials has been demonstrated in antiquity, with stone from the monumental roundhouse re-used Rampart C, and very probably the massive Wall E. It is likely that the sites continued as a convenient quarry from the medieval period into the Victorian era. However, some of this quarrying, notably to the west of Wall E, is in the form of 'wall chasing' and may indicate unrecorded antiquarian activity.

3.5 Conclusions

The excavations were successful in meeting their main objectives. While relatively small-scale, the excavation of the ramparts identified the construction techniques for each circuit and established an overall first-stage model for the chronological development of the successive enclosures. They also confirmed domestic occupation and craft activities that have provided the basis of a review of the role of the forts and how this may have changed through time and resulted in a better understanding the diversity of enclosure forms in the area. In doing so, the work has therefore provided a wealth of new evidence on Iron Age fort construction, use, and social function in the region.

Despite the impact of quarrying, modern landscaping, and tree planting, elements were much better preserved than were perhaps expected. Geophysical survey proved valuable in assessing both the enclosure ramparts/walls and interior features. The recovery of over 500 artefacts, ranging in date from the Neolithic to the Iron Age, has also proved valuable to improving our understanding, and was arguably achieved very effectively through trenches that were neither keyhole nor large and open area in nature. Perhaps most significantly, the excavation revealed no evidence for early medieval use of the site, and Moredun fort can now be identified as wholly Iron Age, developing from a possibly undefended monumental roundhouse in the 4th century BC through at least three phases of fort construction to conclude with a small, but massively defended oval fort on the summit of the hill.

Codicil: Structural timberwork – a case for horizontal timber battens in the dry-stone wall-faces at Moredun wall E

Ian Ralston

Introduction

Examination of the monumental wall-and-fill Wall E fort in 2017 involved clearance of the wall-faces, the examination of superficial deposits overlying the rampart core, and partial excavation of the wall core itself.

The wall was not fully excavated in plan so that complete dissection of its architectural characteristics is presently not possible. Nonetheless, the unusually good preservation of the surviving elements of the enclosing wall allows some remarkable architectural details to be considered. The following paragraphs propose a variant on the interpretation presented in the excavation report above.

Structural timberwork

The former presence of timberwork as a component of this rampart is indicated notably by the near-horizontal and near-continuous voids recognised in the wall-faces in 2017 (Figures 3.65 to 3.69). Apertures for the beam-ends of transversal timbers were also identified in the field at the wall-core end of this void and are intimately associated with these features. Alignments of chocking stones at the surviving wall-head (Figure 3.55) suggest that the ghosts of further transversal timbers may be present at this level [A129-132]. No evidence for the survival of longitudinal timbers making up the lacing in the wall-core was identified, but in the absence of more extensive and intrusive excavation, this is unsurprising.

What is distinctly more unusual about Moredun Wall E as uncovered in Trench A, is the presence in its northern façade of what appears as the near-horizontal slot already mentioned; two such slots can be discerned in the opposite face of this wall (Figures 3.65 and 3.66). Both façades are built of fairly well coursed, blocky, roughly-squared stones, in which the voids represented by the horizontal slots are generally a consistently-present feature, hardly interrupted along the exposed length on the external façade, except by intermittent small stones and a single rectangular block which appears to have dropped into, and settled at, its current position. An alternative interpretation is proposed above (Section 3.2 above). The surviving materials on the inner margin of these voids consist of earthen fill and small stones which generally look displaced and are, in most instances, not functioning as pinning stones. Occasional pinning stones, firmly wedged between the stone courses above and below them, however, remain in place and suggest that these voids were never wholly uninterrupted. In the northern façade, a sondage indicates that there were at least three courses of blocky stones below the level of the slot represented by the aforementioned void before the base of the wall was attained. The other façade, revealed overall to a lesser depth, is slightly different in appearance. Enough was exposed to suggest that this façade consisted of a base of two courses of substantial blocky stones, followed again by a near-horizontal slot (which slopes down slightly to the west), in this case interrupted by rather more small stones visible in the elevation drawing. Few of these small stones again appear to be pinning *in situ* elements, nor are the overlying stones in the wall-face often lintelled over the proposed beam-ends of the transversal timbers. The pattern then repeats itself with a further two courses (again sloping down slightly to the west) followed by a further horizontal slot, in this case slightly less well preserved and surviving and/or distinguishable only over a little more than half the length of the façade as exposed. It seems likely that the slot of the north face may correspond to one of the surviving examples on the southern face in terms of altitude, more likely the upper, suggesting that at least one set of transversal tie-beams may have run close to horizontally through the rampart core between these features. While this (discussed in Section 3.4 above) cannot be formally demonstrated without more extensive excavation, the slight differences in levels suggest this is the more likely candidate for a horizon of transversal beams traversing the wall in its entirety. The fact that the transversals are not strictly horizontal should not cause surprise.

At Moredun, the indications from the internal wall-elevation as drawn are for two horizons, approximately 0.5–0.7 m apart vertically, of what appeared as densely packed transversals materialised by the apertures of their beam-sockets, which (Figure 3.65) vary

considerably in size from c. 0.2 by 0.2 m down to much smaller pieces. The density of transversal timbers indicated by the elevations as reconstructed is high but is not unprecedented. At the promontory fort at Cullykhan, Aberdeenshire (ID 19942) for example, an almost-continuous raft of timbers was identified towards the base of the west wall of the inner fort, although these were aligned longitudinally (Greig 1970: figs 2 and 3). Unambiguous cases of two such apparently close-set rafts of transversal timbers, superimposed within a wall of this type, are nonetheless rare in Britain. At Castle Law Abernethy the ‘port-hole like aspect’ (Christison and Anderson 1899: 19) of the apertures for the beam-ends (Christison and Anderson 1899: fig. 4 and pl. I) intimates their greater size and regularity of spacing compared to Moredun, although they too are relatively serried. The present writer is not concerned by the apparent variability of the size of the pieces of timber incorporated in the Moredun wall as indicated by the differing dimensions of the apertures. It is likely that timber-laced walls often incorporated wood salvaged and re-employed from earlier structures, potentially providing elements of different sizes. This re-use is demonstrable at Green Castle (ID 17408), Portknockie, Moray where the carbonised oaks surviving in the timber frame of this early medieval wall included mortice holes that were not functional within the structure (Ralston 1987: figs 4 and 5); and the continental timber-laced example formed by the *muris gallicus* at the Porte du Rebut at Bibracte, the oppidum of Mont Beuvray in Burgundy, included the slot for a transversal timber in its core which produced numbers of small nails of a size unrelated to the great spikes intermittently augered into the intersections of the internal timberwork here, and so again suggesting re-use of that wooden element. This example is datable to the early first century BC (Buchsenschutz *et al.* 1999). At Dundurn (Alcock *et al.* 1989: 202 and microfiche, cutting 000/400) the variation in the sizes of iron nails in the early medieval Wall 2B, which had been burnt and intermittently vitrified, acts as a proxy for the likely former inclusion of wooden elements of differing dimensions, again allowing the suggestion that it may have included wood recovered after earlier use.

Particularly noteworthy at Moredun, however, are the narrow horizontal voids, surmised here once to have held lengths of wooden batten (*longrines* in French) – perhaps more especially that in the external, northern wall-face and the lower example on the internal face (Figures 3.95 and 3.96). It can be argued that, to ensure their integration and stability within the wall structure, these battens were most likely originally jointed or otherwise fitted into the transversal beams that penetrated through the socket-holes. The survival of evidence for such features is obviously conditional on good preservation, notably an absence of serious settlement in (still less collapse of) the relevant portion



Figure 3.95: Photo montage of the external face of Wall E.



Figure 3.96: Photo montage of the internal face of Wall E.

of the wall-face elevation. The clearest case for the former presence of such battens in Scotland is at Burghead, Moray (ID 16146). These were first recorded at the end of the 19th century during excavations by Hugh Young (1891: figs 1 and 2; 1893), which involved exposing both inner and outer wall-faces as well as the sectioning of the north-east wall of the fort. Its dry-stone outer face is described as being several stones thick (Young 1891: fig. 1), including hammer-dressed sandstones. The salient details for comparison with Moredun relate to the characteristics of the inner wall-face, again several stones thick. This inner face, surviving to c. 1m in height, was described as being constructed on top of a plank or log extending longitudinally at ground level; and a further horizontal plank (Young 1891: fig. 2), again apparently set into the face of the wall, and described as running some considerable distance into the core, is shown at a height of c. 0.30 m above ground level. Over most of the elevation of this wall, the transversal timbers were placed about a metre apart vertically and horizontally, except towards the base of the wall, where the socket-holes for the beams of the basal row, c. 0.4–0.5 m above ground level, indicated that they were much more serried, with these apertures (apparently rectilinear and indicating the ends of squared transversal beams

of some 0.2 m a side) each separated by a single stone. Aside from the planks running longitudinally towards the bottom of, and set into, the inner façade, the wall seems to be a relatively conventional series of separate timber rafts making up the timber-laced wall, with squared transversal beams overlain by, and nailed to, longitudinal planks.

Alan Small also recovered traces of voids to accommodate horizontal timberwork in the inner wall-face elsewhere at Burghead in his campaigns near the coastguard station in 1966 (Ralston 2004: ill. 8). In 2019 and subsequently, Gordon Noble (*pers comm*) has been able to re-expose this inner wall-face at the seaward end of Burghead and has been able to confirm that the longitudinal battens were linked to the transversal beams in the unexamined wall-core, as is made visible by the apertures to accommodate them in the wall-face. Burghead is thus the most thoroughly documented case of this phenomenon in Scotland.

At Green Castle, Portknockie, the inner wall-face was only very incompletely preserved but here too a longitudinal timber was recovered under the surviving stonework of that face (Ralston 2004: ill. 11), in this instance only a single stone thick. This was a component

of the more elaborate timber frame, partially preserved in burnt condition (Ralston 1987: figs. 4 and 5). While suggesting a different history of construction, the key detail is the longitudinal wooden element *in situ* below the only surviving stone course. The Phase 2B timbered wall at Dundurn (ID 24873), including charred oak beams and quantities of iron nails indicating its elaborate construction, also seems to have had its outer face founded on horizontal timbers, in this case intermittently set into a rock-cut groove (Alcock *et al.* 1989: 202 and microfiche). Here, however, the external wall-face had otherwise been entirely robbed out, its stones probably redeployed in later constructions. All three of these examples of horizontal timberwork below or in dry-stone wall-faces are however early medieval, whereas the indications are that the Moredun examples of lengths of horizontal batten integral to the wall-faces, if sustained, belong in the latter part of the first millennium BC (Chapter 3.3).

There is one further possible case of horizontal timberwork in a largely dry-stone wall-face, both geographically nearer, and chronologically likely closer, to Moredun Wall E, although the complex sequence of enclosure at Castle Law, Forgandenny, is not fully understood (ID 26583). The feature of interest was recognised during Glasgow University's excavations directed by Dr Tessa Poller there in spring 2013, which followed up on a late Victorian intervention at the site (Bell 1893), by the Dundee jute mill owner, Edwin Weston Bell (d. 1894). As the 1892 trenches were not backfilled, further observations were made by David Christison (1900b) in the course of his survey of Scottish forts. Bell largely confined his examination of the innermost wall to exposing its external face. He clearly recognised that fuller comprehension of the architecture of the wall, including understanding of any timber framework, would require its systematic excavation, but his death in 1894 put paid to that idea. He commented on variation in the geological types used, although major stones were frequently red sandstones, and the absence of earth in the rubble wall-fill. Vitrified stones – potentially indicative of the former presence of timbers in the architecture – were also identified amongst the tumbled material. 'Curious openings' (approximately 0.2m square) in the masonry were noted in the external wall-face at irregular intervals: an illustration (Bell 1893: plate II) indicates that these were what would now be interpreted as apertures for beam-ends, sometimes set closely together and separated by a single vertical pinning-stone. Noted as having been accompanied by charcoal, Bell was nonetheless circumspect in his interpretation of them in the absence of fuller excavation. Christison (who was able to consider the then-new evidence from Castle Law, Abernethy, as part of the same exercise) examined these and other features of the external wall-face on

the innermost fort at Forgandenny some years later, describing what he saw as 'a row of square holes and slits running deep into the substance of the wall, containing a great quantity of charred wood chiefly in powder...' (1900b: 74 and fig. 33). Pending full publication of the 2013–2014 campaigns, it would not be appropriate to comment on them in detail, but Poller's re-examination of the inner enclosure wall, and that abutted onto and perpendicular with it (in her Trench C) revealed what now appears as a horizontal slot in the outer wall-face of the innermost enclosure. It would seem probable that this corresponds to Christison's use of the descriptor 'slit'. Given the history of excavation and subsequent exposure of this sector already in the years after 1892, however, the evidence here needs to be treated with particular caution, but it is plainly comparable to what is shown on Christison's illustration. Poller (2013b: 28ff and plates 28–31) essentially cleared the sector already examined by Bell, noted the stonework in some detail, but was very circumspect about the horizontal void apparent on the related illustrations: 'Although there are gaps between some of the stones, these are not likely the remnant holes of timber beams' (2013b: 30). She noted that Christison had remarked on these but considered that 'these hollows are more likely where several flat stones had fallen out of the wall face' (Poller 2013b). Poller developed this argument further in her interim discussion in which she concluded that the evidence '... shows that smaller, narrow stones and earth were consistently used in between courses of larger stones. Therefore, the holes depicted by Christison [1900b: pl 33] at this level may have been created as smaller packing stones have eroded from the wall-face rather than holes for timbers' (2013b: 49–50). In essence this is the same rationale as the Moredun excavators proposed for the horizontal slots noted in the wall-faces there and involves selective failure of the wall-faces along narrow horizontal planes accompanied by little adjacent settling: this author finds this view unconvincing and prefers to see these horizontal slots as the ghosts once occupied by lengths of wooden batten. Evidently this is more contentious in the case of Forgandenny's inner wall, given the complex evolution of this portion of the site since its initial late Victorian clearance.

Conclusion

It is reasonable to propose that the Moredun examples are more likely to have held short battens, rather than the longer pieces of scantling intimated by the voids in the facing of thin sandstones at Burghead. That said, it can be remarked that the best-preserved plank recovered by Young (1893) there – its context is not precisely known, was flat on one side and slightly rounded on the other; and c. 1m long. The nature of the Moredun examples depends on the reading of the

pinning stones intermittently indicated on the drawing (Figure 3.65) of the façades between the main courses of stonework. Where these are categorically *in situ*, a gap between battens is implied. But in some cases, it seems possible to suggest that the small stones located within this slot at the time of excavation may have arrived as a by-product of secondary repair or, much more likely, through subsequent slumping. In Figure 3.96, for example, the triangular chocking stone (marked A) looks *in situ*, whereas the arrangements of small stones in the slot in the right-hand half of the image appears rather more like slumping.

While comments on the detailed architecture of the timberwork of Moredun Wall E must be tempered by the fact that it was neither sectioned nor taken down fully in plan, the characteristics noted above furnish some remarkable details, largely due to the survival of the wall-face elevations. The presence of the voids for horizontal battens in both wall-faces is especially noteworthy as constituting an element which is a variant on the normal reconstructed appearance of Scottish later prehistoric timber-laced walls. As noted, currently, the best Scottish comparanda are at Burghead

and Green Castle, Portknockie, both early medieval in date, so that Moredun (along with nearby Castle Law, Forgandenny albeit distinctly more tentatively) would seem meantime to represent the earliest instance of this trait known in Scotland. Further comparisons, beyond Scotland, for such features will be offered in Chapter 7.4: the timber-laced ramparts in wider perspective). Contrastingly the paved area, on top of the surviving wall core, discussed in Section 3.2 above allows a much more speculative suggestion – that the feature encountered was an element for the foundation for a tower or similar structure constructed on the wall-head. Such features are occasionally identified elsewhere on temperate European later prehistoric fortifications, but it would be disproportionate to pursue such comparisons based on the slight Moredun evidence available. This is plainly a case of one swallow not making a summer; but it may alert us to the possibility that such features should not be entirely dismissed. While the excavations at Moredun Wall E have provided significant new information, there undoubtedly remains much to discover about the complexity of its architecture.

4. Moredun fort: the small finds

Dawn McLaren

with contributions by Fraser Hunter, Rob Engl, and Anne Crone

4.1 Introduction

A rich and varied artefact assemblage was recovered during the excavations at Moredun and include finds of metal, stone, worked bone, shale, ceramic and vitrified material including evidence of metal-working waste. The most important of the individual items amongst this assemblage is a substantially intact copper alloy decorative ring-headed pin which was recovered from deposits associated with the roundhouse in Trench B. This pin has been cast from copper-alloy and incorporates an elegant zoomorphic design in its ring-shaped head. A full discussion of its style, symbolism and manufacturing method are presented below.

Other remarkable aspects of the artefact assemblage include a set of worn worked antler points which may have seen use in association with textile production, a sheet copper alloy rivet found *in situ* on a fragment of the rim from a wooden bowl, as well as evidence for shale bangle production in the form of blanks, roughouts and working waste, as well as fragments of completed and repaired bangles. Other aspects of the assemblage are more prosaic and domestic in character such as the fragments of thick-walled low-fired pottery typical of later prehistoric sites across lowland Scotland. A remarkable quantity and range of coarse stone tools were found attesting to the versatility and durability of the material type. Many of the items of worked stone appear to have been re-used as building stones during the construction, maintenance and repair of later features.

The following chapter presents the results of full analysis of the assemblage, presented by material type. As with the previous discussion of the finds from Moncreiffe (Chapter 2) and that which follows regarding Abernethy (Chapter 6), the individual catalogue descriptions of the objects discussed have been removed and are presented in Appendix C. Full catalogues and specialist analysis reports are available in the site archive.

Abbreviations used: L length, W width, T thickness, D diameter, Dpt depth, Wgt weight, mm millimetre, g grammes. The small finds (abbreviated here as 'SF') were assigned individual numbers in the field. In years

2 and 3 these were pre-fixed with the letter code of the trench they were recovered from (e.g., SFC001 = Small find number 001 from Trench C etc.). A small number of unstratified finds were recovered that cannot be located to specific trenches or areas. These are referred to here as general finds (abbreviated to 'GF').

4.2 The prehistoric ceramics

Dawn McLaren

Introduction

A total of 64 sherds (1188.22 g) of handmade, low-fired, later-prehistoric pottery were recovered as hand-retrieved finds from Trenches A, B and C. With the exception of a single unstratified general find, no pottery sherds were present in other excavated areas. The assemblage is dominated by sherds deriving from the bodies of undecorated, thick-walled, steep-sided, flat-bottomed vessels. A minimum of 16 individual vessels are represented and these have been categorised based on fabric type, wall-thickness, surface finish and context. The general absence of 'feature' sherds (e.g. rim sherds or decorated sherds) makes it difficult to reconstruct the form and profile of the vessels with any accuracy, but where possible dimensions have been estimated and recorded within the full archive catalogue. In addition to the pottery sherds, two small ceramic balls and fragments of possible daub were recovered. The following report presents a summary of the assemblage and considers the vessel form, fabric and distribution.

The pottery

Form and production

The assemblage is almost exclusively undecorated body sherds (63 sherds; 96% by weight); only one basal angle sherd (SFC041, Figure 4.1f) was present. The group is fairly homogeneous, consisting of body sherds from large steep-sided pots that are 10 to 20.5 mm in thickness and range from at least 160 mm in internal diameter to over 250 mm. Very few joining sherds were recognised making it impossible to be more precise about vessel size.

Most of the vessels were coil-constructed and in many instances the sherds have clearly fractured along the junctions. In some instances, such as Vessel 8 (SFB002, Figure 4.1c) and Vessel 16 (SF148, Figure 4.1g), the coil junctions are poorly joined with little evidence that the bands of clay had been strongly knitted together prior to firing. The surfaces of the vessels appear to have been hand-smoothed when wet in an attempt to mask the larger rock inclusions, but in many cases the grits still protrude (e.g., Vessel 9, SFB012, Figure 4.1d) and the clay has cracked around them either during firing or in use. Some finger smears and impressions are present on external and internal surfaces (e.g. SFB009, Vessel 14, not illustrated; SFC040, Vessel 15, Figure 4.1f).

Five sherds, four of which re-join into two large pieces, stand out from the assemblage as they derive from a very thick-walled, crudely made, decorated, bucket-shaped vessel (Vessel 12; SFB007, Figure 4.1e). The roughness of the construction gives the impression of a hastily prepared vessel, as the coil junctions are still distinct and there appears to have been little attempt on the internal face to knit them together. The exterior has been hand-smoothed when wet, during which time a series of widely spaced, horizontal, parallel bands of rush or grass stems (W 2–5 mm) have been impressed or embedded around the circumference. The organic material has been so deeply embedded in the wet clay there can be little doubt that its application was deliberate, but whether this was to create a decorative effect or to stabilise the pot during firing is not clear. Similar impressions were noted on coarse pottery from Finavon, Angus, to which the excavator remarked that it looked ‘as if strands of straw or grass had been wrapped round the pot while it was being built up and these strands burned away in the firing’ (Childe 1935b: 71, fig 16).

Fabric

A total of six different fabrics have been recognised amongst the sherds, the majority of which have been formed using a fine, slightly sandy clay, naturally flecked with quartz and mica, to which varying levels of crushed angular grits and organics have been added prior to shaping: fabric 1 is a fine slightly sandy clay with <5% small angular stone grits (average diameter 5 mm) and rare grass/rush inclusions; fabric 2 is very similar to that just described but has more abundant quartz/mica flecks, which makes the surfaces of the sherds sparkle; fabric 3 is a coarser sandy/loam clay, heavily gritted (up to 20% angular grits up to 12 mm diameter) with occasional voids and impressions from burnt-out organics; fabric 4 is heavily gritted (up to 35% crushed rock inclusions) including large possible dolerite or similar igneous rock inclusions; fabric 5 is very similar to fabric 4 but has moderate quantities

of organic inclusions (grass/rush); and fabric 6 is very similar to fabric 4 in terms of inclusions but with more abundant natural flecks of quartz/mica. One fabric (fabric 2) is distinct from the rest of the assemblage as it consists of a coarser clay. This may derive from a different clay deposit than those used to make the other pots or could simply be a variation in the natural clay. All of the sherds derive from pots that have been fired hard and are incompletely oxidised.

Patches of sooting and dark brown residue survived on a few sherds (e.g. SFA067, Vessel 2), implying use as cooking vessels, whilst others were devoid of evidence of use on the hearth. This could suggest that the ceramics at Moredun represent both cooking vessels and storage containers.

Distribution

The pottery sherds were recovered from 15 separate contexts within Trenches A, B and C, and one general find was unstratified (Table 4.1).

Table 4.1: Summary of ceramic assemblage by area.

Trench	No. sherds	Weight (g)
A	23	217.22
B	37	745.6
C	3	170.4
General find	1	55
Total	64	1188.22

A total of 23 sherds were recovered from Trench A, representing sherds from seven distinct pots (V1–7). The contexts of discovery include: soils [A030 and A030/A034] abutting the internal face of Wall E onto which stones from the collapsed wall became embedded; the matrix of the wall core [A018]; collapsed wall material [A103 and A104] to the interior and exterior of the wall; and deposits overlying the wall [A011 and A113]. The surviving sherds suggest little distinction between the vessels represented in terms of shape, size and fabric.

The majority of the pottery, by both sherd count and weight, came from Trench B, and consists of 37 sherds from 6 vessels (8–14). Most of these came from the topsoil and a humic-rich deposit directly underlying the topsoil [B001 and B002], but some were also found amongst charcoal-stained deposits within natural hollows in the bedrock [B004 and B011], stone tumble [B005–2016] from the exterior of structure [B003–2016], and a soil layer [B007–2016] underneath and amongst the rubble collapse of [B003]. A sample of alder charcoal

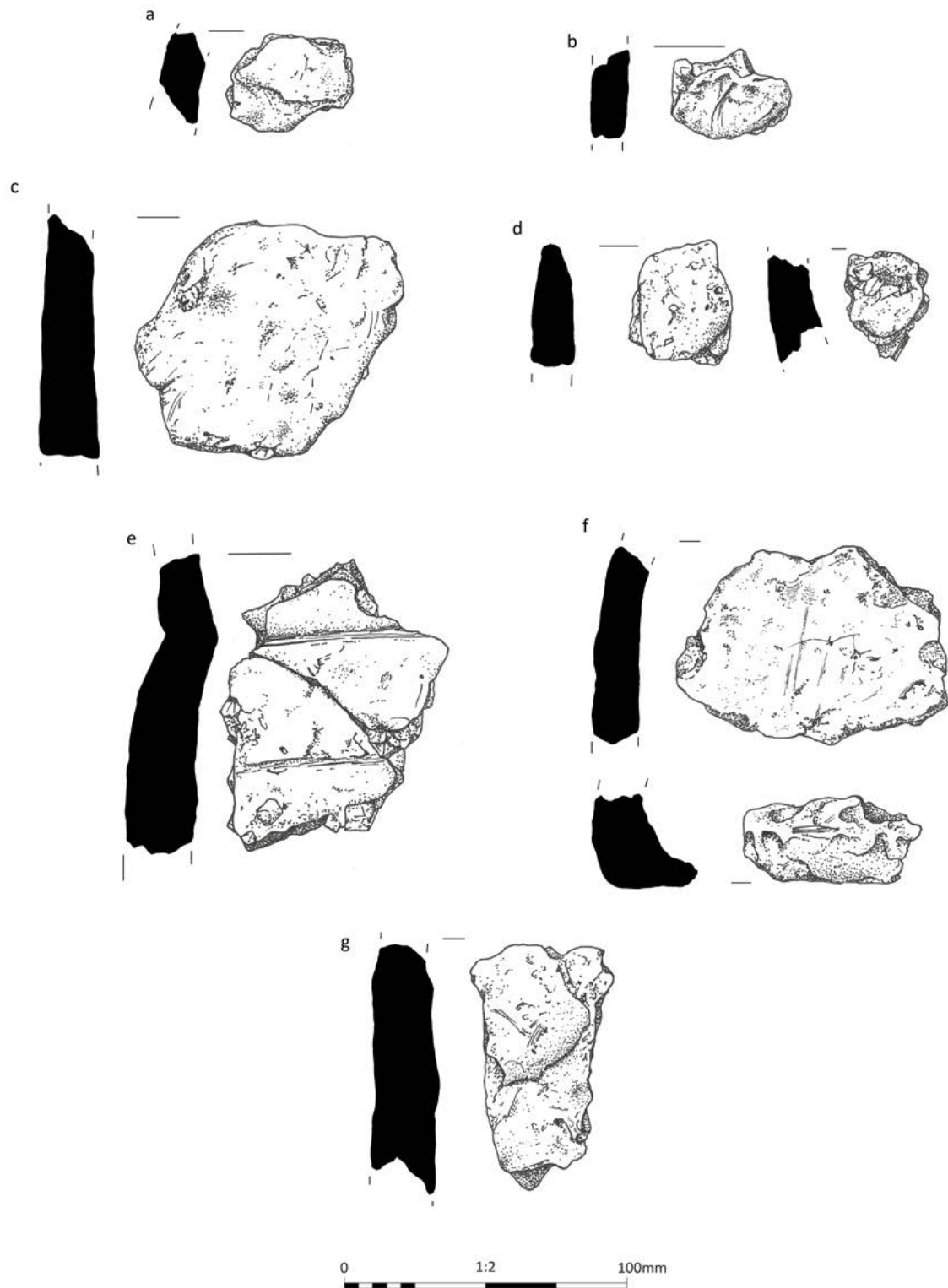


Figure 4.1: Selection of ceramic sherds. None were found to rejoin. a) body sherd V5, b) body sherd V7, c) body sherd V8, d) body sherds from V9, e) body sherd from large vessel with horizontal linear impressions V12, f) body sherd and basal angle sherd from large thick-walled vessel V15, g) large body sherd from V16.

from the latter context has returned a radiocarbon date of 390–200 cal BC (at 95.4% probability; SUERC-76161).

Only four sherds, representing three distinct vessels (13, 15 and 16), were recovered from deposits associated with the monumental roundhouse in Trench C. Two sherds from Vessel 16 came from the collapse [C004] of wall [C003], one sherd from Vessel 13 came from stone tumble [C014] and a single large sherd from a thick-walled vessel was unstratified.

Comparanda

Considering the form and fabric of the assemblage more broadly is challenging due to the lack of diagnostic feature sherds, but general comparisons can be made to the similarly coarse and crudely produced large vessel sherds found at Moncreiffe Hill and Castle Law, Abernethy (McLaren, *supra*). The type of coarse, flat-based vessel that these sherds represent is not, as yet, closely datable and on morphology alone could belong to the Late Bronze Age or Iron Age (Johnson 2010: 20), but the association with a radiocarbon date in Trench A suggests deposition sometime between the early 4th and late 3rd centuries BC. Here, the typology defined for the coarse pottery at Broxmouth fort (ID 58800), East Lothian, is instructive (MacSween and Cool 2013) but, as discussed with regards to the Moncreiffe assemblage (McLaren, *supra*), is not without caveats. Cool (1982) initially identified two broad groups of sherds based on size, thickness, form and fabric: Type 1 sherds were from thick-walled heavily tempered pottery and Type 2 were vessels of medium wall thickness with less temper. Initial analysis suggested that Type 1 pots, which the Moredun assemblage most closely resembles, were early, developing later into pottery of Type 2 form. Recent reconsideration, however, has shown there is much greater overlap between the two forms and this classification cannot be used as a chronological guide in isolation from other sources of evidence (MacSween and Cool 2013: 248, illus 10.9).

Looking across Perth and Kinross more broadly, ready parallels can be found for similarly coarse, thick-walled pottery recovered at Moredun. These include small assemblages found at several of the forts investigated during the University of Glasgow's *Strathearn Environs and Royal Forteviot* (SERF) project, including sherds of coarse pottery recovered in association with a possible burnt structure and the fill of a ditch at Dun Knock fort (Poller 2008: 20, fig 17; Dalglish *et al.* 2009: 13, 16; Poller forthcoming); rampart collapse and ditch fills at Jacks chairs Wood fort (Poller and Goldberg 2007; Poller *et al.* 2007) and from occupation deposits at Castle Law, Forgandenny (Poller 2013b: 2, 45, 54). These assemblages are in the process of analysis at the time of writing (Poller forthcoming) and therefore not available for examination; future comparison of the

Moredun ceramics to these small assemblages will no doubt prove instructive to understanding local and regional styles. Further afield, groups of sherds from large coarse vessels of supposed Late Bronze Age and Iron Age date are known from sites across the region, including Dalrulzion (Thorneycroft 1933: 196–206), Carn Dubh, Moulin (McLellan 1995: 192), Dalnaglar (Coles 1962: 153–4), and Oakbank Crannog (Dixon and Cavers 2001: 79).

Ceramic objects

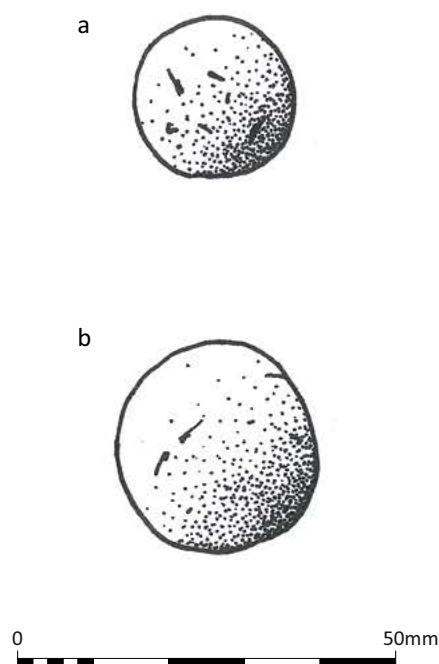


Figure 4.2: Spherical clay gaming pieces, a) SFC005, b) SFC007.

Two small, well-formed, clay balls (SFC005 and SFC007; Figure 4.2) were retrieved from deposits within the interior of the monumental roundhouse in Trench C. These have been made by rolling a piece of clay between the palms to create a smooth and fairly evenly shaped sphere prior to lightly baking them to harden. Neither is perfectly spherical; SFC005 is 21.5 by 23 mm in diameter and weighs 9.9 g, while SFC007 is 23 by 27 mm in diameter and weighs 12 g. The fabric of both spheres is the same, consisting of a slightly sandy-silty clay with frequent natural mica/quartz flecks, and is consistent with the clay used to make the pottery found on the site. The surfaces are smooth with a light burnish and each has occasional fine crescent-shaped indentations that may be finger-nail marks made during production, closely paralleled on an example from Fairy Knowe, Buchlyvie, Stirlingshire (Willis 1998: 332, no. 475, illus 15).

A fragment of a similar clay ball, more ovoid in shape and made with a little less precision, was found during

the antiquarian excavations at Castle Law, Abernethy (Christison and Anderson 1899: 33; McLaren *intra*) and originally interpreted as a pellet or slingshot, following the 75 ovoid and amygdaloid pellets of fired clay found at Ardoch Roman fort (Anderson 1898: 458–9, fig 9). While the idea of the Moredun and Abernethy clay balls as slingshot is not impossible, the careful shaping and burnished finish would be unnecessary for this function and suggest use as gaming pieces (Close-Brooks *et al.* 1987: 165).

Several similar clay balls are known from Traprain Law (ID 56374), East Lothian, including one found in 1916 which is 24 mm in diameter and which has a surface textured by somewhat irregular pin pricks (Curle and Cree 1916: 130, fig 10, no.7; Curle 1915: 196; Curle 1920: 83; Cree 1924: 258). Pricked decoration has also been observed on a clay ball from Clatchard Craig, Fife (Close-Brooks *et al.* 1987: 165, fig 27 no 105; ID 30074), and Close-Brooks suggests the clay examples may be related to the small stone balls found on Iron Age sites in southern and central Scotland, and in some quantities at sites such as Traprain Law and Broxmouth. Small stone balls are more prolific on Iron Age sites than clay examples. Although an early date of use from about the 4th/3rd centuries BC has been suggested (Cool 1982: 95–96), the examples from Traprain argue for use extending through the Roman Iron Age (Rees and Hunter 2000: 431).

Fired clay

Two small, weathered fragments of heat-affected clay (SFA040 and SFA082), weighing 5.1 g and 0.8g respectively, came from a poorly defined soil layer associated with activity post-dating the collapse of wall E [A007] and from a layer of occupation debris or trample in the interior of the wall [A029]. These may be degraded fragments of daub or hearth lining.

4.3 The glass

Dawn McLaren

A single glass bead (SFB019) was discovered during topsoil sieving of Trench B by a primary school pupil engaged in outreach. It is small and annular, and made of a semi-transparent watery grey-blue glass (Figure 4.3). It has a diameter of 4 mm, a height of 1.1 mm and its central hole measures 2.4 mm in diameter. It was probably made by winding a semi-molten filament of glass around a fine metal rod and reheated to fuse the join and create a smooth rounded surface. Although a little darker than most beads of this type, it is consistent with Guido's Type 6 (sub-type iv b) beads (1978: 66–9, 160–161). While a typical Iron Age type, this is a long-lived form which spans the 7th century BC to around

the 9th century AD (Guido 1978: 66–9; Henderson 1995: 153).



Figure 4.3: The glass bead (SFB019) from the roundhouse (Trench B).

A translucent blue bead of similar dimensions came from House 3 at Carn Dubh, Moulin (Henderson 1995), and chemical and microstructural analysis determined it was coloured by a combination of cobalt and copper oxides, giving it a watery-blue pigmentation, not dissimilar to the example discussed here. Further north, a Guido Type 6 (iv b) bead with similar colouring to that from Moredun was recovered from a structure dated 360–50 cal BC at Culduthel, Inverness, which has produced rare evidence of Iron Age glass working and bead production (Hunter 2021a: 203).

4.4 The metals

Dawn McLaren

During the excavations, a very small quantity of iron and copper alloy objects were recovered, consisting of tools, fittings, repair patches and possible working waste. The most spectacular and significant of these objects is a substantially intact decorated ring-headed pin (SFB114 and SFB115), which is discussed separately (Hunter, *intra*). This report focuses on the seven objects of iron and five items of copper alloy recovered from stratified contexts in Trenches A, C and E.

Distribution

The majority of the iron objects came from Trench A, specifically from deposits overlying the collapsed wall [A113, A114, A117 and A119] and were associated with other artefactual material, including shale bangle production waste. These finds include a possible fine chisel tip (SFA113a; Figure 4.4a), twisted and perforated iron strip fragments (SFA113b and SFA118; Figure 4.4b, Figure 4.5), a small iron nail or tack (SF A126; Figure 4.4c), a folded iron strip fragment (SFA132; Figure 4.4d), a fragment of a ring fitting (SF104; Figure 4.4e), a corrosion blister from a completely degraded iron object (SFA148; not illustrated), and the perforated edging from a robust iron object (SFA153; Figure 4.4f). A fragment of carbonised hazel roundwood from [A119] was radiocarbon dated and indicated an episode of activity occurring between the early 4th and late 3rd

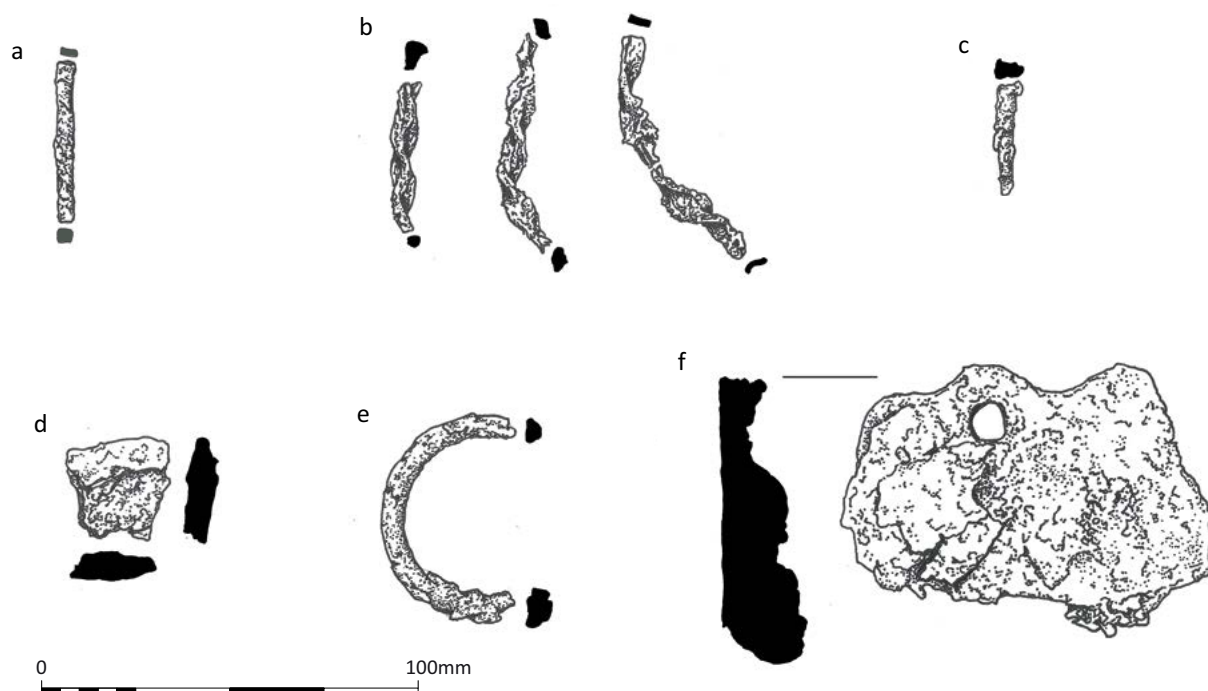


Figure 4.4: A selection of the iron objects a) fine chisel tip (SFA113a), b) twisted and perforated iron strip fragments (SFA113b and SFA118), c) a small iron nail or tack (SFA126), d) a folded iron strip fragment (SFA132), e) a ring fragment (SFC111) and f) the perforated edging from a robust object (SFA153).



Figure 4.5: The twisted and perforated iron strip fragments (SFA113b and SFA114) after conservation.

centuries BC (380–190 cal BC at 95.4% probability, SUERC-76156). Associated with activity within the interior defined by Wall E, also in Trench A, is a small group of copper alloy flecks and globules which were recovered from soil sample retents from [A029]. This context is a lens of bright-orange and black burnt soil which underlay the collapsed stones from the wall and was interpreted as an occupation deposit or trampled surface.

The rest of the assemblage was recovered from Trenches C and E and associated with the monumental roundhouse. These finds consist of a small quantity of amorphous fragments of copper alloy working waste or molten-looking spalls of objects destroyed by the fire that was in evidence within the structure. These

fragments (SFE005 and finds extracted from soil sample retents) came from context [E008], burnt soils associated with the collapsed portion of the roundhouse on the north-east side of the hill slope and, perhaps more tellingly from charcoal-stained and heat-affected soils [C024] directly below the hearth stones [C020] within the interior of the roundhouse. Although no direct date was available from this context, samples of carbonised organics from the charcoal-rich soil [C021] within the hearth were radiocarbon dated, suggesting activity occurring between the early 4th and late 3rd centuries BC (390–200 cal BC at 94.5% probability, SUERC-76164; 380–190 cal BC at 95.4% probability SUERC-76165). A bronze sheet metal repair patch (SFC060) with a small portion of the wooden object it was attached to came from rubble in front of the entrance to the structure

[C028]. Finally, a fragmentary ring fitting (SFC111) came from the demolition backfill deposit post-dating the collapse of the structure.

Discussion

Consideration of the composition and significance of the iron and copper alloy assemblage is hindered by the incomplete condition of many of the objects, particularly the iron. Frustratingly, many of the more intriguing of objects lack ready parallels, making it difficult to discuss their potential function, such as the fragments of a fine narrow iron strip (SFA113b and SFA118, Figures 4.4b and 4.5), carefully and evenly twisted along its length and perforated at regular intervals by small, circular, drilled holes. Its original length is unknown; although five segments of the object survive, only two comfortably rejoin. There is no doubt they form part of the same object, but only one original tapering end has been recognised amongst the fragments, indicating that the pieces that survive are only a portion of a longer strip of at least 189 mm in length. An attempt to re-assemble the fragments demonstrates that the strip curves along its length, but it is unclear whether this is an indication of its original form or a result of its later incorporation and inclusion in the soils overlying the collapsed Wall E [A113 and A114] in Trench A. What is more certain and purposeful is the original twisted form of the strip, the appearance of which suggests a decorative purpose and bears a passing resemblance to the twisted band of Scottish and Irish gold ribbon torcs (Eogan 1983). The strip in this instance is perforated at regular intervals and there is no sign of any attachment or means of fastening at the one rounded tip that survives. The purpose of these perforations is unclear, but they were presumably to allow fixture or to enable other items to be suspended from them. No obvious parallels for this object are known to the writer but its form is suggestive of a decorative fitting or ornament.

Also lacking ready parallels is the perforated edge or rim fragment from a robust forged iron object (SFA153, Figure 4.4f). Prior to conservation treatment to remove the heavy corrosion that obscured much of its surface, this item was thought to be a rim fragment from a large iron vessel or cauldron with a perforation to allow attachment of a handle. Yet, on cleaning, it has been revealed to be flat in profile, without any hint of curvature either on its short or long axis, making the initial interpretation unlikely. Its function remains uncertain, but it may have been a fragment of a repair patch or robust iron fitting.

Tools are surprisingly scarce amongst this small assemblage, consisting of only one certain example: a possible fine chisel (SFA113a, Figure 4.4a) recovered alongside the fragments of twisted iron strip. The

width of the squared working edge is so narrow that it suggests use for fine, detailed work and may be related to the shale bangle working evidenced in the same area (Hunter, *intra*). More prosaic iron objects include the small iron nail or tack (SFA126, Figure 4.4c) with a damaged head and the fragmentary ring fitting (SFC111, Figure 4.4e).

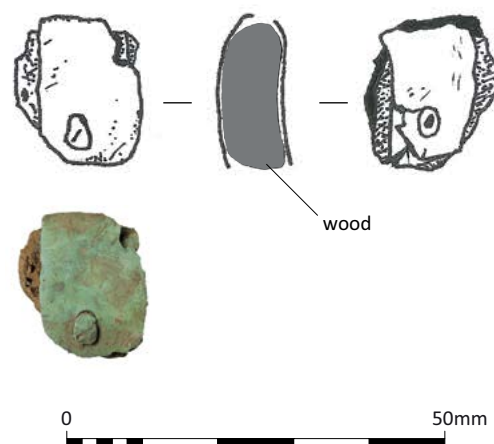


Figure 4.6: Copper alloy repair patch for the rim of wooden vessel (SFC060).

A copper alloy sheet metal repair patch (SFC060; Figure 4.6), bent over and riveted *in situ* to a portion of the rim of a wooden bowl, came from rubble [C028] at the entrance to the monumental roundhouse in Trench C. The wooden bowl is discussed separately (Crone, *intra*) but the form of the repair patch is simple and paralleled among other Iron Age assemblages, such as those from the broch floor at Ardgour, Highland (Maxwell 1951: 164), Fairy Knowe, Buchlyvie, Stirling (Hunter 1998: 346, illus 19, no.44), Hurly Hawkin, Angus (Henshall 1982: 228, fig.6, no.18), Traprain Law, East Lothian (Burley 1956: 190) and Dowalton Loch, Dumfries and Galloway (Hunter 1994: 58–9). More recently, the remains of a wooden bowl from Cairns, Orkney was found to have been repaired on various occasions using fine corrugated copper alloy strips and at least one repair patch similar to the example from Moredun (Martin Carruthers *pers comm*).

Several amorphous fragments of copper alloy were discovered in Trenches A and C. Fragments such as SFE005 came from burnt soils perhaps associated with the collapsed monumental roundhouse [E008]. These are agglomerates of small broken or clipped flat sheet fragments fused with globular and granular fragments, suggestive of partially molten nodules of scrap metal. Other fragments, such as two amorphous spalls recovered during soil sample processing from [A029] could have detached from a completely degraded copper alloy object or objects. Although the quantity of potential working waste is limited in terms of weight

(7.51g) and number of fragments (37), the presence of molten-looking trails, globules and prills from contexts [C024] and [E008] are suggestive of limited and small-scale, non-ferrous metal-working taking place in the structure.

Although the assemblage of metals recovered from Moredun is small and the finds survive in a generally poor condition, they bolster the evidence of small-scale metal-working taking place in the fort during episodes between the 4th and 3rd centuries BC. Other items are more difficult to classify closely due to their fragmentary state, but hint at sophisticated iron-working techniques and products that were accessible to the fort community during the Middle Iron Age.

4.5 The zoomorphic ring-headed pin

Fraser Hunter

The most remarkable find from the Moredun excavations was a copper-alloy bird-headed pin (Figures 4.7, 4.8 and 4.9), unique and yet readily placed into a wider context. It is a miniature masterpiece of early Celtic art dating to the 3rd century BC. A summary of the find and its wider context is followed by a full technical description.

The pin is a lost-wax casting. The shank tapers to a forward-pointing tip at one end (designed to prevent it from slipping out of clothing) and leads into an S-shaped curve ending in a bird head at the other. The lower curve of the S has a saucer-shaped disc riveted to it, originally inlaid. The bird-motif was similarly inlaid (though no trace now survives) in its eyes and wings, but not in its openwork beak (based on different finishes on the internal surfaces). It has a bulbous head, oval eye and down-curved beak with bulbous tip decorated with dots on its upper surface. The pin expanded notably before rounding off at a collar between it and the head; this expansion represented the body, with three recesses probably being the wings and body/tail, disproportionately small compared to the head. Several of the parallels noted below had coloured inlays or spaces for them. Here issues of attachment suggest glass was used; coral would need to be riveted in place, while glass could be constrained in irregular spaces (as in the eyes), gripped by uneven surfaces or slightly in-turned rims as on the disc. We are thus on safe grounds in restoring red glass in the wing-lobes and eyes of our bird.

The form – ring-headed pins

The pin is a variant of a well-known type – the ring-headed pin, a classic Iron Age form in Britain and Ireland with over 200 examples now known (Dunning 1934; Raftery 1984: 157–175; Becker and Channing 2007; Becker 2008). The Scottish finds have not seen recent



Figure 4.7: The zoomorphic ring-headed pin
(© National Museums Scotland).

synthesis, but some 24 examples are now known in a variety of forms (double the total in the last synthesis; Simpson and Simpson 1968). While some of these pins do indeed have ringed heads, there is a wide range of variations from wheel-headed to more S-shaped. Of particular relevance here are other decorative examples. The Irish corpus of some 38 pins includes rather few simple ring-headed examples and a wide range of more decorative forms relevant to the type under consideration here. One (Raftery's type 2, Becker's type 5) has decoration derived from middle La Tène Plastic-style on the head and a separately attached decorative element (a boss or inlaid disc) on the forward projection. This is a characteristically northern Irish type, with two Scottish examples, from Coll, Argyll, and Howe, Orkney, likely to be exports (MacGregor 1976: no 265; Raftery 1984: 168; Ballin Smith 1994: illus 1343 no 4932); the Howe pin is unusual as the boss is integral

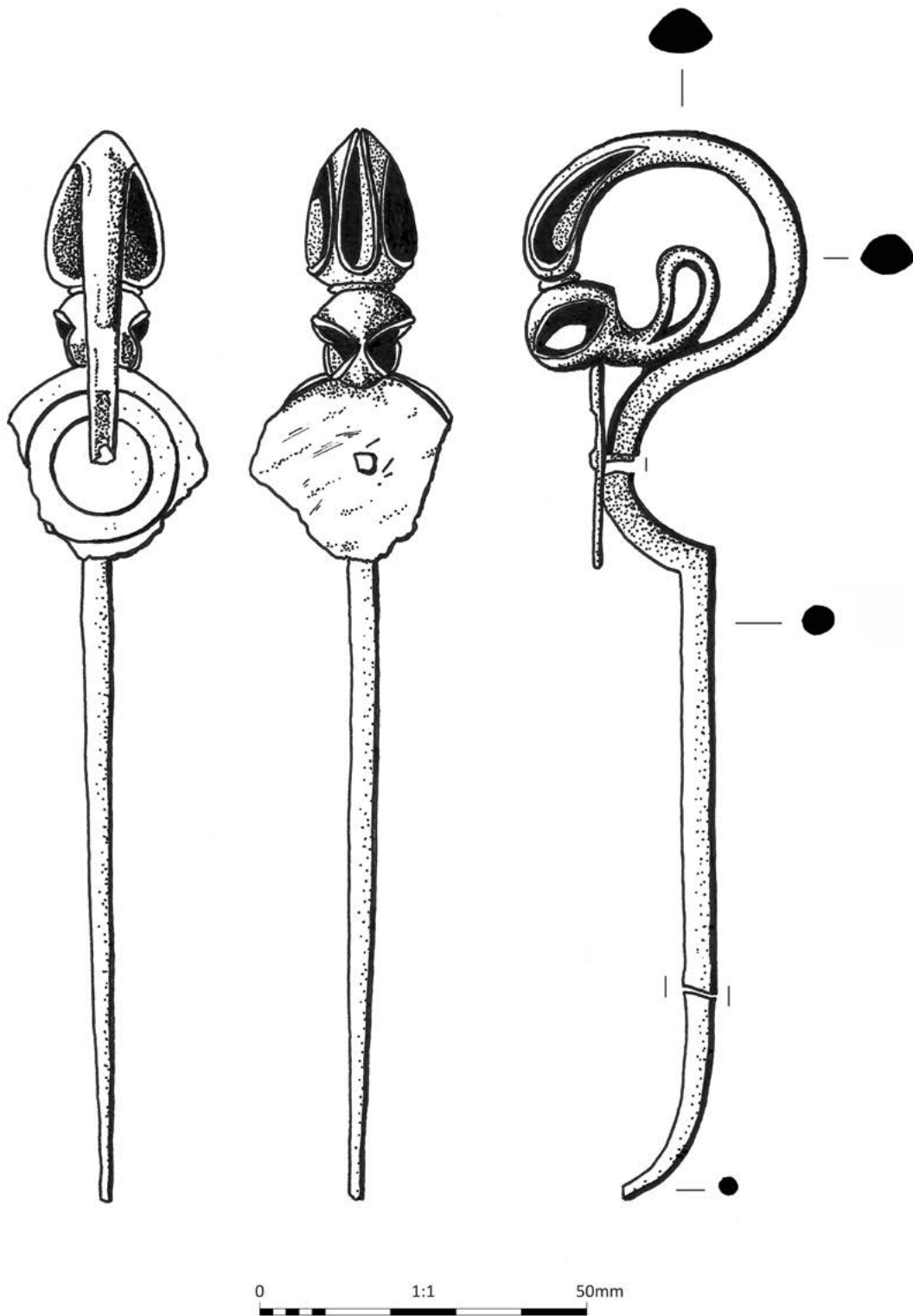


Figure 4.8: The zoomorphic ring-headed pin.

to the casting rather than a separate element, but this does find a single Irish parallel, from Navan, Co Armagh (Raftery 1997: 94). Also of relevance for their avian iconography is a group where the S-curve of the head forms or evokes a stylised bird, sometimes with the eye

indicated (Raftery's type 4, Becker's type 7). The Irish pins are a notably decorative group, though there are no close parallels for our pin. Yet ring-headed pins clearly lent themselves to decorative elaboration, for instance in ornate wheel-headed pins from Dane's Graves, East



Figure 4.9: Photogrammetry render of zoomorphic ring-headed pin.



Figure 4.10: The Torrs pony cap (© National Museums Scotland).



Figure 4.11: Detail of repoussé bird-based design on the cap of the Torrs pony cap (© National Museums Scotland).



Figure 4.12: Detail of the bird head terminal of one of the horns of the Torrs pony cap (© National Museums Scotland).

Yorkshire, and Wavendon Gate, Buckinghamshire, or the cup-headed example from Garton Slack, East Yorkshire (Stead 1979: 77–8; Green 1996).

Dating of the type has not seen recent detailed published review, and many of the finds are strays or from unhelpful contexts, but long-established arguments over chronology and provenance largely remain valid: the type originated in the earlier Iron Age, around the 7th/6th centuries BC and lasted to the end of the pre-Roman Iron Age (Becker and Channing 2007: 49). Some of the variants can be more closely dated: for the Irish type 2 pins (using Raftery's typology; 1984: 157–162), the similarity of some to Plastic-style Celtic art indicates a 3rd-century BC date; the only example from a useful context, from Navan, Co Armagh, is probably of late 3rd/early 2nd century BC date (Raftery 1997: 93–4; Becker and Channing 2007: 49–50).

The decoration – early Celtic art

The evocation of a bird finds good parallels in other pieces of insular Celtic art, particularly in the Torrs-Witham-Wandsworth tradition of the 3rd and early 2nd century BC (Atkinson and Piggott 1955: 227–34; Megaw and Megaw 2001: 194–8). Its thin but broad distribution

spanned much of Britain and Ireland, and included a series of regional workshops, seen most distinctively in the engraved styles characteristic of sword scabbards (and more rarely other items) in Yorkshire and Ulster. Both engraved and three-dimensional decoration is known in this tradition, and in both parallels for the Moredun bird can be found. The Torrs pony cap and horns serve to illustrate the variety of bird styles attested (Figures 4.10 – 4.12). Some are quite clear, such as the horn tips, which may represent shoveller ducks; some are stylised, such as the repoussé curls on the cap, which evoke bird heads with coiled beaks; and some offer just a hint, such as the engraving on the horns, which carries echoes of a winged bird, and where one motif in particular looks like a bird eye and pointed beak.

Birds occur on other spectacular items in this tradition. On the Wandsworth long shield boss, two bird heads adorn the central boss (Jope 2000: pl 70–71); on the round boss, two birds (suggested as swans) chase one another around the rim, with a further bird engraved within one's wing, and two much more stylised birds on the boss (Jope 2000: pl 82–89a). The Witham shield takes stylisation further, with what can be read as bird heads in the engraving of the roundels at the ends of the spine, perhaps also in the lobes where the roundel meets the spine, and full-face views of two eyes and a pointed beak on the boss (Jope 2000: pl 63d, 66a–b). Most bird-like of all is the small copper-alloy knife from Chiswell Green, St Albans, Hertfordshire, where its overall form evokes a bird in flight, with a ball-shaped head and a fierce raptor's beak. The decoration on one side has a further, rather calmer, bird engraved on it (Megaw *et al.* 1999).

One can point to earlier and later examples: the handles on the Chertsey shield, probably slightly pre-dating the Torrs-Witham-Wandsworth tradition, have paired bird heads (Fitzpatrick 2007: 352), while Plastic- and Sword-style on the continent provide clear birds, *inter alia* on linch pins from Mezek (Bulgaria) and Manching (Germany), the cauldron handle from Brå (Denmark) and the Cernon-sur-Coole (France) scabbard (Megaw and Megaw 2001: 128, 144, figs 187–8, 221, 224). The remarkable bird-brooch from Red Hill, Nottinghamshire, is similarly of 3rd-century BC date (Hull and Hawkes 1987: 152–3, pl 43 no 6912). Likely slightly later are the disc from Llyn Cerrig Bach, Anglesey, where Jope's inspired imagination saw puffins, and a scoop from Ireland, similarly with hints of birds (Jope 2000: 115, pl 184–5; 114–7 for insular bird iconography). From Jope's puffins one can readily start to see birds in S-shaped motifs with dots/'eyes' in the terminals (e.g. Foster 2014: table 6.1 for enamel-decorated metal-work), but it was only in the late La Tène period that clear bird forms emerged once more, under the influence of more

naturalistic traditions stemming from the continent (eg Jope 2000: pl 181, 194–5). Other ring-headed pins carried avian iconography: we have noted the Irish type 4 (on Raftery's typology), with their bird-like curves, but one could also read the indents on the rings of other examples as stylised bird heads, such as one from Sasaig, Skye, or an unusual projecting headed pin from Horncastle, Lincolnshire (Simpson and Simpson 1968: pl II; Portable Antiquities Scheme number NLM4719, Elwes 2000). Within this long use of bird imagery, Moredun fits the Torrs-Witham-Wandsworth tradition, with the ball-like head resembling the St Albans knife and the overall coiled stylised form reminiscent of the patterns on the Torrs cap and the two Wandsworth bosses. As we have seen, this tradition shows some diversity; our bird was probably not intended to evoke a particular species and is clearly stylised, with its 'wings' under-sized compared to the head, and the form of the beak not one encountered among native birds. Indeed, beyond the recognition of broad categories such as raptors and waterfowl, it seems over-bold to seek a particular species in such deliberately stylised iconography, particularly when one influence leading to these representations is fantastical animals (griffins and such-like) brought ultimately from Mediterranean and eastern lands (Fitzpatrick 2007: 348–51).

Andrew Fitzpatrick (2007: 351–2) has reviewed the possible symbolism of birds and fantastical animals on weaponry, seeing in them a connection to the 'dragon pairs' found widely across Europe (Ginoux 2007), with a warrior symbolism connected to protective creatures and their power over life and death. But we cannot automatically transfer such speculations to other social spheres such as personal ornament, while other interpretations are possible; Vial (2001: 30), for instance, has drawn on wider anthropological ideas of birds as intermediaries to the spirit world. But we can be sure that this was more than an ornament; to the owner and the viewer it would have spoken of connections to wider worlds in its shared artistic style, and of beliefs now lost.

Was the pin local or imported? This echoes debates which have raged over the Torrs pony cap and horns; scholars prefer a group of material to define homelands, so Ulster, Yorkshire and more broadly eastern England are often seen as key production areas. Yet much of this is created by patterns of deposition in hoards or burials, and there are hints of a more widespread tradition. Moredun shares elements with Irish pins in its design, and with Torrs and (especially) Wandsworth in its birds, but it is unique and cannot be pinned down to a locus. Yet there is no reason to assume it must be an import; we are equally at liberty to see it as evidence of the Torrs-Witham-Wandsworth tradition extending into eastern Scotland.

Deposition

Becker and Channing (2007: 49) provide a useful commentary and overview on depositional contexts. In Britain, of around 190 pins, over half come from settlements, with only about ten from burials. In Ireland many lack context, but there are examples from significant natural places that are likely to be structured deposits; none are known from burials although the area of the finds had an accompanied burial tradition. Scotland mirrors the wider British pattern: of the 21 findspots, 12 are settlements, two clear ritual sites, and several others from wet locations that point to deliberate deposition. Found in an artefact-rich deposit [B007] immediately outside a roundhouse in the interior of the fort, the precise circumstances of the deposition of the Moredun pin is hard to establish in the relatively small trench, but it was clearly deposited intact and has broken from soil movement across two of the weakest areas of the pin. Given the general rarity of copper-alloy finds on Scottish sites, this suggests it was likely to have been buried deliberately as an offering.

4.6 The metal-working waste and associated vitrified materials

Dawn McLaren

37.1 kg of vitrified materials recovered during excavations was visually examined and divided into two broad categories: those produced as the result of iron-working; and others which may have formed during a range of pyrotechnic, high temperature activities and not necessarily the result of metal-working. The vitrified material was overwhelmingly dominated by fragments of vitrified stone and earth, encompassing 95% of the assemblage, the majority of which was recovered from Trench C in association with the monumental roundhouse. Despite the dominance of non-metal-working related slags within the assemblage, small quantities of ferrous metal-working waste, particularly those suggestive of blacksmithing activities, were recognised amongst the group, suggesting that iron-working took place on site during the Iron Age. All of the vitrified material was recovered from secondary contexts; there is no firm evidence of *in situ* iron-working.

Methodology

The material was described using common classifications (Heald and McLaren 2008; McDonnell 1994, 1998, 2000; Paynter 2002) and is summarised in this report. Identification and classification were based on macroscopic study of the internal and external areas of the material and by analysis of the weight, density, texture, form and colour. Each fragment was scanned

with a high-powered magnet to determine the debris' magnetic response. No intrusive scientific analysis was undertaken.

Classification

Table 4.2: Range of diagnostic and undiagnostic vitrified material present at Moredun.

Type	Mass (g)
Indicative of metal-working	
Hammerscale (HS)	30.71
Plano-convex cake fragments (PCC)	88.9
Unclassified iron slag (UIS)	65.2
Runned slag (RS)	98
Undiagnostic vitrified material	
Fuel ash slag (FAS)	540.5
Low density slags	456.42
Magnetic vitrified material (MVR)	32.72
Non-magnetic vitrified material (NMVR)	436.5
Vitrified ceramics (VC)	49.6
Vitrified stone (VS)	35299.9
Heat-affected material	
Amorphous burnt plant material (ABPM)	4.1
Total	37102.55

Most pieces are small and fragmentary. A range of slag morphologies are produced during iron production, yet only a few classifications of slag are traditionally considered to be truly diagnostic of iron-working (for example tapped slag for smelting and hammerscale for smithing). Significant amounts of material within most slag assemblages are unclassifiable, making the classification of individual pieces, particularly fractured or small samples, to specific types and processes by visual examination alone difficult (Crew and Rehren 2002: 84). A summary of the classification is given in Table 4.2 and a full catalogue of the material is provided in the archive report.

Iron-working waste

Plano-convex slag cakes (PCC): a plano-convex accumulation of slag formed in a hearth or furnace pit, which can come in a range of sizes. It is often difficult to be sure whether these were produced during smelting or smithing, although their dimensions, weight, fuel inclusions and chemical composition can often be used as useful indicators to differentiate

between the two processes (e.g. McDonnell 1994: 230; McDonnell 2000: 219). Plano-convex hearth bottoms (PCHB) are a particular type of slag cake that consist of an accumulation of hammerscale flakes and slag spheres that form at the base of the smithing hearth. Traditionally, these cakes tend to be smaller in diameter, more restricted in weight, denser and far more magnetic than cakes formed during smelting (McDonnell 1994:230; Starley 2000: 338). Charcoal inclusions are less frequent in such slags and where present tend to be much smaller in size. Only three small fragments, possibly from the curving edges of such cakes, were recognised amongst the assemblage, weighing a combined total of 88.9 g. They come from Trench A [A002 and A113] and from Trench B [B009] and in each instance were too small and fractured to enable much to be determined, but their density, the lack of large charcoal inclusions and their response to a magnet suggest that they are the product of iron smithing rather than smelting. They range in thickness from 19.5 to 27.5 mm but the diameter of each cannot be determined with any accuracy.

Unclassified iron slag (UIS): randomly shaped pieces of iron silicate slag, probably rake-out material, generated either by smelting or smithing. Only three fragments of UIS are present, consisting of a combined total weight of 65.2 g. They all derive from Trench A deposits [A003, A006, A012].

Runned slag (RS): runs of dense grey slag, typically non-magnetic, liquid or flowed in appearance; where found in quantity and comprising sizeable pieces, these are typically seen as the debris from smelting. Yet, the interpretation of these slags as the result of smelting is dependent on several factors: the quantity and size of the pieces present and the association of this material with other residues indicative of smelting. This ambiguity is caused by the fact that small runs of slag (often referred to as prills) can also be formed in a smithing hearth. The recovery of a limited quantity of small pieces of liquid-looking slag, such as seen at Moredun, cannot be interpreted as the residues from smelting, unless associated with other evidence diagnostic of the same process. Only seven small, fractured fragments weighing a combined total of 98 g were recognised. Six came from Trench A [A007, A021, A032 and A113] and one from Trench 6 [600].

Hammerscale (HS): small flakes of iron and expelled spheres produced by the impact of hammers on hot iron during either the refining of iron blooms or the working of wrought iron. When found in quantities this is indicative of *in situ* iron smithing. Hammerscale flakes and spheres are traditionally thought of as one of the few diagnostic categories of waste from iron-working, and smithing in particular (Starley 2000: 338, 344; Dungworth and Wilkes 2009). A total mass of 30.71

g of hammerscale flakes and spheres was recovered from soil samples from Moredun. The majority (30.7 g) came from Trench A [A113, A119 and A124] and a very limited quantity (0.01 g) came from Trench C [C024].

Undiagnostic

Many items classed as ‘slag’ during excavation cannot be directly related to iron-working and are best viewed as vitrified material or residues. These include vitrified ceramics, fuel ash slags and other low-density waste, magnetic and non-magnetic vitrified residues, vitrified stone and earth as well as amorphous burnt plant material.

Vitrified ceramic (VC): forms due to a high-temperature reaction between the clay lining of the hearth/furnace and the alkali fuel ashes or, in some cases, iron slag (McDonnell 1986: 47; 1994: 230). Often the material shows a compositional gradient from unmodified fired clay on one surface to an irregular cindery material on the other (Starley 2000: 339). Only three fragments were noted, with a combined mass of 49.6 g, and were not from secure, well-stratified contexts [B001, B004 and D103].

Fuel ash slag (FAS): formed when material including earth, clay, stones or ceramics is subjected to high temperatures, for example in a hearth. During heating these materials react, melt or fuse with alkali in ash, producing glassy (vitreous) and porous materials. They can be formed during any high-temperature pyrotechnic process, including domestic hearths, and are not necessarily indicative of deliberate industrial activity (McDonnell 1994: 230). A total of 540.5 g of fuel ash slag was recognised, predominantly from Trench A contexts [A017, A029, A034 and A038], but also from Trench B [B011], Trench C [C024] and Trench D [D113].

Low density slags (LDS): in addition to the more typical range of fuel ash-type slags observed in other slag assemblages, the Moredun assemblage includes significant amounts of fractured, brittle, low-density, heat-affected and vitrified material. Most pieces are friable, amorphous, sintered material, ranging in colour from a pale buff/red brown brittle fused substance to a light grey/green bubbly, vesicular and glassy vitrified material, rather like ‘cramp’ in appearance, suggesting a high siliceous and organic content (Spearman 1997a, 165; Photos-Jones *et al.* 2007). A similar sintered material has been noted at Bornais mound 1 (Young 2012) where it was interpreted as the product of reactions between iron-bearing peat ash, the calcareous sands of the machair and, in some instances, fragments of rock, within hearths and ovens (Young 2012: 289). A total of 456.42 g of low-density slag came from Moredun. All of this waste derived from burnt deposits within the

interior of the monumental roundhouse in Trench C [C008, C011/13 and C019]. This sintered and partially vitrified waste has no characteristics to suggest that it is associated with metal-working, but some of the fragments have mineralised layered fibrous organics identified as rush stems (Jackaline Robertson *pers comm*) and may represent burnt and mineralised floor material.

Magnetic vitrified residues (MVR) and non-magnetic vitrified residues (NMVR): are mixtures of various types of material, fused together through heat. Two different types were recovered: those that were comprised mainly of sand, clay, stone and other material and were magnetic (32.72 g); and those that shared similar constituents but were not-magnetic (436.8 g). It is not possible to relate these small, fractured pieces to any specific process. A low density spread of magnetic vitrified residues was found across the excavated area [A124, B002, C029, D115, D116 and E008]. The non-magnetic vitrified residues were more concentrated in the areas investigated by Trenches A, B and 4, but further small quantities of this material came from Trenches C, E and 2 [200, 409, A109, A114, A118, A125, B008, B009, C017, E003 and E020].

Vitrified stone and earth (VS): Fragments of angular stone, consisting of a range of lithologies, fused together as the result of exposure to intense heat. Typically, the fragments of vitrified stone display a spectrum of colours and textures, from those where the stone has been merely heat-discoloured and/or fractured, to those where the parent rock has entirely melted, becoming glassy and vesicular, often oozing and flowing between other rock types resulting in fragments becoming embedded in the vitrified matrix. The fragments from Moredun often incorporate a coating on the basal surface, consisting of a heat-sintered red-brown silty soil corresponding with heat-affected soils encountered during excavation (particularly [C008-17 and C019-16]), indicating that the vitrified stone formed *in situ* as a result of burning within the structure. This category of vitrified material dominates the Moredun assemblage with a total mass of 35.2 kg being recovered, representing 95% of the assemblage by weight. The vast majority of this material derives from deposits within and overlying the entrance passage of the stone-built roundhouse in Trench C. It should be noted that due to the volume of vitrified stone encountered within the entrance passage to the structure in 2016 that only a bulk sample was collected and so the mass of vitrified stone recorded here is acknowledged as a minimum quantity.

A comprehensive range of local lithologies was noted during visual examination, including shattered rocks of possible granodiorite, quartz, arkose, schist,

Table 4.3: Summary of slag types by area of excavation in units of grammes.

Type	Trench A (incl Tr C)	Trench 4 (= Tr. A)	Trench B	Trench C (inc. Tr 1)	Trench D	Trench E	Trench 2	Unstrat	Total
ABPM					4.1				4.1
FAS	520.7		1.3	17.6	0.9				540.5
HS	30.7			0.01					30.71
Low density				456.42					456.42
MVR	0.6		5.6	0.4	26.11	0.01			32.72
PCC	72.9		16						88.9
RS	98								98
UIS	65.2								65.2
NMVR	261.9	10.2	5.6	0.4		13.2	145.5		436.8
VC			44.9		4.7				49.6
Vit stone	247.6	2070.3		32836				146	35299.9
Total	1297.6	2080.5	73.4	33310.8	35.81	13.21	145.5	146	37102.8

Table 4.4: Quantity of slag by type and context.

Context no	Context	Indicative of metal-working				Undiagnostic vitrified material						Heat-affected material
		HS	PCC	UIS	RS	FAS	LDS	MVR	NMVR	VC	VS	ABPM
Unstrat Tr4	Unstratified								145.5			
407	Soil matrix of collapsed Wall E										129.4	
409	Tumble/core Wall E [401]								10.2		12.5	
412	Re-deposited tumble from outer face of collapsed Wall E (poss from robber/ antiquarian trench)										885.8	
421	Rubble core of Wall E [401]										1023.8	
420/422	OGS										18.8	
600	Topsoil				47.7							
Unstrat TrA	Unstratified										146	
A002	Weathered stone deposit in upper layers of overburden		35.4									
A003	Circular feature in Unenclosed Settlement F			8.5								
A006	Ephemeral stone bank of circular feature [A003], Unenclosed Settlement F			16.8								
A007	Ephemeral stone bank of possible sub-circular feature in Unenclosed Settlement F; poorly defined and not well understood				6.2							
A012	Occupation deposit within the interior of [A003], Unenclosed Settlement F			39.9								
A017	Core material of Wall E underlying A003					5.1						

Context no	Context	Indicative of metal-working				Undiagnostic vitrified material						Heat-affected material
		HS	PCC	UIS	RS	FAS	LDS	MVR	NMVR	VC	VS	ABPM
A021	Tumbled core material from collapsed Wall E [A025] to NE of outer facing stones (A023)				6.2							
A022	Inner facing stones to Wall E [A025]										247.6	
A029	Lens of bright-orange/black burning, predates collapse of Wall E [A025]					378.1						
A032	<i>In situ</i> block core of Wall E (A025)				4.3							
A034	Degraded brown silty deposit above bedrock, below burning A030					129.9						
A038	Fill of rock-cut hollow [A039]					7.6						
A109	Rubble core of Wall E [A111]								65.9			
A113	Occupation deposit above collapsed Wall E	17.1	37.5		33.6				25.3			
A114	Occupation deposit above collapsed Wall E								9.4			
A118	Collapsed rampart material below occupation A113/114 to interior of Wall E								155.3			
A119	Occupation deposit	13.4										
A124	Buried ground surface to exterior of Wall E [A111]	0.2						0.6				
A125	Buried ground surface to exterior of Wall E [A111]								6			
B001	Topsoil									24.3		
B004	Stones and infill of roundhouse [B003]									20.6		
B008	Occupation layer within and under roundhouse [B003]								0.6			
B009	Soil underlying collapsed wall of roundhouse [B003]		16						5			
B011	Sterile layer of charcoal-stained soil underneath possible occupation layer in roundhouse [B003]					1.3						
B002	Deposit							5.6				
C001	Turf and topsoil overlying monumental roundhouse										896.9	
C002	Tumble/collapse deposit from monumental roundhouse										21425	
C009	Rubble within entrance of monumental roundhouse										10346	
C013	Wall of monumental roundhouse (incorporates cup-marked stones)										119.5	
C017	OGS								0.4			
C019	Fill of possible structure						43					

Context no	Context	Indicative of metal-working				Undiagnostic vitrified material						Heat-affected material
		HS	PCC	UIS	RS	FAS	LDS	MVR	NMVR	VC	VS	ABPM
C024	Surface (possible OGS)										48.7	
C008	Burnt organic soil around (C007) inner facing slabs of entrance passage of monumental roundhouse						8.7					
C011/ C013	Stone tumble from C001/destruction layer interior of monumental roundhouse						72.4					
C013	Destruction layer in interior of monumental roundhouse						37.5					
C019	Burnt <i>in situ</i> floor deposits in monumental roundhouse						294.8					
C024	Burnt soils below hearth in monumental roundhouse	0.01				17.6						
C029	Re-deposited levelling material below floor of monumental roundhouse							0.4				
D103	Deposit									4.7		
D112	Lower fill within pond/cistern											3.8
D113	Ground surface					0.9						
D114	Foundation layer/base of wall [D107]											0.3
D115	Ground surface onto which wall [D107] built							0.01				
D116	Dark sandy silt deposit							26.1				
E003	Collapse deposit abutting enclosure wall B (E002)								12.6			
E008	Burnt layer associated with monumental roundhouse collapse							0.01				
E020	OGS								0.6			

sandstone and possible greywacke, but no specialist or scientific lithological analysis was undertaken to confirm these macroscopic identifications. In some instances, the degree of vitrification is too severe to allow identification of the stone type.

Amorphous burnt plant material (ABPM): dark brown/black porous heat-affected but not vitrified organic material commonly found as a component of plant-based fuel residues. Only 4.1 g of this material was recognised and derived exclusively from Trench D [D112 and D 114].

Contextual analysis

Vitrified material was recovered from Trenches 1, 2, 4, 6, A, B, C, D and E. Most of the material came from Trenches A, B and C, with a more restricted spread of residual waste coming from the other areas (Table 4.3). A detailed summary of the distribution of the slag by context and material type is presented in Table 4.4.

Wall E (Trenches A, 4 and 6)

2051.5 g of vitrified stone and 10.2 g of non-magnetic vitrified residue came from collapsed tumble from the

core of the wall [401=A025=A111] in contexts [407, 409, 412 and 421]. A further 18.8 g was recovered from the old ground surface [420/422] below the wall and 247.6 g from the inner facing stones of the wall [A022]. The presence of vitrified stone within the make-up of this feature, and the lack of any traces of burning or heat damage to the inner or outer faces of the wall, may suggest that some of the stone from the already burnt and abandoned monumental roundhouse was robbed out and re-used to build the later wall E.

The majority of the ferrous metal-working waste from the site came from this area (266.8 g) and most of this waste was associated with the artefact-rich deposits which overlay the collapsed wall [401=A025=A111], post-dating the use of the structure. This includes 47.7 g of runned slag which was recovered from topsoil in Trench 6 (2015), an area later explored in more detail in Trench A. Two small edge fragments from plano-convex cakes consistent in density, thickness and magnetic response to smithing hearth bottoms, came from the occupation deposits above the collapsed wall [A003 and A113], alongside 65.2 g of unclassified iron slag [A003, A006 and A012] and 39.8 g of runned slag [A007 and A113]. The most compelling evidence for metal-working within the deposits which post-date the wall are the small quantities of hammerscale flakes and spheres recovered from contexts [A113] and [A119]. Although there was no evidence of an associated hearth, the quantities present suggest that blacksmithing took place in the immediate vicinity. A sample of carbonised hazel roundwood associated with this deposit [A119] was radiocarbon dated, suggesting an episode of activity sometime between 380–190 cal BC (at 95% probability, SUERC-76156).

Further small fragments of runned slag came from the core of the wall (6.2 g from [A021]; 4.3 g from [A032]) which may have become accidentally incorporated in the core during construction. A very limited quantity (0.2 g) of hammerscale was retrieved from soil samples taken from the buried ground surface to the exterior of the wall [A124], alongside 0.6 g of undiagnostic magnetic vitrified residues, suggesting that blacksmithing activities could be attributable to earlier phases of occupation outside the enclosure, and not simply restricted to the post-wall occupation of the site.

Small quantities of fuel ash slag came from deposits underlying the tumble in the interior defined by Wall E (378.1 g from [A029]; 129.9 g from [A034]). Although no contemporary structural evidence was uncovered in the interior, lens of burnt soils attest to occupation and the fuel ash slags incorporated in these soils are likely to be spreads of hearth waste. In addition, 7.6 g of fuel ash slags were recovered from the fill of a rock-cut hollow [A038] associated with these burnt spreads.

The roundhouse (Trench B)

A total of 73.4 g of vitrified material derived from the deposits relating to the roundhouse, including a fragment of a plano-convex slag cake (16.4 g) from soil underlying the tumble from the wall. Although fragmentary, this PCC fragment is consistent in density, magnetic response and approximate diameter to suggest it is debris from blacksmithing. This is accompanied by two fragments of vitrified ceramic with slag attacked magnetic interior surfaces, which indicate an association with ferrous metal-working. These pieces came from the infill of the roundhouse (20.6 g; [B005]) and topsoil (24.3 g, [B001]).

Small quantities of fuel ash slag (1.3 g) representing hearth waste came from soils [B011] within the structure, whilst further small quantities of vitrified residues came from soils within and below the roundhouse (5.6 g, [B002]; 0.6 g, [B008]; 5 g, [B009]).

The monumental roundhouse (Trench C and E)

Most of the vitrified material from the site came from Trench C (33.31 kg) and was predominantly fragments of vitrified stone and earth (32.83 kg). These amalgams of vitrified and heat-affected stone and earth were concentrated within the rubble infill of the entrance passage (10.28 g; C009) and incorporated with the rubble infilling the interior of the structure (21.45 g; C002). The process under which this material formed is not fully understood but on current evidence it appears as though an intense fire burned through the interior of the structure, burning the floor surface, any internal wooden fixtures, and roof, resulting in a mass of burnt organics (timbers, possible thatch and hurdle screens; see Chapter 5.3: Robertson) collapsing over the floor, which were subsequently covered by rubble slabs from the collapsed wall. The fire appears to have been the most intense at the head of the entrance passage, probably where the flames were contained by the stone walls but were able to draw oxygen along the passage from the entrance, the passageway acting like a flue which fed the fire. In retrospect, this area of intense burning is visible in the resistivity survey (Chapter 3.1; Figure 3.9). The fire appears to have burned at a temperature hot enough, and for a long enough period of time, to allow materials such as the stone, the ash from the burnt timbers, the loamy soil and other organics such as roofing material to fuse, becoming molten and vesicular in patches, creating a thick layer of a glassy, vitrified amalgam.

Further debris resulting from the fire is present in small, amorphous, low-density slags (456.42g) recovered from deposits within the interior of the structure, including the burnt *in situ* floor deposits (294.82 g, [C019–17]) and the fire-event layer (109.9 g, [C013–17]). This material is

very light, porous and friable, and under magnification it has a glassy and blebby texture incorporating distinct layers of mineralised organics which have been identified as rush stems (Chapter 5.3: Robertson). It is unclear whether this represents collapsed burnt roofing material or *in situ* flooring material, but it was certainly an organic component of the structure that has been transformed as the result of heat-damage in the fire.

Only 0.01 g of ferrous metal-working debris came from this structure in the form of a small quantity of hammerscale flakes found within soils directly underlying the internal hearth [C024]. If blacksmithing had been taking place in this structure on a regular basis, far greater quantities of such micro-debris would be expected to have become incorporated in the soils surrounding the hearth stones, but this was not the case. From the same context came small fragments of fuel ash slag (17.6 g), which is more typical of non-metal-work related hearth waste.

A further 13.1 g of vitrified material, from deposits in Trench E, represent material from the monumental roundhouse which had collapsed down the eastern slope of the hill. This material was dominated by non-magnetic, undiagnostic residues (13.2 g) from contexts [E003] and [E020].

The rock-cut cistern and associated features (Trench D)

A total of 35.81 g of vitrified and heat-affected material was recovered from the deposits associated with the cistern. None is considered indicative of metal-working. Small quantities of fuel ash slag (0.9 g), undiagnostic magnetic residue (26.1 g), a small piece of vitrified ceramic (4.7 g), as well as fuel waste in the form of amorphous burnt plant residue (4.1 g), came from contexts both in and around the cistern [D103, D112, D113, D114, D115 and D116].

Ramparts B and C (Trench 2)

A single fragment of non-magnetic vitrified residue (145.5 g) was unstratified.

Discussion

Despite the small quantities of metal-working debris recovered at Moredun, the identification of diagnostic slags attests to small-scale iron-working, specifically blacksmithing, taking place in the vicinity of Wall E, and perhaps the stone-built roundhouse [B005], between the fourth and first centuries BC.

What can the metal-working debris tell us about the scale and intensity of this craft on site? Our picture of metal-working from the scatter of debris recovered is

partial and incomplete, making any statement on its role to be conjectural and unsatisfactory. The form of debris present is undoubtedly the result of blacksmithing, probably involving the maintenance and repair of existing objects, and the presence of small quantities of slag spheres provides limited evidence of welding. The quantities of metal-working waste are so slight, however, that only small-scale, periodic or episodic activity can be suggested, although it must be borne in mind that no definitive focal areas for metal-working were identified within the areas excavated. It would be expected that far greater quantities and concentrations of waste would be archaeologically detectable in the immediate vicinity of a metal-working hearth or furnace, and if this took place at Moredun it was probably outside the areas investigated by excavation. By comparison, for example at the Iron Age monumental roundhouses at Aldclune, Blair Atholl, evidence for iron smelting and primary bloomery processing there was concentrated in one area of Site 1, yet a scatter of related debris was found across the entire excavated area, including at Site 2 (Spearman 1997b: 445–6).

At present we have a blanket-approach to interpretations and there is a common perception that evidence for iron-working can be expected on many, if not all, Iron Age sites (e.g. Mortimer 2000: 271). This assertion, however, fails to address the subtle shifts observed in material culture during the period and can be argued more convincingly for the Middle Iron Age and later Iron Age than the Early Iron Age. In Perth and Kinross, convincing Early to Middle Iron Age iron-working evidence is scant, making the stratified scatter of waste from Moredun all the more significant, particularly when considered alongside the suite of metal-working evidence from the henge and stone circle excavated at the foot of the hill near Moncreiffe House (Stewart 1985). Here, remains of an ephemeral workshop consisting of a hearth, bowl furnace and possible casting trough of probable Iron Age date had disturbed the remains of a sequence of Bronze Age ceremonial monuments. Debris resulting from both bronze casting, in the form of crucible fragments and casting debris, and iron-working, represented by dense iron slag, were found. Interestingly, the metal-working debris was found in association with a worn and damaged Late Bronze Age tanged chisel. The chisel may have been of some age at the time of use, but its presence alongside the metal-working evidence hints towards a tantalisingly early date for the iron-working at Moncreiffe House, if we suppose, as the excavator did, that the non-ferrous and ferrous metal-working were contemporary. Without the benefit of direct dates for the metal-working features, this question over the chronology of the crafts undertaken at Moncreiffe House is unlikely to be resolved. Around 5.75 km to the south-east, small quantities of iron-working slags, including a scatter of hammerscale, were discovered in

association with Iron Age structures at the Abernethy Primary School site, Abernethy (Connolly 2004: 80).

Elsewhere in the region iron smelting and primary bloom processing has been found at Aldclune, Blair Atholl, with debris concentrated at a structure thought to have been constructed and occupied in the 2nd and 3rd centuries AD (Hingley *et al.* 1997). At the monumental roundhouse at Litigan, Aberfeldy, excavations recovered several pieces of slag, and fragments of rotary querns and stone discs (Taylor 1969: 35). Examination of the slag confirmed it as iron-working debris but suggested it was later than the settlement (Taylor 1990: 17–18). Excavation of another such site at Queen’s View, Allean Forest, revealed two intriguing features within the building’s interior, which were associated with significant quantities of slag. These were interpreted by Tylecote (quoted by Taylor 1990: 28) as a smithing hearth and a ‘bosh’ for holding water for quenching, and the slag was identified as that relating to smithing.

A single fragment of iron slag found at Black Spout, Pitlochry was incorporated within the wall near the entrance to the building (McLaren 2013: 49), whilst at Easter Bleaton Hill, Kirkmichael, iron-working slags were found in 1969 during ploughing by the Forestry Commission at an unexcavated hut-circle site (Hall 1995). This waste has not been dated but may be Iron Age. Although small quantities of iron slag were recognised amongst a larger assemblage of fuel ash slag at Carn Dubh, Moulin, the metal-working waste was not thought by the excavator to be directly related to the structures and was instead thought to derive from an unidentified bloomery site of later, possibly medieval date (Rideout 1995: 153, 174).

Small quantities of iron-working waste were found in association with an Iron Age roundhouse and souterrain at Newmill near Bankfoot, some from fire-pits which the excavator speculated may have been the truncated remains of bowl furnaces (Watkins 1980: 199). Radiocarbon dating undertaken on charcoal samples

from the site in the 1980’s, suggested activity in both the Iron Age and early medieval periods, including a 9th century AD date for one of the postulated fire-pits/ bowl furnaces, although the relationship and duration of these episodes of activity remain unknown. The validity of these early radiocarbon dates is ripe for re-analysis, but the Newmills example serves to illustrate both the potential longevity of iron-working activities on some sites as well as the caution that must be applied in speculating on the date of spreads of metal-working debris.

At the souterrain at Shanzie, Alyth, limited evidence of blacksmithing in the form of hammerscale and slag spheres, and a crucible fragment for casting bronze objects, were recovered from the fill, but the waste was considered to potentially post-date the structure (Heald 2002: 92).

Several of the forts excavated as part of the *Strathearn Environs and Royal Forteviot* (SERF) project have recovered quantities of vitrified material, including Kay Craig, Auchterarder (Poller 2013c), Castle Law, Forgandenny (Poller and MacIver 2014) and Green of Invermay (Poller 2009). The post-excavation programme of specialist analysis on these assemblages is underway at the time of writing and has not been published, so the identifications noted here should be considered provisional until final publication (Poller forthcoming). Metal-working associated with a hearth was in evidence at Kay Craig, Auchterarder (Poller 2013c: 33). The recovery of crucibles certainly suggests that non-ferrous metal-working was taking place here, but it is unclear at present whether any of this debris might be related to iron production. At Castle Law, Forgandenny, large quantities of vitrified stone and burnt soils were encountered that relate to the vitrification of the fort’s walls (Bell 1893: 19, 21; Poller and MacIver 2014). Small quantities of slag were also recovered; it is currently unclear whether this represents further evidence of structural vitrification or the result of craft processes. At Green of Invermay, several phases of activity were uncovered spanning the Iron Age to medieval period

Table 4.5: Character of the Moredun assemblage. There are also five undiagnostic chunks, probably from roughouts.

Category	Bangle	Other
Gathered and prepared blocks	1	1
Perforated roughouts – early stage	2	
Perforated roughouts – finishing in progress	3	
Perforated roughouts – final stages	2	Ring-pendant
Perforated roughout – unclassified	1	
Jewellery	6 (4 repaired)	

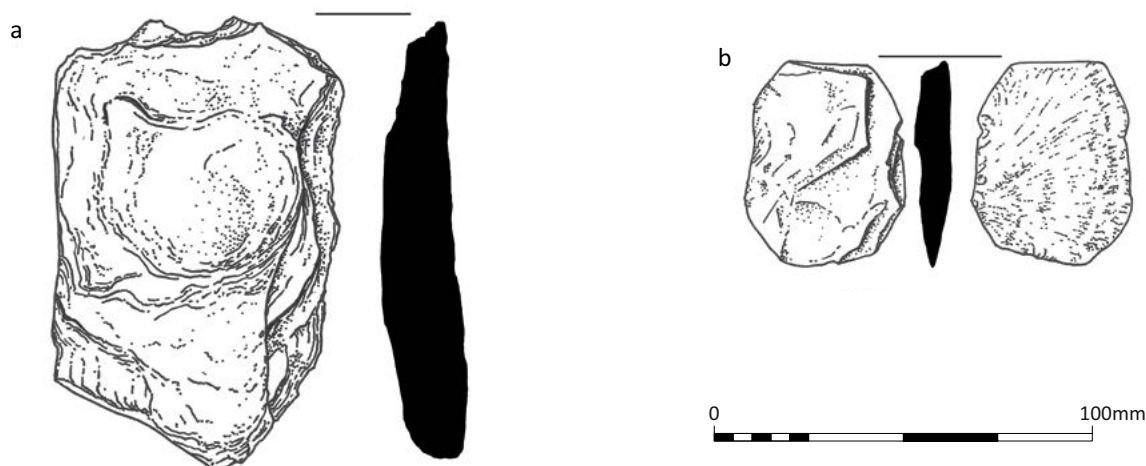


Figure 4.13: Shale working debris. Gathered materials and blanks: a) SFA073 and b) SFC057.

(Poller 2009), but the small quantities of possible iron slag recovered are not datable.

In conclusion, although the metal-working debris from Moredun is small in quantity and from secondary contexts, it is a useful assemblage for stimulating questions regarding the scale, role and organisation of ferrous metal-working at domestic and monumental structures in eastern central Scotland.

4.7 The worked shale and related materials

Fraser Hunter

Excavations recovered a comprehensive assemblage of 21 items from Moredun, including a range of unfinished material, indicating elements of craft production, while in addition, an unfinished bangle fragment was previously recovered from the hilltop as a stray find.

The finds provide a rounded picture of Iron Age use of shale and related materials (Table 4.5). There are 16 diagnostic items as well as five fragments: ten are roughouts in various stages of completion for bangles and ring-shaped pendants, with the remaining being bangles of various forms (and in different materials), several showing evidence of repair after breakage. They come from three trenches in different areas of the site, with 14 items from Trench A, six from Trench C and one from Trench 2. All three trenches produced part-finished items, probably indicating dispersed production. However, the main concentration was in Trench A, with 12 roughouts or undiagnostic chunks of debris and only two bangles (one repaired), while Trench C had only two pieces of production debris, the remainder being finished bangles (three repaired). The Trench C finds come predominantly from layers

overlying and intermixed with the collapse layers of the monumental roundhouse structure, while the Trench A finds all came from contexts overlying the timber-laced rampart. This suggests there were particular episodes of shale-working and use at the site, rather than it being a continuous feature of life.

Production

All the main stages of the production process are represented, allowing reconstruction of the *chaîne opératoire* (Figure 4.16). Initially the exterior was roughly shaped to a block (Figure 4.13) and then a circle by snapping or cutting the edges to shape (Figure 4.14); one roughout shows a later stage, with more careful shaping of the edge by bifacial trimming (Figure 4.14c). Surfaces could be split to thin them or abraded to shape. The centre was perforated from both sides and then expanded to the desired size; there is no indication of any marking out lines. Vertical channels indicate a gouge was the key tool used in perforation, with expansion by knife-trimming. The roughout was then abraded to shape (e.g. Figures 4.14d, 4.14b and 4.14c) using an abrasive stone (perhaps a stone tool like SFA103; McLaren, *supra*), and finally polished.

This process was typical for the Scottish Iron Age (Hunter 2015: 232), but it seems that some stages were more prominent than others at the site. The presence of a gathered shale block (SFA073; Figures 4.13a and 4.14a) and an unperforated small roughout (SFC057; Figure 4.13b) indicates some import of raw material to work from scratch, but the assemblage shows much more of a focus on later stages in the production process. This is confirmed by the results of the extensive sieving programme, which recovered no certain working debris that is most typical of early production stages, as

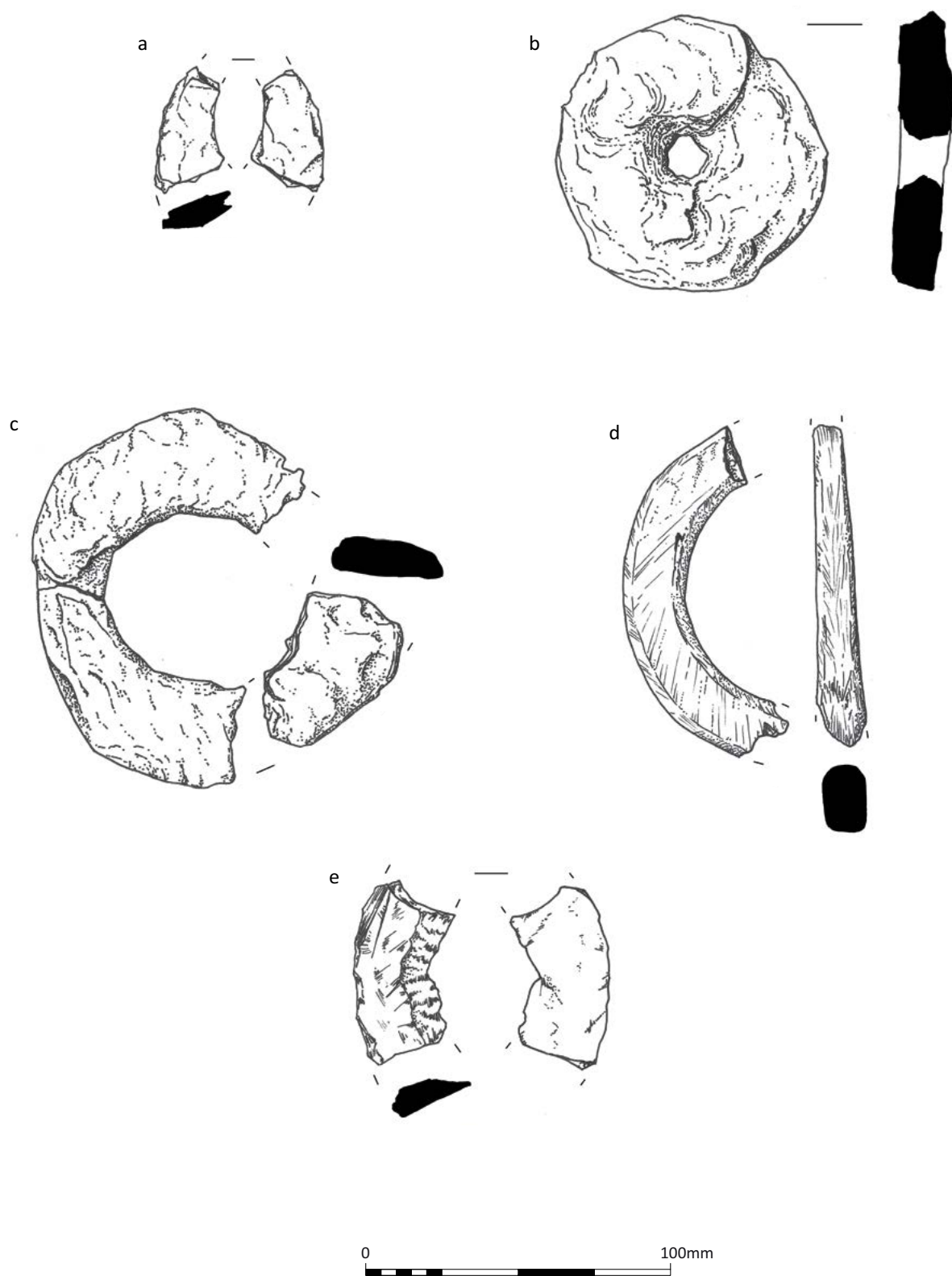


Figure 4.14: Shale working debris. Perforated roughouts: a) SFA116, b) early stage roughout SFA169, c) three joining fragments of knife-cut roughout SFA010, d) roughout with sub-rectangular section SFA020, e) outer edge fragment from gouged roughout SFA026.

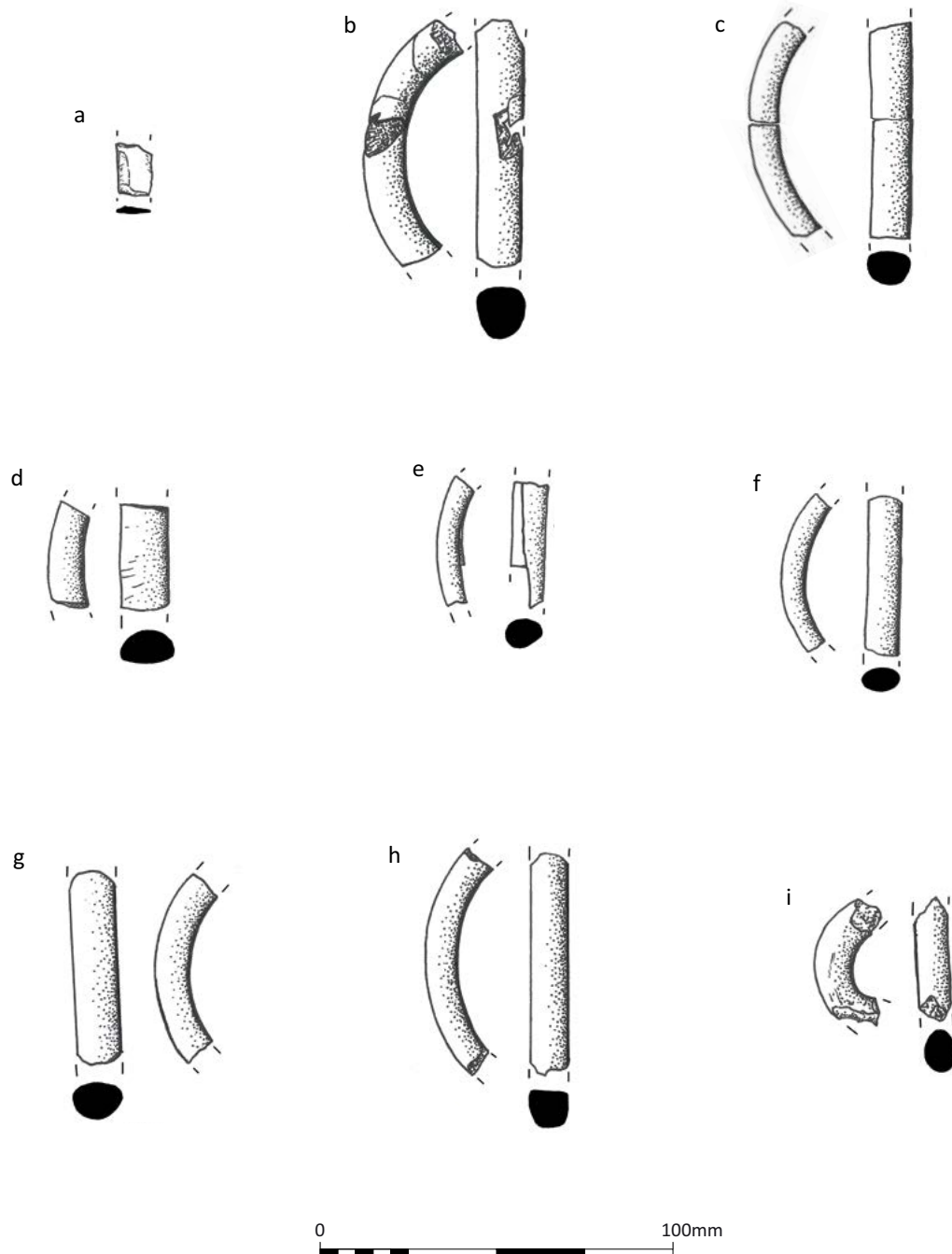


Figure 4.15: Shale working debris. Final finishing and bracelets: a) spall from near complete bangle (SF206), b) bangle broken in final stages of polishing (SFC044), c) two joining fragments of D-sectioned bangle fragment (SFA096/A112), d) repaired bangle (SFA120), e) repaired bangle with part of mount still surviving (SFC003), f) lentoid-sectioned bangle fragment (SFC004), g) repaired bangle fragment (SFC012), h) repaired bangle fragment (SFC030), i) ring-pendant roughout (SFA017).

the initial shaping and perforation generated plentiful flakes and spalls (Hunter 2007a). It suggests that, while some raw materials were brought to the site, the inhabitants were primarily importing perforated shale blanks for finishing. Broken perforated roughouts and items which broke during abrasion and polishing are the most abundant finds, and these later phases in the process focussed on abrasion and polishing, which

would not generate recoverable debris. Indeed, at least one stone tool which may have been used for such abrasion was recovered on site [SFA103; McLaren, *infra*].

Products

The size of the roughouts and the presence of finished products indicate that bangles were the main product,



Figure 4.16: Main stages of shale working chaîne opératoire: a) gathered and shaped block of shale (SFA073), b) early stage perforated roughout (SFA169), c) late stage roughout fragment (SFA020), d) bangle fragment (SFC004).



Figure 4.17: Details of repairs observed on shale bangles: a) fragment showing perforation to take a bracket (SFC030), b) iron mount in situ on SFC003, c) re-shaped squared end of fragment SFA120, d) re-shaped with bevelled edges to make the bangle easier to put on (SFC012).

but there is also an unfinished ring-shaped pendant (SFA017; Figure 4.15i), a classic Iron Age type, and a small roughout (SFC057; Figure 4.15b) may well be a blank for such an item. (For recent discussion of ring pendants see Hunter 2012).

The bangles form an interesting assemblage (Figure 4.15). Their internal diameters show two clear clusters, one of 60–70 mm, the other of 80–90 mm+; these are likely to represent female and male ornaments respectively. The dominant section form was D-shaped in five finished instances and all near-complete ones; two have bevels on the inner edges (SFA120 and SFC012, in the latter case from later modification; Figures 4.14d and 4.15g), while one bangle (SFC044; Figure 4.15b) is much more oval in section with a flattened facet on the interior. Most intriguing is a lentoid-sectioned bangle (SFC004; Figure 4.15g) in a distinctive grey shale, different from other finds from the site. It too has bevels on the inner edges, but rather larger than on other examples; these may be a design feature but could arise from removal of a central core rather than the perforation and expansion technique. This is all but unknown in the Scottish Iron Age (Hunter 2015: 232). However, the technological traces are not sufficiently diagnostic in this case to be confident; the topic requires more extensive review before suggesting any far-reaching conclusions.

Four of the six bangles show evidence of repair, indicating they were valued items and suggesting they were not easily replaced; levels of repair and re-use tended to be higher in areas distant from raw material sources (Hunter 2015: 232–3). SFC030 shows a perforation to take a bracket (Figure 4.17a), while SFC003 (Figure 4.17b) preserves the iron mount itself, a very rare survival indeed. Its corroded condition means some elements of its technology are unclear, but it represents part of an oval plate riveted to the inner surface of the bangle. Two other items show squared ends but no perforations (SFA120, SFC012; Figures 4.15d, 4.15g and 4.17c); presumably sockets were used to fit the ends together in these cases. None show any evidence that they were transformed into anything other than bangles, though it is noteworthy that on SFC102 the fit of the inner side was modified when it was reshaped, with the edges bevelled to make it easier to put on (Figure 4.17d).

The predominant raw material was oil shale, but some diversity of raw material is represented. From visual characteristics, the Moredun assemblage included one dominant shale type, with single finished finds in two others (a grey shale and a banded shale), and three items of cannel coal (one unfinished). The material from the adjacent Moncreiffe fort (Chapter 2) was different again, with a different, less diagnostic shale/

Table 4.6: Iron Age sites in Perthshire with jewellery of shale and related materials.

Site	Size	Jewellery	Production evidence	Date	Reference
Moredun	22	Bangles (some repaired), ring pendant	All stages but mostly final shaping – bangles and ring pendants	Later first millennium BC	
Moncreiffe Hill	2	Bead, undated	Final abrasion (bangle)	c.400–200 BC	
Dun Knock	1		Unfinished bangle, repaired	Early Iron Age?	Hunter in Poller forthcoming
Law of Dumbuils	1		Unperforated roughout for pendant	3rd century BC or later	Hunter in Poller forthcoming
Rossie Law	1	Bangle		Early Iron Age?	Hunter in Poller forthcoming
Castle Law Forgandenny	1	Bangle, re-use		Later first millennium BC	Bell 1893; NMS GP 16
Castle Law Abernethy	2	Decorated bangle; ring pendant		Later first millennium BC	Christison and Anderson 1899: 30; NMS GP 27–28
Deuchny Hill	1	Bangle		?	Boog Watson 1923: 307
Castle Craig fort	2	Bangle	Unfinished bangle	Early Iron Age	Hunter in Poller in prep
Castle Craig broch	3	Two bangles, one repaired	Unfinished bangle	Roman Iron Age	Hunter in Poller forthcoming
Aldclune	1	Bangle		Roman Iron Age?	Hingley <i>et al.</i> 1997: 443, ill 20 no 97
Oakbank	1	Ring pendant		Early Iron Age	B. Andrian, <i>pers comm</i>

cannel coal and the enigmatic jet item (Hunter, *infra*). Provenancing of such black organic materials is tricky without destructive analysis, but it is certain that the raw materials are not locally available. The nearest likely source of shale is the West Lothian oil shale deposits; cannel coals could be obtained from Coal Measures deposits on the far side of the Ochils (Cameron and Stephenson 1985: fig 26; Gibson 1922: 18–25, 43–51). Examination of shale samples by Simon Howard and Peter Davidson of NMS Geology did not reveal any diagnostic fossils to allow tighter provenancing. Nevertheless, visual characteristics indicate use of a single dominant source for manufacture at Moredun, with much more limited use of cannel coal; the one unfinished find from Moncreiffe was from a different source again. Interestingly, given the infrequency of cannel coal in the assemblage, two of the finished items show repair, suggesting they were deemed more valuable than the shale because of their relative rarity.

Despite the extensive excavations, revealing multiple phases of use, it is noteworthy that production and use of these materials at Moredun focussed on two particular areas in what seem to be quite discrete phases. This suggests episodic use of this material, perhaps connected to periods when the inhabitants of the site had the ability to engage in or command wider contacts.

The local context

Table 4.6 lists relevant comparative material from 12 Iron Age sites in Perth and Kinross with items of shale. Nine have produced finished jewellery, while six have working evidence, two of them unperforated roughouts which indicate some production from scratch, but most focussing on the final abrasion. This suggests,

as argued for Moredun, that it was primarily the final shaping of material which took place from imported perforated roughouts. In other words, production of this material on site relied primarily on a supply chain of pre-prepared blanks. Available dating indicates the popularity of the material and its working throughout the Iron Age. The number of sites with production debris makes it difficult to see any of them as a controlling site or production centre; this was a low-level, small-scale craft, though the Moredun evidence suggests there were periods when some sites saw more intensive production and use. It cannot be seen as a restricted craft, but it was always rare.

4.8 The chipped stone

Rob Engl

A total of 58 pieces of chipped stone were recovered and include finds retrieved from both stratified and unstratified contexts. The entire collection was examined macroscopically and a general characterisation undertaken with classifications and descriptions based on those proposed by Ballin (2000). A complete catalogue of all the lithic material is given within the archive, and a summary of the assemblage is given here, accompanied by a small selection of illustrated items (Figure 4.18).

Raw material

The assemblage is dominated by 32 quartz pieces, of which 16 appear unworked and naturally occurring. Of the worked pieces, the quartz shows relatively good flaking properties with many having a grey translucence. Where present the cortex appears smooth and water rolled.

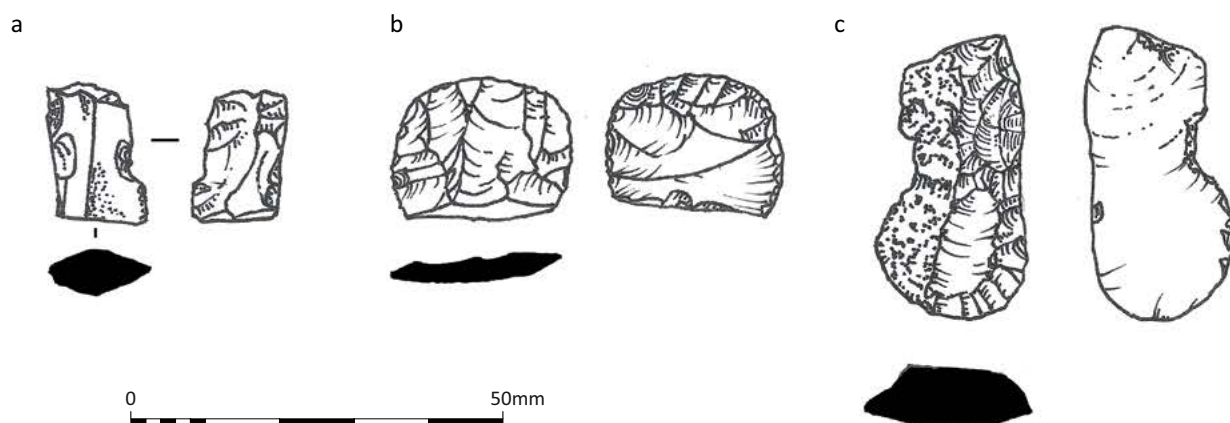


Figure 4.18: Selection of chipped stone objects displaying secondary retouch: a) SFA114, b) SFA007, c) SFB015.

Flint is the chief supplementary material, with 16 pieces ranging in colour from red to grey, which is typical of material found across the east coast of Scotland. The flint is fresh in appearance with little patination. Two of the artefacts show signs of heat treatment, such as loss of mass, crazing and colour change. A further two items appear unworked and natural. As with the quartz, the cortex where present appears smooth and water rolled. It is likely that both categories of raw material were obtained from local riverine or coastal sources and brought deliberately to the site.

Other supplementary raw materials found within the assemblage include agate (three pieces), pitchstone (three pieces) and chert (two pieces). Single pieces of chalcedony and fossil wood are also present.

Primary technology

Three cores of probable Mesolithic date have been recognised, consisting of two bipolar remnants made on quartz and a small platform flake core (SFB2) made on red flint.

A total of 15 flakes are present displaying crushed and unprepared striking platforms, together with hinged and abrupt distal terminations and pronounced bulbs of percussion. Taken together with the evidence of the cores, this suggests that a medium to hard hammer method of reduction was used, possibly with the use of an anvil. Sixteen chunks and blocky fractured material are also represented. These pieces are associated with bipolar reduction.

Secondary technology

Four retouched pieces include two fragments made on agate (SFA114, Figure 4.18a) and burnt flint (SFD4, not illustrated) each with semi-abrupt retouch applied along a lateral edge. The third example is a small, circular flake knife (SFA007, Figure 4.18b) made on an inner flake of honey/grey coloured flint. The proximal end of the flake has been invasively retouched, effectively thinning the flake and creating a semi acute cutting edge. The fourth retouched artefact is a well-made small plano-convex knife (SFB015, Figure 4.18c) made on red flint, which has semi-invasive semi-abrupt retouch applied along the left lateral side. More abrupt regular retouch is visible along the distal edge. The two knife forms are of Neolithic date.

Discussion

The lithic material was recovered primarily from Wall E and as such the material was most probably introduced from areas of former prehistoric activity. None of the chipped stone discussed here is considered to have been in contemporary use with the Iron Age structures

and all came from secondary, residual contexts. The prominence of such sites within the landscape would act as a draw to populations throughout prehistory, as seen on other Iron Age and later forts, such as Dunadd, Argyll (Healey 2000: 197; ID 24873), the Mote of Mark, Dumfries and Galloway (Smith 2006: 99; ID 64911) and, to the north-east, Maiden Castle (Engl 2011: 27; ID 18182) and the Hill of Barra, Aberdeenshire (Cook, M.J. 2012; ID 19668).

Though small in number and limited in the range of classifications present, the recognition of cores and other debitage classes amongst the Moredun assemblage indicates that limited reduction was being undertaken on the hill. The presence of domestic tools, such as the two knives, also suggests that a range of other tasks was being practised.

On typological grounds the assemblage appears to be largely Neolithic, supported by the presence of the pitchstone flakes and the two knife forms. Pitchstone is present in lithic assemblages from the Mesolithic to the Early Bronze Age, though it appears to have increased in importance during the Early Neolithic (Ballin 2009: 108).

4.9 The coarse stone tools

Dawn McLaren

Introduction

Items of coarse stone dominate the artefact assemblage from Moredun and represent a wide ranging and comprehensive group of objects, including tools, household items and occasional items of a more personal nature, such as a bead and a possible gaming piece. In total 80 worked stones were recovered alongside 31 fragments of fire-cracked and heat-affected stone. A further 42 items were collected on-site but were found on cleaning after excavation to be natural and will not be discussed further. Like many similar Iron Age assemblages, tools form the predominant group, consisting of querns for grinding grain, smoothers perhaps used in conjunction with hide working, whetstones for sharpening metal blades, and a range of cobble tools formed on water-rounded pebbles brought to site from a nearby water-source. More unusual items, such as small sandstone faceted discs, have been recognised, which may be specialist grinding tools.

The catalogue is split into broad functional groups (Table 4.7), within which typological categories are described and discussed. The discussion that follows attempts to draw this information together by phase and function and set it within its broader context with reference to comparable material from other sites in

Table 4.7: Summary of the Moredun stone assemblage by function and category.

FUNCTION	TYPE	QUANTITY
Food processing	Saddle querns	4
	Rubbing stones	3
	Saddle/rubbing indeterminate	1
	Rotary querns	1
Tools	Grinders	9
	Pounders	8
	Hammerstones	2
	Smoothers	9
	Burnishers/polishers	2
	Whetstones	2
	Strike-a-light	1
	Combination tools	8
	Sharpening stones	3
	Working surfaces	2
	Grinding surfaces and specialist grinding tools	4
	Spindle whorls (including unfinished)	2
Household equipment	Lamps	4
	Pivot stone	1
Personal and leisure	Bead	1
	Gaming pieces	3
Cup-marked stones	Cup-marked stones	6
Miscellaneous	Possible weight roughout	1
	Stone discs	2
	Notched stone	1
TOTAL		80

Perth and Kinross, and beyond. 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.

Table 4.7 summarises the functional categories of worked stone present: the total does not include fire-cracked or heat-affected stones (Q = 13), or unusual but unworked stones (Q = 23), which are described in more detail in the site archive.

Due to the large quantity of stone tools recovered, particularly the cobble tools, only a summary catalogue is presented in Appendix C, but a full and detailed catalogue is provided in the archive.

Food processing

Quernstones

Querns of both saddle and rotary forms are common finds, particularly in later prehistoric domestic sites. The frequency of their recovery is often in part due to their re-use, as in the construction of walls and paving. At Moredun, the quantity of quernstones was small despite the scale of excavation, comprising three saddle quern fragments, three possible rubbing stones, a possible saddle quern or rubbing stone that lacks distinctive wear to allow closer identification, and two joining fragments of a disc-shaped rotary quern.

The saddle querns (SFA106, SFC005, SFC006 and SFC053) form an interesting group. Although three are fragmentary, all four appear to have been expediently produced, by splitting either a large water-rounded cobble or a glacial erratic to produce a reasonably flat plane that could be used as a grinding surface. No

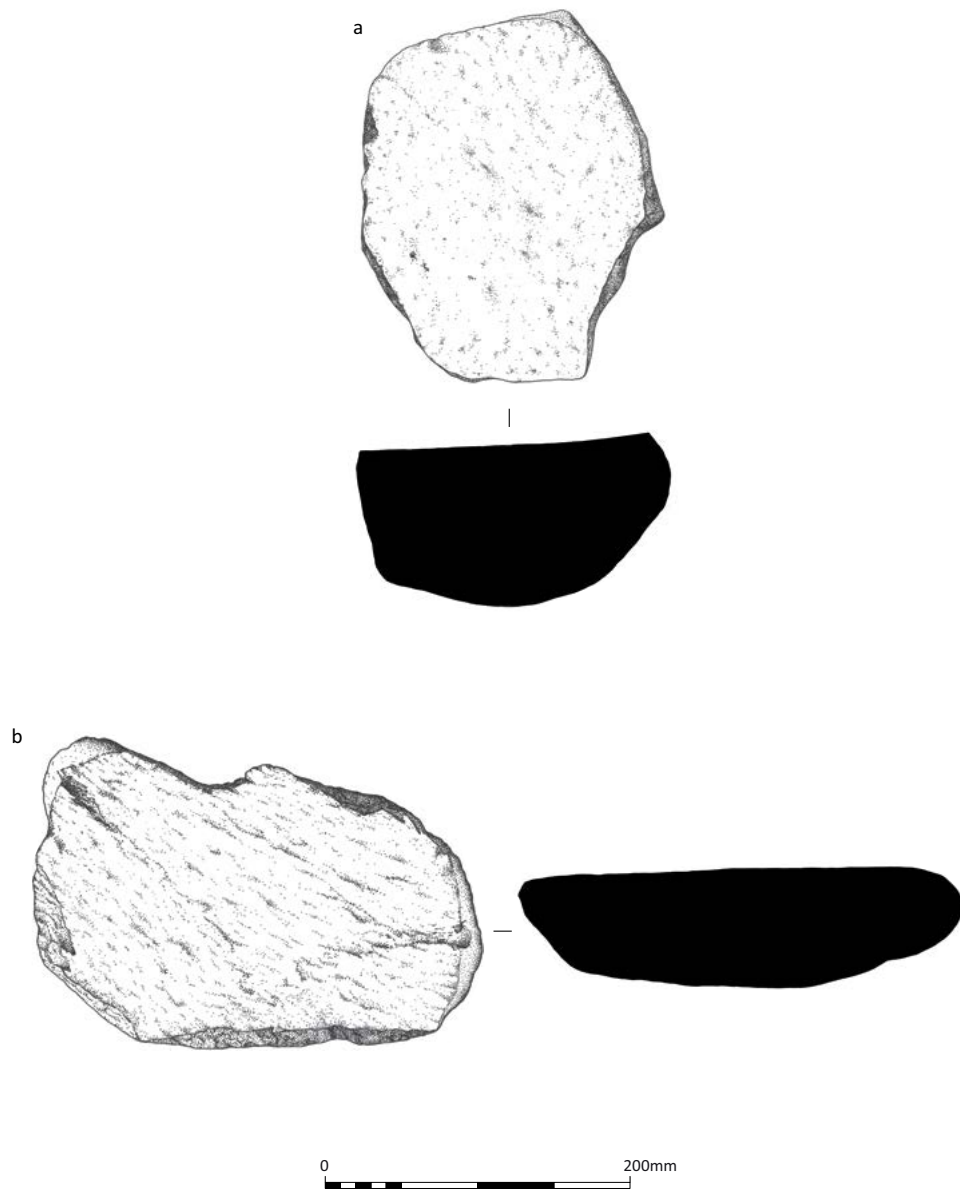


Figure 4.19: Food processing tools: a) saddle quern SFC005, b) rubbing stone SFC049.



Figure 4.20: Corner fragment from a sandstone saddle quern (SFC053).

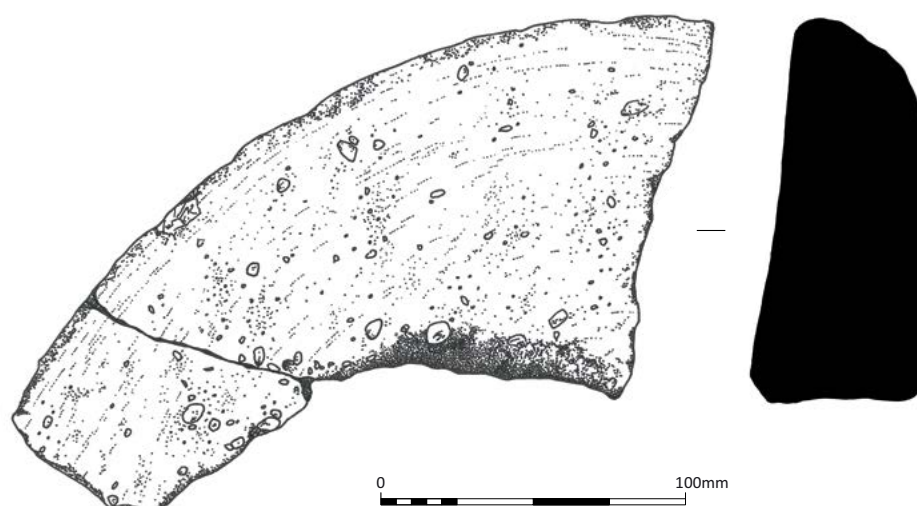


Figure 4.21: Food processing tools: rotary quern fragment SFA018.

preference is obvious in terms of the lithologies used or in the size of the cobbles selected for this purpose. The level of wear observed is also variable: the grinding face of SFA106 is smoothed and abraded through use and has seen secondary use as an expedient working surface; SFC005 (Figure 4.19a) has a band of polish around the remaining periphery of the grinding face caused by repeated passes of the rubbing stone, but also a pitted grinding surface that suggests that the face was lightly dressed by pecking to make it more efficient for grinding; SFC006 is only very lightly used, in contrast to the others just described. The lack of obvious shaping prior to use, the flat rather than distinctly dished surfaces, and the fact that the wear noted extends right out to the edges of the stone, are consistent with an Iron Age date as opposed to early prehistoric examples, which typically display pronounced rims and dished grinding surfaces (Close-Brooks 1983a: 288). Similar examples are known across Scotland, including from Tulloch Field, Strathardle (Thoms and Halliday 2014: 10), Hatton Farm, Angus (Clarke 2010: 21, illus 11) and Dubton Farm, Brechin (Jackson 2002: 42). Three saddle querns were recovered from secondary positions within tumble relating to Wall E in Trench A and the wall of the monumental roundhouse in Trench C. This suggests the querns were incorporated into the walls, but it is unclear whether the damage observed on SFA105 and SFC005 is the result of breakage during the collapse of the structures or occurred prior to their incorporation. In contrast, SFC053 (Figure 4.20) was recovered from a deposit from hearth [C020] immediately below the rubble of the monumental roundhouse.

Three possible rubbing stones (SFA074, SFC049 and SFD003), which would have been used in conjunction with saddle querns, were also recognised. In contrast to saddle querns, whose grinding faces tend to be concave as the result of abrasion, the grinding face

of rubbing stones is typically convex, but otherwise display the same categories of use-wear that would be anticipated on a saddle quern. These include a smooth, abraded face, sometimes with patches of polish where the surfaces of the two stones rub against one another, and pitting, either from naturally dense clasts in the stone loosening and detaching during use or through deliberate dressing of the grinding face. At Moredun, the rubbing stones, like the saddle querns, appear to have been expediently produced from water-rounded cobbles. The most extensively used of this group is SFA074 which has been produced on a split ovoid blue schist cobble. A similar split cobble (SFC049, Figure 4.19b) of comparable size and shape to SFA074 was recognised amongst a layer [A032] of re-deposited occupation material underlying the floor of the monumental roundhouse in Trench C. It has been classified here as a possible rubbing stone but was so friable that it did not survive an attempt to lift it during excavation and its identification here is therefore conjectural. Like saddle quern SFC005, rubbing stone A074 displays bevelled abrasion around the edges and rounded corners of the grinding face as the result of rubbing against the surface of a larger saddle quern during use. This rubbing stone was recovered from the *in situ* core [A032] of Wall E in Trench A. No obvious pairing between the surviving saddle querns and rubbing stones was identified. A further saddle quern or rubbing stone fragment (SFC042) was recognised *in situ* amongst the burnt flooring material [C019] of the monumental roundhouse in Trench C. It had been severely heat affected and was so friable it disintegrated despite careful excavation.

Only two re-joining fragments of a single rotary quern (SFA018, Figure 4.21) were recovered during the excavation. These fragments were recovered from topsoil in Trench A, in the area overlying the collapsed

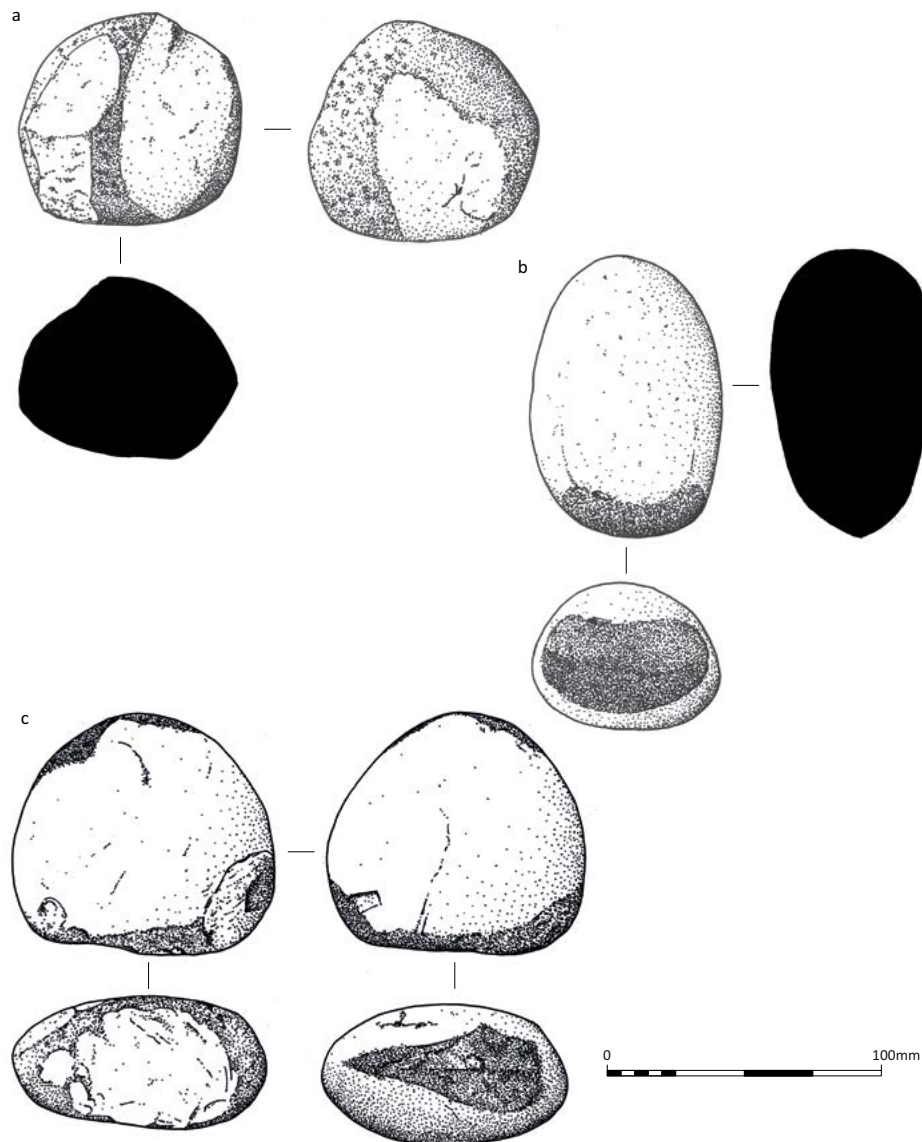


Figure 4.22: Cobble tools, grinders: a) SF101, b) SFA127, c) SFA086.

remains of Wall E. The pieces re-join to make a wedge-shaped segment of the grinding face and rounded edge of a disc-shaped rotary quernstone produced from a coarse sandstone. The grinding face displays evidence of extensive wear in the form of planed off dense clasts within the stone, well-developed abrasion and concentric striations from rotational use, but lacks diagnostic features, such as the handling system or central socket or feeder pipe, to allow the fragment to be identified as that of an upper or lower quern.

Tools

Cobble tools

Cobble tools are ubiquitous tools on Scottish prehistoric sites and are typically a significant component of later prehistoric stone tool assemblages (Clarke 2006: 1). At Moredun, the cobble tools dominate the assemblage with 41 examples identified. This comprises 51% of the stone assemblage and consists of grinders, pounders, hammerstones, whetstones and smoothers, as well as strike-a-lights and working surfaces. Combination tools, where wear from more than one type of function is discernible, form a small sub-group with eight examples (19.5% of cobble tool assemblage). The majority of these tools have been produced from water-

rounded river or beach pebbles of a variety of shapes, sizes and lithologies, but most have seen little to no modification prior to use. Of all the stones present at Moredun, the cobble tools display the greatest range of lithologies selected for use, but, like the rest of the assemblage, fine sandstone, siltstone and quartzite were the dominant choice. As noted, many tools display a combination of wear patterns suggesting a range of functions. These are discussed after consideration of single function tools.

Grinders

Nine single-function grinders are present (Appendix C, Table A) and a further four (A007, A006, A019 and D002) combination tools display abraded facets from similar use. Grinders are characterised by their flattened or rounded abrasion facets, typically at the ends of the

cobble rather than the edges or faces. Examples are shown in Figure 4.22. In the case of SFC035, the full dimensions of the tool are not possible to confirm as only a small fire-cracked fragment now remains. At least two tools (SF101 and SFC035) are further categorised as circumferential grinders, where a wide band of faceted abrasion has developed around a substantial portion of the circumference of the cobble. As has been observed on several later prehistoric sites across Scotland, this circumferential use-wear is typically observed on quartzite cobbles of sub-spherical shape (McLaren 2018: 107; McLaren and Hunter 2007), consistent with the examples from Moredun.

The grinders from Moredun have been produced predominantly from quartzite or quartzite-rich cobbles, with a preference shown to ovoid and flattened-ovoid cobbles. Analysis of the wear facets shows a lot of

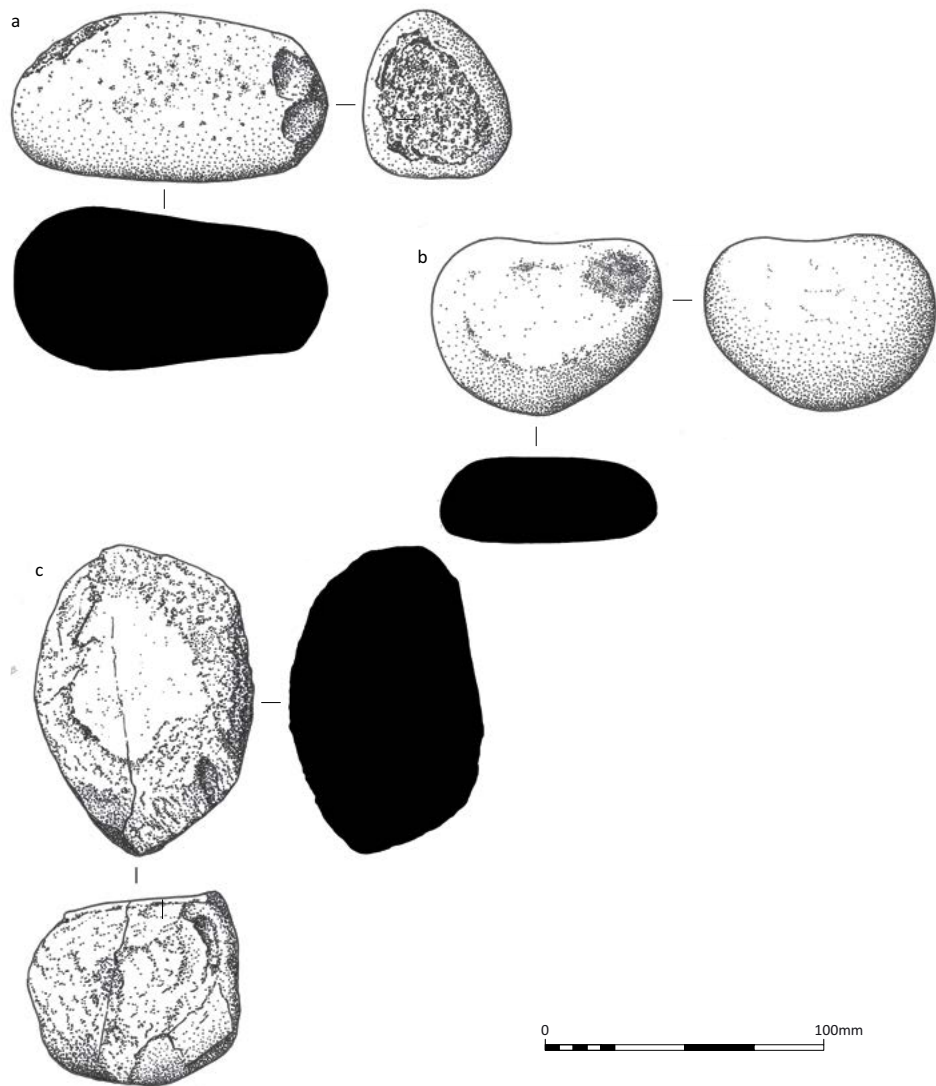


Figure 4.23: Cobble tools, pounders and hammerstones: a) poulder SFA014, b) poulder SFA021, c) hammerstone SFA141.

diversity: most display evidence of use at both rounded ends, the the shape and position of the wear facets indicating that it is probable that the cobble was turned and shifted in angle during use, the wear often taking place whilst holding the tool at an oblique or abrupt angle. Most of the grinders at Moredun display well-developed wear suggesting more than one episode of use prior to discard. In contrast, SFA101 (Figure 4.22a) displays only light perhaps even single use wear.

Grinders were predominantly recovered from Trenches A (Q = 4), and 1/C (Q = 4), with a single example (SFB017) recognised from Trench B. No patterning could be discerned from their contexts of recovery. One (SFA127, Figure 4.22b) came from occupation deposits [A114] above Wall E [A025], while others (SFA086, Figure 4.22c and A133) from this trench were recovered from amongst the outer facing stones [A023] and collapsed wall material [A116], suggesting that they may have been incorporated into the make-up of Wall E. In contrast, those recovered in association with the monumental roundhouse in Trench 1/C were less disturbed: One, SFC043, came from re-deposited occupation material used as levelling material below the floor of the roundhouse [C029], and a fire-cracked fragment SFC035 came from burnt soils [C024] below hearth [C020]. A further example, SF115, was recovered from collapsed rubble [102] of the roundhouse walls.

Pounders

Eight cobble pounders were identified (Appendix C, Table B) while a further four combination cobble tools (SFA008, SFA107, SFA119 and SFD002) display pitting or peckmarked damage likely to be the result of similar use as a pounder in conjunction with other forms of wear. These pounders are identified on the basis of their roughly pitted wear facets, usually located at the ends of flattened ovoid or sub-rounded cobbles. Half of this group display wear on both rounded ends of the cobble (SF603, SFA014, SFA063 and SFD101), two (SFA139 and SFB005) have light wear confined to one end, and one (SFA021) has interrupted use-wear around much of the circumference. The wear on this last tool is unusual and quite distinctive; rather than the usual diffuse-edged sub-rounded peckmarks that tend to concentrate on the working area of a pounder, this tool displays sharp, angular, almost straight edged pits indicating impact against a sharp-edged material. Like the grinders already described, the pounders have been predominantly formed on quartzite-rich cobbles, with the exception of one of sandstone (SFA021) and another of granite (SFA014, Figure 4.23a). Typically, flattened ovoid or ovoid cobbles were favoured. The pounders display a range of level of use, from those that are only lightly worn (e.g. SF A063), to those (e.g. SFA014) that

are heavily worn, causing significant modification to the shape of the stone.

The pounders were recovered from Trenches A/6, B, C and D, indicating a wider distribution than the grinders. In Trench A/6, one example (SFA139) came from collapsed Wall E (A118), suggesting it had been incorporated among the stones that made up the core material, while two (SFA021, Figure 4.23b and SFA063) were recovered from occupation soils [A007 and A012] overlying deposits collapsed from Wall E. Two other examples (SF603 and SFA104, Figure 4.23a) were from topsoil. In Trench C, SFC040, a fire-cracked fragment of a pounder, was recovered from burnt soils [C024] below the hearth [C020]. In Trenches B and D, the pounders came from deposits underlying the topsoil [B005 and D101 respectively].

Hammerstones

Only two single-function hammerstones were identified (not illustrated), while a further example (SFA119) is noted amongst the combination tools as a secondary function. Distinguishing between extensively used pounders and lightly used hammerstones is often difficult and here hammerstones are defined as having seen heavy physical use leading to the point of impact fracturing or flaking.

Both came from Trench A: one, SFA009, came from topsoil [A001], while the other, SFA141, came from collapsed rubble from Wall E [A116].

Smootherers (see also SF100, SFA008, SFA019, SFA107 and SFB007)

Smoothing stones (not illustrated) typically display a concave worn and smoothed surface resulting from repeated rubbing against a soft material and the worn surfaces are often (but not exclusively) associated with dark red-brown staining and residue. This follows criteria adopted at Dunadd, where large numbers of smoothing stones/burnishers were interpreted as hide processing tools (Lane and Campbell 2000: 178, 179, 185) with the staining and residue thought to derive from the natural fats and oils released during working the animal skins.

Nine smootherers have been recognised amongst the assemblage (Appendix C, Table C), with five further examples (SF100, SFA008, SFA019, SFA107 and SFB007) recognised among the combination cobble tools. The evidence of wear is typically confined to one flat or convex face only and to a varying degree all display light abrasion and polish from rubbing; on some this is a light sheen (e.g. SFA125), on others a distinct area of polish (e.g. SFC052). They are distinctive due to traces of red-brown staining, or waxy residue, often associated

with the other forms of use-wear evidence (e.g. abrasion and polish from rubbing). This also sets them apart from burnishers, and is often concentrated along the adjacent long edge or edges to the working face (e.g. SFB008), sometimes extending on to the rounded ends of the face of the cobble, and also typically towards the centre of the convex working faces (e.g. SFC052).

The majority of the smoothers have been produced from small, water-rounded, ovoid or flattened cobbles with naturally smooth, gently rounded faces, and lack any evidence of modification prior to use. They range in length from 66.5 mm to 136.5 mm, with the average length being 105 mm, and the lithology of cobbles selected includes a range of fine-grained sandstones, siltstones and quartz-rich cobbles, with a preference for fine-grained stones with good abrasive qualities. Except for one fire-cracked example (SFC028), and one cobble (SFC018) broken during excavation, all were intact or substantially intact on recovery.

They were recovered from Trenches A, B and C/1. Those from Trench A came from occupation soils [A012 and A014] directly above the collapsed Wall E [A025]. In Trench C, three examples (SFC003, SFC018 and SFC052) came from the collapsed wall of the monumental roundhouse, one (SFC028) from the interface layer [C011/C013] between the stone tumble and the possible burnt destruction layer, and a further example (SF114) from slumped material [107] related to the abandonment or post-abandonment of the structure. Two examples, SFA001 and SFB008, were from topsoil. Despite frequently occurring in association with the monumental roundhouse in Trench C, the majority may have been incorporated into the composition of its walls, rather than relating to activities within the building during its use. Similarly, in Trench A, the tools come from an occupation layer that post-dates the collapse of Wall E.

Burnisher/polisher

Only two single-function burnisher/polishers (SFA027 and SFA036, not illustrated) were recognised, with a further example (SFA006) noted among the combination tools. The use-wear displayed is similar to the smoothers but without the characteristic red-brown staining that suggests hide-processing. They may have fulfilled a range of uses, for example in the burnishing of sheet metal or even the surfaces of pottery vessels. Both were recovered from possible occupation deposits [A012 and A013] overlying rubble from the collapse of Wall E [A025].

Whetstones

Despite the large stone assemblage, and the association of metal-working with later phases of the site, the

number of whetstones present is unexpectedly few. Only two single-function examples were recognised (SFA007 and SFC001, not illustrated), both formed on elongated ovoid pebbles, one of a dark blue-grey schist and the other sandstone. Whetstone SFA007 displays wear towards the centre of only one long face, while SFC001 has only very light wear. In addition to use as a whetstone, SFA007 may have seen expedient secondary use as a grinder, indicated by patches of abrasion at the surviving rounded end. Both were recovered from topsoil.

Strike-a-lights

Strike-a-lights form a distinctive group identified by the presence of linear staining and strike marks from a piece of iron or iron pyrite to create a spark (Ballin Smith 1994: 204). A sub-group have a distinctive groove worn into the centre of the face, or faces, as the result of repeated use, and were classified as ‘tracked stones’ by Childe (1936: 233). Use-wear is often slight, particularly in cases of single or occasional use prior to discard. One single-function example (SFA170, not illustrated) was recognised from Moredun as an unstratified find from Trench A. The presence of possible strike marks from this use were also noted on SFB007 (Figure 4.24), a combination tool.



Figure 4.24: Strike-a-light (SFB007).

Combination tools

Despite the large quantity of cobble tools in the assemblage, only eight combination tools were identified, representing 19.5% of the stone assemblage (Appendix C, Table D). In addition to those classified as combination tools, a saddle quern fragment (SFA106) displays limited evidence of secondary use as a working surface, and a whetstone (SFA007) shows slight traces from use as a grinder, but in both instances the secondary wear appears expedient, light and short-lived rather than purposeful.

The majority of examples of tools displaying a combination of use-wear (Table 4.8), including

Table 4.8: Range of wear types present on combination tools.

Primary function	Quern (Q=1)	Grinder (Q=3)	Pounder (Q=3)	Hammerstone (Q= 0)	Whetstone/ sharpening stone (Q= 1)	Smoother/ burnisher (Q=1)	Strike-a-light (Q=1)	Working surface (Q= 0)
Abrasion					1			
Pecking		1						
Fracturing			1					
Whetting/sharpening								
Smoothing/polishing		3	2				1	
Striking marks								
Percussion damage	1		2			1		

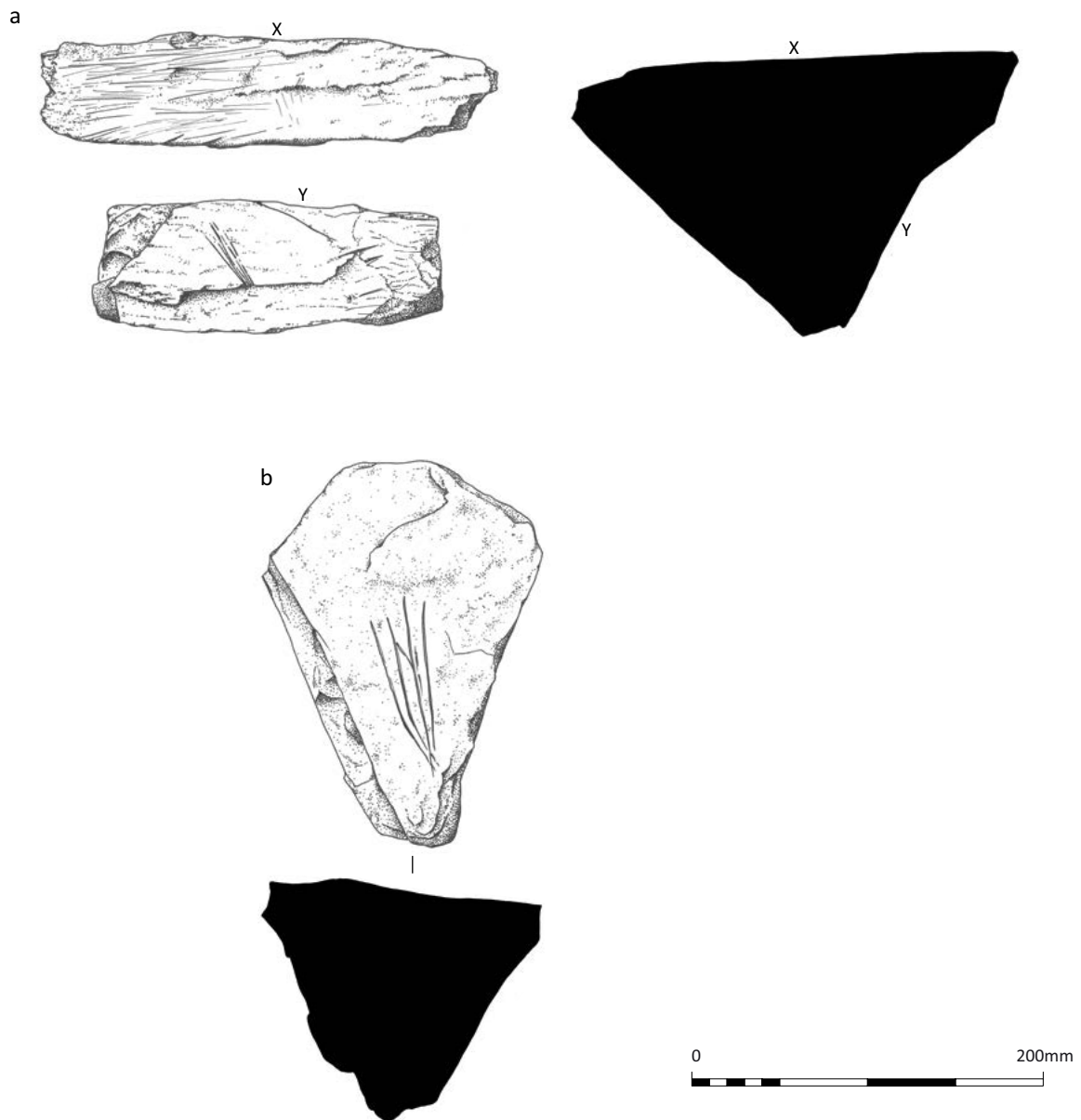


Figure 4.25: Sharpening stones a) SF605 and b) SFC015.

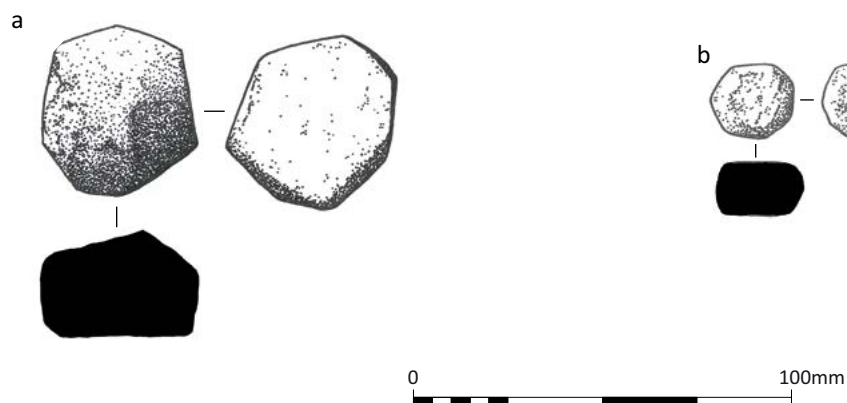


Figure 4.26: Grinding stones a) SFA103 and b) SFB008.

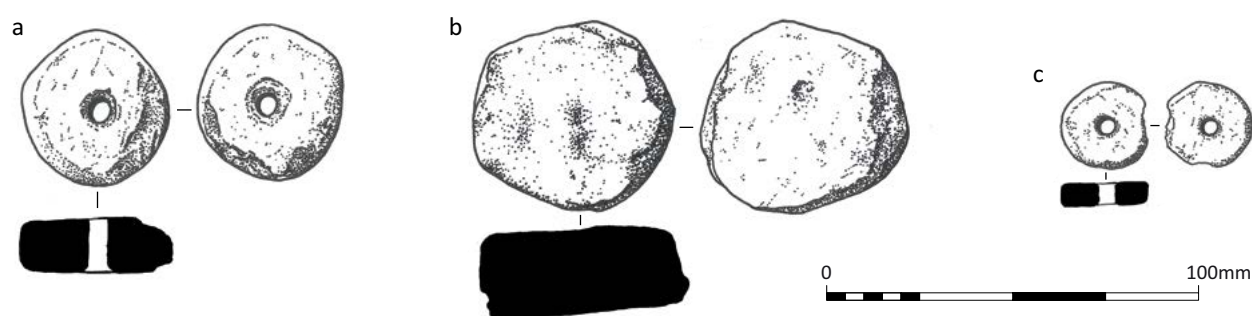


Figure 4.27: Spindle whorls and beads: a) spindle whorl SFB013, b) possible whorl roughout SFB011, c) stone bead SF120.

those where secondary use appears more expedient, comprises two distinct wear types ($Q = 6$), whilst two display evidence of three forms of wear. Grinders and pounders are the most common type of primary use-wear, whilst secondary use as smoothers for hide-processing is frequently noted.

Sharpening stones

Three sharpening stones survive in four fragments, all formed on angular blocks or plates of medium-coarse grained stone, including whinstone and sandstone, presumably favoured for their abrasiveness. SF605 (Figure 4.25a) and SFC015 (Figure 4.25b) are the most extensively used, displaying suites of parallel and overlapping long, linear scores, scratches and grooves resulting from thin-edged or pointed objects, such as pins or points, being ground across the surfaces. In the case of SF605, these are so thin they suggest a blade edge, perhaps to sharpen a knife or similar, an alternative to the more typical whetstone. In contrast, both SFA157 (not illustrated) and SFC015 display wider, but still shallow, scores more consistent with wear from smoothing the surfaces of pins or points of either metal, bone or wood. Two, SF605 and SF157, came from soils [A117] above Wall E in Trench A. The third example,

SFC015, was recovered from tumble from the collapsed walls of the monumental roundhouse in Trench C.

Working surfaces

One certain (SFA055) and one possible working surface (SFA124) was recognised, along with three combination tools (SF100, SFA008 and SFA119) that display similar use-wear, and a fragment of saddle quern (SFA106) which saw expedient use after its milling use had ended. One, SFA055, was formed on a split, ovoid, water-rounded boulder, trimmed around the edges to reduce its mass, and displays evidence of extensive use on the flatter of the two surfaces. The second example (SFA124) is less certain; one face is pitted and damaged, though it is not clear whether this is through use or differential weathering. SFA055 was recovered from the ephemeral stone bank of one of the supposed roundhouses of Unenclosed Settlement F erected on top of collapsed rubble from Wall E in Trench A. SFA124 was unstratified.

Grinding surfaces and specialist grinding tools

Two sub-categories of tool are present. In the first are grinding surfaces, thick blocks of sandstone

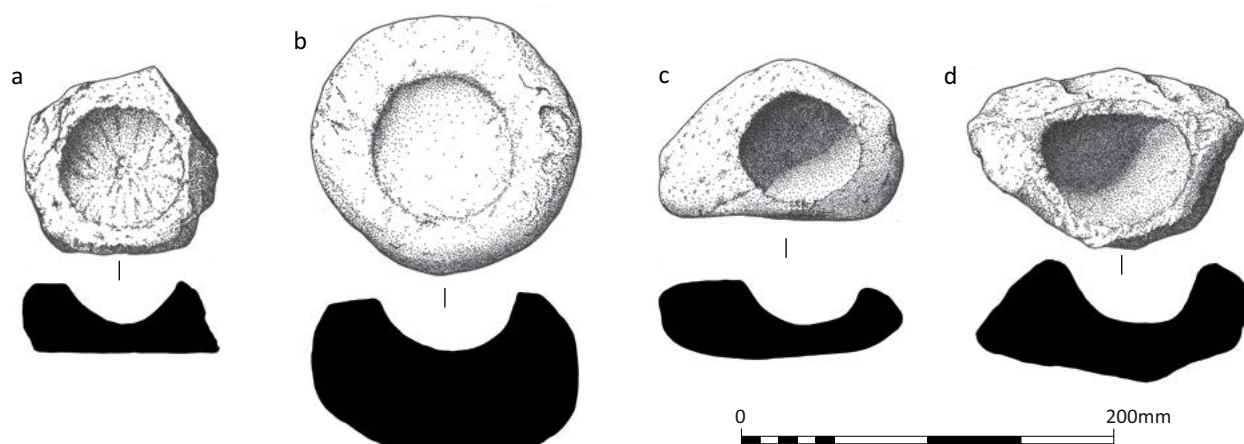


Figure 4.28: Stone lamps: a) SFA032, b) SFA039, c) SFB014, d) SFC020.

(SFA173 and SFC049, not illustrated) used on one flat or convex surface as an abrasive, but which lack the typical characteristics of use-wear observed on saddle querns. They were possibly used as robust whetstones to sharpen larger metal edged tools, or to finish the surfaces of metal objects during their production. Those in the second group have been interpreted as small, specialist grinding tools.

Only two examples of this second group are present (SFA103, Figure 4.26a and SFB008, Figure 4.26b), but they take the form of small, angular, sandstone blocks that have been extensively faceted due to abrasion around their circumference. In the case of SFB003, it is difficult to determine with certainty whether the abrasion around the edges is the result of an attempt to shape the object, or the result of working, but the latter appears more likely based on the similarity of use ware to SFA103. SFA103 displays extensive wear which has modified all surfaces and edges of the stone. These are similar to, but less regular in shape than, the suite of abraded stone discs from Hurly Hawkin, Angus argued to be grinding tools due to their partially bevelled, abraded edges (Henshall 1982: 233–5). An interesting detail of the wear on this tool is the presence of smoothed and abraded, curving, convex wear facets, suggesting the implement was used to grind a material with a concave surface area. Notably the tool was recovered from the spoil [A106] of a possible antiquarian trench, close to an area where evidence of shale bangle manufacture was prevalent, and it is possible that this unusual tool may have been used in conjunction with this craft.

Spindle whorls

A single example (SFB013, Figure 4.27a) is present, produced from fine sandstone abraded to shape, but damaged. In addition, a thick red sandstone disc

(SFB011, Figure 4.27b), its edges roughly shaped and displaying concentrations of small pits and peckmarks at the centre of both flat faces, may be an abandoned whorl roughout. Both were recovered from Trench B over the roundhouse.

Household equipment

Stone lamps

These consist of stones of various shapes and sizes with a single, large, round-based oval or circular hollow at the centre of one extensive face. Although hollowed stones such as these could have fulfilled a range of functions, such as mortars and pivot-stones, all four examples discussed display dark sooting and staining around the rim of the hollow consistent with use as a lamp.

Two of the lamps (SFB014, Figure 4.28c and SFC020, Figure 4.28d) were formed on irregular blocks of fine sandstone/greywacke with little modification to the edges or shape. In contrast, lamps SFA032 (Figure 4.28a) and SFA039 (Figure 4.28b) have fractured and pecked edges to trim the stone to a regular flattened sub-spherical shape, complimenting the central hollow. There has been no attempt, on either example, to disguise tool-marks and the edges remain rough and in places irregular. The hollows are either oval (SFB014 and SFC020) or circular (SFA032 and SFA039); the oval examples, being on the more irregular stones, are designed to utilise the maximum available surface area.

The hollows range in length from 63 mm to 75.5 mm, in width from 54.5 to 72.5 mm, and are between 21 mm and 34 mm deep. They bear tool-marks from manufacture, in the form of regular pits and peckmarks from pounding to shape, and in two instances (SFA032

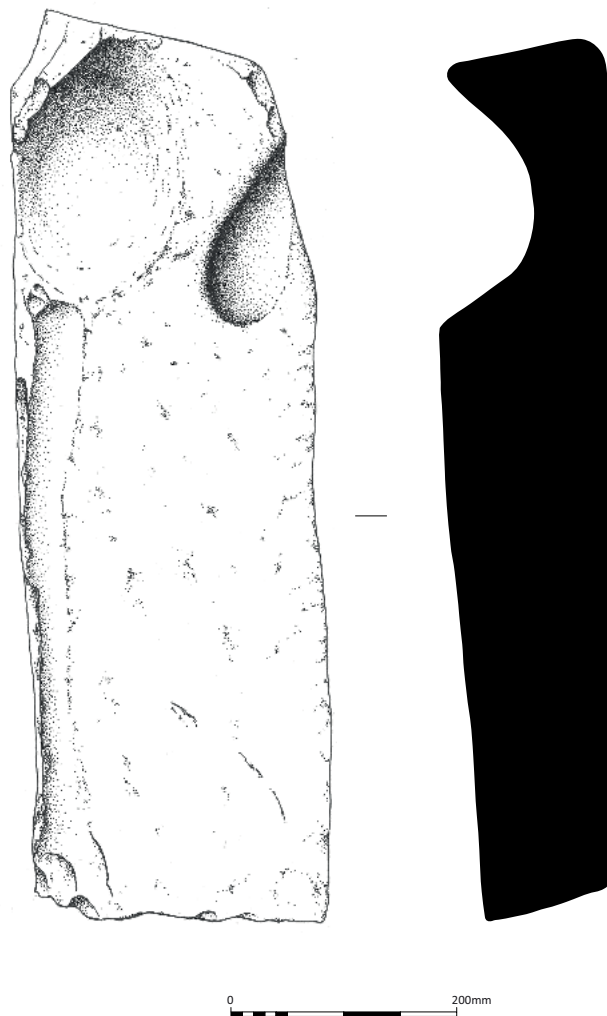


Figure 4.29: Pivot stone SFC014.

and SFC020) distinct linear gouges, presumably made by the tip of a fine metal gouge or chisel. Stone lamps of various forms are common on Iron Age sites in Perth and Kinross. Some, like those from Moncreiffe fort (McLaren, *supra*), Castle Law, Abernethy (Christison and Anderson 1899: 29–30, fig 12 and 13; McLaren, *infra*), have seen little to no modification of the parent stone, apart from the round-based hollow to hold the fat or oil, but others are more complex, involving careful shaping, finishing and, in some instances, decoration. The latter category often makes use of softer lithologies, such as talc-bearing schists or steatite imported from outside the region, such as the example of the handled stone lamps from the monumental roundhouse at Queen's View, Loch Tummel (Taylor 1990: 33, fig.6) and the vitrified fort at Barry Hill, near Alyth (Steer 1956: 243–6; ID 31061). Beyond the area, at sites such as Fairy Knowe, Buchlyvie, Stirlingshire, both simple and more complex examples are found together (Clarke 1998: 379, 382, illus No 302, 473, illus 37, no 125). In addition, two

hollowed mortars or lamps from Law of Dumbuils fort (Poller 2010: 16, fig 19) are noted, but these await full analysis.

The Moredun lamps were intact on discovery. Two (SFA032 and SFA039) were incorporated in the stones (contexts A006 and A011) used to produce the ephemeral stone banks of the circular feature of Unenclosed Settlement F[A003] and [A004], but it is likely they relate to earlier activity, possibly originating from the occupation deposits which overlie the collapsed rubble from Wall E [A025]. The lamp (SFB014) from Trench B came from a little understood deposit [B002], while SFC020, was recovered from among stone tumble (context C002) of the monumental roundhouse.

Pivot stone

A threshold pivot stone (SFC014, Figure 4.29) was recovered from the collapsed stones [C002] of the monumental roundhouse in Trench C, close to the entrance. Unlike small, dressed examples, such as those found in Iron Age contexts at Abernethy Primary School (Connolly 2004: 73, illus 8) and at the early medieval fort of Clachard Craig, Fife (Close-Brooks 1987 *et al.*: 173, illus 32, no 154), the Moredun example consists of a substantial, flat, rectangular slab with two differently sized smoothed hollows situated towards the same squared end of the slab's flat face. The opposite end of the slab is broken so its full length is unknown. The lack of any evidence of shaping or modification to the slab prior to its use, indicates careful selection for this purpose. The hollows vary in size and depth and have smooth internal surfaces marked with fine, concentric striations, demonstrating that the surface was contacted by a post which rotated within the hollowed socket. It is assumed that the smaller of these is a replacement to the larger socket, as it is unclear how both could have functioned simultaneously. Both sockets display wear extending beyond the edges of the hollow towards the squared end of the slab, suggesting the wooden post regularly slipped out of the socket, rubbing against the adjacent surface. Along one long edge of the same face of the slab, a long, but narrow, bevelled abrasion facet may have been created by a wooden gate or door repeatedly rubbing against the edge of the stone as it was opened and closed.

Personal items and leisure

Ornaments

The bead (SF120; Figure 4.27c) is of simple disc-shaped form produced from a thin fragment of red-sandstone, which has frequent quartzite inclusions that sparkle in strong light. It came from an occupation deposit [109] within the monumental roundhouse in Trench C/1.

a

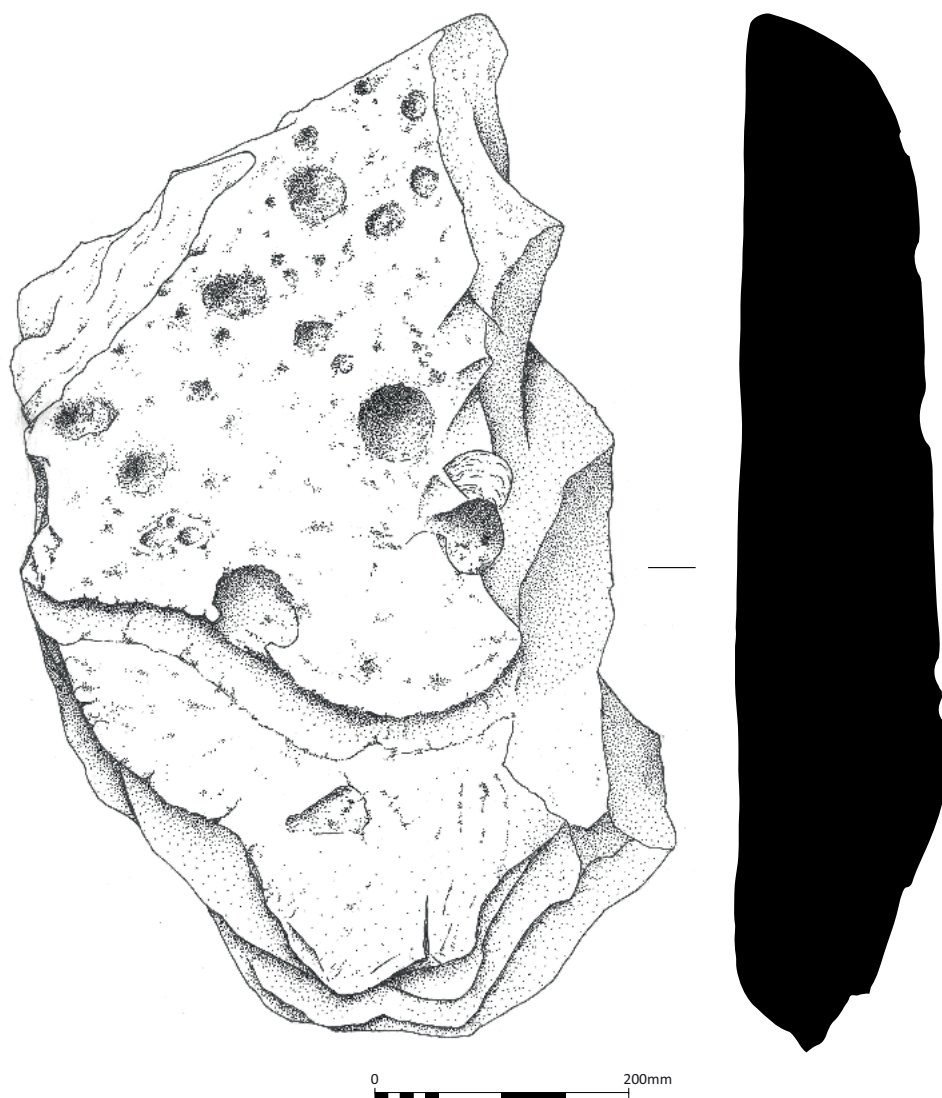


Figure 4.30: Cup-marked slab (SFC019).



Figure 4.31: Cup-marked slab SFC019.



Figure 4.32: Cup-marked slab (SFE016).



Figure 4.33: Cup-marked slabs in situ (Trench C).

Gaming pieces/counters

One certain gaming piece or counter (SF600, Figure 4.34a) was recovered, a small, flattened, ovoid quartzite-rich, water-rounded pebble with a plano-convex cross-section. The surfaces are naturally smooth and rounded, but one face has a concentration of polish towards the centre and light abrasion suggestive of use as a gaming piece. This is different in form to the spherical clay balls found in the monumental roundhouse but may have shared a similar function. Closer parallels to the shape of SF600 come from Fairy Knowe, Buchlyvie, Stirling (Clarke 1998: 386, Illus 39, no 308), Howe, Orkney (Ballin Smith 1994: 188), Jarlshof and Clickhimin, both Shetland (Hamilton 1956: 64; 1968: 80, 84), *inter alia*. These pieces or counters could have seen use in conjunction with scored stone boards, such as the edge fragment from a board from Newmills, Perth and Kinross (Watkins 1980: 190, fig 11e).

Two other examples (SF604 and SFC015) are less certain. SF604 is a naturally spherical, red sandstone pebble, without clear surface modification, but found close

to SF600. Similarly, SFC015 has an unusual shape and form for a natural stone and may have fulfilled a similar purpose, despite the lack of obvious traces of shaping.

Cup-marked stones

Decoration amongst the Moredun assemblage was scant, however six cup-marked slabs were recognised. Most cup- or cup-and-ring marked stones are not well dated but are thought to date to the first half of the third millennium BC, although simple cup marks could date to the early fourth millennium, as suggested at Dalladies, Fife (Brophy and Sheridan 2012: 32). Four of the Moredun cup marks were found on rectangular or sub-rectangular slabs of sandstone; one (A010) was not fully exposed and left *in situ*, so the full extent of the slab and its decoration were not established. The number of individual cup marks varied from a single example (SFC053), to two (A009 and A010), three (SFA034) and multiple markings (SFC019, Figures 4.30 and 4.31 and SFE016, Figure 4.32). In two instances (SFA010 and SFE016), pecked or raised rings surrounded at least one of the cup marks.

SFC019 was the largest and most decorated of the group, consisting of clusters of cup marks of various sizes and depths in conjunction with pecked curvilinear motifs. Some of the decorative elements appear to overlap, erase or respect earlier markings, suggesting more than one episode of decoration. Only one original squared end of this slab survives and the rough, angular edges and fractured basal surface suggest that it was cleaved from the surface of a much larger outcrop that may remain to be discovered. Some of the cup marks and other pecked decoration have been interrupted by this breakage, implying that the original decorative scheme was much larger, and there can be no doubt that areas of decoration have been lost.

Where cup-marked slabs were exposed but survived *in situ* built into the wall of the monumental roundhouse (Trench C) they were recorded on site but left in position (e.g., Figure 4.33) to preserve the integrity of the structure.

Miscellaneous

Possible weight roughout

A single, thick crudely shaped disc (GF100), an unstratified find, lacks any wear except for fracturing of the edges to shape, implying it is unfinished (Figure 4.34b). The intended function is unclear, though it was possibly planned as a perforated weight. Dense quartzite inclusions near the centre of both faces may have made perforation difficult and resulted in abandonment.

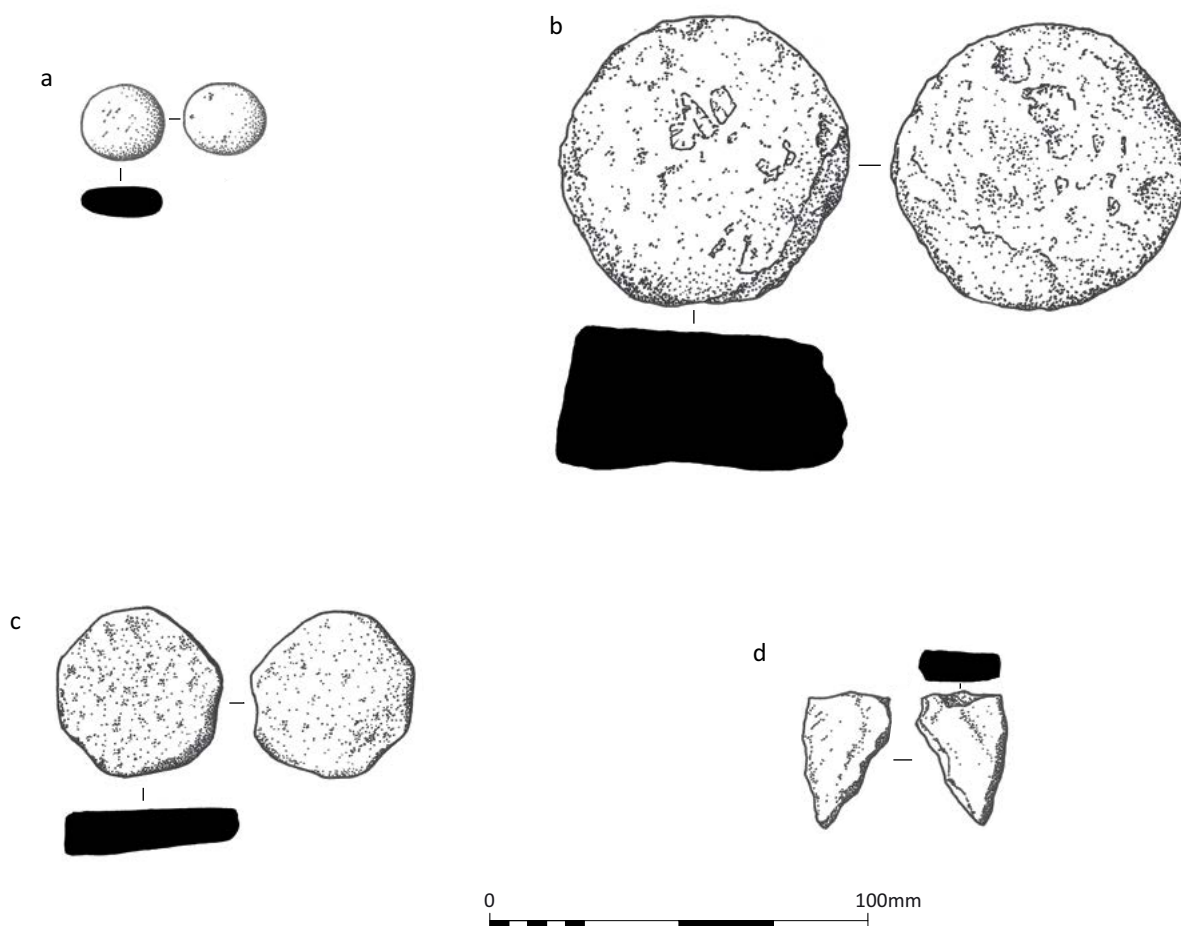


Figure 4.34: Stone discs: a) small stone counter (SF600), b) possible weight roughout (GF 100), c) small sandstone disc (SF301), d) edge fragment from small sandstone disc (SF305).

Sandstone discs

Two carefully shaped, flat discs with ground edges were recovered, one intact (SF301, Figure 4.34c) and the other (SF305, Figure 4.34d) fragmentary. They vary considerably in size; one is 44.5 mm in diameter, the other c. 80 mm in diameter. At Hurly Hawkin, Angus, 50 small stone discs were found in varying states from crudely flaked to finely ground, which Henshall (1982: 233–5) argued as a by-product of their use as rubbing or grinding tools (see SFA103 and SFB003), becoming better ‘finished’ from the resulting wear. It is difficult to draw conclusions on the basis of such limited numbers from Moredun, but the traces of fracturing employed to shape the edges argues against these examples being similar to those from Hurly Hawkin. The discs may be unfinished, the smaller perhaps intended as a spindle whorl (see SF301) and the larger a weight (SF305). As well as those from Hurly Hawkin, small stone discs were also found at Borenich, Loch Tummel (Watson 1915: 30), Queen’s View (Taylor 1990: 33) and Black Spout (Strachan 2013: 42, illus 54) in Perth and Kinross, and at Fairy Knowe, Buchlyvie, Stirling (Clarke 1998: 382), to name but a few examples.

Heat-affected and fire-cracked stones

Thirty-one fragments of fire-cracked and heat-affected stones were collected under 13 small find numbers and are summarised in Appendix C, Table E. These were clustered in Trenches 4 and A, related to Wall E [401]/[A025], and Trench C associated with the monumental roundhouse. One outlier, SFE013, came from topsoil in Trench E.

Several of these (e.g. SF408, SF417, SFC045 and SFC048) were recovered from the tumbled core of Wall E and the wall of the monumental roundhouse. This suggests that cobbles used as pot boilers were routinely incorporated as building material across the site. In addition, three of the tools already discussed display fire-cracked surfaces, indicating that they had been used as pot-boilers after their principal function had come to an end. These consist of two grinder fragments (SFC025 and SFC035) and a smoother (SFC028). A possible saddle quern/rubbing stone (SFC042) was heavily heat affected, but this may be related to the burning of the monumental roundhouse rather than its use as a pot boiler.

Table 4.9: Quantification of the stone tool assemblage by area of excavation and classification.

Function	Type	Annexe D	Wall E	Roundhouse	Monumental roundhouse	Pond	Ramparts B and C and collapse from monumental roundhouse	Unstratified	Total
		Tr. 3	Tr A (including Tr 4 and Tr 6)	Tr B	Tr C (including Tr. 1)	Tr D	Tr E		
Food processing	Saddle querns		1		3				4
	Rubbing stones		1		1	1			3
	Indeterminate				1				1
	Rotary querns		1						1
Tools	Grinders		4	1	4				9
	Pounders		5	1	1	1			8
	Hammerstones		2						2
	Smoothers		3	1	5				9
	Burnishers/polishers		2						2
	Whetstones		1		1				2
	Strike-a-light		1						1
	Combination tools		5	1	1	1			8
	Sharpening stone		2		1				3
	Working Surfaces		2						2
	Grinding surfaces and other grinding tools		2	1	1				4
	Spindle whorl			2					2
Household	Stone lamps		2	1	1				4
	Pivot stone				1				1
Personal and leisure	Bead				1				1
	Gaming pieces		2		1				3

Function	Type	Annexe D	Wall E	Roundhouse	Monumental roundhouse	Pond	Ramparts B and C and collapse from monumental roundhouse	Unstratified	Total
		Tr. 3	Tr A (including Tr 4 and Tr 6)	Tr B	Tr C (including Tr. 1)	Tr D	Tr E		
Cup-marked stones	Cup-marked stones		3		2		1		6
Other	Weight roughout							1	1
	Stone discs	2							2
	Notched stone				1				1
Total by area		2	39	8	26	3	1	1	80

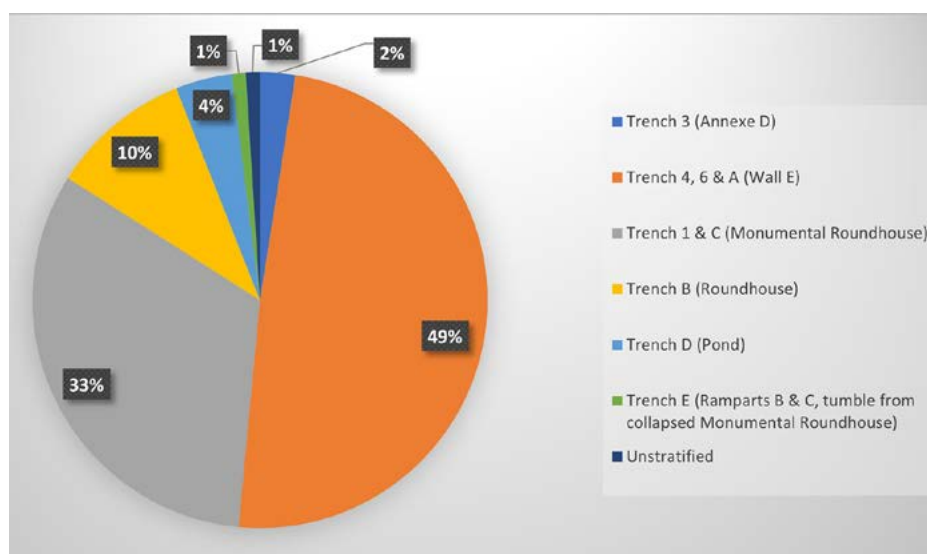


Figure 4.35: Diagram showing the percentage of the stone assemblage by area of excavation.

Distribution of stone tools and other worked items

The distribution of the various categories of stone tools, and other worked items, is summarised in Table 4.9.

The majority of the stone assemblage was recovered from two main areas of excavation: the Wall E (Trenches 4, 6 and A); and the monumental roundhouse (Trenches 1 and C). These groups also comprise the greatest range of worked stone types across the site. In contrast, the

number of items recovered from the areas investigated of Annexe D (Trench 3), the small roundhouse situated outside Wall E to the north (Trench B), the pond (Trench D) and the outer circuits of Ramparts B and C (Trench E), remain very limited in number and restricted in range (summarised in Figure 4.35).

Considering individual tool types, the greatest number of pounders and combination tools came from Wall E, which is also the only area where hammerstones,

burnishers and strike-a-lights were recovered. Quernstones were recovered from areas investigated around Wall E, the monumental roundhouse and the pond/cistern, the greatest number coming from monumental roundhouse, where they seem to have been incorporated into the fabric of the structure. A range of other tools, personal objects and leisure items were associated with this structure, implying a more domestic function than the assemblage recovered from the area of Wall E, where much of the material comes from rubble contexts and probably from the core of the wall. Other interesting find clusters include the spindle whorl and possible whorl roughout in association with the roundhouse in Trench B, and the stone discs, both complete and fragmentary, from Annexe D in Trench 3.

As is all too typical of Iron Age settlements, very few of these items can be linked to potential use-contexts (floor deposits or feature fills) rather than structural or abandonment deposits.

Discussion of the worked stone

Despite the size and comprehensive range of the worked stone from Moredun, the interpretation of coarse stone tools is not always straightforward, as has been considered in detail elsewhere (for example Close-Brooks 1987 *et al.*: 175; Ballin Smith 1994: 211; Clarke 2006: 1–3; McLaren and Hunter 2014: 284–5; McLaren 2018: 107; Hunter *et al.* 2018: 203–4). In summary, problematic issues include durability, recognition, and linking observable wear to specific functions. The robustness of stone means it frequently dominates later prehistoric artefact assemblages, but with much of it from secondary or residual contexts, either in association with other dumped material, or frequently re-used as structural elements (McLaren and Hunter 2014: 284). As a result, the activity represented by the context of recovery can frequently have little association with the date or function of the object itself, and the date of the context can thus be a poor reflection of the date of the object. The other issue faced in the interpretation of stone tools, particularly cobble tools, is modern unfamiliarity with their range of functions. In many instances the character of the use-wear can be observed, recorded and described, but the specific function remains elusive, hampered in many instances by the presence of a combination of wear on a single tool, implying a range of functions (Ballin Smith 1994: 196; Clarke 2006: 2; McLaren and Hunter 2014: 284). A good example, among the cobble tool group, are pounders, which could have been used in various food processing tasks, but might equally have been applied to crush ore for use in metal-working, to break up small grits for inclusion in pottery as temper, or even in the preparation of pigments and medicines.

Raw materials

The stone used to produce items in the assemblage undoubtedly derive from a range of sources, as is suggested for the assemblage from Moncreiffe fort (McLaren, *supra*). The cobble tools have been generally formed using water-rounded stones, without any evidence of shaping or modification prior to their use as implements. Despite consisting of a range of lithologies, they may have been collected from the beds of the River Tay or Earn, or indeed any smaller tributary or riverine deposit in the surrounding valley. Analysis of the cobble tools has shown a preference towards quartzite and quartzite-rich cobbles, as well as fine sandstones and siltstones, which represent hard-wearing and durable lithologies. Finer abrasive stones, such as the sandstones and siltstones, were favoured for tools such as smoothers, whereas the quartzite cobbles were put to more heavy-duty use as grinders and pounders.

In addition to the use of the water-worn cobbles, larger rounded stones may be glacial erratics. In particular, a number of the saddle querns and rubbing stones were made on large schist cobbles that were split in half along their length, giving the querns a plano-convex cross-section. More blocky and angular stones were likely quarried from the hilltop itself. In contrast, the use of Old Red Sandstone, which was heavily used as facing slabs of the various structures investigated during excavation, is less easy to provenance and cannot have come from the hilltop or the immediate vicinity. Although Old Red Sandstone was poorly represented amongst the artefacts, a small number of items had been produced on this deep-coloured stone, including the disc bead, the whorl roughout, a possible grinding stone and a gaming piece. Old Red Sandstone has many advantages over many other rock types, being easy to work, and with aesthetic qualities in its deep, red-brown colouration and the small, quartz flecks that can make the stone appear to sparkle. These qualities set it apart from the dull, matt browns and greys of the other lithologies present, and make it an obvious choice for items with decoration or ornamentation, such as the bead and the cup-marked stones. It is also a coarse-grained stone, which makes it a useful abrasive for grinding, seen for example in grinding stone SFB008.

Crafts and activities

In terms of the activities represented, the Moredun assemblage can be considered in several categories. A small group of objects – the saddle querns, rubbing stones and fragment of rotary quern – are linked with food processing and, by implication, consumption of arable produce. A range of craft activities is also represented. Some can be identified specifically: the

spindle whorl (SFB013) attests to the spinning of yarn and textile manufacture, while sharpening stones indicate the maintenance if not production of points and pins of various materials. Some cobble tools are probably connected to hide-working, such as cobble smoothers, whilst the burnishers could have been used for a range of functions including metal-working and pottery production. The unfinished whorl (SFB011) and the discs (SFA103 and GF100) imply that stone-working was taking place on site (as would be expected for a settlement with such an abundant resource as this); a range of other crafts is undoubtedly hidden within the undiagnosed material. Amongst the most intriguing of the items from the site are two small sandstone grinding tools (SFA103 and SFB003), which are argued here to have a probable role in the shaping and finishing stages of the production of shale bangles (Hunter, *supra*). Despite the abundance of stone tools on site, few querns, particularly rotary quern fragments, were found, which is unusual considering their frequent occurrence on Iron Age sites elsewhere, particularly in secondary contexts, such as at Aldclune, Blair Atholl (Hingley *et al.* 1997) or Black Spout, Pitlochry (Strachan 2013: 105–6). The small number of whetstones and whorls and the complete absence of items such as pot lids, a stone tool type represented elsewhere in Perth and Kinross, including at Dalnagar and Aldclune (Stewart 1962: 144; Cool 1997: 443, illus 20, no 56), is also notable and is likely to be due, in part, to chronological factors (re whetstones, see Hunter 2009: 148).

Decoration

Decorative or personal objects amongst the assemblage are rare, a pattern typical of Iron Age stone assemblages (Hunter 2009: 141). A single bead is the only ornament recognised amongst the worked stone, and the small number of gaming pieces or counters are rare non-utilitarian items. These pieces or counters complement the small clay balls (McLaren, *supra*) found in Trench C, and also recognised among the antiquarian assemblage from Castle Law, Abernethy (McLaren, *infra*).

Items of decoration were limited to the cup-marked slabs, all of which were built into Wall E or the wall of the monumental roundhouse, and represent much earlier activity appropriated from elsewhere and brought to site. The original location and provenance of these stones is unknown, but the largest (SFC019), with the most detailed and comprehensive decorative scheme, appears to have been cleaved from the rounded and weathered face of an outcrop or large glacial erratic boulder, perhaps from further downslope towards the base of Moncreiffe Hill where a suite of early prehistoric monuments and other cup-marked rocks are known (Stewart 1985). During excavation of the henge and stone circle there in 1974, a large cup-marked slab was found, one face covered by at least

18 individual cupmarks (Stewart 1985: illus 13a). It was suspected by the excavator that the slab had been moved in the recent past and was not found in its original position, suggesting that it may not have had any original association with the monument (Stewart 1985: 135). It was also noted during the fieldwork in the 1970s that a slab bearing a complex pattern of cup-and-ring marks had been built into the walls of a ruined summerhouse to the east of Moncreiffe House (Stewart 1985: 136, illus 13c), the design of which brings to mind SFC019 from the current excavations. Cup-marked stones, including those with cup-and-ring markings, are widely distributed across Perth and Kinross, for which earlier considerations on distribution patterns and design variation are valuably summarised by Dixon (1922), Stewart (1959, Fig 3) and Hale (2003).

Re-use of cup-marked slabs

Appropriation of cup-marked stones and their re-use in Iron Age structures is well attested across eastern and central Scotland and a few examples illustrate the range of structures and locations where they have been encountered: at Law of Dumbuils fort, where a cup-marked stone was found in association with a hollow way (Poller 2010: 15–16, fig 18); at Newmills (Watkins 1980: 171) built into a souterrain, a pattern seen widely across lowland eastern Scotland (Hingley 1992: 29); at Aldlune, Blair Atholl, again used as building stones (Hingley *et al.* 1997: 451–2); at Hurlly Hawkin, Angus, where a cup-and-ring marked slab was re-used as paving at the entrance to a possible chamber within the broch wall (Henshall 1982: 236, no. 71); and at Knowes, East Lothian, where a fragment of a cup-marked stone had been modified and made into a knocking stone (Hunter 2009: 141).

At Moredun, in most instances the dressing of cup-marked blocks respected the earlier decoration. Most form substantial, but easily portable blocks (e.g. SFA034), though this is not the case for SFC019, which is noticeably larger than most of the other blocks used and has been scalped from a weathered outcrop or glacial erratic, the fractures cutting through existing decorative elements. It may be that the damage was accidental and the original intention was to cleave the whole decorated panel in one piece. If so, the quarriers failed, but it may be that they were more pragmatic in their approach, simply breaking the panel into a convenient size, and perhaps transporting the rest of it separately for use elsewhere in the structure. Whether this collection and repurposing of earlier material culture was a deliberate act of veneration or desecration is difficult to establish from the available evidence, but consideration of other examples is useful. The re-used cup-marked stone at Knowes, was considered ‘unlikely to have been accidental or unnoticed, and such a creative referencing or re-use

of antique items is increasingly recognised in the Iron Age' (Hunter 2009: 141). Conversely, at Moredun the incorporation of cup-marked slabs in the walls of the monumental roundhouse suggest that if this was a deliberate choice to include and re-use them, then it was equally deliberate that their decoration should be hidden. This is perhaps supported by the concentration of cup-marked stones incorporated into its wall, coupled with their general absence from other contexts across the site. The fact that all of the cup-marked surfaces were laid with their decorated faces upwards, however, indicates that the principles structuring their re-use may have been very different from those found in some other structures. In many souterrains, for example, highly decorated boulders are quite often displayed almost ostentatiously in the wall-faces, albeit in the dark of a subterranean passage, whereas here at Moredun, once built into the monumental roundhouse they would not have been visible: perhaps transforming a mark intended for observation and display into one hidden from view was an important act of concealment (Bradley and Phillips 2008). This process of removing symbolically-rich objects from the landscape may have been enacted as a deliberate mechanism to sever the present from the past, or to claim an ancestral object to legitimise the use of the territory, or as an act of veneration, the incorporation of these objects of a time past within new structures imbuing them with apotropaic properties (Bradley 1992: 175). Hingley's consideration of later prehistoric re-use of Neolithic monuments refutes the notion of the re-use of earlier materials as an act of desecration or intentional destruction (1996: 341). Rather this is seen as an attempt to redefine the tradition of past constructions and identities, referencing ancestral concepts and cosmologies, but framed and re-interpreted within an Iron Age cultural landscape.

The cup-marked stones at Aldclune were argued as a deliberate appropriation within Iron Age structures, and it was noted that they tended to be used in peripheral contexts, associated with the palisade and enclosures, and that while quernstones were also re-

used in a similar way, the distribution of cup-marked stones and quernstones was almost mutually exclusive (Hingley *et al.* 1997: 452). This could be argued to strengthen the established view that re-use of such objects was patterned, structured, and influenced by factors extending beyond practical concerns for suitable building material (Hingley 1992). The presence of re-used saddle querns and rubbing stones alongside cup-marked slabs in the walls of buildings at Moredun may display a slight variation of the mechanisms for selection and inclusion to that seen at Aldclune, but certainly demonstrates an awareness of wider cultural practices involving the re-use of earlier material culture across the region and beyond.

In conclusion, the Moredun stone assemblage is both diverse and informative, with most of it being consistent within a broad Iron Age framework, but little of which is more diagnostic. The stone artefacts when considered as a group, complement evidence gleaned from other artefact types from the site, attesting to various craft activities, such as shale bangle manufacture, metal-working, hide-processing and textile production, as well as more prosaic tasks such as the grinding of grain.

4.10 The wooden bowl and other waterlogged wood

Anne Crone

A notable discovery was the remains of a plate metal repair (SFC060; McLaren, *supra*) found attached to a very small portion of a wooden vessel (Figure 4.6). A strip of copper alloy plate 14 mm wide was bent over the rim, leaving a length of c. 19 mm on either side. It has been secured in place by a single rivet towards the base of the plate, which penetrates the wall of the vessel. The wood of the vessel survives within the bent plate; it has been fashioned from alder (*Alnus glutinosa*). The grain of the wood lies parallel with the top of the rim; this is consistent with the grain alignment found in both lathe-turned and carved vessels. The vessel wall is slightly curved and on the assumption that the rivet head would have been on the outer face the vessel thus

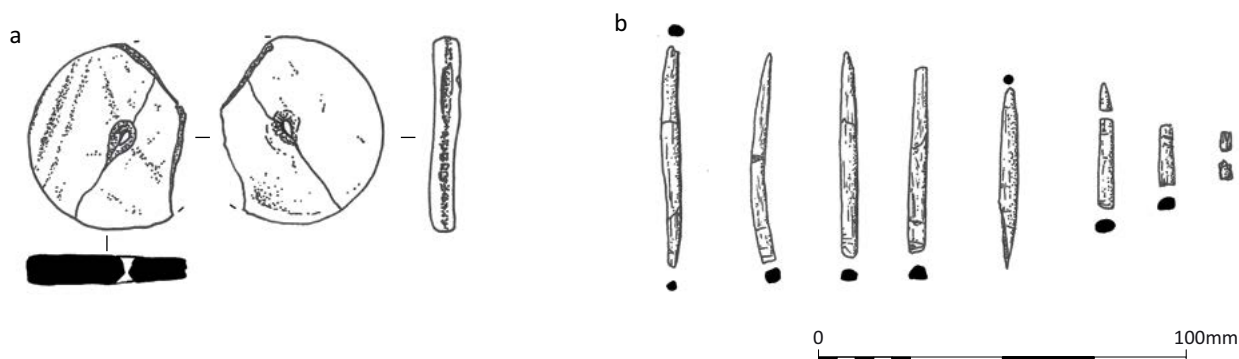


Figure 4.36: Objects of worked bone: a) perforated bone roundel (SF132), b) set of bone points (SFC012).



Figure 4.37: The worked bone roundel post-conservation (SF132).



Figure 4.38: Detail of the wear observed on the tip of the bone points.

curved inwards. The vessel is 5 mm thick throughout and the rim has a simple rounded profile. There is a crack at one corner of the exposed wood but it is not visible at the rim; this may be the damage that the plate was intended to repair. Not enough of the wooden bowl rim survives to enable an estimate to be made of its original dimensions.

The bowl fragment was recovered from amongst flat stones [C028] overlying the bedrock in front of the entrance of the monumental roundhouse in Trench C.

Elsewhere on site, small quantities of waterlogged wood (SFD009) came from the fill [D112] of a rock-cut feature thought to be the remains of a cistern [D111]. The assemblage consisted primarily of unworked roundwood (ten fragments) varying in diameter from 4 mm to 25 mm. Of these, four pieces of roundwood displayed slashed ends; the end of one worked piece was also charred. There were also six offcuts or woodchips, one of which was also charred; the morphology of these woodchips suggests that they came from the trimming of roundwood stems.

4.11 The worked bone and antler

Fraser Hunter

Seven bone and antler items were recovered from the site: a perforated bone roundel (SF132; Figures 4.36a and 4.37) and a group of antler points (SFC012) (Figure 4.36b). The small assemblage has proved surprisingly difficult to interpret as their functions are not entirely clear.

It is easier to rule out options for the bone roundel's use than to propose them. The wear in its perforation is not predominantly rotary, so it was not used as a spinning toy, while the variable form of the perforation suggests it was not a bead (it would be rather clunky in any case); size and wear are inconsistent with use as a whorl. The wear is different on each side, suggesting some string

or wire moved within it which was more constrained on one side and freely mobile on the other. A likely solution is that a string passed through this and then split in two on the other side, with wear on one side from a knot to hold the roundel and on the other from the diverging yarn strands. This disc served as a spacer which restrained the string to prevent the split from spreading.

The set of six antler points were found in a cluster and are minor variations on a theme. All were knife-shaped, with butts trimmed square or nearly so, and the circular-sectioned tips polished and rounded from wear. The best-preserved shows circumferential ribbed use-wear (Figure 4.38). Two of the six were probably unfinished and certainly unused, so this was not a single functional set of items but represents varying stages of use.

The bone point with ribbed wear on its tip is an example of a type of point first identified at Cnip, where one was interpreted as a lyre peg (Hunter 2006: 147-8). This now seems less likely as more recent discoveries have revealed caches of items with related wear at High Pasture Cave and Fiskavaig, Skye (Hunter forthcoming; Cruickshanks and Hunter in prep). The High Pasture Cave examples (of earlier Iron Age date) were found in two caches of seven pins, all showing similar wear, which suggests they may have been used in groups of seven. The Fiskavaig finds (Roman Iron Age in date) comprised a cache of 24 items in varying stages from unfinished to heavily worn and broken; there were also two unassociated finds from the site, and similar wear has been noted on a point from Kilellan, Islay (Ritchie 2005: 146, fig 92/10). It is likely that this was a widespread type, which has simply not been noted before, and further examples may survive in existing collections. Where identified, the material was antler.

What was their function? Their discovery in caches suggests they were used in groups; spares were kept to hand, so use-breakage was anticipated; antler is

a more robust choice of raw material than bone. The distinctive wear that shows something wrapped around the tip (but in a loop rather than a spiral, as the wear is circumferential), suggests a connection to textile or yarn. The presence of groups suggests some form of weaving, but the precise function remains unclear. The simple butts, varying in form, show no use-wear or damage from setting them into a frame or structure, nor any handling polish, so they may just have been set into the soft ground.

The Moredun assemblage is small and puzzling, and valuable. Worked bone and antler is very rare from central and southern Scotland owing to predominant soil conditions (this material survived because it was charred or burnt). These would once have been abundant raw materials: every fresh find serves to develop the picture and will ultimately allow better understanding of regional patterning and common types.

4.12 Discussion of the small finds assemblage

The artefact assemblage from Moredun is both large in scale and wide ranging in terms of the artefact types represented. In keeping with Iron Age sites in the region, the majority of the finds are associated with household activities and their associated equipment, as well as tools and products related to everyday craft processes. These provide a valuable avenue towards understanding aspects of day-to-day activities including procurement of resources and raw materials, food production, storage and consumption, as well as allowing insights into some object types or crafts that are poorly understood due to their rare survival in the archaeological record.

The most significant individual object uncovered during the excavations at Moredun is undoubtedly the decorated bronze pin, a massive cast bronze masterpiece incorporating in its design an elegant, stylised bird motif. This is a prestige item; one that would mark out the wearer as a person of means and influence in the community. As impressive as the pin looks today, in its original condition the pin would have been a striking sight to those that viewed it. Although now lost, the probable blood-red glass inlays in the wing lobes and eyes of the bird, as well as inset within the protruding disc, would have looked remarkable. As already noted, the pin is a miniature masterpiece of Celtic art that is unique in its design but can be readily placed within the panoply of decorative ring-headed pins known from Britain and Ireland. Elements of the design of the pin and its execution, particularly the stylised bird motif, are also paralleled in La Tène Plastic-style and can be seen to fit comfortably within the Torrs-Witham-Wandsworth decorative tradition. This allows the pin

to be considered within wider design and metal-work traditions, as well as affording an opportunity to reflect on the potential symbolism that undoubtedly lay behind the pin's design. We have no way of knowing whether the symbolism imbued in the design would have been recognised, understood or legitimised by the community at large but the decorative tradition it embodies resonates across the country and, as a result, would have identified the wearer as someone who enjoyed access to luxury goods and to a network of far-flung connections that lay beyond the walls of the fort. The surviving substantially intact condition of the pin is also of note, presenting the possibility that it may have been purposefully deposited, a scenario postulated for the circumstances of deposition of several other pins of this form and tradition found elsewhere.

Potential symbolic deposition of artefacts on the site can also be considered in the context of the various cup-marked stones and slabs that were found to be built into the walls of the monumental roundhouse and Wall E. It is unclear whether these earlier decorated stones were procured and incorporated into the structures as acts of veneration of ancient stones or of concealment of the same, but the act may be a testament to the community's desire to negotiate connections with the past and present via their physical environment. It has not been possible for the original locus or loci of these stones to be determined.

More prosaic objects provide evidence of the domestic activities carried out in and around the various structures uncovered during the excavation. Despite the limited quantities of hand-made ceramics found, these sherds all derive from large, thick-walled, and crudely-produced cooking and storage vessels. Only one has any traces of surface decoration and this takes the form of impressed lines of twisted plant fibres or sinew used to create a rather haphazard series of grooves up the profile of the vessel. Overall, the ceramics are utilitarian in form and technique of production. The quantity of pot sherds recovered suggests that ceramic vessels were only one component of a wider range of receptacles used in food production and storage, and this is confirmed by the rare survival of a rim fragment from a wooden bowl with a copper alloy sheet repair patch *in situ*. Food processing tools, in the form of saddle querns and rubbing stones used to grind grain into flour, are well attested within the assemblage but only one fragment of rotary quern was recognised. The large quantities of cobble tools present amongst the worked stone is unsurprising considering the date of activity represented by the excavated features and it is likely that at least some of these grinders and pounders saw use in pulverising, crushing and grinding down various foodstuffs and other materials, and performing other functions.

Items related to the internal fittings of the household and household equipment are rare at Moredun, but several hollowed stone lamps were found that would have been used to provide additional light beyond that provided by the central hearth. These are simple examples where a deep-based hollow has been pecked or gouged towards the centre of one face of a cobble to hold fat or oil to be used as fuel. A wick would be floated on top of the fuel, its position sometimes indicated by the halo of sooting that coats the rim of the hollow and upper edges of the stone. Only two strike-a-lights, stones used in conjunction with an iron pyrite or fire steel, were recognised amongst the assemblage but these both bear the strike marks that resulted in the stone being struck to create a spark to light a fire or lamp wick. A massive and extensively worn pivot stone was found near the entrance to the monumental roundhouse that displays multiple areas of wear. This provides an intriguing insight into the possible appearance of the monumental roundhouse prior to the fire event that engulfed it. Not only can we see a series of deep hollows in which the rounded base of a wooden door post would have pivoted but a bevelled groove has been worn along one long edge, presumably the result of repeated contact with the bottom edge of a wooden door. This latter feature is very rare.

Another remarkable component of the assemblage is the suite of roughouts, working waste and bangle fragments made from black organic stone, principally shale. Although fragments of shale and related black organic stone bangle are often encountered during excavation of Iron Age sites in Perth and Kinross, the evidence of production recognised at Moredun is a significant addition to our understanding of the scale of manufacture as well as providing insights into the popularity of ornaments of this material in the region. The entire *chaîne opératoire* (Figure 4.16) is present from crudely roughed out blanks to fragments of finished and worn bangles. A number of tools, namely a small iron chisel tip and two faceted grinding stones of fine sandstone, have been postulated here as possible implements that could have been used in the production of the ornaments, although this is not certain. Remarkably, two of the finished and worn bangle fragments display evidence of repair or reworking, testifying to the value placed on these personal ornaments and the desire to keep them in circulation for as long as possible. Elsewhere on site, items of personal ornament are rare with the bronze ring-headed pin, a single glass bead and a sandstone disc bead as notable exceptions.

As well as evidence for the working of shale within the hillfort, numerous other small-scale craft activities are demonstrated through the artefact assemblage. Stone

spindle whorls are not numerous but those present attest to the production of yarn for weaving and the remarkable series of tapering antler points found near the centre of the monumental roundhouse are also likely to be tools associated with the production of textiles. The working of skins and hides is also in evidence through the recovery of multiple cobble ‘smoother’s’ whose surfaces are stained from contact with the natural tannins released from the hides they were used to rub down. Stone working, although not large scale, is recognised in the form of at least one whorl roughout and crudely produced small stone discs.

The survival of iron objects amongst the assemblage is notable as iron is typically poorly preserved on sites of this date due to a tradition of recycling the valuable metal as well as the unfavourable conditions of Scottish soils that fail to promote the survival of iron well. This makes the proxy record in the form of worked bone and stone even more significant as the tool marks in evidence on these materials attest to long lost implements, likely common in the Iron Age but rarely surviving in the archaeological record. Knife cuts on the surfaces of the antler points, abrasion on the surfaces of whetstones from sharpening blade edges, and the sharpening grooves made during the shaping and finishing of points or pins, all contribute to filling in the gaps in our record of metal tool use. Despite the survival of iron objects at Moredun, few have been identified closely and many lack ready parallels. There is, however, evidence of iron-working on site in the form of an array of iron slags. These include micro-debris diagnostic of blacksmithing indicating that the repair or production of iron objects was undertaken on site, but this appears to be small in scale and the locus of this activity was not identified during the excavation. Clips of copper alloy sheet metal, globules and prills from the monumental roundhouse are suggestive of small pieces of scrap metal collected together for the purpose of recycling but no crucibles or moulds were found to confirm that copper alloy working was taking place on site.

4.13 Conclusions

All the strands of evidence presented from amongst the artefact assemblage offer a picture of a community with abundant access to local resources who were engaged in small-scale craft activities typical of the Middle Iron Age. The abundance and variety of the assemblage, however, stands out amongst contemporary sites in the region and the presence of remarkable objects such as the bronze ring-headed pin attest to a level of status and social connections rarely observed in this area of south-east Scotland.

5. Moredun: environmental evidence

David Strachan (ed.)

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5.1 Introduction

The following presents environmental evidence from Moredun fort and its immediate environs. Sections 5.2, 5.3 and 5.4 deal with evidence from the excavations presented in Chapter 3. Section 5.2 summarises the results of micromorphological analysis of Kubiena samples from soils below Wall E, and from possible floor and sub-floor deposits within the monumental roundhouse. Section 5.3 presents analysis of the charred macroplant, charcoal and animal bone assemblages. Section 5.4 reports on the discovery of a small quantity of burnt human bone during the excavation of the monumental roundhouse in Trench C. Section 5.5 then presents the results of palynological and sedimentological analysis of a small, unnamed pond immediately to the south-east of the fort, and while most relevant to Moredun, they also provide some insight into vegetation change across Moncreiffe Hill as a whole. Finally, section 5.6 considers aspects of the plant communities and land uses at and around Moredun based on the evidence presented in sections 5.3 and 5.5.

5.2 Soil micromorphology

Lynne Roy

Methodology

This section summarises the results of micromorphological analysis of two 8.0 x 6.0 cm Kubiena samples collected: one from soils below Wall E in Trench A and one from possible flooring deposits and sub-floor deposits within the monumental roundhouse in Trench C. Two further Kubiena samples from these trenches were assessed but discounted from further analysis.

Samples were prepared for analysis using the methods of Murphy (1986) at the University of Stirling in the Department of Biological and Environmental Sciences. Thin section description was conducted using the identification and quantification criteria set out by Bullock *et al.* (1985) and Stoops (2003; *et al.* 2010) with

reference to Mackenzie and Adams (1994) for rock and mineral identification. The coarse/fine threshold of 25 µm was used to differentiate both mineral and organic components. Plant remains were identified with reference to Fitzpatrick (1993), Schweingruber (1978), modern reference collections and with the assistance of archaeobotanist, Jackaline Robertson.

The analysis of samples from Trench A aimed to clarify site formation processes, and specifically the relationship between the natural [A135] and the overlying soil [A125] underlying wall E. Analysis of samples in Trench C aimed to clarify the formation processes within the various lens and deposits underlying the wall tumble within the monumental roundhouse. A full report including a detailed methodology, terminology and results is provided in the site archive.

When estimating abundance of fabric constituent the following terms (after Stops 2003: 49) have been used as percentages of area: very dominant (>70%); dominant (50–70%); frequent (30–50%); Common (15–30%); few (5–15%) and very few (<5%).

Results

General characteristics of the samples

The mineralogy of the sand grains, and lithology of the rock fragments, from both samples represent a soil parent material of sandy soils derived from glaciofluvial deposits overlying igneous rocks of the Ochil Volcanic Formation (Walker *et al.* 1982: 141–2) present over much of the surrounding area. The underlying geology is complex and reflected in the wide range of mineral grains identified, but no patterning or significant variation in mineral content was observed within either sample, and no erratics, introduced by human occupation, were identified.

Anthropic indicators include bone fragments, cellular wood charcoal, charred sediment and a vitreous slag fragment. Iron (Fe) and manganese (Mn) appear to have replaced organic material within localised areas across

the deposits. Chemical changes appear to be localised and perhaps reflect variations in the acidic, anaerobic and damp conditions required for them to occur. The greatest number of Fe/Mn accumulation indicators were observed within [A125] and are indicative of incipient podsol formation. Clay coatings and partial infillings of voids were noted across the samples, being most frequent in [A125], and are indicative of the mobilisation of clays throughout the sediment profile. Phytoliths (silica particles that are deposited in cells of plants), were present in both samples but were generally disarticulated and poorly preserved, preventing identification of type although their presence is generally indicative of grass vegetation.

A summary description and interpretation of the results is presented below by context number and according to stratigraphic sequence. Full details are available in the site archive. Units and contexts are described and discussed from the base-up in order of sediment deposition.

Trench A: Sample 2

Sample 2 was taken through soils underlying Wall E and was collected to investigate the formation of the soils pre-dating the construction of the rampart, and to establish whether there was evidence of occupation or activity in this area prior to construction of the rampart.

Context [A135]

Context [A135] is contained within the base of sample TR2A. When observed in thin section, this was found to consist of a single micro-stratigraphic unit with a massive to weakly developed channel and chamber microstructure. The coarse mineral fraction accounts for over 75% of the unit and is dominated by single quartz sand grains with few (5–15%) rock fragments. Coarse organic inclusions comprise very few (<5%) poorly preserved plant tissue fragments. Very few (<5%) internally amorphous black probable charred fragments are distributed throughout the matrix. Trace quantities of cellular charred material were also observed. This is a very compact deposit with porosity of <5%. Preservation of fresh organic plant matter is generally poor across the context and non-charred cellular organic material was only rarely observed. Identified pedofeatures include occasional moderately to strongly impregnated Fe/Mn nodules and occasional dusty silt to clay coatings, cappings, infillings, and intercalations (Figure 5.1A).

Fe/Mn pedofeatures and clay infilling to void

The lithology and mineralogical evidence are consistent with a natural deposit formed from the underlying

parent materials of glacial tills and sands. The micro fabric consists of rock fragments in a clay and silt fine matrix with common medium sand, containing silt cappings, silty orange clay void coatings, infillings and sandy fabric intercalations. The orange, silty clay cappings and void infillings likely result from the slow movement (translocation) of clay particles down the profile in solution under rainwater and may also be derived from freeze-thaw action affecting glacial tills in the Late Devensian. They are generally related to ‘undisturbed’ soil profiles. The dusty clay component suggests that this soil has witnessed some disturbance and mechanical mixing in the past but there is insufficient evidence to determine the nature or source of such disturbance. In soil horizon terms, context [A135] can be characterised as a B horizon. A low level of anthropic activity nearby is indicated by the inclusion of rare charcoal and a burnt seed, which may have blown into the context from the surrounding area during deposit formation.

Context [A125]

Context [A125] has a predominantly massive microstructure with very few (<5%) channels and chambers. Porosity is less than 15% but higher than in the underlying context. The mineral component comprises approximately 50% of the unit and is more diverse than in the underlying context, including several large rock fragments and mineral aggregates. Organic inclusions comprise few (5–15%), poorly-preserved plant tissue and organ fragments with cellular structure very rarely intact. Probable anthropic indicators include common micro charcoal distributed throughout the matrix and rare cellular charcoal. Pedofeatures include rare (1–2%) to occasional (2–5%) dusty silt and clay coatings to mineral grains and partial infillings and crescentic clay infillings (Figure 5.1B). Rare to occasional Fe/Mn nodules and accumulations were noted, decreasing in frequency upwards.

The micromorphological features observed provide evidence for soil formation processes and indicate that this is a buried soil context. The darker appearance of this context when compared with the underlying context (Figure 5.1C) is likely a consequence of incorporation of some minor inclusions of anthropic material such as fine charcoal, bone and plant tissue fragments. The identified different types of infill/coating pedofeatures may indicate disturbance. Such features are often cited as evidence of disturbance by digging (Adderley *et al.* 2010) and may be indicative of cultivation of the overlying soil. Clay coating features are explained by Jongerius (1983) as derived either by the clearance of vegetation from the site or cultivation exposing the soil surface to rain splash. No conclusive evidence for either process is evident within the sample although these features evidently formed prior

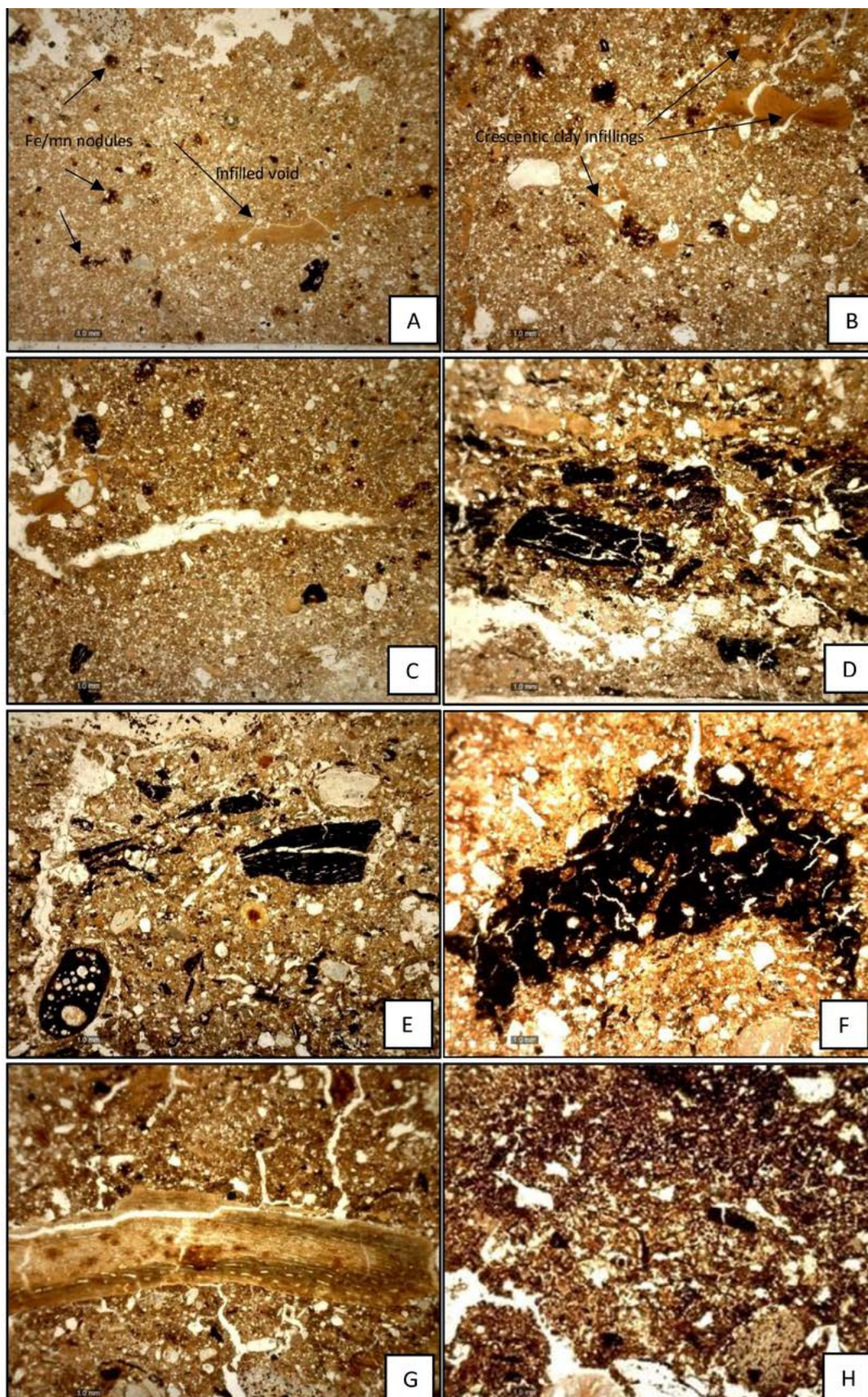


Figure 5.1: Photomicrographs in Plane Polarised Light (PPL): (A) Fe/mn pedofeatures and clay infilling to void; (B) Crescentic Clay infillings; (C) Boundary between underlying natural (A135) and buried soil (A125); (D) Charcoal layer within C029; (E) Mix of charred materials, vitreous slag and unburned plant material; (F) Charred peat fragment and burned reddened soil matrix; (G) Bone fragment (H) Pellicular microstructure dominated by faecal material.

to the construction of Wall E and may be indicative of preparation of the soil surface (levelling, digging, trampling) necessary for construction.

The context generally exhibits strong, fine, humic staining and impregnation with amorphous sesquioxides (or iron oxides and hydroxides) and indicates that [A125] may have been affected by podsolisation, a complex process of leaching of iron and other components of the soil which can be exacerbated by burial beneath archaeological monuments (Wilson *et al.* 2013). The low void space, iron and manganese nodular impregnation may thus be effects of burial. This context can be described as an altered (compressed) organic stained lower A soil horizon, with some incipient B subsoil horizon characteristics, especially oxidised iron enrichment (as described above), which becomes more pronounced with depth. The context has received intermixed low quantities of anthropic material, and within-soil illuviation of fines (silt and clay), probably the result of disturbance of the bare surface above.

Trench C: Sample A

This sample was taken through soils underlying the layers of rubble [C010] (2017 context) and [C012] that represent the tumbled walls of the monumental roundhouse. Various thin lens of heat-affected soils were found to overlie large, carbonised timbers. Amongst the lens of soil present, possible occupation layers [C019], [C032], and levelling deposits [C029] were noted. The aim of analysis was to investigate the process of soil formation to confirm on-site interpretations of possible floor levels and occupation deposits, and to better understand the formation of the sub-floor deposits.

Context [C029]

Context [C029] consists of two units located at the base of the sample. The lower unit has a complex, weakly-separated, sub-angular, blocky microstructure. The coarse mineral component accounts for approximately 50% of the unit and consists of sands and gravels dominated by quartz, but with feldspars, pyroxenes, biotite and olivine also present. Few (5–15%) angular and subangular gravel sized (3 to 75 mm) rock fragments were also observed. Rare bone fragments <500µm are distributed randomly throughout the matrix. The coarse organic component comprises 50% of the unit, which in turn comprises 50% charred material, much of which is concentrated within a 2 mm thick horizontally aligned band and intermixed with the groundmass (Figure 5.1D). The charred material is predominantly angular and internally amorphous although few (5–15%) cellular charcoal fragments were observed.

It was not possible to identify charcoal to species level owing to an absence of identifiable roundwood sections. However, numerous larger fragments were cut transversely and could be identified as ring porous hardwoods (after Schweingruber 1978) with rare examples of diffuse porous hardwoods also observed.

The upper unit has a weakly separated, sub-angular, blocky microstructure. While the distribution and composition of the coarse mineral material within the upper unit is similar to the underlying unit, the coarse mineral material accounts for a greater proportion of the overall unit (c. 10% higher than in the underlying). Bone fragments <1 mm are also more frequent than in the underlying layer and are distributed randomly throughout the matrix. A single rounded vitreous slag fragment (Figure 5.1E) measuring 1 x 4 mm was observed and provides further evidence for anthropic influence. Plant residues are rare in both units with organic matter largely consisting of amorphous reddish-brown clusters of material. A single, unburned, woody cross section was observed within the upper unit. Pedofeatures observed in both units include occasional dusty silt and clay coatings to mineral grains. Sample [C029] thus comprises a heterogeneous deposit with frequent evidence for anthropic activity.

Context [C029] was described during excavation as a loose, medium-brown soil. It was identified at the north-east edge of Trench C overlying an area where the underlying bedrock dips away at a steep angle. It was suggested as a redeposited natural deposit, as a means of levelling the ground surface (Chapter 3). In thin section, it consisted of two layers. The lower layer, rich in charcoal and exhibiting horizontal alignment of larger fragments of wood charcoal, was overlain by a mixed layer with frequent anthropogenic input in the form of charcoal, and both burnt and unburnt bone fragments. The micromorphological evidence therefore opposes this hypothesis. The context contains clear evidence for anthropic influence and evidence for mechanical mixing. Given its location, in an area assumed to have been artificially levelled, it may represent dumping of general waste material as a means of levelling the surface. The clustering/layering of coarse charred matter, which may have been caused by sweeping of hearth waste, was a feature noted by Miller *et al.* (2010) during their experimental work on micromorphological signatures of hearth features.

Context [C019]

Context [C019] is present within the centre of the sample and has a diffuse boundary with underlying [C029] and is distinguished by its redder hue, higher proportion of anthropic materials, including charred and uncharred bone, charcoal and charred sediment (Figures 5.1F–

G). It consists of a single unit and has a complex microstructure of 5–10% unaccommodated channels and irregular voids with undulating walls and locally weakly separated, sub-angular blocky microstructure. The context is dominated by amorphous reddish brown and blackened (charred) organic matter. Preservation of fresh organic plant matter is very poor across the context and non-charred cellular organic material was only rarely observed. Frequent silt, very fine sand and fine sand size black particles are probably comminuted charred particles. Observed pedofeatures were limited to rare brown typic *fe/mn* nodules (50–500 μm) and occasional dusty very dark brown to black coatings to mineral grains and voids.

Context [C019] was described during excavation as a mottled, spread of burnt, sandy soil within a mid-brown, loamy, dense soil featuring dark charcoal-rich patches and pockets. It was hypothesised as comprising the remains of burnt *in situ* floor deposit (Chapter 3). The ‘floor’ is perhaps more accurately described as a compacted occupation surface than a constructed floor. Such occupation surfaces are characterised micro-morphologically by the presence of anthropic remains burnt at different intensities, embedded within the sedimentary matrix with some indications of trampling, such as fragmented bone (Mallol *et al.* 2018). The accumulation of anthropic and soil material is suggestive of occupation on the surface of the underlying levelling deposit. Some indication of reworking is provided by channel and chamber voids which dissect charred material and indicate reworking by soil flora. Dusty clay-lined voids are indicative of some limited disturbance, while partially ash filled voids probably relate to ash-induced, charcoal disintegration.

Context [C032]

Context [C032] occupies the upper 25% of the sample and has a complex pellicular grain to inter-grain and locally crumb microstructure. The coarse organic component is dominated by fine to medium sand-sized quartz fragments, with only rare larger rock fragments and mineral aggregates. The layer is dominated by reddish brown amorphous organic material occasionally with cellular structure but more commonly heavily decomposed. The microstructure attests to the extensive post-depositional pedoturbation and most pedofeatures are excremental in origin. The patches of granular structure are a mixture dominantly of enchytraeid and earthworm excrement (Kooistra and Pullman 2010). Essentially this layer has been almost entirely reworked by soil meso and microfauna and is an excremental fabric.

Anthropogenic indicators are limited to few (5–15%) internally amorphous possible carbonised fragments.

The frequency of these decreases upwards although the presence of fine charcoal in voids and throughout the matrix attests to continued anthropogenic influence. Pedofeatures are largely excremental in origin with occasional *fe/mn* nodules also present. Context [C032] thus likely represents the general remains of occupation much altered and reworked by biological activity.

Context [C032] contains abundant evidence for intensive biological activity giving an increasingly pelletal structure towards the top of the profile (Figure 5.1H), indicating that the deposit was left open to the elements for sufficient time to allow partial reworking and homogenisation. Unfortunately, this period of time cannot be identified as it would depend on various complex factors, such as temperature, soil moisture and organic matter. This would, however, preclude the immediate burial of this deposit following the burning episode hypothesised in Chapter 3 and suggests that the wall did not immediately collapse onto this deposit.

Conclusions

Micromorphological study of the thin sections from Trench A have provided evidence for the development of a natural B subsoil horizon affected by soil illuviation, overlain by a lower A horizon which has received intermixed anthropic materials and provides evidence for human activity within the landscape prior to, or contemporary with, the construction of the wall.

Within Trench C, analysis indicates that the incorporation of charred materials into the lower surface is likely a consequence of mechanical mixing and is indicative of deliberate levelling and raking of the surface in advance of construction. Preservation of discrete layers within this levelling deposit and the overlying occupation surface indicates that the lower part of the sample has been subject to minimal post-depositional reworking by soil biota.

The sediments observed within the upper part of the sample sequence were evidently biologically active soils. They have been heavily reworked and in places consist of densely packed aggregates of excreted material separated by a network of channels (Courty *et al.* 1989: 142). Studies have indicated that complete soil reworking and a total loss of micromorphological features can be achieved within as little as 40, and certainly by 200 years (Davidson 2002; Davidson and Carter 1998). The ubiquitous presence of excrement of soil fauna are indicative of open conditions following deposition of this deposit which has allowed for the observed extensive reworking to occur and may represent a period of less intensive use of this area of the fort, and specifically the area of the monumental roundhouse prior to the collapse of its walls.

5.3 The environmental remains

Jackaline Robertson

The environmental remains consist of assemblages of charred macroplant, charcoal and fragmentary animal bone, collected in the field as hand-retrieved finds and extracted from soil samples during processing.

The macroplant and charcoal assemblages were large and generally well preserved. Their study has provided valuable information about the local plant resources exploited, as well as providing insights into wood species used as timber in association with the various structural elements exposed during the excavations. Of note, is the rich and varied assemblage recovered from the monumental roundhouse in Trench C. Excavation of this structure revealed evidence of a catastrophic fire with large amounts of carbonised ecofacts and debris associated with the superstructure and daily life covering the entire floor as described in Chapter 3. In contrast, the animal bone from throughout the site was poorly preserved, and despite the quantity of bone recovered, most fragments were small and fractured, and a large proportion were burnt, limiting the number of individual fragments that could be identified with confidence. The summary of the analysis presented is based on the full details of the methodology used in the analysis of the macroplant, charcoal and animal bone assemblages, as well as detailed catalogues, within the site archive.

Results

The macroplant assemblage

The carbonised macroplant assemblage was recovered from 57 contexts. Preservation ranged from poor to excellent, though most were described as adequate to good. The assemblage was large with 1672 remains identified. The plant taxa were composed of four distinct categories; cultivated cereals, wild foods, building materials and weeds. The dominant groups were cereal and building materials, followed by much smaller numbers of weeds and wild foods.

The 766 cereal remains were composed of a mix of caryopses, spikelet forks and nodes recovered from 47 contexts. The species were hulled barley (*Hordeum vulgare* L), naked barley (*Hordeum var Nudum*), barley (*Hordeum* sp), emmer (*Triticum dicoccum* L), emmer/spelt (*T dicoccum/spelta*) and oat (*Avena* sp). Cereal nodes accounted for 52% of this group. The dominant cereal species was barley (12%), followed by more limited quantities of emmer/spelt (5%), wheat (5%), hulled barley (3%), oat (2%), emmer (1%) and a single naked barley caryopsis. The remaining cereal caryopses (20%) could not be identified further due to poor preservation.

The cereal remains were concentrated within four contexts, all deriving from Trench C; [C016B], [C016F] [C016J] and [C016N] collected as grid samples from a concentration of burnt materials thought to represent the collapsed roof of the monumental roundhouse. The rest of the cereal assemblage was scattered throughout the remaining 43 contexts in relatively small numbers with no evidence of deliberate or selective disposal. These remains are representative of food debris and building material. A large number of cereal nodes concentrated within four contexts – [C016B], [C016F], [C106N] and [C016J] – are the remnants of thatching material within the monumental roundhouse that collapsed during the catastrophic burning event.

Nuts and fruits may have been collected as an additional source of food and were identified as hazel (*Corylus avellana* L) and blackthorn (*Prunus spinosa* L). A total of 48 hazelnut shell fragments were scattered in 16 contexts – [A029], [A030], [A113], [A114], [A116], [A128], [A134], [B008], [B011], [B012], [C016B], [D001], [D113], [D116], [217] and [600] – described as roof, floor, hearth, occupation surfaces, rampart/wall and topsoil, with no evidence of selective or deliberate disposal. The two blackthorn stones were recovered from occupation deposits [A029] and [A114].

The weed assemblage totalled 843 remains recovered from 26 contexts. The species were wide ranging but dominated by sedge (*Carex* sp), which accounted for 50% of the assemblage, followed by 16% hemp nettle (*Galeopsis Subgenus Galeopsis*) and 14% black bindweed (*Fallopia convolvulus* L). The weed taxa (756 remains) were concentrated within five contexts – described as interface [C013/16] and collapsed burnt roofing material [C016B], [C016F], [C016J] and [C016N] – in the interior of the monumental roundhouse in Trench C. The sedge and weeds collected from these deposits were inclusions with the thatch.

The remainder of the weed species are scattered across the site in small numbers with no evidence of deliberate or selective disposal. These weed plants are composed of a mix of agricultural contaminants, waste ground plants and potential building materials deriving from a range of habitats and soil conditions. For example, orache (*Atriplex* sp), black bindweed (*Fallopia convolvulus* L), mustard/charlock (*Brassica/sinapis* sp), fat hen (*Chenopodium album* L), sheep's sorrel (*Rumex acetosella* L) and dock (*Rumex* sp) normally favour acidic soils and grow alongside main crops as a weed, while sedge (*Carex curta* L), pondweed (*Potamogeton* sp) and buttercup (*Ranunculus* sp) normally favour damper conditions.

Plants identified as potential building materials include both cultivated cereal remains and specific weed taxa and were concentrated within contexts [C016B], [C016F], [C016J] and [C016N] in Trench C. They included both

cereal straw and sedge remains, which appear to have been combined to create thatch to roof the structure. During excavation, the remnants of burnt turves were noted in [C016], but further analysis confirmed this was thatch constructed using cereal straw and sedge grass.

The charcoal assemblage

This large assemblage weighed 3.9 kg in total and was recovered from 102 contexts, and the 1040 fragments were identified to species. The dominant species was alder (*Alnus glutinosa* L), which formed 44% of the assemblage, followed by oak (*Quercus* sp) (24%), hazel (*Corylus avellana* L) (20%), birch (*Betula* sp) (5%), apple/pear/hawthorn/rowan (*Maloideae/Sorbus* sp) (4%), ash (*Fraxinus* sp) (1%), cherry (*Prunus* sp) (1%), heather (*Calluna vulgaris* L) (0.5%), willow (*Salix* sp) (0.2%), pine (*Pinus* sp) (0.2%) and blackthorn (*Prunus spinosa* L) (0.1%). Roundwood fragments belonging to all species accounted for 24% of the total charcoal assemblage and were concentrated within 17 contexts associated with the catastrophic burning event and monumental roundhouse A. All of these contained possible structural elements, such as timbers, planks and roof supports. The remaining 85 contexts were found to contain much smaller quantities of structural elements, and/or fuel debris.

The bone assemblage

A total of 4748 fragments (3.1 kg) was collected as both hand-retrieved finds and from the bulk samples (Table 5.1). The bone was poorly preserved due to acidic soil, weathering and exposure to heat (74%). Those fragments which could be identified to both element and species were dominated by teeth and even these were poorly preserved. The minimum number of individuals (MNI) present were two cattle, two sheep/goat and two pigs. The bone was scattered throughout the site with no evidence of either deliberate or selective disposal of remains. These fragments are primarily representative of food waste.

Discussion

Cereal

The cereal remains at the fort have been derived from a range of activities: cooking debris; domestic cleaning refuse; thatch material; and small-scale processing waste. The presence of cereal caryopses, chaff and straw nodes perhaps suggests that crops were grown nearby with both the caryopses and straw transported to the fort to provide food, animal feed, roofing and flooring material. It is also possible that additional cereals were imported from outside the immediate area if suitable land for cultivation was not available.

Table 5.1: A summary of the bone assemblage showing the Number of Identified Specimens (NISP) and the minimum number of individuals (MNI).

Species	NISP	MNI
Cattle	454	2
Sheep/goat	23	2
Pig	28	2
Rodent	2	N/A
Large mammal	1155	N/A
Medium mammal	73	N/A
Small mammal	13	N/A
Indeterminate mammal	3000	N/A
Total	4748	6

It is unclear which species was the more commonly used, but it is likely that hulled barley had a significant role given the environment and growing conditions prevalent in this region during the Iron Age. Many of the barley caryopses could not be identified to species due to poor preservation but they are probably of the hulled variety. The importance of hulled barley in many Scottish sites in the Lothians and in the north of Scotland has previously been recorded at Fishers Road, Port Seton (Miller *et al.* 2000: 46), Clachtoll Broch, Assynt (Robertson 2022a), Seafield, Inverness (Pelling 2011: 31) and Kintore, Aberdeenshire (Holden 2000: 58). This is because hulled barley is more tolerant and better able to thrive in the soil and climate conditions that existed in many regions of Iron Age Scotland than other crop species (Dickson and Dickson 2000: 233). This broad geographical coverage confirms that barley was an important crop across Scotland.

The presence of emmer/spelt indicates that the population had access to a range of cereal species, although the proportion of this crop amongst the assemblage suggests that these potentially had a less significant dietary role than hulled barley. It is possible if emmer/spelt was not cultivated locally it may have been obtained from other nearby settlements. Certainly, there is evidence in the south-west of Scotland that many of these sites adopted a more varied approach to crop husbandry and cultivated a variety of cereals (Robertson forthcoming a).

The role of oats and naked barley at the site is more difficult to understand. It was not possible to determine if the oat was wild or cultivated, as no florets were recovered, and it is possible oats had a minor dietary role or alternatively that it was a weed within the hulled barley and emmer crops. The recovery of a single, naked barley caryopsis indicates that this species was no more than a contaminant.

The fort population had access to a variety of crops that included hulled barley along with emmer/spelt wheat and potentially oats. This suggests the fort may have been able to access similar agricultural resources as enjoyed by the settlements in the south-west of Scotland located in Dumfries and Galloway, including Black Loch of Myrton (Robertson forthcoming a), Cults Loch (Robertson 2018), Dorman's Island (Robertson 2011: 87), Fox Plantation (Alldritt 2000: 40), Upperclench Annandale (Scaife and Clapham 1993: 66), Carronbridge (Boardman 1994: 270) and Rispaun Camp (Haggarty and Haggarty 1983: 37). Many of the south-west settlements adopted a varied approach to arable farming by cultivating a wide range of cereals. If the land directly surrounding the fort was not suitable for cultivating this wide range of cereal species the population were still able to access this resource through potential links with nearby settlements. The benefit of also exploiting multiple crop species is that if one should fail the population still has access to another food resource.

The large number of cereal-sized culm bases within contexts [C016B], [C016F], [C016J] and [C016N] suggests the cereal was harvested low or pulled intact from the ground (Bond 2007: 204; Smith 1999: 332). The straw would have been an excellent source of thatch and animal feed but could also have been used to make other items, such as baskets and ropes (Bond 2007: 204). The large numbers of cereal culms mixed with weeds indicates some of this material was used as thatch within the monumental roundhouse. When the straw was gathered low to the ground it invariably resulted in arable weeds becoming tangled within the stems and these were not removed prior to the material being turned into thatch. The weeds may also have been deliberately left within the thatch to provide additional building material and insulation.

There is no evidence that unprocessed grain was stored at the fort in any significant quantity or that grains were stored separately according to species. It is more likely the crops were threshed, raked, winnowed, sieved, and dried at a separate location that had adequate ventilation with only the processed grain and separated straw transported to the fort (Hillman 1981: 132–133). Processing grain typically generates significant quantities of dust and requires adequate floor space. For this reason, crops were either processed

outside in a breeze or in a building with multiple doors or air vents to create an artificial cross breeze (Smith 1999: 332). There is no evidence to suggest any of the structures at the fort were adapted to process or store large quantities of grain; although of course only a small sample of the interior was investigated.

A small number of cereal chaff was noted within the assemblage but not in the quantities to suggest that processing of grain occurred on a large or significant scale. This is not to argue that small-scale processing of grain did not occur at the fort. It is possible the occupants may on occasion have processed grain as and when needed, as occurred at other Iron Age sites, such as at Black Loch of Myrton (Robertson forthcoming a). Small-scale processing would normally occur either outside or in a well-ventilated structure. The emmer chaff fragments were dispersed among three contexts in the monumental roundhouse [C013/16], [C016B] and [C016F]. It is possible these were used as thatching but could also be the remnants of small-scale processing that took place in close proximity to the hearth, which would have provided light and heat in this structure. It was also commonplace for processed chaff to be recycled as a fuel material or disposed of within hearths.

It might be speculated that some of the grain recovered from the roof deposits within the monumental roundhouse may originally have been crops left out to dry, as if damp they will spoil and become inedible. It is not uncommon for cereal to be dried in a container sometimes attached to the roof rafters above a hearth or fire (Smith 1999, 332). Within the monumental roundhouse the cereal remains were concentrated within the collapsed roofing deposits and could be remnants from dried crops. However the idea that this grain was left out to dry, can perhaps be ruled out, if only because the cereal was not numerous enough. Nor is it likely this area was used for storage as rather than a large concentration of a single cereal, there was a random mix of species scattered around these deposits. Instead, the caryopses were either residual food debris trampled piecemeal into the floor or were accidental components of the thatch roofing material. The roofing deposits in which the cereal was concentrated also contained the largest quantity of thatch material composed of straw culms, sedge and weeds.

Wild food

Hazelnut shells are a common find at most Scottish prehistoric sites. The nuts if not eaten raw can be roasted and the shells recycled as a kindling material or disposed of in fires during cleaning of occupation surfaces (Bishop *et al.* 2009). Thus the shells at Moredun may be the remnants of discarded domestic food waste, but are unlikely to represent large-scale food

processing, storage or roasting of large caches (Bishop 2019). Hazel wood was also used at the fort for fuel and building material so probably grew relatively near, making the nuts an easily exploited seasonal and nutritional food source.

Blackthorn may have grown near the plateau or was collected from the lowland. The fruits and wood were probably gathered for both food and fuel. The fruits, while edible, are bitter, but do become more palatable if dried (Dickson and Dickson 2000: 281). Blackthorn has also been used to treat a variety of medical conditions, including asthma, scabies and sore throats, but given the small size of this assemblage it is unclear if this species was employed as a medicine (Dickson and Dickson 2000: 281). It is also possible that blackthorn was brought to the site to form thorny barriers to be used in conjunction with the series of encircling ramparts.

Weed taxa

The weed species were a mix of agricultural and waste ground species, favouring a range of habitats such as acidic and/or damp soil conditions. Some of these plants, such as fat hen orache and black bindweed could have been collected as both human and animal feed, especially in times of famine, but there is no evidence these species were used primarily as a food source. Rather, the concentration of various weeds, such as black bindweed and hemp nettle within contexts [113], [C013/16], [C016B], [C016F], [C016J] and [C016N], suggest they were imported alongside the straw, having grown among the main crops as agricultural contaminants. Their recovery from contexts [C016], thought to be the remains of the collapsed charred roof of the monumental roundhouse in Trench C, indicates they were inclusions within the thatch material used to roof the structure. The large number of cereal nodes demonstrates that the crops were harvested low to the ground and this would have resulted in agricultural weeds being collected alongside the straw. In contrast, the large quantity of sedge within this same context implies this species was deliberately used as thatching material alongside the straw.

The charcoal

The charcoal assemblage was extensive and significant concentrations are described below by trench and context. Wood species such as oak, alder and hazel appear to have been deliberately selected for construction. The larger structural elements were mostly formed of oak. This species was preferred for construction due to its strength and durability, although there is some evidence that alder and hazel were also used to provide building material, but on a

much smaller scale. Alder, hazel and in all likelihood birch, willow and cherry were used to construct smaller structural elements such as wattle screens. Heather (*Calluna vulgaris* L), which formed a minor component of the assemblage, was probably derived from turves used for fuel and perhaps building materials, including flooring and roofing sections.

The tree species recovered are all native to Scotland. Alder, birch and willow normally favour more damp habitats. Hazel, ash, blackthorn and cherry are found in hedgerows, scrub and woodland. Oak will grow wherever the soil and climate will allow. Pine is adaptable to surviving in poor soil conditions not normally favourable for other species. Heather grows in heaths, moors, bogs and open woodland (Linford 2009; Martynoga 2012).

The large variety of wood species indicates that the habitat surrounding the hillfort was formed of both woodland and open landscapes. The dominance of alder, oak and hazel within this assemblage could be because these trees grew nearby and were easily accessed or they were deliberately selected as the preferential material for providing building and fuel resources. The more minor role of birch, apple/pear/hawthorn/rowan, ash, cherry, heather, willow, pine and blackthorn may have been because these species perhaps did not grow in the immediate vicinity, were more difficult to access, or that the community simply preferred alder, oak and hazel. Heather was noted in two roof deposits [113] and [C016]. It was speculated that turves were used as a construction material at the fort, and certainly at both Clachtoll Broch (Robertson 2022a: 232) and at Black Loch of Myrton (Robertson forthcoming a) this was a vital resource used in creating flooring, roofing and for fuel. At Moredun, turves seem to have had a much more minor role with other plant resources used instead. This may be because peat was difficult to access or transport to the hilltop.

Trench 1/C: the monumental roundhouse

There was extensive evidence that the monumental roundhouse had been burnt down. Throughout the excavation, poorly preserved concentrations of charred wood were encountered, thought to represent the remains of burnt timber structural elements of the roundhouse, including roofing timbers and possible floor or sub-floor planks. The charcoal assemblage was concentrated in context [118] from which 1045.8 kg of fragments were recovered. This sample was identified as large fragments of alder (25%) and hazel (75%).

Context [C013/016] is described as the interface between a destruction layer inside the structure [C013] and the collapsed burnt roof [C016] and consisted of

74.3 g of charcoal. This was identified as a mix of alder (30%), hazel (30%) and oak (20%). It is possible that these remains have derived from multiple sources; the alder and hazel could have been used to construct a wattle screen, whereas the oak was likely a structural timber.

A total of 672.3 g of charcoal was recovered from contexts [C016B], [C016D], [C016F], [C016J], [C016L], [C016 N] and [C016P] identified as the collapsed roofing material for the roundhouse. The species identified were alder (12%), hazel (36%), heather (2%) and oak (47%), which were spread among these seven grid samples. The alder and hazel appear to have formed part of the roof framework to support the thatch material, whereas the oak was probably part of the roundhouse's internal upright structural timbers. Roof timbers from [C009], [C015], [C018] were all identified as oak (113.3 g), (27.8 g) and (44.8 g) respectively. This material was composed of large fragments, and notably these were vitrified, indicating the temperature was particularly high at this location when this material was burnt.

Context [C019] had 43.7 g of charcoal identified as alder (72%) and hazel (28%). It was described as burnt *in situ* floor material and these remains appear to be either the residue of a wattle screen or possible planks.

Deposit [C020] was collected directly from the hearth and included 47.2 g of alder (10%) and hazel roundwood (90%), which are interpreted as residual fuel debris, however the presence of hazel roundwood suggests that part of a wattle screen or similar may have been recycled as fuel to be burnt on the hearth.

A series of internal timbers were noted within contexts [C022], [C023] and [C026]. Context [C022] was composed of 125.8 g of alder described as possible *in situ* floor planks. The charcoal (11.4 g) from [C023] was a mix of both alder (80%) and hazel (20%). These remains could be planks or part of a mixed species wattle screen. A small number of the fragments from [C023] were worked and were probably part of floor planks burnt *in situ*. The charcoal from [C016] totalled 77.1 g of alder and hazel. These fragments were noticeably large and have probably originated from the floor planks that were destroyed *in situ* during the burning of the roundhouse.

Context [C028], described as entrance rubble, contained charcoal identified as 17.6 g of alder, which appears to have derived from a timber burnt *in situ*.

Trench 2

Context [215], overlain by Rampart B, had 24.5 g of charcoal identified as cherry (45%), alder (20%), birch (15%), oak (15%) and hazel (5%), and may be the vestiges of structural elements, such as a wooden framework or revetment.

Context [225], a deposit pre-dating Rampart C, contained 59.5 g of charcoal identified as alder (79%) and hazel (21%) and may have derived from two separate posts or stakes which were burnt *in situ*.

Trench 4

Context [422] was formed entirely of large fragments of oak (12.9 g) which are part of a burnt timber identified in a buried ground surface [420].

Trench D

Evidence of worked wood was noted in the fill [D112] of the rock-cut cistern (Chapter 3 and Chapter 4.10). The charcoal (21.9 g) was identified as hazel (70%), willow (10%) and oak (20%), and one hazel fragment had a cut mark.

Trench E

An alder timber [E006] (28.5 g) from the top of the lower layer of Wall E is believed to represent the reuse of material. A series of burnt timbers totalling 116 g were noted in the collapsed monumental roundhouse [E026] and identified as alder (60%) hazel (10%), ash (20%) and apple/pear/hawthorn/rowan (10%).

Context [E027/017] was described as an original ground surface underlying Wall E and 413 g of alder charcoal was recovered, which appear to have derived from a timber burnt *in-situ*.

The bone

The animal bone is so poorly preserved that little information could be obtained from the majority of the fragments.

Cattle

Cattle bones (454 fragments; 30% burnt) were found scattered throughout 58 contexts, including the soils of the ramparts and other floor and structure deposits. There was no evidence of selective or deliberate disposal of any of these, and instead they probably derived from butchery, cooking and cleaning waste, disposed of in midden deposits that had been later re-worked and re-distributed across the site. The identifiable elements were dominated by loose teeth (433 fragments) amongst smaller quantities of skull, scapula and long bone fragments. A minimum number (MNI) of two cattle is represented by these fragments, both of which were older than three years old at time of death. While this is a very small dataset it suggests these animals were first exploited for secondary products such as milk and traction, and then later slaughtered for their meat and skin.

Sheep/goat

Sheep/goat bones (23 fragments) were recovered from ten contexts, providing little evidence of deliberate or selective disposal. The fragments were dominated by teeth (21 fragments) but two calcanei were also present, one fused and the other unfused. This implies a MNI of two animals and provides an age of death for one individual as younger than three years, and another older than two. There was no evidence of butchery marks or pathologies.

Pig

A total of 28 fragments were identified as pig bone and these were found scattered throughout 13 contexts. The pig bones were dominated by loose teeth fragments alongside smaller numbers of mandibles, scapula, long bones and foot bones. Examination of MNI revealed the presence of two individuals. Examination of epiphyseal fusion suggests both these animals died between the ages of one and two years, and the analysis of tooth eruption and wear indicates that at least one individual died between 17–22 months.

Rodent

Rodent teeth and a vertebra were recovered from two contexts (113 and A125), one of which (A125) was described as an old ground surface. It is possible the rodent bones are intrusive.

Large, medium and small mammals

The remainder of the assemblage was poorly preserved and was dominated by long bone shafts, ribs, vertebrae and small fragments which could not be identified to element. Most of the fragments (80%) had either been partly charred or were fully calcified.

Conclusions from the ecofacts

The three ecofact assemblages collected from Moredun are all typical of a Scottish Iron Age fort located in the south-east of Scotland. The population living at this fort had access to a wide range of plant and animal resources which they were able to exploit for food, fuel and building. The plant remains, charcoal and animal bone accumulated through distinct taphonomic pathways. The ecofacts accumulated from the small-scale disposal of domestic food, fuel and structural debris and from the *in situ* burning of the monumental roundhouse and other features.

The plant diet at the fort was composed of both cultivated crops and wild food resources. The populace had access to a range of cereals, nuts and fruits. The

crops could have been grown locally or imported from other settlements as and when required. It appears that the bulk of the cereal was processed in a separate location with only some occasional small-scale processing taking place on site. The cereals remains transported to the fort were composed of the caryopses and straw with both having an important role. Many of the weeds appear to have been inclusions within the straw and sedge and were probably introduced to the site as a by-product of the thatch.

The charcoal assemblage contained structural remains such as timbers, planks, wattle screens and fuel residue. The tree species are all native to Scotland but there was a clear preference for alder, oak and hazel within this community. This could be because these species were more accessible in the surrounding landscape or were the preferred choice for the people living here. The other wood species had a much more marginal role and were collected on an *ad hoc* basis.

While the animal bone assemblage was small and poorly preserved it was still possible to identify the three main domesticates, cattle, sheep/goat and pig. These three species are all common finds at most Iron Age sites, but which species was the more important to this community if any is impossible to identify. The cattle and sheep/goat were probably exploited first for their secondary products such as milk, wool, traction and transport. These animals would later be slaughtered with beef, lamb/mutton and pork forming part of the diet.

5.4 The human remains

Rebecca Watts with a contribution on radiocarbon dating by Dawn McLaren

Introduction

An unexpected discovery of a small quantity of burnt human bone was made during the excavation of the monumental roundhouse in Trench C. These remains (SF29) were heavily fragmented and incomplete but were found amongst the burnt soils underlying the tumbled stones of the collapsed structure and from the deposits within the interior, contexts [C013, C014, C017, C018, C020, C029 and C033]. A full osteological analysis was undertaken on the burnt bone with the aim of confirming whether the fragments were indeed human and if so, to estimate the minimum number of individuals present and the age and sex of the individual(s) represented, and to identify any pathological conditions present. A detailed report which outlines the methodologies used and full results is presented in the site archive. A summary of the results is presented below.

Analysis confirmed that the majority of the burnt bone was human and represents a minimum of two individuals, an adult and a possible juvenile, although the fragmentary nature of the bone meant that it was not possible to determine sex or provide a more precise age-at-death for either individual. The human bone had been burnt inefficiently, resulting in a variety of colours which did not correspond to any particular area of the skeleton. The radiocarbon dating of a sample of the human bone indicates that the bone post-dated the monumental roundhouse.

Results

Five samples (SFC033, SF29, SFC013–17, SFC018 and SFC020) of burnt bone with a total weight of 510 g were analysed. Although each sample was recovered separately in the field, these originated from the same area in the north-east quadrant of the interior of the monumental roundhouse, below the tumble deriving from the collapsed walls and are thought to relate to a single deposit of material.

Although the burnt bone was heavily fragmented, a large proportion measured >10 mm (92% of the total weight) and contained many identifiable fragments (70% of the total weight of the sample) (Table 5.2). Prior studies of cremated bone from archaeological contexts have determined that the anticipated weight range of bone for a single adult burial can vary from 57 g to 3000 g, with an average weight of c. 800 g (McKinley 1989: 2000). In this instance the total weight of burnt human bone recovered was only 510 g.

The identified fragments represented every broad region of the skeleton, including the cranium, axial skeleton, upper limb and lower limb (Table 5.2). This indicates that although the remains were highly fragmentary and incomplete, they probably derived from a complete individual or individuals rather than a selective, token deposit (e.g. when certain bones are targeted for collection from a funeral pyre). As two right petrous temporal bones and two right mastoid

processes were identified amongst the fragments, the minimum number of individuals represented by the burnt bone is two. However, the skeletal remains of both individuals were incomplete. The mastoid process of one of the complete right petrous temporal bones appeared extremely small and gracile, even after some loss of size due to shrinkage is taken into account, and thus may belong to a juvenile individual. The hand phalanges, metacarpals and ribs had completed epiphyseal fusion, and the annular rings of the lumbar vertebrae had also fused, indicating that these belonged to a fully mature adult individual. The material therefore represents the incomplete remains of a minimum of two individuals, an adult and a possible juvenile, but there was insufficient skeletal evidence to provide a more precise estimate of age-at-death, or to determine the sex of either individual.

Pathological changes were observed on the bones in the form of *cribra orbitalia*, as well as indicators of degenerative joint disease and trauma in the spine. Lesions indicative of *cribra orbitalia*, consisting of large and small pores in the orbital roof, were evident on a fragment of the right orbital roof (Grade 3: large and small foramina). These are pathological lesions caused by expansion of the spongy cancellous bone separating the inner and outer layers of the cortical bone of the skull (Stuart-Macadam 1991). To the naked eye this appears as an area of pitting in the interior of the eye socket. This is believed to represent a metabolic condition caused by vitamin B12 deficiency (Walker *et al.* 2009). Vitamin B12 is naturally found in meats, fish and dairy products and is typically absorbed by the body through consumption of such foodstuffs. Individuals with a vitamin B12 deficiency produce defective red blood cells that cannot carry oxygen properly (Walker *et al.* 2009) and this can promote changes to the bone structure, resulting in the formation of lesions in the interior of the orbital sockets. These lesions typically form during early childhood and can heal over time (Watts 2015). The presence of *cribra orbitalia* lesions in the remains from Moredun suggests that the individual may have consumed a childhood diet that was very

Table 5.2: Identified bone fragments and percentage by weight distribution (u = upper, l = lower, id = identified, wt = weight, no = number, g = grammes).

Find no.	id wt. (g)	% total weight	skull wt. (g)	% total weight	axial wt. (g)	% total weight	u. limb wt. (g)	% total weight	l. limb wt. (g)	% total weight
SFC033	6	75	6	75	0	0	0	0	0	0
SF29	66	47	47	33	16	11	3	2	0	0
SFC013–17	69	74	4	4	31	33	10	11	24	26
SFC018	112	97	30	26	37	32	25	22	20	17
SFC020	105	68	21	14	20	13	21	14	43	28
Total	358	70	108	21	104	20	59	12	87	17

low in animal products (perhaps due to a period of childhood illness, for example, where diet was restricted) or suffered from a condition where vitamin B12 absorption was compromised or ineffective.

Degenerative joint disease is one of the most common pathological conditions in both archaeological and modern populations and involves the deterioration of the joints of the skeleton due to ageing or excessive strain (Rogers 2000). The changes observed on the remains from Moredun were mild, consisting of porosity of the joint surface and contour change on several of the superior and transverse facets of the thoracic vertebrae. It is unlikely that they impacted on the health or mobility of the individual. Schmorl's nodes, which appear as indentations of the superior and inferior surfaces of the vertebrae (Rogers 2000), were observed on two fragments of lumbar vertebrae. These lesions represent the herniation of intervertebral disc into the joint space (Rogers 2000) and occur when excessive strain is placed on the spine, often during adolescence when the individual begins to undertake strenuous physical activities that place high levels of strain on the immature spine. As it was not possible to determine the age of the individual affected, it is unclear whether this was a young adult with a physically active lifestyle, or a sedentary older adult who had begun to experience the 'wear and tear' of age.

The colour of the burnt bone, which reflects the level of oxidation of the organic component, varied from blue-black to grey-white, with some fragments appearing unburnt and displaying heat fissures. While the level of oxidation is largely influenced by temperature, additional factors such as air flow can also affect bone oxidation (McKinley 2004). The degree of oxidation (i.e. colour of the fragments) did not correspond to any particular area of the skeleton, with the cranium, vertebrae and limbs displaying both unoxidised and heavily oxidised fragments. The wide variation in the colour of the burnt bone from Moredun indicates that the remains had been burnt inefficiently or at inconsistent temperatures that did not reach higher than 600 degrees Celsius. It is therefore possible that the remains were deliberately cremated on an inefficient or poorly constructed pyre, or that weather conditions interfered with the burning event.

Prior to osteological analysis, there was speculation over whether the burnt human remains could represent the remains of a person or persons who were caught in the fire that engulfed the structure and so casualties of the event that led to the destruction of the building. To investigate this further, a sample of human rib fragment was selected from SFC017 [C013–17] and submitted for radiocarbon dating. This returned a date of 2102 ± 24 BP (200–40 cal BC at 95.4% probability;

SUERC-77003), which post-dates the construction and use of the monumental roundhouse by several hundred years and multiple generations.

Although no single and certain explanation for the presence of the human remains within the monumental roundhouse can be proved, two main hypotheses can be offered, hampered of course by a lack of understanding of the date of collapse of the structure. The first is that the cremated bones were a later addition to the partially standing roundhouse after the fire event. As the tumble from the wall overlay the burnt bones, this implies that at least part of the structure was still standing when the bones were deposited. The second hypothesis, albeit less likely, is that the human remains represent casualties of the fire event, buried by the collapsing walls and roof. In this second scenario, the human remains would provide the closest date to the fire-event (as opposed to the construction/use date) suggesting that the ruination of the building took place sometime between the early 2nd and mid-1st centuries BC. What is certain from this dated sample of human bone from Moredun is that they do not represent the inclusion of earlier, ancestral human bone, incorporated and deliberately built into the structure during its construction as frequently attested in Iron Age structures in Atlantic Scotland (Armit and Ginn 2007), such as those from Cnip, Lewis (Armit 2006), *inter alia*.

5.5 Palynological and sedimentological analyses of off-site environments

Richard Tipping, Danny Paterson, Eileen Tisdall and Carla Ferreira

The pollen site and pollen recruitment

Pollen analyses were undertaken to understand the plant communities and land uses on the plateau prior to, within and after the Iron Age. The sedimentology of deposits was described to understand how changes in the catchment affected plant communities. The pollen site is a small unnamed pond at NGR: NO 14080 19790 at c. 190 m OD on the south side of Grange Hill, a broad ridge rising just above 200 m OD, some 500 m east-south-east of the centre of Moredun fort, which is at 223 m OD (Figure 5.2). The origin of the pond is unclear: its southerly aspect and low altitude make it unlikely to be a corrie, which it superficially resembles.

The hydrological catchment of the pond is 1.13 ha, formed in Devonian andesite. To the west and north of the pond, slopes rising from the shore of the pond to the ridge above are very steep (c. 30 degrees). While the ridge is exposed, the pond is sheltered by these slopes. To the east the catchment extends some 35 m on much gentler slopes which support the only stream channel



Figure 5.2: View of the pond looking north to the ridge of Grange Hill in May 2018. The pond is in the centre marked by a complete cover of *Potamogeton*, within grassland and surrounded by partly overhanging non-native trees.

flowing to the pond, now entirely dry. The outlet of the pond is a subdued bedrock ridge. A few tens of metres south of the outlet, very steep slopes and cliffs fall c. 170 m to the lowland.

The surface of the pond is 0.005 ha, 11 m long, oriented south-west-north-east, and 5 m wide. The pollen source area *sensu* Jacobson and Bradshaw (1981) is local to extra-local, extending several tens of metres from the pond. The tree canopy partly shades the pond in summer. The outlet maintains a high water level throughout the year. There is no fen around the pond: terrestrial soils fall to the shore. The vegetation of the pond is largely *Potamogeton* (pondweed) with clumps of Cyperaceae (sedges) forming a precarious *schwingmoor* floating over c. 30 cm of open water. Trees around the pond are entirely introduced and many are non-native, part of a 19th-century ornamental woodland that covers Moncreiffe Hill (Figure 5.2).

Field sampling

The very restricted access the *schwingmoor* gives meant that coring was possible at only one point, towards the centre in the north of the pond at NGR: NO 14080 19790.

Reconnaissance in summer 2015 recorded just over 2.5 m of sediment in an open-sided 1.0 m long, 3.0 cm diameter Eijelkamp peat gouge. A radiocarbon assay on amorphous peat at the base of the sequence gave a date of 9230–8830 cal BC (95% probability; SUERC-63688). In summer 2016 this point was re-sampled in three cores with a 1.0 m long, 6.0 cm diameter closed-chambered Russian-type corer.

Sediment description

Table 5.3 is the combined description of the three cores. An amorphous peat is the basal sediment sampled, with 40–70% wood below 104 cm depth. Above 79 cm depth the sediment becomes an organic-rich mud, and above 64 cm depth is a poorly organic clay with silt. This changes to an organic mud above 50 cm depth to the top of the sediment column.

Dating controls

Sediments are dated by six AMS 14C assays (Table 5.4; Figure 5.3). Single-entity organic matter was too rare to provide samples, which were thus of heterogeneous amorphous peat and organic mud. The humic acid fraction of the organic matter was dated. Age estimates are conformable.

A 3rd order polynomial best describes (R20.988) sediment accumulation from assay SUERC-78832 at 122.0 cm depth to the still-forming sediment surface. Age estimates indicate very slow sedimentation from early in the Holocene (Table 5.5). Events within the minerogenic sediment between 64.5 and 30.5 cm depth (Table 5.3) could not be radiocarbon dated because of low organic contents: the ages of palynological events between these depths is considered in Section 2 of the Discussion. All age estimates reported are modelled using Bacon v2.2 software (Blaauw and Christen 2011), calibrated and expressed at 95% probability unless otherwise defined.

Laboratory analyses

The sediment record contains a prominent unit of mineral sediment (Table 5.3). Contiguous 5.0 mm thick sediment slices through this, between 24.5 and 92.0 cm depth were sub-sampled to measure carbon content by loss-on-ignition at 550 degrees Celsius for four hours: changes in carbon content on this rock type represent changes in organic content. Residues from carbon content assays and additional samples were then analysed for particle size distribution by laser interferometry using a Coulter LS230 Analyser, at contiguous 5.0 mm intervals between 18.0 and 64.0 cm depth and at 10.0 mm intervals between 65.0 and 84.0 cm depth.

Table 5.3: Sediment description.

Depth (cm)	Description
1–9	mass of coarse pale fleshy herb stems attached to leaves of <i>Potamogeton</i> sp. With small amounts of dark-brown organic mud; gradual to
9–26	dark brown structureless organic mud with abundant very fine, fleshy, horizontally bedded pale graminoid stems and one intrusive vertical, coarse fleshy root/stem at 13–16 cm depth; sharp to
26–32	dark brown structureless organic mud with common, declining to occasional, very fine, fleshy, horizontally bedded pale graminoid stems and rare fine, fleshy, horizontally-bedded dark herb stems; sharp to
32–33.5	paler but still dark brown structureless organic mud with occasional very fine, fleshy, horizontally bedded pale graminoid stems; gradual to
33.5–40.5	mid-brown structureless organic mud with rare very fine, fleshy, horizontally bedded pale graminoid stems; sharp to
40.5–50	mid-brown structureless organic mud with rare very fine, fleshy, horizontally bedded pale graminoid stems, changing gradually below 46 cm to darker brown; gradual to
50–56	mid-brown structureless organic-rich clay with occasional silt and rare very fine, fleshy, horizontally bedded pale graminoid stems; sharp to
56–64	pale to khaki-brown clay with occasional silt and very rare very fine, fleshy, horizontally bedded pale graminoid stems; sharp to
64–67	dark brown structureless organic mud with occasional fine, fleshy, horizontally bedded dark herb stems and one 3 mm diam. Sub-rounded rotted lava clast at 66 cm; gradual to
67–79	mid-dark brown structureless organic mud with occasional-common very fine, fleshy, horizontally bedded pale graminoid stems; gradual to
79–88	dark brown structureless amorphous peat with occasional to common very fine and fine, fleshy, horizontally bedded pale graminoid stems, rare small unidentified seeds scattered throughout and one vertical lens of khaki-brown clay 88–92 cm depth; gradual to
88–96	dark brown structureless amorphous peat with rare very fine and fine, fleshy, horizontally bedded pale graminoid stems; gradual to
96–104	very dark brown structureless amorphous peat with common fine and coarse, fleshy herb stems, many vertical, and very rare small roundwood (twigs); sharp to
104–109	very dark brown structureless and compacted amorphous peat with common fine and coarse, fleshy herb stems, many vertical, common small-medium wood fragments and common small roundwood; sharp to
109–117	very dark brown structureless amorphous peat with common fine and coarse, fleshy herb stems, many vertical, common small-medium wood fragments and common small roundwood; gradual to
117–137	very dark brown structureless amorphous peat with much-abundant small, medium and large wood fragments, the largest (30 x 10 mm) horizontal at 118–119 cm depth, and rare small-medium roundwood; gradual to
137–172	Very dark brown structureless amorphous peat with occasional-common small and medium roundwood, very rare large wood fragments and very rare scattered sand below c. 151 cm depth; gradual to
172–179.5	Dark brown structureless amorphous peat with rare small and medium roundwood, occasional mineral matter and occasional scattered sand; gradual to
179.5–188	Dark brown structureless amorphous peat with common-much medium and large roundwood, occasional mineral matter and common scattered sand; gradual to
188–193	Dark brown structureless amorphous peat with rare small-medium roundwood, occasional-common large wood fragments, occasional mineral matter and occasional scattered sand.

Table 5.4: Radiocarbon dates.

Depth cm	Lab ID	Radiocarbon age (BP)	$\delta^{13}\text{C}$ (‰)	Calibrated date range (95% probability)
30.0–31.0	SUERC-70887	502 $\pm$ 29	–30.0	cal AD 1400–1450
64.0–65.0	SUERC-70886	2842 $\pm$ 29	–30.2	1120–910 cal BC
69.5–70.0	SUERC-78130	3316 $\pm$ 29	–29.8	1670–1500 cal BC
97.0–97.5	SUERC-78131	6882 $\pm$ 29	–29.4	5840–5710 cal BC
122.0–122.5	SUERC-78132	8628 $\pm$ 29	–29.1	7720–7580 cal BC
249.0–250.0	SUERC-63688	9629 $\pm$ 29	–30.5	9230–8830 cal BC

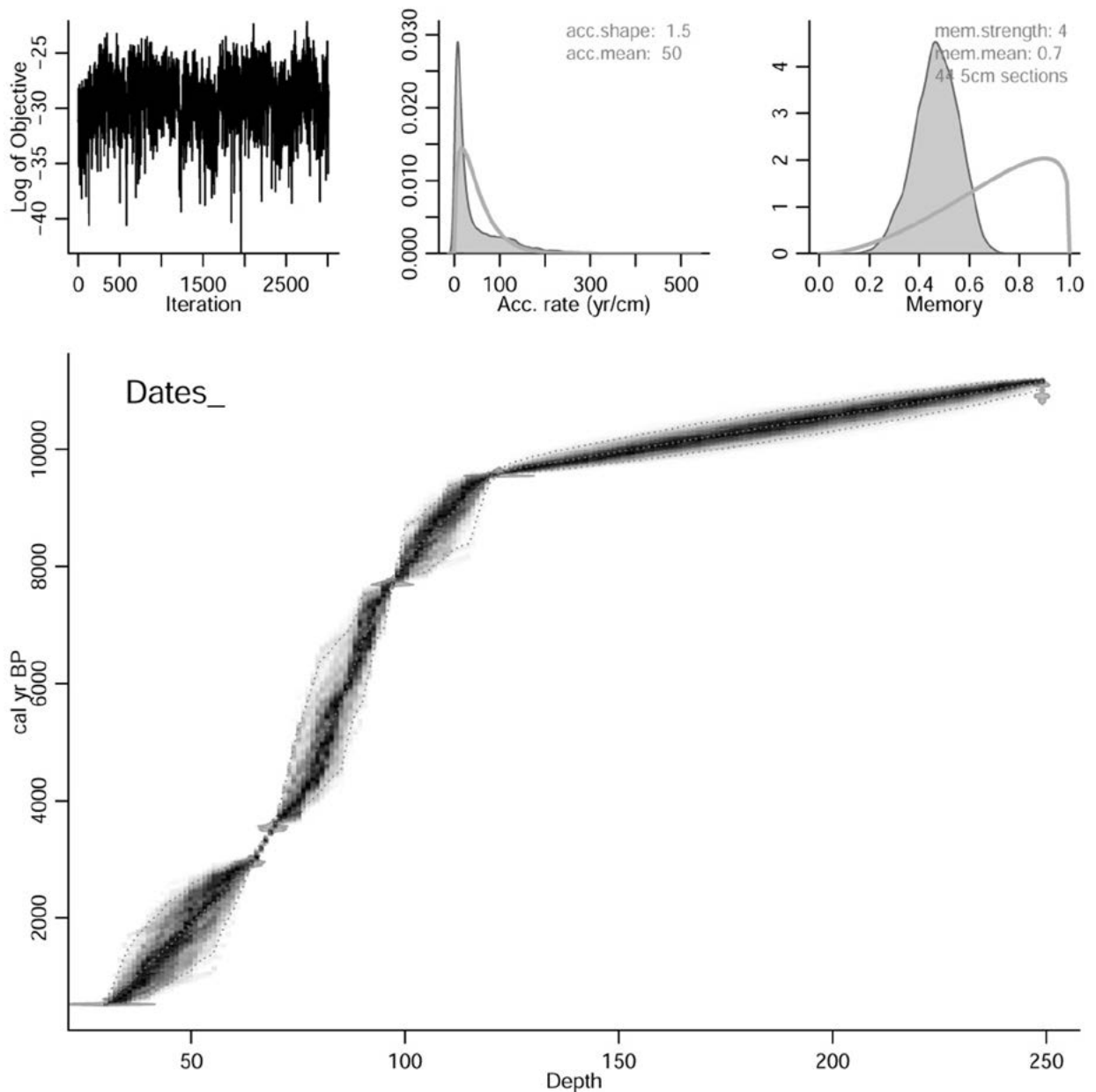


Figure 5.3: Age-depth model for the sediments at Grange Hill generated by BACON, showing (a) the positions of the calibrated ^{14}C assays, the 95% probability date range constrained within black dotted lines, all probable age-depth models in grey, darker areas with increasing probability and the best model based on the weighted mean average by the dotted line, (b) the number of MCMC iterations in the model; (c) prior (curve) and posterior (histogram) distributions for accumulation rate estimates and (d) the ‘memory’ in accumulation rate estimations.

Table 5.5: Estimates of sediment accumulation rates between radiocarbon dating controls from 3rd order polynomial modelling.

Interval	Accumulation rate (yr/cm)	(cm/yr)
0–30.5	28.4	0.03
30.5–64.5	58.0	0.02
64.5–69.5	92.5	0.01
69.5–97.5	164.9	0.006
97.5–122.5	65.9	0.01
122.5–249.5	11.1	0.09

5.0 mm thick sediment slices were sub-sampled for pollen analyses between 32.0 cm and 124.0 cm depth: Table 5.5 defines the approximate time spans homogenised in each 5.0 mm slice. Above 70 cm depth, mid-points of subsamples are on average at 12 mm intervals. Below 70 cm depth the sampling interval is much lower at c. 90 mm intervals as we sought to explain a significant reduction in carbon content (below). Subsamples were prepared by standard chemical methods (Moore *et al.* 1991). Residues were embedded in silicon oil. *Lycopodium* spores were added to calculate pollen concentrations and influx. Pollen identifications were made using an Olympus BX40 binocular microscope. Counts were made at magnification x400 with critical examinations and size measurements made at magnification x1000 under oil immersion, sometimes using phase contrast. Pollen was identified by reference to Moore *et al.* (1991), Beug (2004) and the University of Stirling pollen reference collection. Key attributes (a-axis; b-axis; annulus diameter; porus thickness and boundary with exine; sculpture) of a total of 68 pollen grains of Poaceae (grasses) with a-axes >30 µm were measured at magnification x1000 under oil immersion and related

in Table 5.7 to Andersen's (1979) groups with reference also to Küster (1988) and Tweddle *et al.* (2005). Counts were to a minimum of 500 grains representing plants growing on terrestrial soils, including Cyperaceae (total land pollen: tlp). Pollen nomenclature follows Bennett (1994) and plant nomenclature follows Stace (1997). Pollen deterioration was insignificant (Figure 5.5). Microscopic charcoal was quantified in five size classes of a-axis length (10–25, 25–50, 50–75, 75–100 and >100 µm).

Results and Interpretations

Sedimentological analyses

Figure 5.4 presents data plotted against depth (cm) for carbon content, Udden-Wentworth defined particle size distributions, median particle size, the coefficient of variation (CV) of samples, and their skewness and kurtosis. Particle size data incorporate bars representing the single standard deviation around the mean of all samples (Table 5.6) except, for clarity, in the three coarsest classes.

Table 5.6: Summary statistics of sedimentological data.

Measure	mean	SD
Clays %	11.3	2.1
Very fine silt %	10.4	1.7
Fine silt %	21.1	3.0
Medium silt %	24.6	2.4
Coarse silt %	22.8	3.5
Very fine sand %	8.0	3.5
Fine sand %	1.3	2.0
Median size (µm)	21.7	6.0
Coefficient of variation (CV) %	98.6	17.0
Skewness	1.9	0.7
Kurtosis	5.3	4.5

The amorphous peat between 123 and 97 cm depth (Table 5.3) accumulated slowly at around 66yr/cm (Table 5.5). Wood was common below c. 96 cm depth (c. 5600 cal BC). Between 97 and 69 cm depth the accumulation rate was c. 2.5 times slower, at c. 165 yr/cm. Given this, it may have been that peat accumulation then was discontinuous. The peat had carbon contents fluctuating around 70% but between 83 and 70 cm depth (c. 3430 to 1700 cal BC) the organic content of the peat steadily fell, recognised in Table 5.3 above 79 cm depth (c. 2890 cal BC) in sediment described as organic mud. A rapid partial recovery of carbon contents occurred from 69 to 63 cm depth (c. 1580 to 920 cal BC): the mud accumulated at a faster rate, c. 92 yr/cm (Table 5.5). Carbon contents fell very rapidly above 64 cm depth (c. 1000 cal BC). Peat changed abruptly to a minerogenic sediment: the fen was transformed to a very muddy pond. The mud accumulated faster still, around 58 yr/cm (Table 5.5). Carbon contents increased sharply between 46.5 and 44.5 cm depth (c. cal AD 300 to 440), fell back at 41 cm (c. cal AD 680) and increased sharply once more after 36.5 cm depth (c. cal AD 990) (Figure 5.4). Very large increases occurred above 32.5 cm depth (c. cal AD 1250) to 24.0 cm depth (c. cal AD 1500), to values >65%. The sediment remained an organic mud (Table 5.3) which accumulated at around 28 yrs/cm (Table 5.5).

Particle size data are available between 84 and 18 cm depth (Figure 5.4). The coefficient of variation (sample SD/sample mean) of these samples (CV: Figure 5.4) describes their degree of sorting. The mean of 98.6% implies generally very poor sorting. Sample standard deviations are very close to sample means. All particle size distributions are positively skewed, to finer particles (skewness: Figure 5.4). The mineral component of the sediment is a medium-coarse silt (mean 79%: Table 5.6). The median particle size is a medium silt throughout except between 32.5 and 26 cm depth (c. cal AD 1250–1400) when it coarsens to coarse silt. There are almost no significant changes in particle

size classes (defined as a value exceeding the standard deviation (SD) around the mean of all samples between 84 and 32 cm depth) but there are trends.

Clays are more abundant than their SD below 80 cm depth (c. 3020 cal BC). Their reduction between 80 and 69 cm depth (c. 1580 cal BC) is largely due to erratically more abundant very fine and fine sand, with peaks of fine sand exceeding their SD at 84, 81, 79, 76 and 69 cm depth (between c. 3560 to 1580 cal BC). Medium sand is found at 79–76 and 60–57.5 cm depth (c. 2890 to 2480 cal BC and c. 690 to 500 cal BC). Sediment was more poorly sorted (higher CV) below 76 cm depth. Samples below 60 cm depth have very variable skewness through erratic inputs of different-sized particles.

Finer particles (clay, very fine and fine silt) are close to their SDs from 62.5 to 59 cm depth (c. 880–610 cal BC) and more abundant than their SDs between 56 and 52 cm depth (c. 380 cal BC to cal AD 100). The CV of sediments 58 to 53 cm depth are closely comparable, suggesting constancy of depositional processes and little disturbance. Clays and very fine silt are less than their means above 50 cm depth (c. cal AD 40), fine silt less than its mean above 43 cm depth (c. cal AD 550), and very fine and fine silt are generally less abundant than their SDs between 38 and 32 cm depth (c. cal AD 890–1280). This coarsening-up trend is seen principally in coarse silt, which is less than its SD between 56 and 49 cm depth and gradually increases, to exceed its SD between 38 and 34 cm depth. Very fine sand resembles this pattern but without sustained increases above 49 cm depth. Peaks in very fine sand are seen at 42, 37 and 34 cm depth and in fine sand at 40 and 38 cm depth (between c. cal AD 750–900). Medium sand is commonly recorded above 50 cm depth. The impact of these episodes and pulses of coarser sediment is to increase the kurtosis of samples, the degree to which the distribution has tails, between 52 and 47, and at 42.5 cm depth, particularly as the finest particles are still deposited. More poorly sorted sediment, exceeding

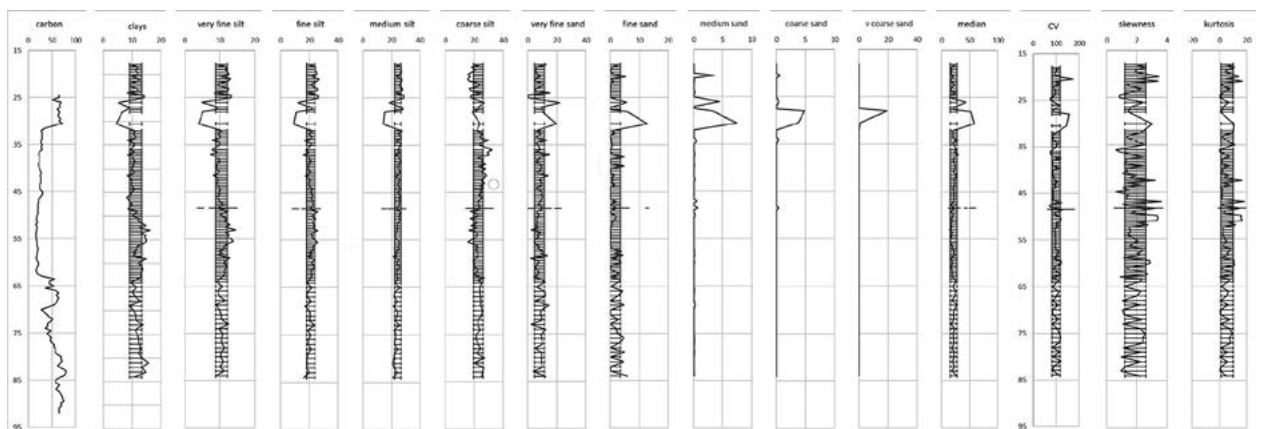


Figure 5.4: Carbon contents and particle size data, the latter plotted in relation to 1.0 standard deviation around the overall mean to define significant changes: note changes in horizontal scales.

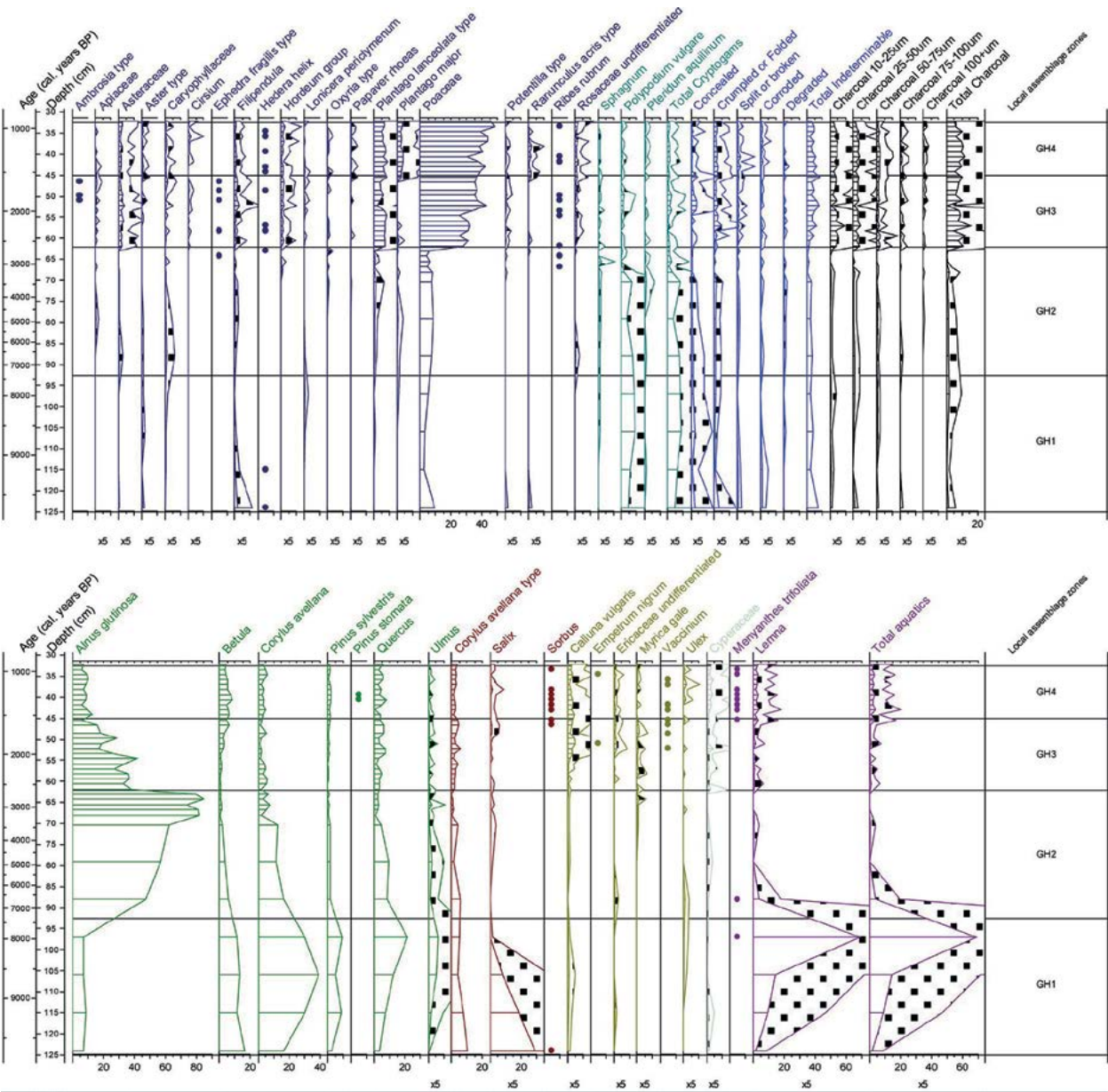


Figure 5.5: The complete percentage-based pollen record with four local pollen assemblage (lpa) zones.

the SD of all samples, is found between 50.5 and 47 cm depth and at 39.5 and 37.5 cm depth. Though comparatively coarse, sediment between 46 and 40 cm depth is better sorted (lower CV). Samples between 47.5 and 36 cm depth are generally closest to symmetrical skewness (0.0).

Between 32 and 26 cm depth (c. cal AD 1290–1400), though understood from fewer analyses, is a sediment totally unlike that below 32 cm depth in the abundance of sand, including coarse and very coarse sand and reductions in particles finer than coarse silt, with very high coefficients of variation. Fine particles are not lost, however, and skewness and kurtosis are not significantly distorted. Above 26 cm depth, particle size

distributions are less variable. Proportions of coarse silt fall as those of fine silt increase to 18 cm depth in a fining-up trend punctuated by peaks of very fine and fine sand at 26 and 24 cm depth, with very poorly sorted sediment (high CV: Figure 5.4) at 20.5 cm depth (c. cal AD 1625).

Pollen analyses

Lpaz Grange Hill 1 (124.0–93.0 cm depth: c. 7690–5200 cal BC)

At the base of the pollen stratigraphy (c. 7690 cal BC) the pollen source area was dominated by trees and shrubs. *Salix* (willow) bushes almost certainly grew

around the pond and in large numbers: its pollen is under-representative of the abundance of the plant. *Salix* had probably been lost from the pollen source area by 97 cm depth (c. 5750 cal BC). Open water was present to at least 80 cm depth (c. 3020 cal BC) to judge from the abundance of cf. *Hydrocharis* (frogbit) pollen, a shallow-water floating perennial. Herbs like Cyperaceae (sedges), *Filipendula* (meadowsweet), *Potentilla* type (cf. tormentil) and Ranunculaceae (buttercups) would have grown on damp soils. On dry soils, *Corylus avellana* (hazel) was common with *Betula* (birch) and *Quercus* (oak) from the base of the pollen record (c. 7690 cal BC), and with *Ulmus* (elm) until 97.5 cm depth (c. 5820 cal BC), after which time *Ulmus* was lost from the pollen source area. Though it is unlikely that *Pinus* (Scots pine) grew locally, its consistent pollen record before 97.5 cm depth might suggest that the deciduous woodland canopy was open, allowing Scots pine pollen to blow in from some distance away. The pollen of *Ulex* (gorse) might also suggest an open canopy. There is no evidence for human modification of the vegetation. Microscopic charcoal is rare.

Lpaz Grange Hill 2 (93.0–63.0 cm depth: c. 5200–925 cal BC)

Alnus glutinosa (alder) began to dominate the pollen record (Figure 5.5) between 97 and 88 cm depth (c. 5750–3910 cal BC). This wetland tree almost certainly colonised the edge of the pond and, quite possibly, sediment at the sampling site as proportions increased slowly to >85% tlp by 65 cm depth (c. 1080 cal BC). It was mono-dominant in this habitat. There is little palynological evidence for peat-forming plants like Cyperaceae or *Sphagnum* because of the abundance

of *Alnus* pollen, and the density of vegetation on and close to the sampling site makes it hard to detect contemporary plant communities away from the pond (cf. Janssen 1959): their pollen and spores are imagined as having been intercepted by *Alnus* foliage. *Betula* (birch), *Quercus* (oak) and *Corylus avellana* (cf. hazel) are recorded at much lower percentages. The impression from the few analyses is that dry woodland was gradually reduced, but this is uncertain because of the preponderance of *Alnus* pollen.

Aquatic pollen is absent or rare above 80 cm depth (c. 3020 cal BC). Pollen influx values of all taxa in Figure 5.6 increase markedly from 70 to 64 cm depth (c. 1700 to 1000 cal BC). Influx values are corrected for inferred changes in sedimentation rate, but correction cannot be complete in such sparsely dated sediment, so that a proportion of these increases probably still represents reduced sediment accumulation, lower by perhaps 2/3 to judge from tlp-*Alnus* pollen concentration values. While influx values of *Betula*, *Quercus* and *Corylus* increased 3.6 to 4-fold between 70 and 64 cm depth, those of *Alnus* increased 7.3 times (Figure 5.6), so there is a vegetational signal, probably a response to an increasing density of *Alnus* trees, their spread to dryer ground or their increased pollen production coinciding with peak percentage representation of *Alnus* pollen.

Lpaz Grange Hill 3 (63.0–45.0 cm depth: c. 925 cal BC–cal AD 410)

Pollen influx values of all major taxa (Figure 5.6) fall to 62 cm depth (c. 850 cal BC). *Alnus* influx values fall 11-fold, *Betula* 7-fold and *Quercus* 5-fold, but those of *Corylus* fall 17-fold. Though there may have been a short-lived

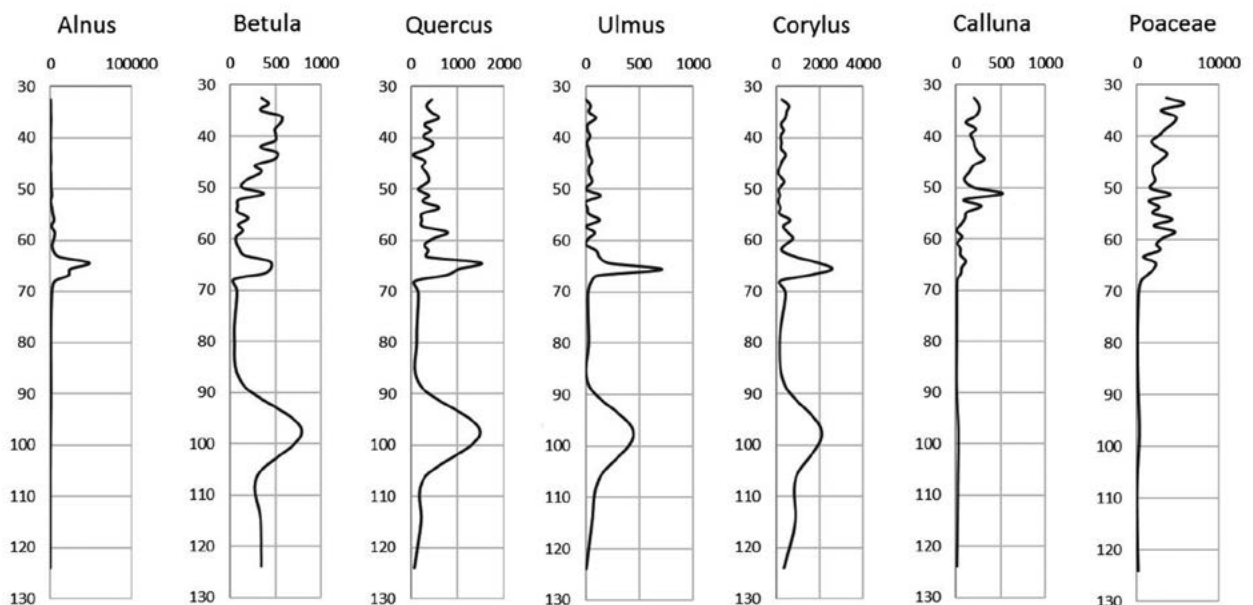


Figure 5.6: Pollen influx values (grains/yr) of selected taxa.

acceleration of sediment accumulation, these falls probably principally represent reductions in numbers of these trees in the pollen source area. Percentages of *Alnus* are halved between 64.4 and 63.2 cm depth (Figure 5.5). It is very likely that *Alnus* foliage became less dense because the pollen of plants that would have grown on nearby dry soils (e.g. Poaceae >40 µm, *Plantago lanceolata*) are better represented. The greater ease with which plants on dryland soils are detected probably implies that *Alnus* trees were locally lost, either by thinning within the stand or a reduction in the extent of trees. Proportions of microscopic charcoal increase as those of *Alnus* decline, but this is taken to indicate the greater ease with which charcoal, like dryland pollen, reached the sampling site and not the use of fire in tree loss. Wetland trees and shrubs (*Betula*, *Salix*, *Myrica gale*) would be expected to gain from thinning of the *Alnus* stand and because their percentages do not increase it is likely that the *Alnus* canopy was reduced in area, the edge of the stand shrinking and moving closer to the sampling site. The pollen of climbers like *Lonicera periclymenum* (honeysuckle) and *Hedera helix* (ivy) might also suggest a thinning of the canopy.

The proportions of dryland trees did not increase when those of *Alnus* were reduced. This is taken to mean that dry woodland was absent from the pollen catchment by 63 cm depth (c. 920 cal BC). Consistent but low percentages of *Quercus* and *Corylus avellana* after this time probably represent trees in the region. At 54 cm depth (c. 240 cal BC) there are small increases in percentages of *Betula* and *Calluna* pollen as those of *Alnus* decline further but these do not represent significant vegetation changes. A few grains of *Ribes rubrum* (redcurrant) pollen hint at the presence of scrubby elements around the pond. The increased percentages of Poaceae >40 µm (wild grasses) need not represent the expansion of grassland at the expense of *Alnus*: wild grasses were probably already present. Grassland is the only plant community to be better represented. The high proportions of *Plantago lanceolata* indicate that the grassland was grazed, as might those of *Oxyria* type, from the dock family but difficult to

assign to species. There was edaphic diversity in the grassland, with moist grassland herbs like *Filipendula* (meadowsweet) and *Galium* type (bedstraws). *Pteridium* (bracken) grew, a plant under-represented in the pollen record. Small areas of *Calluna* (ling heather) colonised: a short-lived fall in the influx of *Calluna* pollen between 51 and 44 cm depth (c. 30 cal BC–cal AD 480: Figure 5.5) may represent grazing pressures.

Two pollen grains of *Avena-Triticum* (oats or wheat) and one grain of *Hordeum* group pollen (barley type) are recorded in this zone (Table 5.7). *Hordeum* group pollen does not necessarily represent barley or even a cultivar, though in support of this being a crop is the observation that *Hordeum* group pollen is not recorded in older sediments, though characterised by comparatively few samples. *Avena-Triticum* is probably of cereal origin. The pollen record of these is accompanied by species within the Asteraceae (daisy family), with members of the Apiaceae (umbellifers), *Artemisia* (wormwoods) and *Cirsium* (thistles), pollen taxa with very many species and wide ecological tolerances but which are common components of disturbed and bare ground, including arable ground. Together, though, this is meagre evidence for crop-growing around Grange Hill. Only single cereal-type grains are found, separated in time by hundreds of years (Table 5.7). Despite cereal pollen being poorly dispersed, single grains could have originated from the region, and the associated herbs may simply indicate disturbed ground, perhaps intensively grazed: in this regard, *Plantago major* (greater plantain) plants, a bare ground indicator, contribute a few pollen grains between 63 and 57 cm depth (c. 920–460 cal BC). *Ambrosia* type and *Ephedra fragilis* type are misidentifications, the former probably representing *Lonicera periclymenum*.

A third reduction of *Alnus* pollen to c. 10% tlp at 50 cm depth (c. cal AD 40) led to it becoming a minor element in the pollen catchment. *Myrica gale* was probably lost from the pollen source area. Increasing *Betula* pollen percentages may still reflect deposition of regional pollen, suggested also by the slightly increased

Table 5.7: Measurements of *Hordeum* group and *Avena-Triticum* pollen

Depth (cm)	Estimated date (cal)	Size (µm)	anl-D (µm)	Porus diam. (µm)	Porus: exine thickness	Porus/grain boundary	Sculpture	Andersen Group
40	c. AD 750	40	12	4	indet.	Sharp	scabrate	<i>Avena-Triticum</i>
40	c. AD 750	40	8	4	X1.5	sharp	scabrate	<i>Hordeum</i> group
58	c. 540 BC	40	8	4	X2	sharp	scabrate	<i>Hordeum</i> group
60	c. 690 BC	40	12	4	X2	sharp	scabrate	<i>Avena-Triticum</i>
68	c. 1450 BC	45	12	4	X2	diffuse	scabrate	<i>Avena-Triticum</i>

representation of *Pinus sylvestris* pollen. Grazed grassland continued to dominate. *Plantago lanceolata* is the most abundant herb. *Ranunculus acris* type (several buttercup species), recorded above 50 cm depth, is most associated with moist grassland, though buttercups will also establish in disturbed habitats like paths and arable land.

Lpaz Grange Hill 4 (45.0–32.0 cm depth: c. cal AD 410–1290)

The decline of *Alnus* pollen was halted. Tree and shrub pollen taxa are largely unchanging and probably represent the regional pollen rain. One oddity is the record of *Pinus* stomata at 41 and 39 cm depth (c. cal AD 670–810). Stomata are parts of needles and indicate the presence of the tree far better than its pollen (Sweeney 2004; Froyd 2005), but the pollen record (Figure 5.5) does not suggest *Pinus* to have grown in the pollen source area at this time, or in the region (Bennett 1984; Dickson 1988).

There are few changes to the plant communities represented in Lpaz 3. *Menyanthes trifoliata* (bogbean) grew in the pond, suggestive of a water surface some tens of centimetres above the sediment surface, as at present, and an absence of shade. *Viola palustris* (marsh violet) colonised the pond mud or damper soils, and *Teucrium* (wood sage) may have grown on drier rock walls. There is a suggestion in the increased occurrence of *Ulex* (gorse) that the pollen source area supported more scrubby elements. Grassland continued to have been grazed: grazing indicator taxa are unchanged. Single grains of *Avena-Triticum* and *Hordeum* group pollen (barley type) are recorded in the same sample at c. cal AD 750 (Table 5.7). Bare and disturbed ground herbs are represented still. There might be some ecological significance in the occurrence of Asteraceae and *Aster* type (*sensu* Moore *et al.* 1991) but it is not possible to resolve this in these pollen taxa. Two pollen taxa previously recorded as single grains, *Plantago major* and *Papaver rhoeas* type, are recorded consistently at and above 46 cm depth (c. cal AD 340) to the top of the pollen record at 32 cm depth (c. cal AD 1290). Together at these proportions they suggest very substantial disturbance of soils in the pollen source area.

Synthesis

Willow bushes grew around the peat prior to their loss c. 5750 cal BC. The wetland habitat of alder trees makes it very likely that they also became established on and around fen peat between c. 5750 and c. 3910 cal BC, and the abundance of alder pollen is such to invoke growth of a dense stand. The establishment of alder at the sampling site makes it difficult to detect vegetation changes on dry soils away from the peat. This frustrates

the understanding of the prolonged decline in organic matter of the peat from c. 3430 to c. 1700 cal BC, in which the peat became a mud that progressively contained less clay and more coarse silt and sand, introduced in pulses that might imply limited erosion of nearby soils. Evapo-transpiration by alder may also have lowered the water table, allowing oxidation of organic matter in such slowly and perhaps intermittently accumulating sediment, particularly c. 1700–1000 cal BC. However, though aquatic pollen taxa are lost, there are no increases in corrosion of pollen (unpublished data) that might support this interpretation. The rapid partial recovery of carbon contents c. 1580–920 cal BC coincides with peak percentage representation of alder pollen, which might imply a greater extent/density of trees and greater input of organic matter from these to the pond.

The second, more abrupt decline in organic matter after c. 920 cal BC has no origin in soil erosion because percentages of finer particles increase, to c. cal AD 100, interrupted only by a pulse of very fine sand after c. 620 cal BC. Declining organic matter contents may have originated in nothing more than the gentle in-washing of pond-edge mud eroding as it slipped below an elevated water surface.

Alder pollen was reduced from c. 925 cal BC. There is no direct evidence for anthropic impacts, but woodland clearance is most likely because of the rapidity of the event, over one-two human generations and at a time of increasing climatic wetness which would otherwise have facilitated alder growth. Trees were not burnt down: there is little evidence for fire in the microscopic charcoal record and wetland soils near the pollen site would probably have made fire less effective anyway. The rapidity of the losses suggest that initial clearance at least was not through grazing pressures, but probably by axe. The purpose of clearance is unclear. It is inferred that by this time there was no woodland on dry soils around the pond, and probably on the ridge of Moncreiffe Hill. Alder may have been the last tree to be removed because damp-to-wet soils offered little to farmers. The scale of clearance should not be exaggerated: this was a stand of trees in a small part of the landscape that had not warranted clearance before. Partial clearance of trees around the pond may have been only to allow or increase access to water for livestock. This did not initially lead to soil erosion. Alder was reduced further at c. 240 cal BC and for a final time at c. AD 40, and the latter event coincided with sediment in the pond becoming slightly coarser. Trampling of the pond-edge by livestock may have induced local soil erosion sufficient to muddy the water. This activity might imply increasing herd/flock densities or a shift to livestock more needing of water, such as a change from sheep to cattle.

This activity took place in a largely treeless grazed grassland. Grazing pressures may have suppressed dry *Calluna* heath despite the acidity of soils (Section 5.2 above: Roy). The evidence for crop-growing on the ridge is not strong. The occurrence in the early medieval period c. cal AD 670–810 of Scots pine needles in the pond sediment nevertheless suggests that people created a very unnatural landscape on Moncreiffe Hill. We assume that the needles were attached to the branches of trees that were introduced by people to the ridge. Whether this was because locally-grown trees were by then absent is unclear.

The pollen record ends at c. cal AD 1290, after the lifespan of the fort landscape, but it stops short of a major phase of sediment in-washing c. cal AD 1300–1450 that introduced much coarser sediment to the pond, demonstrating the relative insignificance of later prehistoric soil-erosional episodes.

Discussion

Moncreiffe Hill is within the *Quercus-Corylus-Ulmus* (oak-hazel-elm) primary woodland of Scotland (Tipping 1994). These three dryland trees grew on the ridge together with *Betula* (birch) from the base of the pollen record at c. 7690 cal BC. The local loss of *Ulmus* (elm) after c. 5820 cal BC is extraordinary because it is very early, though it is poorly defined. Our understanding of Neolithic and Bronze Age woodland loss on Moncreiffe Hill is also not well defined because the project focused on later periods and because of the abundance of *Alnus* carr at the sampling site, but dry woodland was probably lost from much of the plateau by c. 925 cal BC and probably a lot earlier. It is likely that people indirectly caused the losses by gradual pressures exerted by grazing livestock. The palynological evidence for grazing pressures is slim but analyses in this period are not detailed and are confounded by the local abundance of alder. Alder itself is suggested to have been reduced from around the pollen site, probably by axe, at c. 925 cal BC. The region around Moncreiffe Hill, an arbitrary c. 50 km around the ridge, has several upland pollen sites, though most are to the north and north-west. High-altitude woodland at c. 450 m OD around The Mounth (Huntley 1981) was barely modified in later prehistory. Woodland at a similar altitude on Ben Vrackie at Carn Dubh (Tipping 1995; 2013) was reduced by pulses of enhanced grazing pressure c. 3700–c. 3500 cal BC, c. 2700–c. 2300 cal BC and after c. 2200 cal BC, but was not finally cleared of woodland until c. 400 cal BC. On Ben Lawers, Donner's (1962) analyses at Lochan nan Cat at 770 m OD, though undated, suggest from palynological dating controls that some woodland was lost at c. 2700 cal BC, but through blanket peat expansion which need not have been anthropogenic in origin (Tipping 2008): woodland was lost entirely only within the historic

period. Trees were finally lost from altitudes around 500 m OD on Ben Lawers in the late medieval period (Tipping, McCulloch and Tisdall unpub.). At Lair in Glen Shee, at c. 420 m OD, most trees were lost in the early medieval period (Paterson and Tipping 2019). To the south-east of Moncreiffe Hill at 395 m OD, however, analyses on West Lomond in Fife record the gradual loss of woodland by around 1350 cal BC (Edwards and Whittington 1997).

The pollen analyses at Grange Hill reflect an earlier timing of upland woodland loss compared to sites in the Grampians to the north and north-west, but similar to that on the Lomond Hills to the south-east. Whether this represents a regionally significant difference remains to be seen. The plateau surfaces of both Moncreiffe Hill (around 80 ha) and the Lomond Hills (around 2300 ha) are small compared to the extensive plateaux of neighbouring uplands like the Ochil and Sidlaw Hills, which offered more scope for upland land use, especially grazing. Small hills like Moncreiffe and Lomond were marginal in this regard. It is interesting, then, that these small plateaux were cleared and used so early given this disadvantage. Though we have no reliable estimates of population density in later prehistory, it is very unlikely that they were turned to because more extensive upland resources were fully used, but access to those resources may have been denied. Alternatively, we might think that later Bronze Age farms were self-sufficient and not yet regionally integrated, such that apparent marginality was not important. Whether the plateaux were part of a transhumant rural economy is unclear.

Plantago major pollen occurred in contiguous spectra from c. 925 cal BC, soon after *Alnus* trees around the pond were cut down. Sedimentological evidence for soil disturbance that might have promoted the local growth of *Plantago major* comes only after c. 620 cal BC with slight increases of coarse sediment. Then *Plantago major* and *Papaver rhoeas* type are recorded together from c. cal AD 340). Their relative abundance from this time undoubtedly indicates habitats that had become very common, either for the first time or over a much more extensive area. Yet sedimentological evidence in the pond suggests there was no major disturbance in the hydrological catchment.

The synchronous appearance of these two herbs (*Plantago major* and *Papaver rhoeas* type) is unusual. The pollen of *Plantago major* (greater plantain) is identifiable to species and so its habitat can be described in detail. It is a wind-pollinated shade-intolerant perennial herb in a family with exceptionally high pollen dispersal (Broström *et al.* 2005), 'most frequent on paths, tracks (where it is the "commonest species": Sagar and Harper 1964: 191) and at trampled field boundaries...

Table 5.8: Estimates of the age (cal BC/AD) of the synchronous expansion of *Plantago major* and *Papaver rhoeas/dubium* at 46cm depth using different age-depth models (see text).

Depth	Model	1	2	3	4	5	6a	6b	7
46 cm	BC/AD	AD 360	AD 296	AD 1020	AD 1650	AD 1160	AD 540	AD 290	AD 290
57 cm	BC/AD	265 BC	485 BC	200 BC	AD 54	AD 990	130 BC	AD 130	430 BC
63 cm	BC/AD	750 BC	910 BC	645 BC	815 BC	AD 880	685 BC	500 BC	865 BC

and...frequent in disturbed habitats such as demolition sites, soil heaps...and...on arable ground', though once established, persisting in closed grassland (Grime *et al.* 1988: 440), despite being unpalatable to grazing animals. It frequently occurs as a mono-dominant stand where disturbance is greatest and is 'almost always associated with the activities of man' (Sagar and Harper 1964: 190), though it is not regarded as an archaeophyte (Preston *et al.* 2004). *Papaver rhoeas* type pollen (some members of the poppy family) probably represents, from their present distributions, either *P. rhoeas* or *P. dubium*. The two grow together. *P. rhoeas* is today close to its northern limit at Perth and *P. dubium* close to its western limit there. *Papaver* species are insect-pollinated, and though they produce many times the amount of pollen than other disturbed grassland herbs (Percival 1955; Bosch *et al.* 1997) they are poorly represented in the atmosphere (Güvensen and Öztürk 2002), and pollen dispersal, though not well understood, seems to be restricted (Brooks *et al.* 1996). Its habitat is very close to that of *Plantago major*, growing on verges and dry waste ground, though it is more common in arable ground: the two taxa are frequently found together (McNaughton and Harper 1964). *Papaver* is an archaeophyte (Preston *et al.* 2004), intimately associated with human activities. Pollen dispersal characteristics make it likely that *Papaver rhoeas/dubium* grew in the hydrological catchment of the pond. The source of *Plantago major* pollen was potentially much larger (Broström *et al.* 2005). Neither were probably part of the grazed grassland. An association with waste and bare ground is most likely. One habitat appropriate to *Plantago major* and *Papaver rhoeas* type must have been the heaps of disturbed earth and rock in construction and use of both the Moncreiffe Hill and Moredun structures (Chapters 2 and 3), which clearly imply an enormous amount of disturbance.

These occurrences occur in mineral sediment that cannot be radiocarbon dated, and where the closest radiocarbon assays are at 64.5 and 30.5 cm depth, perhaps c. 2400 cal years apart (Table 5.4). The third-order polynomial equation that most successfully models sediment accumulation rates (Figure 5.3),

however, represents only one model of the relation of sediment depth to age. Table 5.8 presents the dating of sediment at 46 cm depth, when *Plantago major* and *Papaver rhoeas/dubium* pollen peak, using eight different approaches and assumptions, to explore the apparent contrast between the timing of fort construction and plant assemblages.

Model 1 is from 3rd-order polynomial modelling (Figure 5.3). Model 2 assumes that the sediment accumulation rate between 30.5 and 64.5 cm depth was linear between the mid-points of assays at these depths (Table 5.4) at 71 yrs/cm. Model 3 projects forward the linear sediment accumulation rate (110 yrs/cm) between assays SUERC-78130 and -70886 (Table 5.4), over a quite short duration. Model 4 projects forward the linear sediment accumulation rate (145 yrs/cm) over a longer duration, between assays SUERC-78131 and -70886 (Table 5.4). Model 5 projects back from the sediment surface through assay SUERC-70887 at a rate of 17 yrs/cm.

Model 6 draws on pollen concentration data (Middeldorp 1982) between 64.5 and 30.5 cm depth. Pollen concentrations are absolute measures of the amount of pollen per unit volume (cm³). If contributions of pollen from major pollen producers do not change over time, then the concentration per cm³ becomes a measure of changing sediment accumulation: slower rates mean higher concentrations and *vice versa*. Between 64.5 and 30.5 cm depth, only concentrations of pollen from *Alnus* significantly change, so a sum of tlp concentrations minus *Alnus* concentrations per cm³ (Figure 5.4) removes that variable. Mean tlp-*Alnus* concentrations per cm³ between 64.5 and 30.5 cm depth were calculated, and differences in individual samples from this (%) assumed to be because the sediment accumulation rate varied by the same proportion. Model 6a (Table 5.8) adjusts the varying sediment accumulation rates per cm derived from 3rd-order polynomial modelling, and Model 6b adjusts the linear sediment accumulation rate in Model 2. Finally, Model 7 assumes that the sediment itself is the best guide to changing sediment accumulation rates: the total proportion of sand per cm³ represents

faster sediment accumulation, either because of higher energies in transporting coarser sediment or because of lower packing densities.

The spread of age estimates for the short-lived establishment of *Plantago major* after 63 cm depth varies from 910 BC to as late as a very implausible AD 880 in Model 5. A date for its establishment might reasonably have been between the 7th–5th centuries cal BC. There is good agreement in this with the beginning of Iron Age activity at both Moncreiffe Hill and Moredun in the archaeological record (Sections 2.3, 3.3), supporting the hypothesis that *Plantago major* flourished because of the scale of ground disturbance. However, the age estimates of the synchronous expansion of *Plantago major* and *Papaver rhoeas/dubium* cluster around cal AD 340, long after Iron Age activity ended. This might suggest either a phase of early-mid 1st millennium AD construction, which is not identified in the archaeological record, or that disturbed ground continued to be common.

This postulated relationship between vegetation patterning and monument construction (or reconstruction) is rare. In Scotland, pollen analyses related to Iron Age forts (Squires in Jobey 1978; Innes and Shennan 1991; Butler in Rideout *et al.* 1992; Edwards and Whittington 1997; Davies and Dixon 2007) have not detected this. Most recently, Hawthorne (2018: 56) has detected from analyses of microscopic charcoal in peat close to the Iron Age fort (5th to 4th–2nd centuries cal BC) of Dun Deardail in Glen Nevis, burning at c. 400 BC, perhaps in woodland clearance for the fort, and a major burning event around 300 cal BC, thought to have been from destruction of the fort by fire and vitrification, but not habitat creation from fort construction. However, Smith *et al.* (1991: 109) linked *Plantago major/media* pollen at The Breiddin hillfort, in the Welsh Marches, to a local landscape ‘heavily utilised by man’.

The high temporal resolution of the later prehistoric and early medieval pollen record at Grange Hill allows the clear observation of land use continuity from at least the later Bronze Age until the medieval period on Moncreiffe Hill. There is no suggestion of reduced activities at any time and a remarkable constancy of land uses on an upland ridge that, despite its commanding height and political significance, would always have been more agriculturally marginal than the surrounding lowlands. Whatever was the response of the native inhabitants around Moncreiffe Hill to Roman activity in the region, it did not include abandonment of the ridge as farmland (cf. Whittington and Edwards 1993). There is equally no evidence that the upland ridge was abandoned as farmland upon the waning of Roman influence or at any time in the early medieval period, irrespective of the actual occupation of the two forts on the ridge. Indeed, the waste and bare ground herbs, *Plantago major* and *Papaver rhoeas*

type show no reduction in representation to the end of the pollen record at c. cal AD 1290, and neither do other disturbance indicators. The pollen source area of the pond continued to experience significant anthropogenic disturbance into the medieval period, and this can be shown to be within the hydrological catchment of the pond with transport and deposition of coarser particles. What this episode signified is not known.

Conclusions

The ridge of Moncreiffe Hill was wooded until before c. 925 cal BC when grazing pressures reduced woodland on dry soils. Human landscape change immediately around the pond on Grange Hill was more gradual and sustained than abrupt: although the organic matter content of pond sediments changed, detailed sedimentological analyses showed that these changes were largely insignificant and to be explained by small interactions between plant communities, soils and livestock. Around c. 925 cal BC the stand of alder around the pond was cleared, probably by axe, perhaps only to give livestock access to water.

Both *Plantago major* and *Papaver rhoeas/dubium*, bare ground herbs that are not necessarily associated with farming but suggestive of very large expanses of disturbed soil, were established between the 7th–5th centuries BC. Their later, synchronous expansion cannot be directly 14C dated but age-depth models using different assumptions suggest this to be of early-mid 1st millennium AD age. Fort construction, reconstruction or destruction would have been perhaps the simplest explanation for this disturbance, but this date is difficult to relate to the archaeological chronology.

5.6 Discussion of sections 5.3 and 5.5

Sections 5.3 and 5.5 tried independently to understand aspects of the plant communities and land uses at and around Moredun. Section 5.3 focused on the on-site carbonized macroplant assemblage, Section 5.5 on off-site pollen analyses. The two data-sets are different in what they say about the landscape and environment, and some interesting interpretative differences have arisen. This section attempts to reconcile these differences.

Section 5.3 described a rich assemblage of cereal remains including hulled barley (*Hordeum vulgare* L), naked barley (*Hordeum var Nudum*), emmer (*Triticum dicoccum* L), emmer/spelt (*T. dicoccum/spelta*) and oat (*Avena* sp). The diversity of recovered plant structures (caryopses, spikelet forks and nodes) suggests that crops were grown nearby and transported to the fort for processing. Many weed species would find a place

in arable fields. Pollen analyses from a pond around 500 m from the monumental roundhouse (Section 5.5), however, found very few pollen grains demonstrably of cereals, with only two such grains within Iron Age sediment (Table 5.7): *Hordeum* group pollen is in addition not assuredly a crop. It was concluded from this negative evidence that the Moredun plateau did not support arable agriculture. Weed taxa were argued to represent bare or disturbed ground rather than arable soils. This is also true for most weed taxa in the macroplant assemblage, though not for *Bilderdykia* (cf. *Fallopia*) or *Galeopsis*. The simplest resolution of this interpretative difference might be that fields were distant from the pollen site: cereal type pollen is very poorly dispersed, falling within metres of the plant.

Preserved as charred fragments were a number of tree taxa, including oak, alder, hazel, birch, willow and cherry, all trees that would have grown naturally on Moncreiffe Hill. Pollen analyses suggest, however, that there were very few trees within the pollen catchment by the Iron Age. Trees might have grown outside the pollen catchment, particularly scrubby genera like alder, birch and willow, but the pollen catchment includes the full range of habitats on the hill. It may be that timber had to be imported. Alder did continue to grow, probably around the pond on Grange Hill. Alder was lost, not gradually but in three discrete periods from the Early Iron Age to the early historic period.

There is no support in the charred plant assemblage for the two herb species, *Papaver rhoeas* and/or *P. dubium* and *Plantago major*, that were given such

prominence in interpretation of the pollen record. However, with the exception of the rich charred plant assemblage associated with the collapsed roof of the monumental roundhouse, which is not typical of the archaeological site, other assemblages are sparse and relatively uninformative. They do not undermine the palynological interpretation. The pollen record of *Plantago major* does agree in age with fort construction, suggesting a causal relation in the creation of disturbed ground. The persistence of these habitats long after the archaeologically attested cessation of disturbance, however, suggests either that different habitats were created in which both taxa flourished, or that disturbance continued which is not recorded archaeologically.

In terms of processing grain, it is likely that large-scale processing took place elsewhere with the separated grain and straw then transported to the site. However, while small-scale processing such as milling may have taken place within the monumental roundhouse, there is no evidence of storage as the cereals are generally simply representative of small mixed accumulations. In terms of roofing materials, it is unlikely that crops were grown only for the straw as it is labour intensive (unless from marginal land), and sedge, rush and grass was available. It is probable the builders were using straw because it was readily available. Good quality peat was not readily available on Moncreiffe Hill, usually the first choice for both building and as fuel. The population at Moredun were able to successfully adapt their environment and use straw and sedge instead.

6. Castle Law, Abernethy

David Strachan, Martin Cook and Dawn McLaren

with contributions by Derek Hamilton, Anne Crone, Jackaline Robertson, and Ian Ralston

6.1 Introduction: the site and its environs

David Strachan

The fort of Castle Law, Abernethy, is located on a rocky promontory at the east end of the Castle Law hill, to the south-west of the village of Abernethy, Perth and Kinross (Figure 6.1: 1). Designated as a Scheduled Monument in 1964, it commands panoramic views to the north over lower Strathearn, the confluence of the Rivers Earn and Tay, and the inner Tay estuary, with the Carse of Gowrie and the Sidlaw hills beyond. To the east, a steep decline into the Ballo Burn affords command over this important terrestrial route through the North Fife hills from the Tay to the Howe of Fife. The site is overlooked by the main body of Castle Law hill to the west, however, and views to the south are also much restricted by the North Fife hills. The fort is constructed on exposed hypersthene-andesite bedrock of the Ochil Volcanic Formation, with drift geology consisting of glaciofluvial till, gravels, sands and silts (British Geological Survey 2023; Figures 1.4 and 1.5). Both elements of the name Castle Law, first recorded at Abernethy in 1722, are Scots and refer to the fort and hill (Peter McNiven *pers comm*). The suggested original name of *Gourdie*, may derive from Gaelic *gruaidh* meaning ‘cheek or brow place’, and Old Gaelic *gruad*, in the sense of ‘brae or slope of hill’ (Taylor *et al.* 2017: 409).

Possible Iron Age settlement and activity in the immediate environs is shown in Figure 6.1 and details of the sites shown can be found in Appendix A. The closest possible fort in this part of the Ochil Hills is an unconfirmed report on Beins Law (Figure 6.1: 2), some 3 km away at the southern end of this same pass through the hills. The OS 1st edition 6-inch map of 1856 shows two eccentric circuits of what would have been a contour fort, the inner of which contains a mound, though this may be no more than a depiction of the summit of the hill (Stratford Halliday *pers comm*). The fort would have enclosed c. 0.3 ha and its location, on the summit of Beins Law at 268 m OD, would have afforded commanding views over the Howe of Fife, on a par with those over the estuary from Castle Law, Abernethy. Other than Beins Law, the closest forts are set along the same northern façade of the Ochils: namely Black Cairn Hill, c. 5 km to the east overlooking the estuary from

above Newburgh, and Castle Law, Forgandenny c. 8.3 km due west from its namesake above Abernethy.

The cropmark record again provides the most tangible archaeological context indicating sites in a variety of forms. At Aberargie, a sub-oval enclosure measuring c. 30 m by c. 24 m transversely, contains a roughly circular macula c. 4 m in diameter, potentially a roundhouse (Figure 6.1: 3). A ring-ditch of c. 13 m in diameter lies around 80 m further to the south (Figure 6.1: 4), and a less convincing curvilinear enclosure, suggested by the arc of one or possibly two ditches, c. 200 m to the south-west (Figure 6.1: 5). In addition, a large circular enclosure, c. 55 m in diameter is recorded at Newbigging (Figure 6.1: 6), an oval enclosure, c. 36 m by 20 m, at Clunie Field (Figure 6.1: 7), and to the south of the south-east corner of the Roman marching-camp at Carey, a sub-circular enclosure, some 80 m in diameter (Figure 6.1: 8).

Unenclosed settlement is suggested at Glenfarg House where sub-circular maculae have been identified, probably indicating roundhouses (Figure 6.1: 9 and 10), while other roundhouses are suggested at: Broadwell (Figure 6.1: 11); Netherton (Figure 6.1: 12); Glenfoot (Figure 6.1: 13); Ferryfield of Carpow (Figure 6.1: 14); Carpow (Figure 6.1: 15, 16 and 17) and Balmano (Figure 6.1: 18). Roundhouses close to souterrains are recorded at Carpow (Figure 6.1: 19) and East Clunie (Figure 6.1: 10 and 21). An elongated sub-rectangular enclosure, c. 40m by 20m transversely, is recorded on a terrace on the north side of the River Farg where it joins the River Earn at Culfargie (Figure 6.1: 24), while another sub-rectangular enclosure with a maximum dimension of c. 50 m is suggested to the south-west of Abernethy village, c. 500 m north-east of Castle Law fort. Further traces of Iron Age activity have been suggested through work at Abernethy village, including at the Primary School site, which revealed a possible stack yard, truncated souterrain and a single post-hole (Connolly 2004; Figure 6.1: 22), and the upper stone of an Iron Age ‘beehive’ quern on Station Road (Figure 6.1: 29).

As previously noted, Pennant, in the account of his second tour, asserted Abernethy was a Pictish capital, with Moredun fort as its ‘citadel’ (1776: 532–533). Oddly, however, he makes no mention of Castle Law fort, possibly because it was tree-covered at that

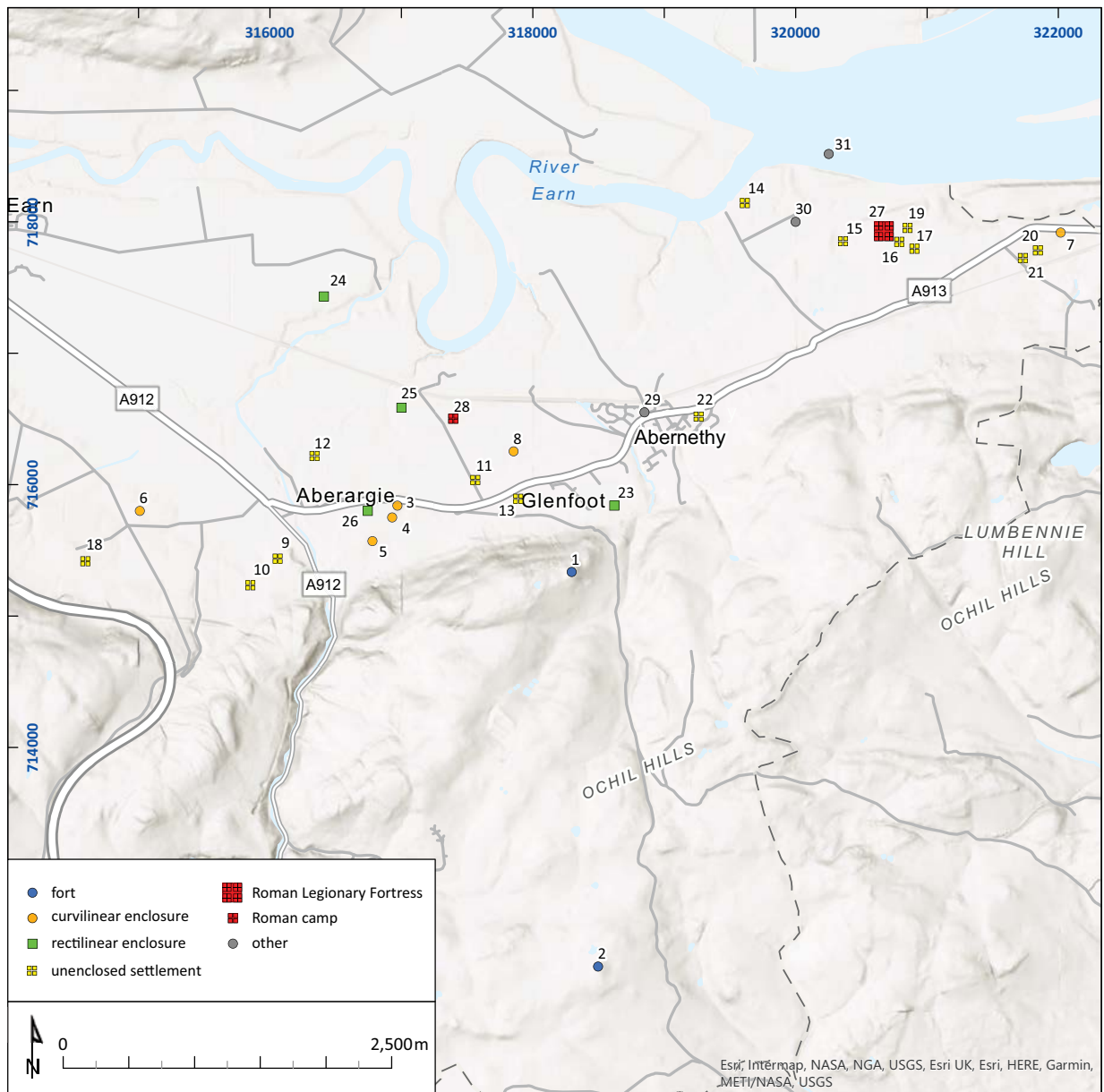


Figure 6.1: The location of the fort (1) with known and possible Iron Age sites mentioned in text (Appendix A).

time (Stratford Halliday *pers comm*). The first written reference is in 1794 when the Old Statistical Account records that ‘tradition says there was a fort’ and its conjecture that ‘it probably served for one of those watch towers on which the Picts used to kindle fires, on sudden invasions, insurrections, or the approach of the enemy; these signals were communicated from tower to tower, till the whole country was alarmed and flew to arms’ (OSA 11, Abernethy: 447–448). Fifty years later, the New Statistical Account records: ‘the vestiges of a very imperfect vitrified fort. The principal enclosure seems to have been surrounded by a rude mound of irregular stones, many of which are burnt or partially fused. The form is somewhat like the section of a jargonelle pear cut longitudinally’. It goes on to note that two ‘indistinctly visible out-works, lower down

the hill...seem to have been connected with it’, before again suggesting that in addition to guarding the pass into Abernethy Glen, it functioned as a signal-post to communicate with other forts, including Dundee Law, Evelick, Dunsinane, and its ‘magnificent namesake’ Castle Law, Forgandenny (NSA 10, Abernethy: 851–852).

The Ordnance Survey *Name Book* repeats the assumption of a Pictish date and function noting it was the ‘first of a chain of strongholds extending from Abernethy (the then Pictish Capital) to Ardoch, & one of the first to be attacked by the Roman squadrons landing about the Tay or Earn’ (1859–1862: Abernethy 57).

It also recounts a tradition regarding ‘two lochs & a marsh’ on the summit, which notes that when ‘Romans

attacked the fort the Picts, it is said, threw a valuable silver cradle, the property of some of the King's children, into one of lochs near, & many silly persons under the idea, that, with the assistance of a little ledgerdmain interference of the famous witches of Abernethy, they would be able to get the long lost treasure from the bottom of the loch. Several have been even foolish as to try the experiment, & have spent long & anxious nights on the hill, but all of course in vain, never succeeded so far as to procure an interview with the witches who were to lend the helping hand' (1859–1862: Abernethy 57–8).

This traditional reference to silver 'treasure' perhaps captures a memory of the much earlier recovery of finds of the type to be recovered from the cistern in the excavations of 1895–7 (below and McLaren *intra*). The site was subsequently first mapped by the OS as an elongated oval in plan and annotated as 'Fort (Remains of)' on their 1st edition 25-inch map of 1862.

The Victorian excavations

As outlined in Chapter 1.4, in 1892 Edwin Weston Bell excavated the complex series of forts superimposed on Castle Law, Forgandenny (1893). It is probable Bell's work inspired two local residents of Abernethy, Alexander Mackie and James Marr, who as David Christison subsequently explained, 'employed their leisure hours for the last three years' (i.e. from c. 1895–7) in uncovering stretches of the walls at Castle Law, Abernethy (Christison and Anderson 1899: 13). Christison was 'astonished' by the scale of this pioneering act of community archaeology, and given the importance of the remains uncovered, the Society of Antiquaries of Scotland funded completion of the excavation in 1898. This included photography by P.M. Macintyre, an advocate, measured drawings by the architect Thomas Ross and Frederick R. Coles, and notes on the finds by Joseph Anderson, then keeper of the National Museum of Antiquities of Scotland.

Prior to the excavation Mackie described the hilltop as being cloaked in a substantial deposit of grass-covered stone tumble, presumably largely emanating from the enclosing walls (Christison and Anderson 1899: 15). The excavations revealed the following features and the terms used in the original report are indicated with inverted commas. The main feature was the 'inner wall' or 'wall of enceinte' forming an oval fort measuring internally c. 43 m north-east to south-west by 15.5 m transversely and enclosing an area of c. 0.06 ha. In addition, running across the spine of the hill, an 'outer wall' was found to the west of the main enclosure, attached to it on the south-west by a short 'transverse wall' (Christison and Anderson 1899: 18–22, fig 2). Other features described include the 'space between the

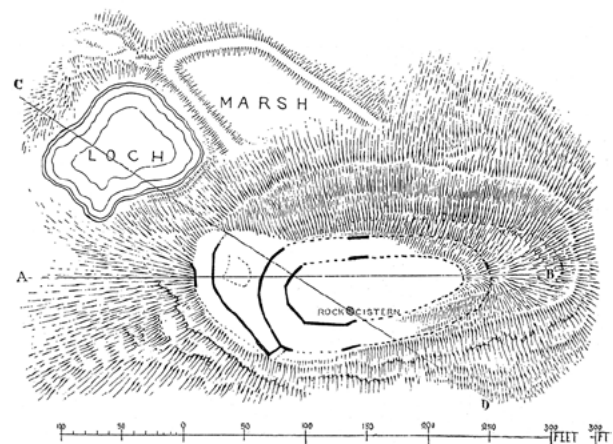


Figure 6.2: The plan of the site, and the lochan to the west, as presented by Christison and Anderson (1899: 16, fig. 2. Reproduced by kind permission of the Society of Antiquaries of Scotland).

walls', the 'interior' and the 'embankment of the loch and marsh' (Christison and Anderson 1899: 23–5, fig 2). The annotated plans of the excavations (Figures 6.2 and 6.3) show the lines of the wall-faces uncovered and illustrate the then common practice of 'wall chasing', but with more open area excavation at the west of the fort. As shown in Figure 6.3, no entrance was identified through the defences, despite its circuit being followed to its 'full extent' (Christison and Anderson 1899: 28). The transverse wall 'had not been bonded' to the inner wall but was 'continuous with...the outer wall proper' (Christison and Anderson 1899: 21), suggesting that the entire outer wall had been built up against the existing fort. Despite being 'thoroughly excavated', no structures were discovered within the interior, except some paving of flat stones and a circular, rock-cut cistern (Christison and Anderson 1899: 24). The remarkable assemblage of artefacts recovered, including animal bone from the cistern, is further discussed below (*intra*). The concise though detailed published record of the work is exemplary for its time; however, it has proved challenging to correlate the exact locations of the sections and elevations drawn by Ross and Coles, and more importantly the spectacular photograph of the inner wall taken by Macintyre (Christison and Anderson 1899: plate I; reproduced here as Figure 6.4), with the plan and remains as re-excavated in 2017.

The 'inner wall' has for long been the classic Scottish example of visible timber beam-sockets in a wall-face, in no small part due to Macintyre's iconic photograph (Figure 6.4). It varied in thickness considerably from c. 5 m to c. 7 m, but was generally between 5 and 6 m, and survived to a height of c. 2.5 m. The 'outer wall', survived to a similar height and for most of its length was found to be c. 4 m thick, but it was depicted as widening at its north-west terminal to 7–8 m (Figure

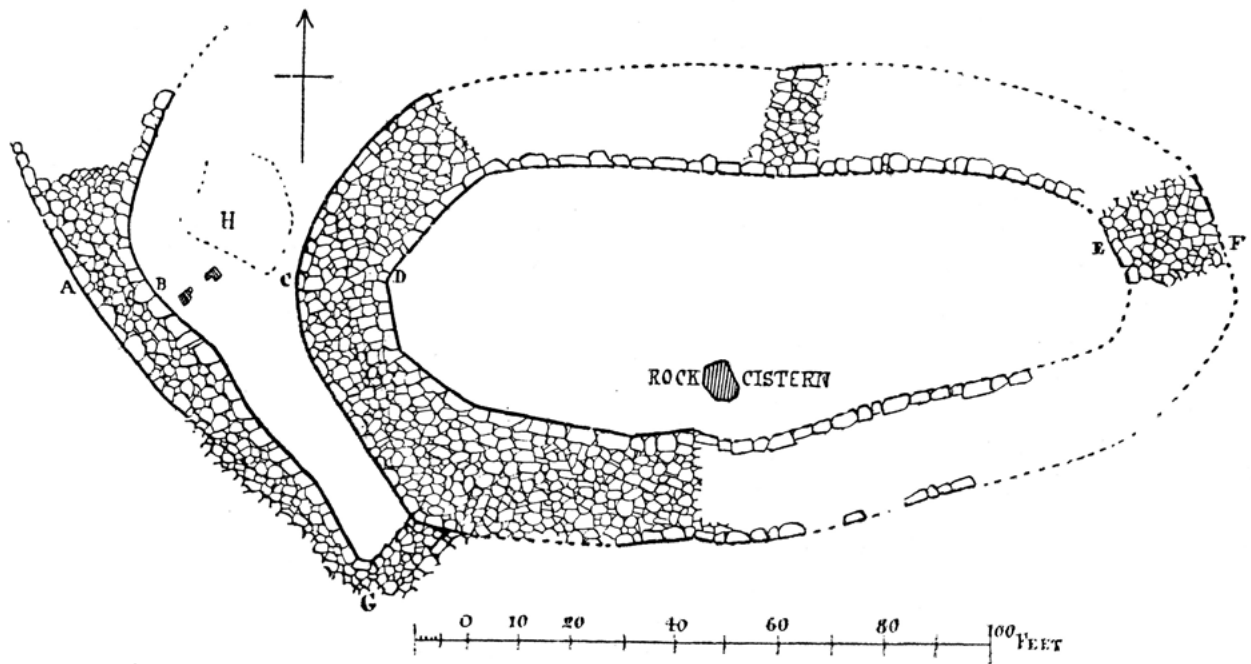


Figure 6.3: Detail of structures uncovered during the 1890s excavation (Christison and Anderson 1899: fig 3, Reproduced by Kind Permission of the Society of Antiquaries of Scotland).

6.3). A batter was noted on the faces of both walls, being most pronounced on the outer face of the 'inner wall' and on the 'outer wall' (Christison and Anderson 1899: figs 6, 7 and 9). As commonly found on Scottish forts, both walls were constructed directly onto sloping bedrock, with Christison calculating that the base of the external face was almost 3 m lower than its internal equivalent (Figure 6.5; cf Ralston below).

Both walls were timber-laced, with their outer façades containing sockets for horizontal, transverse timbers which were demonstrated as running up to 3 m (more than halfway) into the wall-core (Christison and Anderson 1899: figs 4, 5 and 8; plate I; Figure 6.4). In addition, unfilled channels for longitudinal timbers were recorded running within the wall-core and parallel to the façades (Christison and Anderson 1899: 18–22, fig 6). Evidence for the presence of longitudinal timbers within the inner wall can also be seen in the plan of the fort, described by Christison as 'somewhat irregular and occasionally...even angled' (Christison and Anderson 1899: 18), the angular sectors of the faces perhaps indicating they were aligned with straight timbers within the wall-core (Figure 6.3).

The interior contained an area of paving of flat stones and a circular, rock-cut cistern c. 2.3 m in diameter and c. 2.1 m deep. On excavation, they found the upper fill of the cistern to be a layer of large stones mixed with 'charcoal and ashes'. Beneath this there was a layer of brushwood, hazel twigs and ferns, which had 'partially

converted into a kind of peat' and contained a quantity of well-preserved animal bones. This lower deposit was evidently waterlogged and once emptied the cistern filled up with c. 0.6 m of water (Christison and Anderson 1899: 24, fig. 10; McLaren below). While Christison uses the term 'cistern', the refilling of this rock-cut feature could be considered evidence that it is in fact a well (i.e. tapping into underground water rather than supplied from above ground from the collection of rainwater). The refilling of the feature may simply have resulted from runoff from the surrounding ground, and as a result, the term cistern is maintained in this volume.

A small area ('H') between the outer and inner walls was left unexcavated (Christison and Anderson 1899: 25 and fig 3, reproduced here as Figure 6.3). The extent of the excavation between the inner and outer walls is captured in Macintyre's second photograph in the report (Christison and Anderson 1899: plate II; Figure 6.6). To the north-west of the oval enclosure, an embanked dam of unknown date was found to have created a pond, and a second bank to the east of this, on the break of the slope, was suggested as possibly having formed another outer work (Christison and Anderson 1899: 25).

The timber-laced walls uncovered were in an excellent state of preservation. The remarkable photograph of the beam holes (Figure 6.4), which imply a series of large parallel transversal timbers on a single horizon, prompted comparison by early commentators with



Figure 6.4: The south-west section of the outer face of the main enclosure or 'inner wall' uncovered over 1895–7 as shown in Figure 6.3 (Christison and Anderson 1899: plate I. Reproduced by kind permission of the Society of Antiquaries of Scotland).

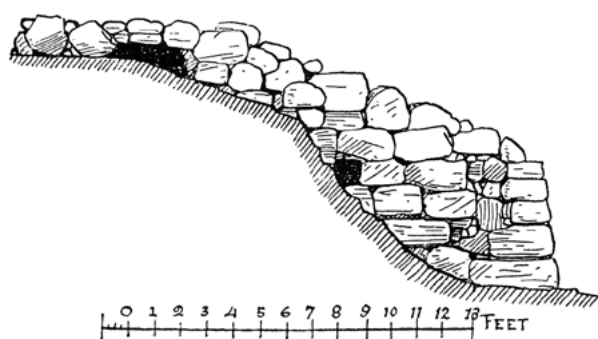


Figure 6.5: Christison's section through the 'inner wall' (Christison and Anderson 1899: fig 6. Reproduced by kind permission of the Society of Antiquaries of Scotland).

the gun-ports of a man o'war. Both the walls, and the recovery of high-status items, such as a jet ring, a bronze finger ring and a bronze fibula (McLaren *infra*), have ensured that Castle Law has played a central role in Scottish Iron Age studies since. Along with Castle Law, Forgandenny (ID 26583), and Burghead, Moray (ID

16146), it was interpreted by Gordon Childe under the heading of 'Gallic Forts', which together with vitrified forts he embraced within his 'Abernethy Complex' (1935a: 193–5, 236–7). This comparison to the *murus Gallicus* described by Caesar placed this northern series of forts firmly into a wider European tradition. And while they appear as an especially northern British variant (Ralston 2006: 56), they include the same dominant features of an internal framework of longitudinal and transverse timber within a stone-faced wall, with the beam ends exposed or projecting from the outer, and sometimes inner, façades.

Pre-excavation survey

An initial topographical survey, carried out in 2012 by Oxford Archaeology North (Figure 6.7), was further refined by an interpretive topographical survey by RCAHMS in 2013 (Figure 6.8).

The 2013 survey suggested that both walls at the south-west end of the fort appeared to survive well, but erosion to the exposed wall-faces was noted. A network



Figure 6.6: The second photograph of the 1890s excavations, taken from the south. The inner face of the outer wall appears on the left with the inner wall on the right (Christison and Anderson 1899: plate II. Reproduced by Kind Permission of the Society of Antiquaries of Scotland).

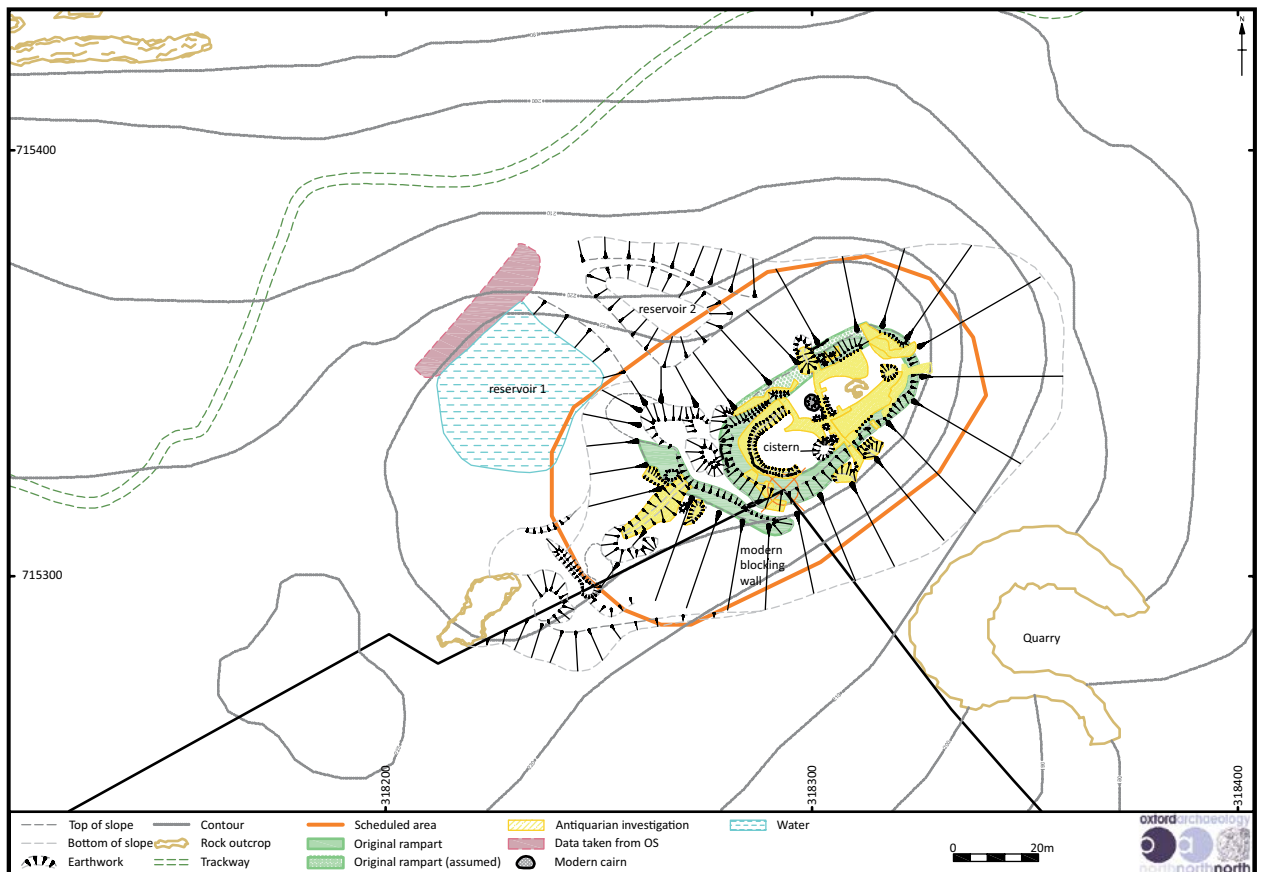


Figure 6.7: The 2012 survey by Oxford Archaeology North showing the extent of the scheduled area.

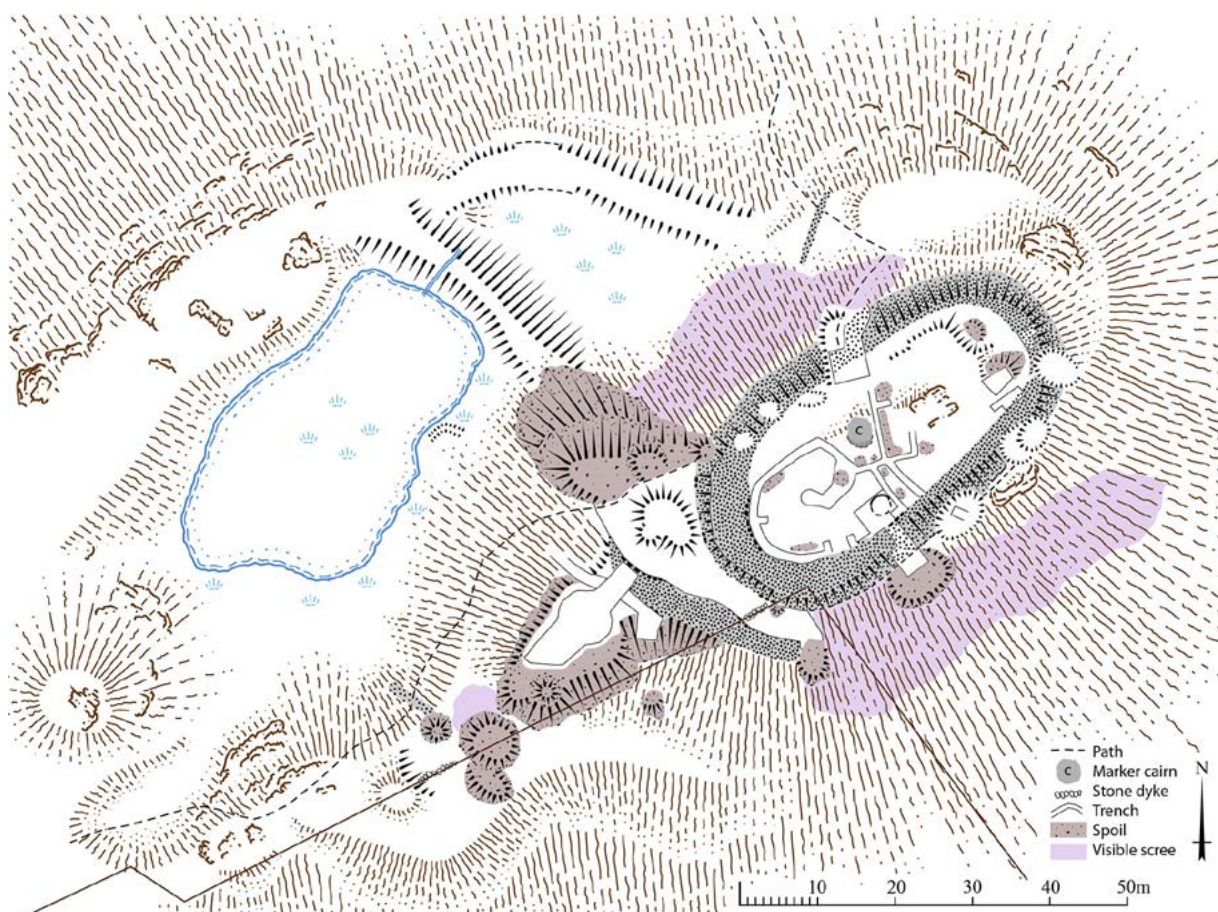


Figure 6.8: The 2013 RCAHMS survey showing the fort and the 1890s excavation trenches and their spoil (Crown Copyright: HES).

of excavation trenches was identified at the south-west end and within the interior; almost certainly the work of Mackie and Marr between 1895 and 1897. In addition, a cairn at the centre of the fort, on the highest part of the spur, was suggested as a possible stance for a 19th-century survey station. The RCAHMS surveyors noted that the 'Loch' identified by Christison below the fort to the west is little more than a shallow pond formed by damming a gully that naturally drains away to the north-east. A narrow break in the dam is either the remains of a contemporary sluice or a later drain, which debouches into the 'Marsh' behind a second embankment to the north-east (Figure 6.8). The purpose and date of both of these works and their relationship to the fort are unknown, but they may be broadly contemporary with the fort. Comparisons might be made with Barry Hill, near Alyth, where an outer wall encloses and to some extent forms a dam for a pond (RCAHMS 1990: 28–9; Lock and Ralston 2022: 298).

The possibilities of expanding our knowledge of the fort through geophysical survey was considered by geophysicist Peter Morris, but he concluded that due to the shallow soils and geology of the site, neither magnetometry nor resistivity were likely to yield results of any value.

6.2 Excavation results

Martin Cook and David Strachan

Research objectives

Despite the impact of the 1890s excavations on Scottish fort studies following Christison's Rhind lectures of 1894 (Christison 1898) and since, the chronology was entirely dependent on the artefact assemblage that had been recovered, most of it poorly contextualised. For the purposes of modern discussion, it critically lacked independent radiocarbon dating to confirm a chronology and allow direct comparisons with other timber-laced fortifications. A priority for re-excavation was to recover secure charcoal samples from beneath or within the walls, while other targets included Christison's unexcavated area 'H' between the inner and outer walls (Christison and Anderson 1899: 25, fig. 3; Figure 6.3) to assess the survival of undisturbed stratigraphy. Specific research objectives were set out in the project design (Strachan 2017b):

- to establish a chronology for the development and occupation of the site;
- to identify any phasing of activity;

- to assess the condition of the *in situ* historic fabric 120 years after the excavation, in particular the walls, given that the excavation trenches were not backfilled. Compare surviving elevations with the historic photographs taken by Macintyre;
- to record the extent of any vitrification and to assess why, if possible, vitrification at this fort was so minimal.

Methodology and results

Two trenches were excavated over a two-week period in 2017. Trench 1 measured 24 m by 6 m and was aligned north-east and south-west across the inner and outer walls and the interior (Figure 6.9). It was located to examine areas previously excavated and aimed to record the survival of the previously exposed walls and retrieve further information on their construction and chronology. Trench 2 measured 5 m by 3 m and was aligned north-east and south-west across the junction between the inner and outer walls. It aimed to explore the stratigraphic relationship between the inner and outer walls.

To aid management of volunteers over an uneven space, Trench 1 was split into areas A, B and C. Area A was found to comprise the inner wall and the fort interior, Area B the area between the inner and outer walls, and Area C the outer wall and external area. Details of the principal features described (outer/inner wall) are presented below.

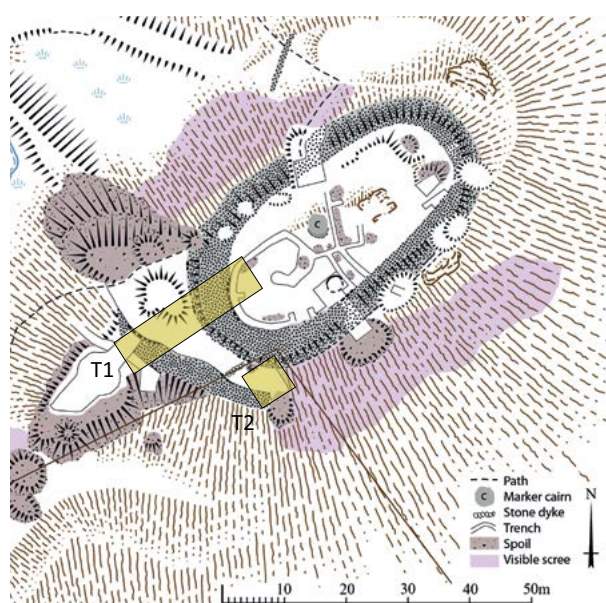


Figure 6.9: The location of the 2017 excavation trenches (background image Crown Copyright: HES).

Area A: the inner wall [119]

As outlined above, the inner wall varied in thickness, but within Trench 1 measured c. 6.4 m in thickness and survived to c. 2.1 m in height on the internal face (Figure 6.10). Both the external (Figure 6.11) and internal (Figure 6.12) faces were constructed in large roughly-dressed blocks of both Old Red Sandstone and grey andesite, placed directly onto the bedrock. Evidence for horizontal timberwork within its rubble core was identified in the external face, with beam holes for transverse timbers located at intervals of 0.5 m (Figure 6.13). Importantly, only one course of these sockets was identified, whereas Christison recorded at least two (Christison and Anderson 1899: figs 4 and 5), illustrating the extent of collapse, of c. 0.4 m of the upper stonework of this façade since its initial excavation and display.

While not as convincing as the timber sockets on the outer face, possible sockets for transverse timbers were noted in the inner face (Figures 6.12 and 6.13), but the lack of any distinct pattern to these may indicate they are no more than missing facing stones rather than sockets for structural timbers. As the wall was built over a steep drop in the level of the bedrock, the transverse timbers represented by these possible sockets would most likely have been closer in height to the second course of sockets, now lost, in the external façade. The lower course of transverse timbers, relating to the surviving external sockets, probably rested on this bedrock scarp. No further evidence was found for the longitudinal timbers recorded previously within the core of the wall. In one area of the inner face that was revealed, stones in three course layers were inserted directly above one another, rather than in an overlapped bond as found across the rest of the wall (Figure 6.14). This may reflect repair of localised collapse in antiquity, or perhaps a construction phase by different work gangs, or even a secondary phase of construction. Alternatively, it could be a much more recent repair to replace stones removed during the 1890s excavation. Elsewhere, later insertions and rebuilds for display have been identified at antiquarian excavations from the 1820s onwards, for example at Castlehill Wood dun, Stirling (MacKie 1971; Murray Cook *pers comm*). There is no evidence to suggest this at Castle Law, perhaps because the outer wall was so well-preserved no rebuild was required. Instead, the Victorian trenches were left open, and became infilled through natural deposition and erosion of the exposed structure.

Albeit from a relatively small sample, one noticeable feature of both façades of the inner wall is the alternate layering of Old Red Sandstone courses with those of other lithics, and the coincidence of the sandstone courses with the regular timber sockets (Figure 6.13).

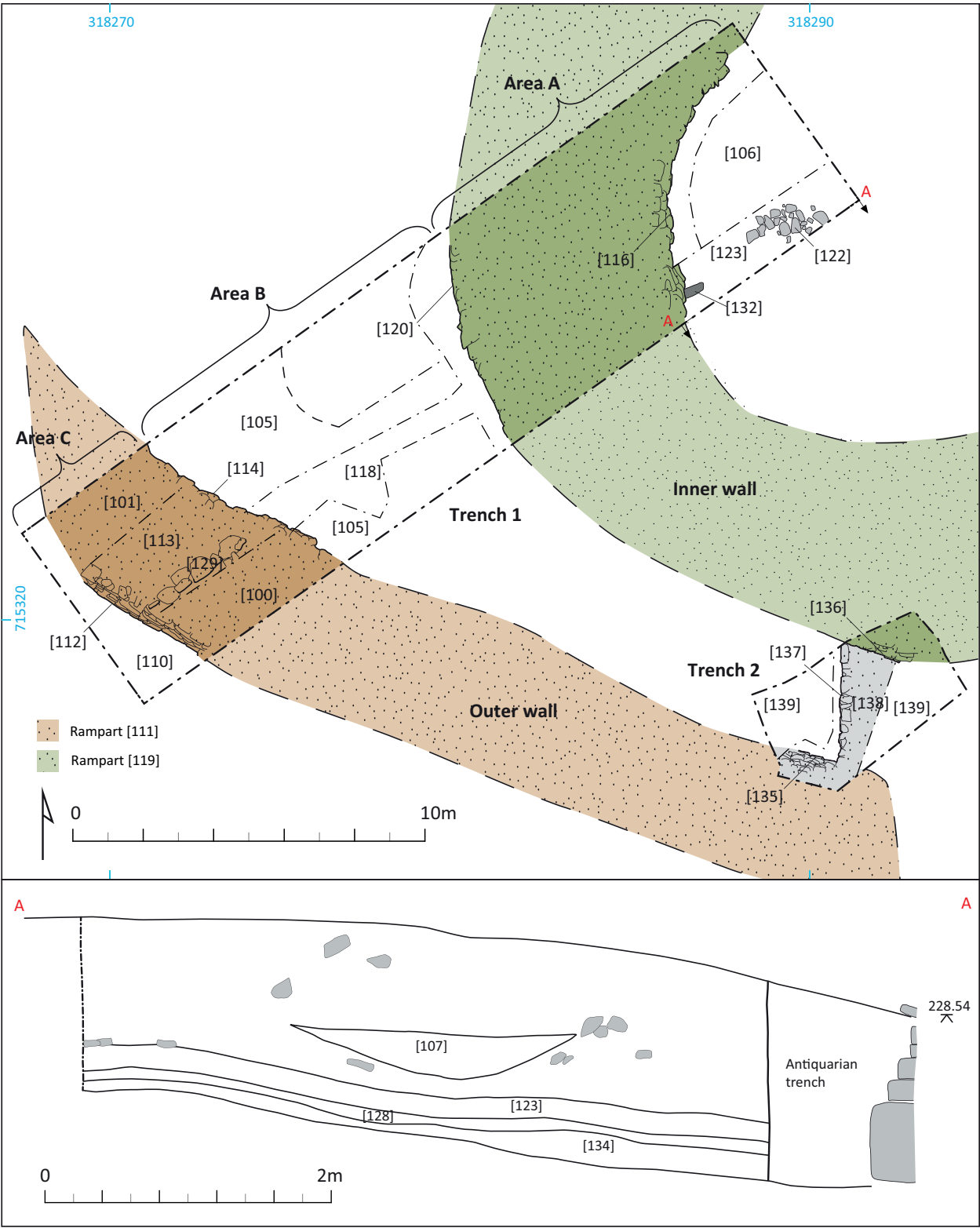


Figure 6.10: The plan of Trenches 1 and 2 (above) and the section through the interior of the fort in Trench 1 (below).



Figure 6.11: The external façade of the inner wall in 2017, constructed onto the bedrock. The extent of erosion is clear through comparison with Figure 6.4.



Figure 6.12: The internal face of the inner wall detailing with probable timber sockets.

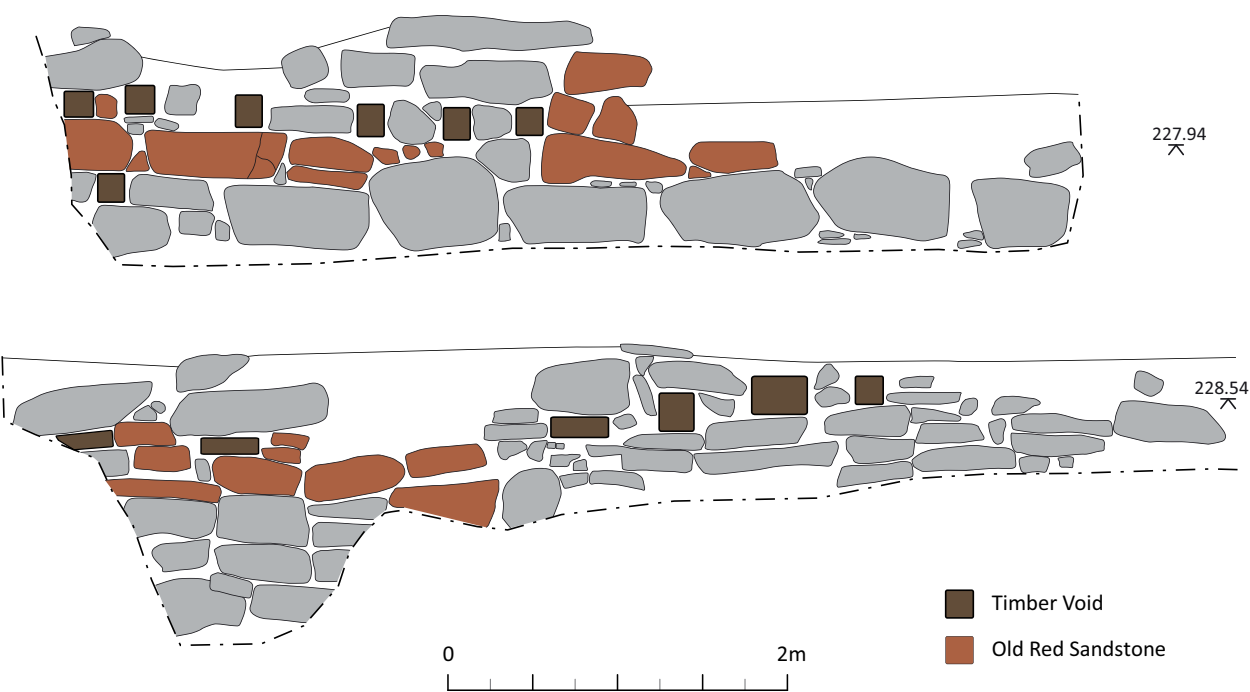


Figure 6.13: Elevations of external (above) and internal (below) façades of the inner wall showing the use of Old Red Sandstone and probable/possible timber voids.



Figure 6.14: The inner face of inner wall in Area A, showing the possible repair in the façade.

The latter is reminiscent of Caesar's description of the *muris gallicis*: 'this work, with respect to appearance and variety, is not unsightly, owing to the alternate rows of beams and stones, which preserve their order in right lines' (1869: 7.23). The combination of the Old Red Sandstone with the timber sockets courses may have been a design feature to enhance the visual display of the wall face, creating a banded appearance to the façade with a broadly regular stippled pattern created by the exposed timbers. A more prosaic explanation for the pairing of Old Red Sandstone with the timber sockets may have been the workability of the sandstone, it being much easier to shape and face than the volcanic bedrock. It is equally possible that the happy coincidence of both attributes was recognised by the builders.

Area A: the interior

The 1890s excavation chased the internal face of the inner wall (Figure 6.3 and 6.8), including in the area re-excavated in Trench 1. As a result, the sondage within the interior at the east end of Trench 1, cut through both the antiquarian trench and undisturbed *in situ* stratigraphy (Figure 6.10: both plan and section). This was well-preserved and included upcast rubble from the antiquarian works [102] overlying a series of deposits that probably originated following the abandonment of the fort. These included a dark silty soil with rubble inclusions [103] which overlay a deposit of frost-



Figure 6.15: The curvilinear setting of flat stones [122] amongst dark *in situ* internal deposit [123], taken from the east.



Figure 6.16: The fully exposed setting of flat stones [122] below the rubble collapse [106].



Figure 6.17: The oak timber [132] at the base of the internal face of the inner wall [116].

shattered stone [107] and a layer of rubble [106] that had collapsed from the inner wall. Three prehistoric ceramic sherds (SF011 and SF013) were recovered from the interface between [106] and [107], and while not diagnostic, are similar to Late Bronze Age/Iron Age examples found on other sites (Chapter 4.2).

Below these deposits were a series of thinner deposits, which are likely to represent occupation and activity within the fort interior. The uppermost of these consisted of a layer of charcoal-rich material [123] from which a small amount of vitrified material (SF025), a fragment of a crucible (SF024) for non-ferrous metal working, and fragments of cattle bone were recovered. It may possibly represent tumble from the nearby wall-head and illustrate that localised vitrified material might have fallen from the wall. Deposit [123] abutted and overlay a curvilinear setting of flat stones [122], which measured 1.08 m by 2.32 m, with individual stones measuring c. 0.25–0.35 m (Figures 6.15 and 6.16). Although only partially excavated and not associated with either cut features or a hearth, it may have formed part of a larger building or structure relating to occupation or some other activity. It is no doubt an unexcavated section of what Christison described as ‘rude paving of flat stones’ within the interior (Christison and Anderson 1899: 23–4). A deposit of charcoal [132], including a charred oak timber (Figures 6.10 and 6.17), abutted these stones and was radiocarbon dated to 1370–1120 cal BC (SUERC-77618), the significance of which is discussed below (Section 6.3 below).

Area B: Intra-mural space

Excavation of the ‘space between the walls’ aimed to explore the relationship between the walls, and the function of the intra-mural space (Figures 6.3, 6.6 and 6.10). Little material had been left *in situ* by Mackie and Marr, however, and little more than a thin layer

of rubble and roots [105] overlay the natural bedrock [118]. Further, neither of the two possible *in situ* pivot stones, identified in the original excavation to the south of the unexcavated area ‘H’ (Christison and Anderson 1899: 25) were identified. It remains unclear whether they have been removed. The upper surface of the underlying bedrock had been quarried to create a more severe gradient to the outer face of the inner wall and perhaps to win construction material. Manipulation of the bedrock was also a feature at Moncreiffe (Chapter 2: *passim*) and Moredun (Chapter 3: *passim*) forts, and a large possible pounder (SF012) that was recovered may have served to break or shape stone, as with the maul from Moncreiffe fort (Chapter 2.4).

While excavation did not uncover any other evidence to demonstrate a specific function of the intra-mural space, there are at least three possible options. The possible pivot stones recorded in the earlier excavation, if correctly identified, might suggest a structure, perhaps entrance-related within the intra-mural space. Alternatively, they may simply have been displaced stones collapsed from the outer wall and, if so, may intriguingly represent the remains of earlier use of the site. More generally, with the outer wall protecting an approach along the higher ground of the ridge to the west, the intra-mural space may have been conceived as an open ‘killing zone’ in the defensive scheme, designed to trap attackers attempting to assault the fort, below defenders manning the inner wall. The outer wall would also have kept attackers further from the main fort wall, protecting the defenders from thrown weapons and projectiles such as slingshot.

Area C: outer wall [111]

Broadly concentric with the south-west curve of the inner wall, this out-work consisted of an unusual wall, averaging c. 4 m in thickness, and running for up to 28 m across the spine of the ridge (Figures 6.3, 6.9 and 6.10). At its south-east end Christison recorded a right-angled turn inwards to abut the inner wall, while at its north-west terminal it is depicted as widening to 7–8 m before petering out, disappearing down the steep slope towards the lochan to the north-west (Christison and Anderson 1899: fig. 3; Figure 6.3). As exposed, the wall was c. 4.5 m thick and consisted of an inner [114] and outer [112] face with a rubble core [113], and survived internally to a height of c. 2 m. No construction cut was identified as due to physical constraints on site, the external façade was not fully excavated, and the underlying surface was only reached locally along the inner elevation.

Only a small section of the external face [112] was previously excavated (Christison and Anderson 1899: fig 8; Figure 6.8). Part of this, and a previously unexcavated

section to the south-east was excavated in 2017. As with the inner wall, the section of wall previously excavated had eroded somewhat and around 0.4 m of stonework was lost (Figure 6.18: left hand side). The previously unexcavated section (Figure 6.18: right hand side) was found to be in very good condition (Figures 6.18 to 6.20), having been covered by a deposit of soil and rubble [108, 109 and 112] dumped against it, which was also identified by the Victorian excavators (Christison and Anderson 1899: fig 9). This dump [108] was made up of a mid-brown gravelly loam 0.32 m deep with occasional large angular stones. It extended beyond the limit of excavation and was covered by a topsoil [100]. Underlying [108] was a deposit of large (0.6 m by 0.4 m by 0.3 m) sub-angular to sub-rounded stones of mixed lithographies [109]. Abutting the outer face [112] of the outer wall, this has been interpreted as collapsed rubble originating from the upper works of the wall. The lowest deposit was a mid-reddish brown gravelly sandy deposit [110].

The outer wall face [112] was well built, with a minimum of five stone courses surviving undisturbed, and up to seven courses surviving in part. The courses were made up of large, roughly squared blocks, measuring up to 0.80 m wide by 0.40 m in height, which were pinned in place by smaller blocks and slabs. The lower courses

of the section exposed were all of Old Red Sandstone, with mixed lithologies above (Figures 6.18 and 6.19). The façade included two lines of voids for the ends of transversal timbers, with smaller pinning blocks used to fill gaps and define the timber sockets. The timber sockets were variable in size, evidently tailored to individual timbers, but generally measured c. 0.25–0.30 m (Figures 6.18 and 6.19). The lower line of sockets was distinctive in that two were considerably lower than the others (Figure 6.18: right hand side) and this may be a response to irregularities in the underlying bedrock. The timber sockets of the rows are vertically off-set, confirming there were no vertical timbers either in the façade or within the core.

The inner face [114], previously exposed by the Victorian excavations (Figures 6.18 and 6.21), was unstable and therefore only uncovered to its full height within a narrow trench with battered sides, which was no more than 0.5 m wide at the base (Figure 6.22). At least seven courses of facing stones were identified, but the blocks used for its construction were not as uniform as those of the internal face [116] of the inner wall [119].

A linear arrangement of five large stones [129] extended through the top of the rubble core [113] and visibly marked the northern side of one of the channels for the



Figure 6.18: Elevations of the external (above) and internal (below) façades of the outer wall, indicating the use of Old Red Sandstone and the survival of timber beam holes.



Figure 6.19: The external face [112] of the outer wall [111].



Figure 6.20: The batter on the outer face of the outer wall.



Figure 6.21: The inner face of outer wall [111] surviving in situ between the ranging poles, with large, tumbled blocks in front.



Figure 6.22: The inner face [114] of outer wall [111] with bedrock exposed beneath. Detail of the surviving façade as excavated is shown in Figure 6.18.



Figure 6.23: The section through the outer wall [111] showing the linear arrangement of flat stones [129] that may cover a transverse timber channel within the wall core [113].

transverse timbers (Figures 6.10 and 6.23). Measuring 4.5 m in length by 0.50 m, the fill of the channel [130] of the linear arrangement, was a mid-reddish-brown, sandy loam.

The primary function of the outer wall was no doubt to provide additional defence to the south-west of the fort, where the knoll on which the fort is built is much less steep than on the other sides. Indeed, further to the west the fort is overlooked by the main ridge of the hill. Thus, the out-work would not only have protected it from attack from the main body of the hill, but also signalled the presence of the fort further afield to the south-west and south.

Trench 2: the transverse wall

Trench 2 investigated the relationship between the inner and outer walls, re-excavating the junction where Christison recorded the outer wall returning to abut the inner wall (Christison and Anderson 1899: fig. 3; Figure 6.3). The western face of this transverse wall [137] was exposed as the antiquarian excavators had done previously (Figure 6.10). The wall [137] was oriented north to south and was located between the inner face [135] of the outer wall [111], and the outer face [136] of the inner wall [119]. Due to the restricted size and depth of the trench, however, the base of the wall was not fully reached by excavation. It was exposed in plan at the north junction with the inner wall (Figure 6.24) and to a depth of four courses of masonry at the south junction with the outer wall (Figure 6.25).

At the northern end, the transverse wall [137] was found to abut the outer face [136] of the inner wall [119], confirming Christison's report that it 'had not been bonded' to the inner wall (Christison and Anderson 1899: 21). In contrast, while Christison described wall [137] as 'continuous with...the outer wall proper' the junction exposed in 2017 suggests that the transverse wall may also have abutted inner face [135] of the outer wall [111] at its southern end (Figures 6.26 and 6.27). While would indicate that the transverse wall was constructed between the two existing inner and outer walls. The potential discrepancy here is difficult to explain as the quality of excavation, recording and interpretation of the original excavations is good and proved correct elsewhere on the site. The extent of the 2017 excavation was limited, and simply may not have revealed enough of the original structure to confirm the true relationship. Alternatively, as at other sites, the wall may have been re-instated after the antiquarian period for display, on the line of exposed walls that were left *in situ*. On balance, the relationship between the wall [137] and the outer wall [111] could not be definitively demonstrated in 2017. While it is possible that the transverse wall and outer wall were added in one phase as Christison suggests, the 2017 evidence



Figure 6.24: Looking north in Trench 2 along the transverse wall [137] showing it to abut the external façade of the inner wall [119].



Figure 6.27: Detail of the intersection between the transverse wall (left) and inner face of the outer wall (right) shown in Figure 6.26.



Figure 6.25: Detail of the join of the transverse and inner walls shown in Figure 6.24.



Figure 6.26: Trench 2 view to the south showing the transverse wall [137] (foreground left) apparently abutting the inner face [135] of outer wall [111].

suggests wall [137] was noted bonded to either the inner or outer walls and it seems likely that it was a later construction between two existing structures, albeit it probably within the relatively short lifecycle of the fort.

6.3 The radiocarbon dates

Derek Hamilton

Following a review of the material available between the excavation team and Dr Tony Krus at SUERC, it was agreed that unfortunately most datable material was neither stratigraphically secure, nor structural, and only a single viable sample was returned from the remains of an oak roundwood recovered from context [132], at the base of the stratigraphy in the fort interior in Area A of Trench 1 (Table 6.1 and Figure 6.28). This returned a Middle Bronze Age date (1370–1120 cal BC; 95% probability; SUERC-77618). This unexpected result poses a problem in the interpretation of the deposits recorded in the interior. There is little doubt that the fort is broadly of Iron Age date, but whether this timber was a portable object still in use or derived from a Bronze Age structure previously standing on the site is unknown. It may reflect the scale of timber acquisition required for the construction of such massive timber-laced walls, not only from living trees but also by scavenging a range of other sources from further afield. Elsewhere, dendrochronology has demonstrated that Bronze Age timbers were incorporated into much later structures, such as at Buiston crannog (Crone 2000: 58).

Other samples were obtained during the analysis of the bone recovered from the cistern during the Victorian excavations (Section 6.4 below). While an initial attempt to date the bone by SUERC failed (GU49155), a second analysis dated to 370–170 cal BC (95% probability; SUERC-82632), confirming that at least some, if not all,

Table 6.1: Radiocarbon dating.

Laboratory Code	Material	Context	Radiocarbon age (BP)	$\delta^{13}\text{C}$ (‰)	Calibrated date (95% probability)
SUERC-77618	Charcoal: Oak	132	2994±30	-25.6	1370–1120 cal BC
SUERC-82632	Animal Bone	Recovered during antiquarian excavation of the cistern (NMS: X.2014.214)	2205±28	-22.2	370–170 cal BC

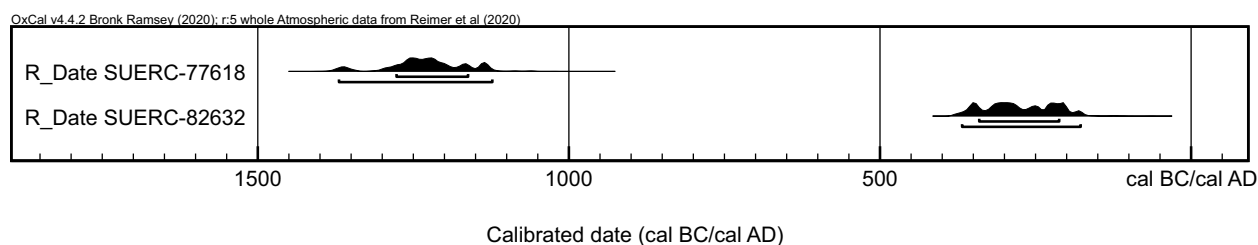


Figure 6.28: Calibrated radiocarbon results.

of the faunal remains and presumably material culture retrieved from the cistern relates to Iron Age activity (Table 6.1 and Figure 6.28).

6.4 The artefacts

Dawn McLaren

with a contribution on the wooden bowls by Anne Crone

Introduction

A small and limited assemblage of artefacts was recovered, consisting of small and fractured fragments of pottery, coarse stone tools and vitrified material. The majority of these small fragmentary items were recovered as residual material from the spoil or slumped infill of the areas that had been investigated during the 19th century (Christison and Anderson 1899). Overall, the quantity and size of these fragmentary artefacts implies a good rate of recognition and collection during the 19th-century excavation, representing only a handful of items that had been missed during the earlier investigation.

Despite the small quantity of individual finds, the artefacts recovered in 2017 provide a useful avenue of investigation into the activities undertaken within the fort during its use. It has also provided a valuable platform from which to re-appraise the 19th-century artefact assemblage, which is now curated by the National Museums of Scotland. While a detailed re-analysis of this earlier assemblage was not possible, it has been examined with the aim of clarifying its

composition, re-cataloguing the objects and comparing them with the finds discovered in 2017. The following report will consider the 2017 objects by material type, followed by a discussion of the 19th-century assemblage.

Both the antiquarian artefact assemblage and that from 2017 inform our understanding of the chronology of the site. The more closely datable of the individual items amongst the assemblage firmly point towards an Early to Middle Iron Age occupation.

The assemblage

A summary of the assemblage is presented below by material type and summary catalogues are presented in Appendix D. A full catalogue and report on the excavated assemblage can be found in the site archive.

Ceramics

A total of nine sherds was recovered, deriving from a minimum of three low-fired, handmade pots. The sherds are all small plain body sherds weighing 182.2 g collectively. Each of the pots that these sherds represent had been produced using a fine sandy clay, to which varying amounts of crushed grits were added as temper to provide strength to the fabric. The sherds indicate coil-construction and were hand-finished by smoothing the external surfaces when wet to, at least roughly, mask the junctions between the coils and to obscure protruding grits. The junctions observed beneath this masking, however, are generally poorly knitted together, similar to the sherds from both Moncreiffe and Moredun, and those from the 19th-assemblage (see

below). So little of the vessel profiles or circumferences are represented that not much useful comment can be made about their form or size, although it is clear the pots had steeply-sloping thick walls, probably with flat bases. The presence of sooting on external surfaces and traces of carbonised encrusted residues on the interior (e.g. Vessel 3) indicate their use as cooking vessels. Like the Moncreiffe Hill pottery assemblage, they are difficult to date with any accuracy, due to the lack of diagnostic ‘feature’ sherds, but their form and fabric, as well as general appearance, invite a Late Bronze Age/Early-Middle Iron Age date.

Coarse stone

The assemblage of worked stone was extremely limited in size and range and consisted of a saddle quern fragment produced from a sandstone boulder (SF001; Figure 6.29), a hand-held pounder produced from a water-rounded river pebble (SF002; Figure 6.30), and a water-rounded sandstone cobble used as a working surface or anvil (SF012). A fractured sandstone slab (SF026), found in the setting of flat stones [122] in Trench A, had been deliberately fractured to shape, but lacked any additional evidence of use or modification. Finally, a fire-cracked cobble, probably a pot boiler (SF015), came from the interface between contexts [106] and [107], also Trench A.

Non-ferrous metal-working

Metal-working evidence was very limited amongst the assemblage, but a spall from the rounded base of a hemispherical crucible (SF024, Figure 6.31) was recovered from context [123] in Trench A.

The external surface had traces of a glassy vitrified residue adhering, suggesting that the metal being cast was copper-based, but in the absence of scientific analysis the alloy type cannot be confirmed. Intriguingly, an angular fractured chunk of copper-rich stone (SF029) came from the same context. Although the mineral inclusions in this stone are small and limited, this may provide an insight into the raw materials being used, suggesting production was not restricted to simply recycling scrap bronze, as is often suggested on Iron Age and later sites.

Vitrified material

Several large angular fractured pieces of heavily vitrified material (SF003, SF005, SF025) were recognised from contexts [A102], [A123] and [B105]. In total the vitrified material weighs 1040.5 g and is dominated by fractured angular fragments of vitrified stone deriving from [A102]. The rest of the fragments cannot be closely classified and consist of dense, dark-coloured, glassy vesicular material. None of the vitrified material

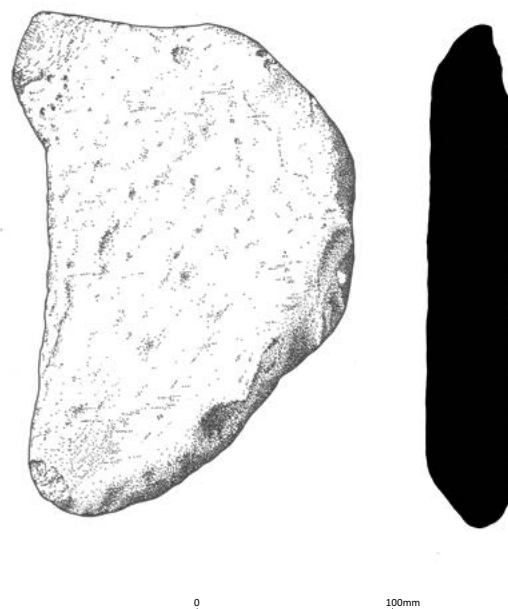


Figure 6.29: Saddle quern fragment (SF001) from the 2017 excavations.

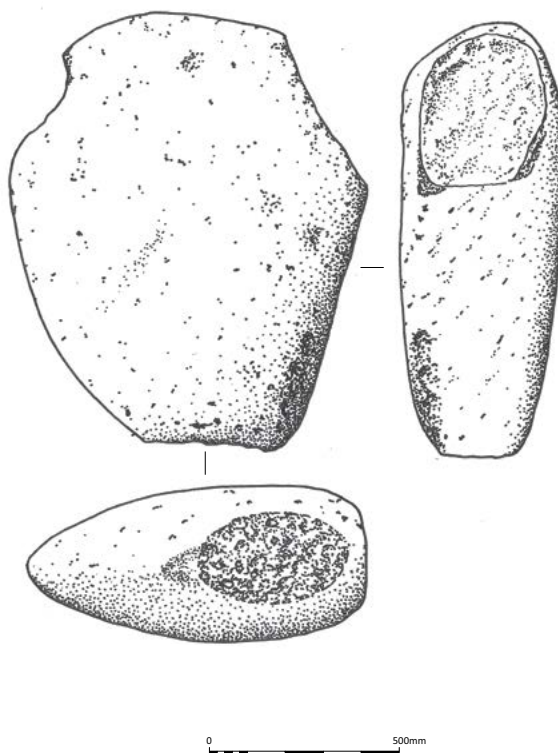


Figure 6.30: Pounder (SF002) from the 2017 excavations.



Figure 6.31: Spall from a ceramic crucible (SF024) from the 2017 excavations.

is consistent with metal-working or indicative of a specific industrial process. The presence of fragments of vitrified stone leads to the question of whether these might derive from a vitrified portion of the enclosing wall, but there was no evidence uncovered during the excavation to suggest that the walls were burnt or vitrified in any of the areas investigated.

Victorian items

Objects that could be directly related to the late 19th-century excavations include a horseshoe-shaped iron heel cleat (SF007) from context [102] in Trench A, which must have fallen off one of the workmen's boot heels, and a worn and corroded brass coin (SF022), the surfaces of which are too corroded to allow close identification but is probably a Victorian half penny based on its size and weight. This was recovered from the fill [124] of the antiquarian trench [126] in Trench B and may have been deliberately left by the early excavators.

The antiquarian assemblage

The artefact assemblage recovered during the late-19th-century excavations is much larger and more wide-ranging than that discovered during the 2017 investigations, and includes significant individual items of high-status metalwork, including a bronze La Tène I style brooch and a probable iron linchpin. The objects were discussed in detail by Joseph Anderson in the original site report (Christison and Anderson 1899: 28–33), accompanied by illustrations of seven key finds. These include pottery sherds and items of worked clay, bone, stone, flint, metal and wood, representing a range of household items, tools, weaponry, jewellery and ornaments. Although the descriptions of many of the items need little revision or embellishment, the re-examination of the assemblage has allowed closer identification of several items, including the iron objects, and has enabled the re-interpretation of some,

such as the clay 'pellets', with the benefit of a century of new discoveries and study since Anderson's initial assessment. The composition of the assemblage is considered here and a catalogue of the extant artefact assemblage within National Museums of Scotland's collection can be found in Appendix D.

Turning specifically to the metals amongst the assemblage, Anderson notes that 'the iron objects are few, and so much oxidised that it is impossible to determine their character with certainty' (Christison and Anderson 1899: 32). Since his examination, all the metal items have been conserved, removing much of the deforming corrosion that restricted his observations. Amongst the more significant new insights are the identification amongst the iron objects of a possible pre-Roman Iron Age linchpin from a wheeled vehicle, and several conical ferrules that are likely to be spearhead tips or butts. An intact iron ring-headed pin was previously identified amongst the assemblage, but a second iron decorative pin, also a derivative of the ring-headed pin type, has also been recognised, alongside a re-worked knife blade fragment and more prosaic items such as an incomplete short ferrule or collar. It is also worth noting that several of the iron objects have been accessioned under the same number (NMS X.GP 40). These were presumably found as a group, but this is not referenced or explained by Anderson in the excavation report (Christison and Anderson 1899).

Early prehistoric objects

One object that stands out as somewhat anomalous amongst the Iron Age assemblage is a ground stone axehead (NMS X.GP 19) of Neolithic date. The axehead is fairly narrow and sub-rectangular, with an oblique cutting edge which is chipped and damaged from use. It is made of a green-grey, calc-silicate hornfels stone, banded in appearance with frequent natural sub-spherical pits across the surfaces. Although its lithology has not been analysed, its colour and appearance are similar to material from the Creag na Caillich outcrop, near Killin (Edmonds *et al.* 1992; Ritchie and Scott 1988). Despite the damage to the axehead's blade, the tool could still have performed its function and could have been re-ground to sharpen, suggesting that its presence on the hill is unlikely to have been fortuitous.

In addition, two fragments of flint (NMS X.GP 25 and X.GP 26) recovered during the early excavations, and a chert barbed-and-tanged arrowhead found on a path on the northern slope of the fort in 1994 (King 1994: 85), attest to activity on and around the hill during the Early Bronze Age and is interesting in light of the Middle Bronze Age radiocarbon date obtained from the charred wood sample from the interior of the fort.

Household equipment

The ceramic sherds reported by Anderson (Christison and Anderson 1899: 33) are of a similar form and fabric to those discovered in 2017. It was not possible to test for joins between sherds from both investigations so there remains a possibility that these sherds may derive from the same pots described above. Two stone lamps (NMS X.GP 17 and X.GP 18) produced from water-rounded cobbles, have a single round-based hollow pecked into the centre of one face. In each instance, the rim of the hollow is heavily sooted with patches of encrusted carbonised residues, confirming the use of the hollowed stones as lamps.

Fragments of a wooden bowl and possible wooden lid were retrieved from the cistern during the 19th-century investigations (Christison and Anderson 1899: 32–3) and subsequently accessioned by the NMS under the numbers X.GP 41 and X.GP 42. They were air-dried and are consequently cracked and distorted, so their original dimensions can only be estimated. It was also not possible to determine the species of wood used in their manufacture, except that it was a diffuse-porous species such as alder, which was commonly used in the manufacture of wooden vessels.

The bowl and lid/platter are dated by association: their survival strongly suggests they were found in the cistern alongside animal bone dated to 370–170 cal BC (95% probability; SUERC-82632). It is unknown whether the animal bones and wooden vessel fragments were deposited in the cistern in a single event and no stratigraphic relationship was recorded by Christison and Anderson (1899: 32–3) to assist in disentangling the picture, however, it is reasonable to assume they are broadly contemporary. There are currently no ready parallels for the lid/platter; there is a platter of similar size from Oakbank crannog, but its profile is unrecorded (Dixon 2004: 147). However, the bowl is one of an assemblage of 17 surviving Iron Age wooden bowl fragments from Scotland (Crone forthcoming). Almost all of the 11 examples that are directly dated were made in the 1st to 4th centuries AD; only the bowl from the Black Loch of Myrton, made in the 5th century BC, is earlier than the Castle Law example. The Black Loch bowl is unique in terms of its footed shape and decoration, but many parallels for the Castle Law bowl can be found in the later group. Where sufficient detail survives to determine the profile, the majority are round-bottomed bowls and display the same everted rim as the Castle Law bowl. They vary widely in diameter from 113 mm to 260 mm; the Castle Law bowl is one of the larger examples. The early 1st millennium AD assemblage is distinguished by the presence of carved handles, both vertical and horizontal, and both single and on opposing sides, so it is possible that the

Castle Law example may also have been handled. The Castle Law bowl is significant as it demonstrates that round-bottomed bowls were in use in Scotland from at least the latter half of the 1st millennium BC and are not a Late Iron Age phenomenon.

Tools

Tools of various forms of iron, bone and stone are amongst the assemblage and include a simple stone grinder (NMS X.GP 20), the tip of a small iron paring chisel (NMS X.GP 40), and a fragment of a possibly repaired or re-worked whittle-tanged blade (NMS X.GP 40). Impressions from the grain of the wooden handle of the blade survive across the surface on one face, but, a pair of rivets appear to have been added through the rear of the blade, just forward of the junction, perhaps affording the replacement of the handle after the breakage of the original whittle tang. A forked double pronged tool (NMS X.GP 53) produced from an antler tine or narrow beam may have performed a function in textile production.

The most curious of this group is a small intact tanged iron tool (NMS X.GP 40) with a short flat splayed tool head, the wide curving edge of which is toothed and bent down at 90 degrees to the tang. Although it bears some resemblance to small single handled saws, such as those summarised by Laing from Dunadd, Argyll and Garryduff, County Cork (1977: 296, fig 106, no2; Christison and Anderson 1905: 318, fig 51; O'Kelly 1962), the angle of the toothed cutting edge on the Castle Law example does not seem consistent with use as a saw. Perhaps of more relevance are two examples of three-toothed tanged iron tools from Culduthel, Inverness (Hunter 2021b: 179, 182, illus 6.44 and 6.46, SF0371 and SF1002), which have been identified as tools that were probably used to create slits in leather for stitching. The Culduthel examples differ from that at Abernethy as their teeth project straight from the head of the tool, whilst those from Abernethy are bent at 90 degrees. Despite this difference, enough similarities remain in the form and design of the tools at Abernethy and Culduthel to suggest a shared function. Those from Culduthel were recovered from well stratified and directly dated contexts, SF0371 from a context dated to c. 60 BC – AD 90 and SF1002 from a context dated to c. 50 BC – AD 50 (Hunter 2021b: 179 and 182).

A further tool which may relate to fine metalwork, possibly sheet metal-work, is a shale burnisher (NMS X.GP 22). This consists of a large natural pebble of shale or cannel coal worked at one end into a blunt point, the tip and faces of which are abraded from rubbing. Its soft and durable surfaces would have enabled material such as sheet bronze to be worked without scratching the surfaces. Although no concrete evidence

of metal-working is present amongst the 19th-century assemblage, the crucible fragment recovered in 2017 certainly suggests that non-ferrous metalwork was taking place at the site.

Also worthy of note is a cylindrical handle from an iron tool (NMS X.GP 46) produced from antler. The natural rubicose surface of the antler has been deliberately removed and smoothed, and the surfaces have become polished as the result of handling. As on other sites, the tool marks on items of worked bone and antler can provide a useful proxy record of the use of metal tool types that often do not survive within the record and this handle is a good demonstration of this. The end of the handle into which the tapering tang of the iron tool would have been inserted, appears to have been sawn, whilst a series of fine linear chatter marks, made by the edge of a knife blade, are visible on the face of the handle where the natural surface has been pared away.

Weaponry

Anderson noted a large portion of an iron blade, interpreted as a possible spearhead (Christison and Anderson 1899: 32). It can no longer be located, unless it is one of two conical ferrules which survive amongst the assemblage. This cannot be confirmed, however, as the dimensions Anderson provides do not match any of the extant items. One (NMS X.GP 38) has a distinctly flattened lentoid section at the tip and has broken across a nail hole towards the open socket, suggestive of a spear-tip or javelin and similar to those noted at Dunadd (Lane and Campbell 2000: 162). The second conical ferrule (NMS X.GP 40) is larger and is circular rather than flattened in section. The surfaces have largely been lost, making it more difficult to classify with confidence. Although it is feasible that this too may have been a projectile tip, it may have simply protected the butt of a spear or staff (Manning 1985: 140–1).

Anderson also described two ‘pellets of baked clay, resembling sling-bolts’ (Christison and Anderson 1899: 33). Re-examination of these suggests that one (NMS X.GP 24) is indeed of lightly fired clay, whilst the other (NMS X.GP 23) is a fragment of animal coprolite with no obvious evidence of modification. The fired clay ball is incomplete, with surface damage consistent with rodent activity, but it is similar in form to examples from Traprain Law in East Lothian, Clachard Craig in Fife and Moredun (Curle and Cree 1916: 68, fig 40, 7; Close-Brooks 1983b: 222; McLaren, *supra*). Anderson’s suggestion (Christison and Anderson 1899: 33) that they may be slingbolts remains a possibility, but the study of examples found elsewhere highlights their similarity to Iron Age stone balls used as gaming pieces (Close-Brooks 1983b: 222; Cool 1982), as discussed with respect to the Moredun examples (McLaren, *supra*).

Vehicle equipment

Perhaps the most remarkable object within the assemblage is a robust loop-headed fitting, consistent with the shape and size of an iron linchpin (NMS X.GP 37). Linchpins are fittings, typically in metal, used to secure a wheel onto the axle of a wheeled vehicle. This example has a simple looped head and a square-sectioned stem, broken towards the tip, which is assumed to have originally curved outwards at right angles. Immediately below the head, the stem thickens to accommodate a transverse perforation within which a strap would have been secured. This simple form of linchpin is found in contexts dating from the end of the pre-Roman Iron Age (Manning 1985: 72, fig 19) and is known in both Britain and the Continent (see MacGregor 1976 for other Scottish linchpins). Similar loop-headed linchpins, referred to as Llyn Cerrig Bach type after an example in that hoard (Manning 1972: 231), are also known from hoards such as that from Waltham Abbey, Essex; Bigbury, Kent; and Worthy Down, Hampshire (Manning 1985: 72). Manning’s (1985) classification of this type of linchpin dates them to the late first century BC/early first century AD and suggests that the curved stem, assumed to have been present on the Castle Law example but now lost, is a characteristic of many La Tène linchpins (Manning 1985: 72). Closer to home, an iron J-shaped linchpin with inlaid decorative strips is known from Phantassie, East Lothian (Hunter 2007a). It was found to have been deposited under the stone paving of a structure relating to Phase 4 activity on the site (c. 40 BC to AD 130). Although this date of deposition of the Phantassie example cannot be tied down more precisely, it supports Manning’s interpretation of a first century BC/AD currency for this form of fitting.

The presence of the linchpin at Castle Law is significant both in terms of its suggested date and the implied ownership and use of a prestigious wheeled vehicle, perhaps even a chariot (Hunter 2007a). The position of the fort, and indeed the lack of any evidence of an appropriate entrance, makes it unlikely that such a vehicle could have been driven into the interior, so by implication it has probably arrived in this assemblage independently of the rest of the vehicle. The absence of contextual information about the find spot makes any suggestion about the circumstances of its deposition conjectural, but there is a strong possibility that such an unusual and prestigious item was deliberately deposited, perhaps as a foundation offering, or to mark an episode of change in the use of the fort. A similar suggestion has been made for the deposition of a linchpin from Culduthel, Inverness, found inserted into a post-hole of a timber-built roundhouse (Hunter 2021b: 176) and has been postulated for the example from Phantassie, East Lothian (Hunter 2007a).

Personal ornaments

A surprisingly wide-ranging group of personal ornaments is present, consisting of a copper alloy brooch, a copper alloy spiral finger ring, two iron pins, a shale bangle fragment, a ring pendant and two copper alloy hemispherical mounts.

The most significant of these is the bronze brooch, a rare example of a Middle Iron Age type (Christison and Anderson 1899: 32, fig 17; Childe 1935b: 76; Stevenson 1966: 20–1, 28 pl. 2a; Hull and Hawkes 1987; Mackreth 2011: 8–9; Adams 2013). Unfortunately, this item (NMS X.GA 30) was not available for analysis at the time of examination so the following description is based solely on Anderson's original observations and the published drawing. It is a simple cast brooch with a solid, very shallow catch plate, the foot of which turns upwards at an angle to the axis of the pin; the bow is marked at the centre by a concave transverse moulding (Christison and Anderson 1899: 32). This form is consistent with Hull and Hawkes' (1987) Type 1C brooch, a type which has more recently been re-examined and refined by Adams (2013) who suggests that the type can be further divided into Types 1Ca and 1Cb. The Castle Law brooch is consistent with her Type 1Ca brooch due to its sloped or low arched bow and the fact that the foot stretches to the hip of the bow at an angle of about 45 degrees from the end of the catchplate (Adams 2013: 57). Hull and Hawkes considered whether these brooches might be imports or British copies of continental types (1987: 117). In contrast to continental counterparts, Adams notes (2013: 108) that Type 1C brooches have external chords and decoration is typically limited to only one part of the bow or the foot, setting these apart from continental forms. A copper alloy and coral brooch of this type from the site at Mill Hill, Deal, Kent (Parfitt 1995: 95) provides the most secure insight into the possible date of deposition due to the tightly dated series of burials at the site, which implies that the Type 1Ca brooch was deposited in the mid-to-late 3rd century BC or later (Garrow *et al.* 2010: 87, 103). Looking more broadly, Adams surmises that Type 1Ca brooches likely enjoyed a currency from the 4th to 2nd centuries BC and are firmly associated with Middle Iron Age types on both stylistic grounds and depositional context (Adams 2013: 110). This date range offered for Type 1Ca brooches is consistent with the radiocarbon date obtained from a sample of animal bone from the cistern at Castle Law.

The spiral finger ring (NMS X.GP 29) is an ornament type often considered diagnostic of the Middle Iron Age, yet their dating has been the subject of long-running debate (Clarke 1971). Clarke (1971: 26) has shown that the type originated in the Middle Bronze Age, with a floruit of use in the Iron Age, but extending well into

the late first millennium AD. The actual number of spiral finger rings from Scotland remains small and these are obscured by a number of spiral rings that were probably used as connecting loops rather than worn on the finger (e.g. two examples from Shanzie Farm, Alyth; Coleman and Hunter 2002: 90, illus 18, no 13). The size of the Castle Law example suggests that it was worn on the finger of an adult, and the development of a patina on the surfaces implies considerable wear prior to its loss or deposition.

An intact iron ring-headed pin (NMS X. GP 36), and a second damaged pin (NMS X.GP 35) that may be a derivative of a ring-headed example, are also noteworthy. Iron and copper alloy ring-headed pins are known from Iron Age sites across Britain, but many are from insecure or poorly dated contexts preventing refinement of their dating (Hunter *et al.* 2013: 264). The ring-headed pin developed from the Late Bronze Age swan's-neck pin (Dunning 1934), seeing further development in the north into projecting ring-headed pins. Like many Scottish examples, the Castle Law pin adds little to our understanding of the currency of use of this type as details of its context of recovery and stratigraphic position are unknown. The dating of a bone skeuomorph of a ring-headed pin from Broxmouth, East Lothian was recently re-evaluated and determined to be from a third century BC context (Hunter *et al.* 2013: 264). This broad date would be consistent with the radiocarbon assay returned from the sample of animal bone from the cistern at Castle Law, but as we cannot be sure that the pins were recovered from this feature, little more can be said.

There are two ornaments of black shiny organic stone within the assemblage in the form of an intact ring pendant (NMS X.GP 27) and a fragment of a decorated bangle (NMS X.GP 28). It has not been possible to confirm the raw materials using established methodologies (combination of X-ray fluorescence, X-radiography and visual inspection; Hunter *et al.* 1993; Davis 1993) and their description here relies entirely on macroscopic examination. The ring pendant is large with an external diameter of 46 mm, displaying a distinct wear facet on one area of the internal edge where a thong has been fastened, suggesting its use as a pendant (Hunter 2014: 153). This type of ornament has not seen systematic study or detailed synthesis but has a long currency of use from the Iron Age to the early medieval period and a wide distribution (Hunter 2004: 107; 2014: 153). Similar examples include those from: Carlungie (unpublished, NMS: X.HD 1924; Hunter 2007b: 66), Elliot (Hunter 2007b: 66–7), Finavon (Childe 1935b: 76, fig 16), and West Grange of Conon (Jervise 1862: 497), all in Angus; Cairngryffe, Lanarkshire (Childe 1941: pl. LII); Traprain Law, East Lothian (Cree and Curle 1922: Fig 24.15–16); Sheep Hill, Dumbarton and Dundonald,

Ayrshire (Hunter 2007c: 203, table 4; Hunter 2004: 107, no.81); and a roughout for what may be another was recognised amongst the assemblage from Moredun (Hunter, *infra*). Roman and early medieval examples are valuably summarised elsewhere (Hunter 2004: 107; 2014). The external surface of the Castle Law bangle has been decorated in a cable pattern, a decorative motif also observed embellishing an Iron Age bangle fragment from Luce Sands, Wigtownshire (NMS X.BH 8293; Hunter *et al.* 2018: 213, illus 165c).

Also present are two small hemispherical copper alloy mounts (NMS X.GP 31 and X.GP 32), each with a small central perforation and flattened, flanged edges. Although Anderson suggests that these may be two halves of a bead (Christison and Anderson 1899: 31), these were later discussed by Audrey Henshall as comparable to the bell-shaped studs or rivet heads from Hurly Hawkin, Angus (1982: 226), the Castle Law examples lacking the central pin. The suggestion made by Henshall follows the interpretation of those from Traprain Law (Burley 1956: 132, 188), that these were used as decorative studs or mounts on items of heavy leather or wood (Henshall 1982: 226).

Chronology and context

In the absence of detailed records of the stratigraphical context of the finds, their chronological significance for the site is limited. Specific mention is made in the original report of a collection of well-preserved animal bones recovered from the cistern (see Robertson, below, for a reappraisal of this assemblage), but the other components of the assemblage are divorced from both their stratigraphic context or a location. The fair to moderately good condition of many of the more vulnerable materials (e.g. the iron), and the presence of sherds of two distinct wooden bowls implies that some, if not all of the artefacts, may also have been dredged from the water-logged cistern. During this current project, a sample of animal bone retrieved from the cistern in the 19th century was directly dated, indicating that at least one episode of deposition took place between 370–170 cal BC (at 95% probability; SUERC-82632). Although this date provides a valuable chronological marker for activity within the fort, it should not be applied to the whole artefact assemblage uncritically in the absence of detailed information about their find spots.

Also of note is the intact or substantially complete condition of many of the objects, particularly the brooch and the fine iron ring-headed pin. Recovery of ornaments such as these in a complete state is not unprecedented, but the number of substantially complete ornaments and other objects merits consideration and may hint at careful, and therefore

purposeful deposition. Ready parallels can be found elsewhere for structured deposition of artefacts on Iron Age settlements (Armit 1992; Hingley 1993), such as that already noted at Culduthel, Inverness (Hunter 2021b: 176; Hatherley and Murray 2021: 229), but without detailed contextual information of the find spots of these objects, it is not possible to expand this discussion into a consideration of whether this might have involved specific foundation or closing deposits. Other finds, such as the Type 1Ca Middle Iron Age brooch, by their very rarity stress the significance of the site and the status of its inhabitants, and the wide networks of contacts enjoyed by the community at Castle Law.

Stepping back from the constraints on our understanding of the assemblage due to the lack of stratigraphic information, and accepting that the taphonomy of these finds will never be fully understood, individual objects point towards Early to Middle Iron Age occupation of the fort. In particular, the Adams (2013) Type 1Ca brooch is consistent with a 4th to 2nd century BC date, whilst the iron linchpin, the iron ring-headed pin and its derivative pin, are all suggestive of a pre-Roman Iron Age date. Items such as the shale or cannel coal ring pendant, bracelet fragment and spiral finger ring, enjoyed longer currencies of use stretching into the Late Iron Age and early medieval period and are, therefore, less valuable in refining the chronology of the artefact assemblage and the activity that these finds represent.

In conclusion, while this re-appraisal of the antiquarian assemblage has been limited in scope, it has allowed the identification of previously unrecognised items and has provided a useful avenue into investigating the nuances of the chronology of activity at the site, as well as allowing valuable questions to be asked of the context of the recovery of this important group of finds. In the absence of detailed contextual information about the find spots, however, it will not be possible to determine the sequence of deposition of individual items or to interrogate the mechanisms behind the choices made by the fort community to discard, deposit or abandon certain objects. Yet there are hints, in the unusual composition of the assemblage and the condition of some of the rarer objects within it, particularly the ornaments, which speak of possible deliberate deposition, perhaps to mark significant events or episodes in the community's shared history.

The picture of life in the fort that these artefacts illustrate may not be complete, but this reassessment highlights the merit in re-considering antiquarian finds and demonstrates the benefit to engaging with 19th-century aspects of museum collections.

Animal bone analysis

Jackaline Robertson

Two small assemblages of animal bone with a combined weight of 4.3 kg were submitted for environmental analysis from two distinct phases of investigation in 1898 (Figures 6.32 and 6.33) and 2017 respectively. The first assemblage was collected by hand from the cistern within the interior of the fort, which was found to contain two feet of water (Christison and Anderson 1899). The second was from across the areas excavated in 2017.

Aims

The overall analysis of the animal bone assemblage continues on from an assessment of the faunal remains conducted in September 2018, which had three main objectives: the first, was to identify and catalogue the faunal remains from both assemblages to species and element, noting any pertinent information on the age of the animal at time of death as well as noting the presence of butchery marks; the second, was to determine whether it was likely, on the basis of the condition of the bones and the species present, that the assemblage recovered in the late 19th century could indeed be of some antiquity; finally, the third objective was to select a suitable sample for AMS radiocarbon dating to help determine the broad time period in which episodes of deposition within the 'cistern or well' feature took place. Based on this assessment, a single cattle phalanx from the cistern was identified and permission was granted from National Museums Scotland to destructively sample this bone for the purpose of radiocarbon dating. This returned a date of 370–170 cal BC (95% probability; SUERC-82632). The confirmation of an archaeologically secure Iron Age date led to this more detailed report on the diet and animal husbandry practised at the site.

The recovery of animal bone preserved in excellent condition from an anaerobic context offers a greater opportunity to understand the importance of animals at Iron Age forts than is normally possible. The soil conditions in this region of Scotland are normally unfavourable for the recovery of unburnt bone. This was true for the animal bone assemblages collected from both Moncreiffe and Moredun, which were dominated by poorly preserved fragments of burnt bone (Robertson, *supra*). For this reason, the assemblage of waterlogged animal bone from the 1890s excavation, while small, has proved a valuable resource in understanding the role of both domesticated and wild species at the site. Even so it must be viewed with some caution as it is unclear if this material has derived from a single depositional event or several. As has been argued elsewhere, the deliberate depositions



Figure 6.32: The crate of animal bone from the 1890s excavation held by the National Museums of Scotland (photo: Trevor Cowie).



Figure 6.33: Detail of the animal bone wrapped in newspaper from July 1939, suggesting repackaging for protection in advance of WW2 (photo: Trevor Cowie).

of faunal remains in contexts such as wells were often made to mark specific episodes or events in the lives of the community or are representative of the debris from special events such as feasts (Jiménez *et al.* 2011). Such a selection of material and the unusual context of deposition necessarily creates a bias in the archaeozoological record that we must be cautious of, as only those fragments exposed to the anaerobic conditions have survived in a stable condition.

Results

The overall bone assemblage was small, with 222 fragments (4.3 kg) recovered. Of these, 46 elements were collected during the 1890s excavation and 176 fragments in 2017. Table 6.2 shows the species and number of identified specimens (NISP) identified were: cattle (64); red deer (1); sheep/goat (6); pig (3); and rodent (3). The remaining fragments were described

as large mammal (134), medium mammal (3), and indeterminate mammal (8). Analysis of the minimum number of individuals (MNI) revealed the partial remains of three cattle, one red deer, two sheep/goat, one pig and one rodent.

Preservation of this assemblage ranged from poor to excellent. The bone from the 1890s excavation was noticeably better preserved and stained jet black, attributable to anaerobic conditions. There was also evidence of blue vivianite and a white powder residue adhering to the surface of the bone. Vivianite can be found in association with organic materials in waterlogged and anaerobic conditions. Bone in a similar waterlogged condition has previously been analysed at Camelon Roman Fort, Falkirk (Jackaline Robertson *pers comm*). Although the Camelon faunal assemblage is later in date (1st – 2nd centuries AD) the surface condition and staining of the bones are directly comparable to the assemblage from the cistern.

In contrast, the bone from the 2017 excavations at Castle Law survived in a generally poor state of preservation; the majority were small, fractured fragments and most displayed evidence of burning. As the excavations in 2017 were conducted in part to assess the condition of the structures exposed and left open to weather since the 19th-century investigations, it must be emphasised that at least some of the bone from the recent excavation may not be stratigraphically secure due to the earlier excavation work potentially re-working material, especially within the upper layers.

Table 6.2: A summary of the bone assemblage showing the Number of Identified Specimens (NISP) and the minimum number of individuals (MNI).

Species	NISP	MNI
Cattle	64	3
Red deer	1	1
Sheep/goat	6	2
Pig	3	1
Rodent	3	N/A
Large mammal	134	N/A
Medium mammal	3	N/A
Indeterminate mammal	8	N/A
Total	222	7

Discussion

Species dominance

It is recognised the assemblage is small but it was largely composed of the three main domesticated species, cattle, sheep/goat and pigs. The only other species was rodent, which was likely intrusive as these fragments were recovered from the upper fills from the 2017 excavation. Evidence for the exploitation of wild species was confirmed by the presence of a single red deer bone from the cistern.

Diet

Cattle

The 64 skeletal elements identified as cattle were a mix of mandibles, loose teeth, long bones, and feet bones. These elements have derived from both high and low value cuts of meat. Typically bones such as the scapula, humerus, radius, ulna, femur and tibia are regarded as better-quality cuts of meat when compared to the mandible, metapodials and phalanges, which are normally less desirable as they have less flesh. The presence of mixed skeletal elements indicates that these animals were probably slaughtered on or near to site and this assemblage has accumulated through the disposal of both butchery and domestic food waste.

Sheep/goat

The six sheep/goat skeletal bones were identified as scapulae, pelvis, femurs and a tibia. Unlike the cattle remains, there was no evidence of any other skeletal elements such as skull fragments and foot bones. This could suggest that this species was slaughtered and butchered elsewhere and that chosen cuts of meat were then transported to site. Alternatively, these animals could have been slaughtered on site and that the missing elements were disposed of elsewhere. Given the small size of the faunal assemblage and the taphonomic bias in preservation, which favoured those elements deliberately disposed of within the cistern, there is not enough evidence to validate either theory. While the importance of sheep/goat, and whether these animals were housed and butchered on site remains unclear, it is apparent from the skeletal elements recovered from the cistern that this species did have a dietary role.

Pig

There were two pig mandibles and one humerus present. Unlike the other domesticates, pig had limited secondary products to exploit (e.g. bones were sometimes used in the production of pins (MacGregor 1985: 120–1) and pork as a source of food appears to have had only a minor role.

Mortality profile

To establish slaughter patterns and thereby the age of death of individual animals, tooth wear and epiphyseal fusion were both analysed. Given the small size and nature of the bones recovered, it was not possible to identify the presence of females, males and castrates within the assemblage.

Cattle

The cattle assemblage was small, but analyses of epiphyseal fusion provided some information for when these animals died. The youngest individual as demonstrated by the unfused distal epiphysis of a metacarpal died before the age of 2.5 years. The remaining animals appeared to be older than three years at time of death. There was no evidence of any neonates within this assemblage. Nor were there any pathologies typically associated with more elderly individuals. This suggests that these animals were part of a mixed economy, that they were first exploited for their secondary products of dairying and traction and only later were they slaughtered for meat.

Sheep/goat

The remains of a minimum of two sheep/goat were recorded. The younger individual died before the age of ten months, whereas the older expired between the age of 2.5 and 3 years. The culling of young surplus animals is not uncommon, especially if adequate fodder for winter was lacking. The older individual was probably slaughtered once it had reached the required weight ratio but was likely first exploited for breeding, milk and wool. While this is a small data set, it is typical of animals from a mixed economy where milk, wool and meat were all utilised.

Pig

Pigs which have no secondary products and can prove difficult to maintain are usually slaughtered as soon as possible or once they obtain their maximum size. The pig remains belonged to an older individual which, based on epiphyseal fusion, tooth eruption and wear, indicated an age of death at approximately 3.5 to 4 years. This suggests that this animal was probably kept long term for breeding.

Butchery

Butchery marks were noted on a cattle scapula and femur, and a pig humerus. The scapula had a hole in the blade which was probably produced to allow this cut of meat to be hung to aid with drying, smoking or salting. The femur shaft appeared to have been deliberately

cracked to extract marrow, and the pig humerus had been chopped along the shaft.

Pathology

There was evidence of marked hypoplasia which affected four cattle teeth in a single mandible. There were noticeable incremental steps in the cementum affecting the second and third premolars along with the first and second molars. This condition is usually caused by malnutrition, although it can also be a side-effect of disease or trauma. This condition has previously been noted among the Neolithic cattle remains at Pool, Sanday (Bond 2007: 233).

Bone modification

A total of 126 bone fragments had been modified by exposure to heat, but very few were completely calcified, indicating that most had been exposed to relatively low temperatures for short periods of time. Most were smaller than 50 mm and the only identifiable fragments were a long bone and carpal belonging to a large mammal, and a phalange from a medium sized mammal. The remaining fragments could not be identified to element. These remains are likely domestic food debris derived from the disposal of cooking waste.

Metric analysis

A total of six foot bones were measured and these were three phalanges, a calcaneum, an astragalus and a naviculo-cuboid.

Non-metric traits

A single non-metric trait was observed on a cow third molar where the third cusp had failed to develop. This condition has previously been noted at Pool, Sanday and at Camelton Roman Fort (Bond 2007: 233; Jackaline Robertson *pers comm*). This condition is not pathological in nature but is probably due to genetic selection within specific breeds.

Wild species

Evidence for the exploitation of wild species was corroborated by the presence of a single red deer scapula. The recovery of a single element suggests that deer had only a minor role in the diet of this site when compared to the greater economic importance of the main domestic species.

Comparison sites

The recovery of such a well-preserved animal bone assemblage from a Scottish Iron Age fort is of note

as finds from similar sites in this region, with the notable exception of Broxmouth (Cussans 2013: 433; ID 58800), tend to be dominated by poorly preserved burnt fragments. This was true of the faunal remains recovered from Moredun fort where the animal bone assemblage was small and composed of poorly preserved fragments (Robertson, *supra*). While the animal bone assemblage from Moredun fort was poorly preserved it was noticeably larger, comprising 4748 fragments compared to the 222 fragments from Castle Law, Abernethy. Many of the bone fragments from Moredun were burnt and not identifiable, but it was still possible to identify cattle, sheep/goat and pig within this assemblage, which were also present at Abernethy.

At both Abernethy, and the forts on Moncreiffe Hill, the two assemblages, while small, do indicate that cattle and sheep/goat provided important resources, with pig perhaps having a more minor role. Based on the available kill off patterns, there were some similarities in the age at which the cattle and sheep/goat were slaughtered. At both sites, the evidence suggests that cattle were cared for beyond the age of three, whereas sheep/goat were generally slaughtered earlier. While both forts also kept pigs, the most noticeable difference was that the animals at the Moncreiffe fort were slaughtered at a younger age when compared to the Castle Law, Abernethy, individual. This discrepancy, however, could be explained by the unusual taphonomic conditions at Castle Law, Abernethy, which favoured the recovery of those elements that were deliberately disposed of within the cistern. This has undoubtedly created a bias within the animal bone assemblage.

This pattern for the exploitation of domestic species appears to be common throughout the Scottish Iron Age and a similar picture is shown by the assemblages examined throughout the Scottish mainland, and the Northern and Western Isles, including those from Crosskirk, all in Caithness (McCartney 1984), and Pool, Orkney (Bond 2007) and Cnip, Lewis (McCormick 2006).

In conclusion, the animal bone assemblage from the site, while small, contains useful information concerning both diet and animal husbandry practised. The community appear to have practised a mixed economy, exploiting cattle and sheep/goat primarily for their secondary products before slaughtering them for meat. Pig appears to have had only a minor role within the diet of this population. Exploitation of wild species such as deer did occur, but it is difficult to say on what scale as the faunal assemblage is somewhat biased in terms of preservation. In general, the animal bone assemblage is typical for Iron Age Scotland in that this community had access to a range of domesticated and wild species with which to establish a mixed and varied economy to satisfy their dietary and material needs.

6.5 Discussion of the excavation results

The most important results came from the re-excavation of the walls first uncovered in the Victorian investigation, and in the reassessment of the finds from the cistern from those excavations. Both have refined our understanding of the chronology of the site, which was one of the key objectives, but the results have also contributed to our understanding of the site in six key areas.

Location

Perched at the east end of Castle Law hill, on the northern edge of the Ochil Hills, the fort primarily offers a dramatic, panoramic view across lower Strathearn to the north, the confluence of the Rivers Earn and Tay at Carpow, and the inner Tay estuary with the Carse of Gowrie and the Sidlaw hills beyond (Figures 6.1 and 6.34). The fort displays a distinctive and dominating profile when viewed from the lower ground to the north albeit while being overlooked by the main body of the hill to the west (Figure 6.35). With this dominant aspect, and the distribution of known Iron Age sites primarily on the estuarine terraces below (Figure 6.1), it is tempting to consider Castle Law only as a fort of the estuary. However, while the fort's relationship with the estuary was no doubt of primary significance, the Ballo Burn to the east of the fort is an important terrestrial route linking the estuary to the Howe of Fife through the North Fife hills. Indeed, while Abernethy might most readily be seen as part of a linear series of forts from Castle Law, Forgandenny (ID 26583) in the west, along the North Fife Ochils to Norman's Law (ID 31814) in the east, recent cluster analysis by Simon Maddison has grouped the site along with those inland in Fife (Lock and Ralston 2022: 369–377; Chapter 1.1). Be that as it may, when viewed from the Ballo Burn to the south-east (Figure 6.36) its presence is much more understated. The unusual outer wall, in addition to providing secondary defence on the west, may also have amplified visual display of the fort inland to the south and south-west, and may be broadly comparable to the 'fake', partial outer walls created for display at either end of Knock Farril (ID 12782), Easter Ross, at Barry (ID 31061), near Alyth, and at Finavon (ID 34813), in Angus. Such visual signalling may have been important as 'signposts' through key terrestrial routes, where forts may have played an important role as recently suggested on the northern Ochils to the west of the Tay area (Given *et al.* 2019).

In terms of the fort's relationship with contemporary sites, it is possible that some of the unenclosed settlement, or curvilinear enclosures to the north (Figure 6.1) are contemporary, but they are currently undated. Not all, but most of this settlement evidence

is above the upper estuarine terrace, the post-glacial shoreline of the Mesolithic (Nicol and Ballin 2019) which occurs at c. 30 m OD, broadly the line followed by the modern A913. At Aberargie, the combination curvilinear and rectilinear enclosures (Figure 6.1) is similar to the pattern of juxtaposition described around Moncreiffe Hill (Chapter 3.4). It suggests occupation, and possibly re-occupation, over a prolonged period in a variety of forms. As suggested at Moncreiffe and Moredun, it is possible that these surrounding settlements were part of the wider community who built the fort. Indeed, Castle Law may have acted as a sign across the estuary of their existence, perhaps to welcome trade, and the high-status finds from the site may be relics of this.

This focus on the estuary alone may be an oversimplification, and the distribution of known sites misleading, as it consists largely of cropmark evidence. As a result, no sites of proposed Iron Age date are known in the uplands of the Ochil Hills, though it is reasonable to assume some existed but remain unknown. One benefit of Abernethy's location is that it had influence both over the rich agricultural estuarine terraces to the north, and the uplands to the south, which would have offered complementary resources. On balance, Castle Law's very direct relationship to the estuary may well have been its primary *genius loci*, with easy access to extensive estuarine and riverine travel offering far flung social and trading networks.

The architecture of enclosure

The 2017 excavations confirmed the Victorian report regarding the nature of the enclosing walls and are testament to the quality of the plans and sections by Ross and Coles, and Christison's interpretation of construction. The fort is very small and was only included in the *Atlas of Hillforts* due to its topographic setting and the scale of its massive enclosing wall (Lock and Ralston 2017; 2022). The disproportionate scale of the main enclosing wall in relation to the internal area, and the comparable scale of the outer wall, make Castle Law a candidate as a special fort, as is also suggested by the finds it has produced.

Excavation confirmed that the massive walls were constructed using large, roughly dressed blocks of not only locally derived andesite bedrock, but also Old Red Sandstone brought onto site from the valley terraces at the foot of the hill, constructed over a timber-laced framework. The sockets in the external façades for the ends of the transverse timbers, running across the thickness of the wall, were the most identifiable feature of the 1898 excavation and were the subject of the iconic photograph of the report. At that time sockets for the transverse timbers were identified in the external faces

of both the inner and outer walls, but not the internal faces. In 2017, however, possible sockets in the inner face of the inner wall were identified (Figures 6.12, 6.13 and 6.37). Re-excavation of the inner wall confirmed it had largely collapsed since it was revealed in 1898; two layers of sockets were identified then, but only parts of the lower tier survived in the area re-examined in 2017.

The 1898 excavation also identified the presence of longitudinal timbers, running lengthwise within the wall core. The transverse timbers would probably have rested on top of these to provide a solid timber framework on which the next courses of stonework could be added. Evidence for longitudinal timbers was revealed both in Cole's sections through the wall, and reflected in the fort plan, which shows short straight lengths in the line of both its internal and external faces (Figure 6.3). Unfortunately, these were not identified in 2017, due to the limited scale of the excavations.

Piggott estimated that the Castle Law wall would have required a minimum of 3200 linear feet (c. 975 m) of trees, which under natural conditions would be scattered through about 60 acres (c. 24 ha) of forest (1965: 204). While the validity of this claim requires re-assessment, qualifying the number of layers of transverse timbers for example, it at least gives some indication of the scale of the operation involved.

The rectangular nature of the sockets suggests squared off timbers, and a framework of squared timbers would afford additional structural integrity over roundwood. However this would have added considerably to the task of construction and it is possible that roundwood was used, and was perhaps an incentive in the re-use of timbers from other structures as an alternative.

As noted in Section 6.1, vitrification of the walls was first claimed in the New Statistical Accounts which record that many of the stones 'are burnt or partially fused' (NSA 10, Abernethy: 851–852). The account is difficult to explain as Christison and Anderson (1899) make no record of any burnt or vitrified stone their report and it is otherwise detailed and well observed. Significantly, no *in situ* evidence for vitrification of the walls was identified in 2017. Isolated vitrified materials recovered from the interior, not readily the result of an industrial process, may indicate very localised burning of the wall. If so, it was small-scale, occurred higher in the wall than survived during the 1890s excavation, and left very few traces compared with. There is no evidence for the extensive *in situ* vitrification visible at, for example Finavon, Angus, or Tap o' Noth (ID 17169), Aberdeenshire, and as at Moredun Wall E, the good condition of the Abernethy walls reflects the lack of burning in this fashion, or at least very minimal burning.



Figure 6.34: The excavation and view to the north-east, including the estuarine terraces at Abernethy village, the confluence of the Rivers Tay and Earn at the head of the estuary, and the Carse of Gowrie beyond (photo: Ken Ward).

The use of Old Red Sandstone, as at Moredun (Chapter 3.2: the inner oval fort, Wall E) and Castle Law, Forgandenny, is significant as it must have been transported onto the hill from much lower in the surrounding landscape. Possible reasons behind this are further explored in Chapter 7.5, but the scale of this operation alone gives a different perspective on some of the other tasks involved. The squaring of timbers for the wall construction, for example, may not have been considered that onerous a task.

As discussed above, the outer wall was probably primarily designed to provide additional defence across the ridge of the hill and protect the west approach where the fort is overlooked from the west. It may well have had other purposes, including a display function, and so have parallels with the non-enclosing walls along the ridge on Knock Farril, Easter Ross, and at Barry near Alyth, Finavon in Angus, and elsewhere. Further, sitting slightly below the upper wall, when viewed from higher ground to the west, their combined impact would have been significantly increased (Figure 6.37). Other forts with proven multiple timber-laced walls include Abbey

Craig (ID 47113), Stirling, and Dunagoil, Bute (Harding 2004b; ID 40279).

Access

No entrance to the fort was identified at ground level by the early excavators, a feature common to several oblong forts in eastern Scotland, including for example, Castle Law, Forgandenny, Knock Farril, Easter Ross, and Doune of Relugas (ID 15755), Moray. Accepting that these forts were entered for occupation, or at least occasional activity, there are two possible ways in which access may have been afforded: through a lintelled entrance built into the wall face some height above ground level; or over the wall via a timber structure, perhaps an extension to the timber-lacing.

At Abernethy, it is possible that the outer wall was configured in part to facilitate access. When viewed in plan (Figures 6.3 and 6.8), the intra-mural area between the inner and outer walls widens to the north, and the outer wall also appears to increase in thickness. A terminal to the outer wall may have presented the



Figure 6.35: The view south-south-west from Abernethy round tower showing Abernethy Hill (left); the Glen (middle); and Castle Law (right), illustrating how the flat-topped fort at the left of Castle Law is overlooked from the main body of the hill to the west (to the right).



Figure 6.36: A less familiar view of the fort from the south-east showing how the fort, above the quarry to the right of the ridge, is far more vulnerable on its south and west side.

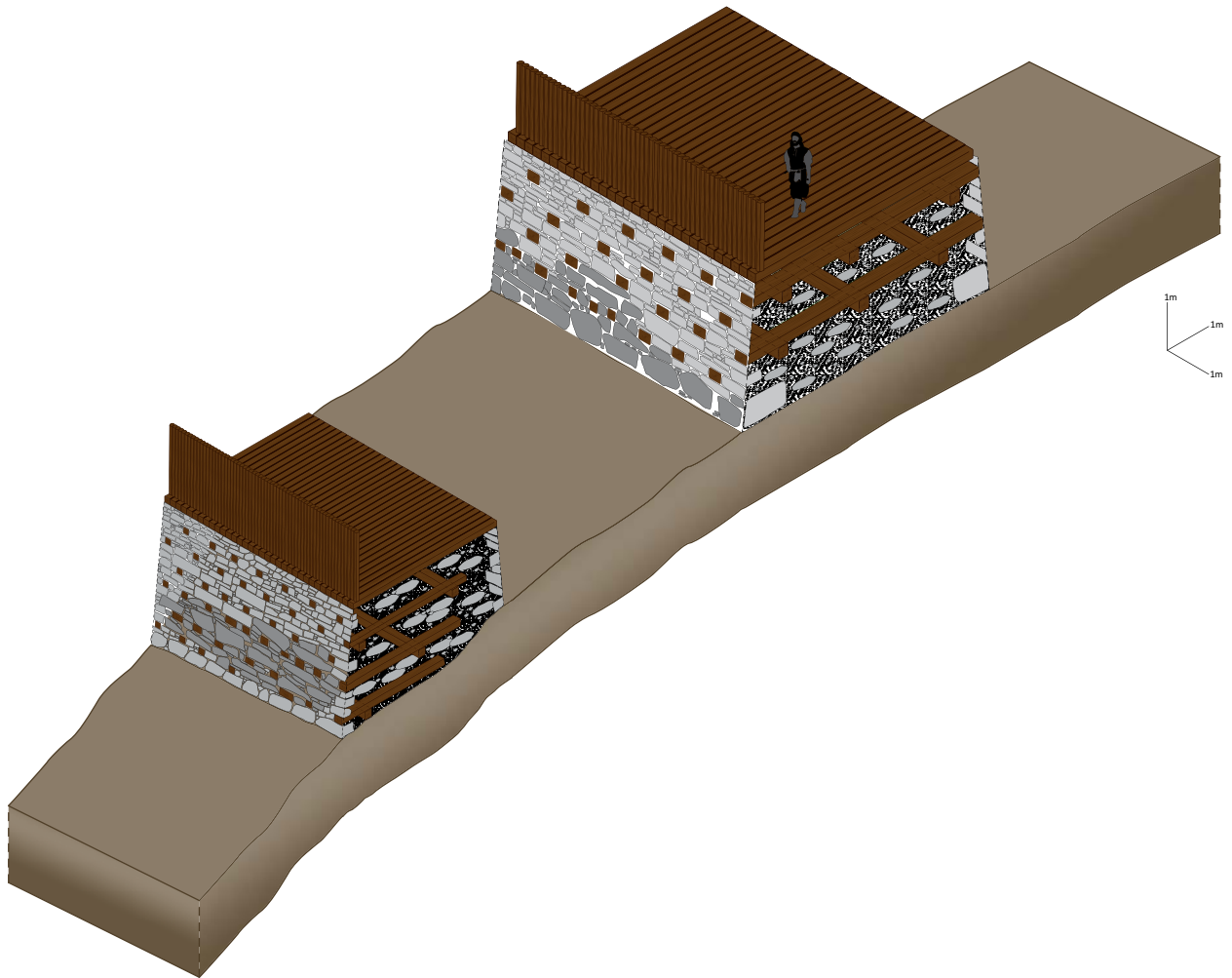


Figure 6.37: A schematic isometric reconstruction of the outer (left) and inner (right) timber-laced walls, showing excavated façades (dark grey) and possible structural timberwork in brown.

appearance of an opening in the defences, and marked the mouth of a funnelled entrance passage, approached from the north and perhaps narrowing to meet a timber superstructure where the transverse wall connects the outer and inner walls. In this scenario, the outer wall would have acted as a one side of an in-turned entrance and the intra-mural area an enclosed 'killing zone' in front of the entrance. The 'feature H' within the intra-mural space, left unexcavated by the earlier excavators, was found to contain only bedrock and backfill. The only other feature identified in the 1890s to suggest some structure within the intra-mural space were the pivot stones described as appearing as 'checks for a doorway' (Christison and Anderson 1899: 25). These were not located in 2017 and were either located outside the modern excavation, or perhaps had been removed by the early excavators or in the intervening period. They may have related to an external door or gate within an outer transverse barrier, probably of timber. This is the scenario offered in the reconstruction Figure 6.38. The

nature of these oblong forts, and their apparent lack of entrances, is further discussed in Chapter 7.7.

Internal use: domestic and ritual

The series of small, oblong, timber-laced forts in eastern Scotland have been argued as 'a special case', apparently with restricted access that would have limited or even prohibited normal domestic use (Harding 2012: 87). While occupation of the fort was explored through only very limited excavation within the interior, it identified traces of several surfaces or structures beneath the wall tumble. A shallow deposit of anthropogenic material, which probably extended across the hilltop, was identified as an occupation layer, albeit much disturbed by bioturbation and erosion. The curving linear setting of stones within the interior may be the footing of a turf wall and projection of its curve suggests a circular building or structure with an internal diameter of c. 4 m (Figures 6.10 and 6.16). Small

roundhouses of this size are known in Angus (Dunwell and Ralston 2008: 97–101), and at Castle Law would be more understandable given limited space within the fort. If domestic, it could have housed only a small family unit, and while it may have been accompanied by other similar buildings to house an extended family, it is difficult to reconcile domestic buildings of this size within a structure designed to impress and signal power and status. Further, no other features such as a hearth or post-holes, were identified to support domestic use, and so if a building, another unknown function must be considered. Although the small sample size may simply prevent a better understanding of the full structure. While the recovery of ceramic and animal bone suggests human occupation, it is unclear from this alone as to whether this was on a temporary or permanent basis. A more likely scenario, given the enormous effort and implied power in constructing the fort, is for the presence of a larger building, rather than a cluster of small roundhouses. In this model, a small building or structure could have performed a wide range of ancillary functions to a primary, larger building, whether residential or otherwise. This is the sort of internal organisation depicted in the reconstruction Figure 6.38.

A more compelling case for domestic occupation is perhaps made through the cistern cut into the bedrock within the fort, and as a water source for human consumption it suggests permanent rather than sporadic use. The intriguing kink observed by Coles in the line of the inner wall directly to the south of the cistern (Figure 6.3) could indicate a structure over or around the cistern. Arguably the clearest sign of domestic occupation is from artefacts recovered from both the early investigations and the 2017 excavation. Combined, this spectacular assemblage contains domestic items, such as stone lamps, coarse tools, pottery and fragments of wooden bowls, as well as evidence for possible on-site crafts, such as metal- and textile-working. What sets it apart from most other Iron Age settlements, however, are the prestige items, including the La Tène brooch, the vehicle linchpin, and the weapons. While we know nothing about the circumstances of their deposition, their occurrence in such a monumental structure speaks of a powerful and privileged elite on the North Fife Ochil Hills.

Animal bone assemblages are relatively rare from Iron Age forts, and while based on a very small number of individuals, the mixed animal bone assemblage from both excavations confirms a mixed economy with exploitation of animals for secondary products such as leather. There is no direct evidence for on-site activity, and the scale of the interior, with limited access, suggests that very few, if any, live animals were kept within the fort. Butchering, however, probably took

place on or close to the site. The largest assemblage from mainland Scotland is from Broxmouth (Armit and McKenzie 2013: 433) where it was confirmed that large mammals were reared for both meat and dairy, providing the bulk of the inhabitants' protein (Armit and McKenzie 2013: 467). The existence of the external pond at Castle Law might suggest the keeping of larger mammals in numbers, with the internal cistern servicing the inhabitants. Alternatively, livestock may have been kept by other possible Iron Age sites in the local environs, whether enclosed or unenclosed (Figure 6.1), suggesting a hierarchical relationship whereby neighbouring settlements provided animal products. While small in comparison to other local forts, the status of the fort in this hierarchy is signalled both by its massive walls and commanding location. The quantities of timber and stone brought to the site indicate the occupants had control of much of the surrounding landscape, and the considerable labour, including skilled labour to carry out the construction. The fort and its occupants may well represent the residence of a local chief, who controlled much of the contemporary settlement and agricultural activity in the surrounding landscape (Figure 6.1). While the material culture provides a glimpse of the status of the occupants, it cannot confirm whether occupation was permanent or seasonal.

The role of ritual and ceremony should not be overlooked and may have pervaded many aspects of the construction of the fort, from the processes of extracting and transporting materials and erecting the walls, to the life of the completed structure. This may most convincingly be demonstrated by the proposed purposeful deposition of Iron Age artefacts and animal bone in the cistern. Furthermore, it is possible that earlier prehistoric artefacts, such as the stone axe and arrowhead, were brought to the site, perhaps as heirlooms as part of ceremonies in the Iron Age, rather than having been deposited in the Neolithic/Bronze Age. As with the incorporation of earlier cup-marked rocks into the walls at Moredun, the large Middle Bronze Age timber from the interior may also have been a relic with a previous life transported to the site. In this sense, Castle Law is probably typical of so many Iron Age sites where it is likely that both the profane and ritual spheres co-existed in all aspects of everyday life and compartmentalising these aspects may be to oversimplify the evidence (Hingley 1993).

While the 2017 work was unable to confirm a comprehensive site chronology, the fort was most likely constructed and used over the last three centuries BC, and perhaps slightly earlier. The combined evidence is compelling that it was constructed as an elite residence and may have been later repurposed with a more ritual focus.

External works and water management

The oval fort and its outer wall occupy an elevated outcrop at the east end of the hill overlooking a shallow, flat-bottomed gully directly to the west (Figures 6.7 and 6.8). At the north-east end of this gully two earthen banks have been constructed, the western to dam a spring and create a small lochan or pond (Figures 6.8 and 6.38).

While undated, Christison sectioned this bank and confirmed it to be of earth only; the trench was not planned but may survive as the narrow channel across the bank in the RCAHMS survey (Figure 6.8). He also confirmed there was ‘no knowledge or record of its construction for any recent purpose’ and suggested that the outer wall ‘appears to give the garrison control of the loch’ (Christison and Anderson 1899: 25, 27). Childe noted that ‘beyond the outer wall an earthen bank seems to have extended the fortified area to include a small loch’ (1935a: 194). While the outer wall and the dam bank are only broadly aligned, they may have been designed to function together. The pond would have provided an ample water source for animals, while the internal cistern may have served the inhabitants. The pond itself may also have added a further line of defence to the fort around this flank, which might otherwise be vulnerable to attack (Figure 6.38). The second bank, which lies to the north-east of the dam, follows the break of slope at the mouth of the gully. It is also undated, but if it was constructed as an additional defence to the main fort it must have returned in some way along the north-west flank. While defence at hillforts is usually perceived primarily in terms of ramparts/walls and ditches, ethnographic sources indicate the potential for other obstacles, such as stakes and thorn bushes, to be employed in an enclosure (Harding 2012: 74). The creation and defence of ponds through out-works has parallels with other oblong forts in the area. A similar feature is referenced at the timber-laced Castle Law, Forgandenny (Lock and Ralston 2022: 298), while a pond is contained within outer ramparts that enclose the fort on Barry Hill, near Alyth (RCAHMS 1990: 27–29).

Chronology and phasing

As at Moncreiffe (Chapter 2.5), there is evidence of pre-Iron Age activity at Castle Law, including Early Bronze Age lithics, and a Middle Bronze Age charred timber from within the fort, potentially re-used in some way.

Unfortunately, the date of construction of the walls remains unknown. While most timber-laced walls in the British Isles are from earlier in the Iron Age, before 400 BC (Lock and Ralston 2022: 164), in Scotland there is one important series that appears to date from c. 400–

200 BC, and a second in the first millennium AD. The La Tène brooch may be dated, at earliest, to c. 450 BC, but the type to which it belongs is more generally dated 4th–2nd centuries BC. Very little of the material recovered from relevant contexts was suitable for radiocarbon dating, however, the animal bone recovered from the cistern confirms activity in exactly this period, 4th–2nd centuries BC. This is broadly contemporary with construction and occupation at nearby Moredun (Chapter 3.4) and at Castle Law, Forgandenny (Tessa Poller *pers comm*) and it would be reasonable to assume this date broadly represents the primary phase of use.

The timber-laced wall of the oval fort would most probably have been constructed in a single phase, the complex configuration of timber lacing requiring a constant build. The kink in the line of the wall previously identified on the south (Figure 6.3) may indicate a change in construction or perhaps another unknown feature. The date of the outer wall is also unknown, and while it may have been constructed at the same time as the inner wall, it might equally be an addition to the main fort. There was certainly evidence of ongoing maintenance and repair to the outer face of the main wall, and the stratigraphic relationship of the transverse wall across the intra-mural space suggests it was an insertion built later than either the inner or the outer wall. Although the length of time between these phases of construction cannot be established, this evidence of adaptation and modification to the defences allows the possibility that the outer wall was an addition to an original scheme.

The Bronze Age oak timber from the interior cannot be used to date the fort. It may have been re-used in its construction, perhaps in the timber-lacing, and as noted above, the re-use of large structural timbers is known at Buiston crannog, for example (Crone 2000). It is difficult to reconcile its survival when none of the other wall timbers survived, however, and this fact suggests a different taphonomy and purpose. Whether derived from the hilltop, possibly suggesting an earlier construction on the site, or imported from further afield, it perhaps should be regarded as a relic that held some special value.

The dichotomy of the finds, on one hand everyday domestic, on the other high-status, could perhaps be explained by an evolution of use, perhaps from an initial elite residence to a site focussed on high-status ritual and ceremony. It is worth noting that the apparent incongruity of high-status and domestic finds is also a feature of early medieval forts, such as Kings Seat, Dunkeld (Strachan *et al.* forthcoming; ID 27172) and may simply reflect the need for the everyday around the special at anytime. Significantly, as at Moredun, there was no artefactual or other evidence for early medieval

activity, the other era of timber-laced construction in Scotland.

6.6 Conclusion

The work in 2017 offered a rare opportunity to excavate a nationally significant monument and a classic Scottish type-site. The aim was primarily to improve understanding of the long-standing question of chronology, but to also explore evidence of phasing, vitrification, and the conservation and management of previously excavated sites. In addition, it facilitated re-assessment of the antiquarian artefacts, one of the more important Iron Age assemblages from a Scottish fort.

The excavations were limited in scale and by the fact that they predominantly re-opened earlier excavations, which had comprehensively removed most of the stratigraphy and small finds. The quality and record of the antiquarian excavations were quite good for their time, but focussed on the walls rather than interior structures that may have existed. Unfortunately, they didn't report the context for much of the artefactual assemblage recovered, and no amount of re-excavation can redress that failing. The most significant contribution of the new work has been in securing at least some radiocarbon dating, and in presenting an opportunity to review the nature, function,

and landscape context of the fort. Re-excavation the spectacular wall-faces, left open following the Victorian excavations, has unsurprisingly confirmed that significant erosion that has occurred: a strong reminder that consolidation of drystone structures is an essential prerequisite of their display.

As with the excavations of 1895–7, the work in 2017 has raised as many questions as it has answered. Castle Law's status as a key power centre of the later Iron Age remains unaltered, but perhaps with a later ritual dimension. We know almost nothing about the date or nature of the decline of the site.

Codicil: Additional notes on the structural timberwork

Ian Ralston

Castle Law, Abernethy has for long been the classic example in Scotland of visible beam-sockets in a wall-face (Christison and Anderson 1899). Mackie's description of the hill prior to excavation (Christison and Anderson 1899: 15) indicates that a substantial deposit of grass-covered stone tumble, presumably largely emanating from the enclosing walls, cloaked the surface of the site until c. 1895. The 19th-century work identified beam-holes in the external wall-face of both walls; and also that the former emplacements of the transversal beams could be traced running up to



Figure 6.38: A reconstruction proposing an entrance through the inner wall at high level, accessed by an intra-mural timber structure, and one large internal building at the east end (artist: Chris Mitchell).

3 m (i.e. more than half-way) into the core materials. Evidence for the former emplacements of longitudinal timbers in the core of at least the inner wall was also identified. Christison (Christison and Anderson 1899: 18) also noted the slightly angular plan of the inner wall, perhaps a result of the inclusion of straight timbers aligned longitudinally within the wall-core. A pronounced batter was recorded on the outer wall-face, which survived to a height of c. 2.5 m, and as is typical of many Scottish examples, the wall had been constructed directly on to sloping bedrock, such that Christison calculated that the base of the external face was almost 3 m lower than its internal equivalent.

The 19th-century section drawings indicate that the transversals and longitudinals did not form a contiguous internal wooden latticework, but rather separate ‘rafts’ within the wall-core material. Christison and Anderson’s section drawing (1899: fig. 6) clearly shows the sloping nature of the location, more particularly beneath the outer half of the inner wall; and the batter on the external wall-face. One longitudinal timber is depicted in section as resting on the inclined bedrock c. 1.5 m behind the external wall face and slightly less, if projected, above the base of the external wall-face. It is possible that this beam, which is drawn as square in section of c. 0.3 m a side, was linked to the transversal timbers inferred from the beam-holes in the external wall-face at roughly the correct height. A second longitudinal timber is drawn in section, again resting on the bedrock, but towards the inner face of the wall, at a position where the underlying bedrock has largely levelled out. Some 0.6 m wide and c. 0.3 m thick, this lay c. 5 m behind the projected line of the battered external wall-face (which did not survive at this point); any related transversal timber running to the external wall-face would have been of the order of 2.5 m above the base of the external wall-face. Tentative as this evidence as hypothesised inevitably is, it is plain that the wall was originally higher; and it is thus not impossible that a localised burning event at greater height in the wall-core could have provoked the alteration of the small-scale vitrified stone pieces subsequently recovered from the fort interior, as noted by McLaren (Section 6.4: vitrified material). If this hypothesis is accepted, a tentative claim can be entered to add Castle Law, Abernethy (in the ‘piece’ category) to the list of Scottish vitrified forts (Lock and Ralston 2022: 430–1, table A2.1). Harding (2017: fig 4.1) has offered a reconstruction of this wall: there is, however, no archaeological evidence for the former presence of the vertical timbers standing within the wall-core as shown there.

The quality of build of, in particular, the external wall-faces preserved in both the inner and outer walls at Castle Law Abernethy is unusual, in part due to the upper works having collapsed to mask perhaps as much

as the lower half of their elevations. The fact that they remained buried in debris until the mid-1890s is also significant, meaning that both the late Victorian work and the 2017 project have been able to record some remarkable information on the character of the wall-faces and the disposition of the timbers once visible within them, as apparent from the surviving beam-holes.

In the case of the outer face of the inner wall, the evidence to be discussed consists of Christison and Anderson’s (1899) figs 4 and 5, along with their plate I, the iconic photograph taken by Macintyre (Figure 6.4), and Figures 6.11 and 6.13, which indicate the extent of the Old Red Sandstone used in the construction. The Victorian fig. 4, depicting the west end of the wall, is particularly informative. It shows a lower register of beam-holes, in the main c. 0.3 m by 0.3 m, separated by empiled small stones acting as pinnings and founded on (where most clearly drawn at the left of the image) two courses of mostly roughly squared masonry, the largest stone measuring c. 0.8 m wide by c. 0.3 m high. The lower beam-holes are covered by substantial blocky stones, the largest c. 1.0 m wide and 0.5 m high. The first six apertures of the lower register of beam-holes are essentially level, at the left (i.e. northern end) of this façade, whereas those shown over a distance of c. 2 m on the right of the image (i.e. at its southern end) are both more irregular in size and general disposition, as well as seemingly surrounded by stonework of rather different character; they are also set slightly higher in the wall-face than their northern equivalents. Albeit with less clear-cut distinctions, the second register of beam-holes mirrors the north-south contrast just noted: the northern beam-holes are on a level plane, and both more regular in size and separation than their southern equivalents. The northern second-register apertures are off-set in the wall-elevation compared to their lower equivalents; the positions of the beam-holes in the southern external elevation of this wall are much less regular. Some of the same traits are apparent in the shorter elevation exposed and drawn in fig. 5. Beam-holes are seemingly entirely absent in the lowest c. 0.7 m of the elevation and the two registers are drawn to suggest they originally housed wooden elements of different sizes and shapes; the constructional regularities apparent at the north end of fig. 4 are largely absent. Macintyre’s half-tone (Figure 6.4) shows a higher build quality for the wall-face than is suggested in fig. 4. It is conceivable that these distinctions in the build quality of stonework may indicate either different construction teams or a repair. Various traits already noted are again replicated, notably the careful selection of the empiled pinning stones set between each beam aperture (more particularly on the right here), the general regularity of the dimensions of the beam-holes, and the off-setting of the beam-holes of the superjacent register

(and their apparently less regular spacing). Although it is clear that the photograph has been taken slightly obliquely to the wall-face, it is also apparent that the main register of beam-holes is not strictly horizontal. All three images just discussed make it plain that the vertical spacing between the two series of transversal timbers seemingly far exceeds the likely dimensions of any single series of longitudinal timberwork formerly incorporated in the wall-core. The implication is that the dense rafts of transversal timbers intimated by the beam-holes may have been linked to longitudinal wooden elements, but that the whole is unlikely to have formed a contiguous internal wooden scaffolding as is often proposed for some series of timber-laced walls (Ralston 2013: fig. 19 nos 1–2). A similar thought may have led Harding (2017: fig. 4.1, see above) to infer the former presence of free-standing vertical posts not set into post-holes to give the wall cohesion. The present writer, however, thinks the surviving evidence suggests that the timberwork in the wall was erected as a series of independent rafts in tandem with the building of the wall-faces and the insertion of the core materials, rather than as a more substantial free-standing timber scaffolding subsequently incorporated into the wall as it rose.

There are also apertures in the stonework to accommodate the ends of transversal beams in the outer face of the outer rampart at Abernethy. Again, first illustrated and briefly described by Christison and Anderson (1899: 22 and fig. 8), they are also presented in Figures 6.18–20. In this case, the 2017 evidence is the more coherent and easier to describe, albeit the excavation did not attain the ground surface at the wall base. The new excavation evidence demonstrates that the outer face of the out-work is different in character, notably in relation to the beam-holes in the lower principal register encountered, at the junction in the deployment between the two major rock types. The lowest register is only represented by two apertures for beam-ends, but this too varies from what is visible in the outer face of the inner wall: the key distinction is that the overlying stones placed over the beam-apertures frequently end directly over the apertures

themselves, rather than forming capping stones which are in effect lintels over these apertures. This again suggests the wall-face was progressively erected when the transversal beams had been inserted. Contrastingly, the beam-apertures in each main register are more evenly horizontal, although their horizontal separation centre to centre varies slightly, being mostly c. 0.55 m but occasionally more substantial. The upper principal register was also for the most part level and evenly-spaced, and included one noteworthy stone with a central projection which accommodated a void for a beam-end to either side of it. The two principal registers are again off-set; they are separated by c. 0.4 m vertically, a figure which perhaps militates against a complete internal timber framework within the wall here – as was mentioned above – unless the hypothesised longitudinal timbers were of substantial cross-section. The 1899 elevation, contrastingly, shows only two registers of rather irregular beam-holes, set above a substantial and well-built drystone wall.

A major distinction between the evidence of the beam-sockets in the external wall-faces in both walls at Abernethy and arrangements at Moredun Wall E, is the absence at Abernethy of the near-continuous horizontal slots apparent in the outer wall-face at the latter site; these may once have held short lengths of wooden batten originally visible in the wall-face and keyed into the transversal beams (Chapter 3: codicil). The most convincing evidence that the ends of the transversal timbers did not appear in the inner face of the outer wall remains Macintyre's excellent second published photograph (Christison and Anderson 1899: plate II; Figure 6.6). The recent project saw both the inner face of the inner wall and that of the out-work recorded (Figures 6.13 and 6.18). While the excavators have tentatively identified a number of voids in the inner face of the inner wall that may have accommodated beam ends (Figures 6.13), Christison's observation that the transversals only penetrated c. 3 m into the core from the outer face of the wall remains the strongest evidence that the dry-stone inner wall-faces at Abernethy may have been fundamentally different in character from their external equivalents.

7. Discussion and conclusions

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with contributions by Ian Ralston and Derek Hamilton

7.1 Introduction and background

The long and complex history of research into ‘hillforts’ in Britain and Ireland has been recently summarised (Lock and Ralston 2022: 43–5) and complemented with an account of the development of ‘fort’ research in Scotland (Halliday 2019b). In contrast to England, Wales and Ireland, Scotland has seen a revival in fort studies through increased excavation over the last two decades (Lock and Ralston 2022: 49–54). These have included projects focused on single sites, such as Trusty’s Hill, Dumfries and Galloway (Toolis and Bowles 2017; ID 63641), Dun Deardail, Highland (Cook, M.L. *et al.* forthcoming; 23727), and King’s Seat, Dunkeld (Strachan *et al.* forthcoming; 27172), and also larger studies considering multiple sites across a landscape, as in the Traprain Environs Project, East Lothian (Haselgrove 2009), in Strath Don, Aberdeenshire (Cook, M.J. 2013), and in lower Strathearn, Perth and Kinross, through the *Strathearn Earn and Royal Forteviot* (SERF) project (Poller forthcoming). Finally, the Northern Picts project (Noble *et al.* 2020) has targeted forts of possible early medieval date across a much wider area. In scope, the *Hillforts of the Tay* project, might be considered as a limited landscape approach, but with potential to contribute further when considered alongside the results of the SERF project, which investigated the landscape directly to the west of the Tay estuary. It is fortuitous that the *Hillforts of the Tay* was carried out over the development and publication of the *Atlas of Hillforts* project (Lock and Ralston 2017; 2022) which has contributed significantly to our understanding of the context of the project through the analysis of existing records for Britain and Ireland.

The recent resurgence in Scottish excavations has been almost exclusively small-scale, however, the antithesis of the long-term research approach at, for example, Danebury, Hampshire (Cunliffe 1984a and b) or Crickley Hill, Gloucestershire (Dixon 1976; 1994 and 2019). A notable exception has been the recent development-led excavation at Broxy Kennels, near Perth (ID 26737); now the most fully excavated fort in the region. In addition, the recent excavations have focussed heavily on the enclosing ramparts/walls, a trait not unique to Scotland. Of the small number of British ‘hillforts’ excavated, examination of their interiors is low, c. 35% for England, 31% in the Isle of Man, 15% in Wales, but

only 10% in Scotland (Lock and Ralston 2022: 43–5, fig. 2.4). The benefits of large-scale excavation of both ramparts/walls and interiors, and the constraints of ‘keyhole’ excavation, have been long recognised and widely discussed, in part encouraged by the extensive rescue excavations of hillforts such as The Breiddin, Powys, in the 1970s (Musson 1991). While still a limited sample, the *Hillforts of the Tay* excavations were much larger in scale than many of the other recent Scottish work outlined above. They also investigated both the enclosing works and, at least to some degree, their interiors. Detailed topographic and geophysical surveys were also employed prior to excavation, in recognition of the successful use of geophysical and LiDAR survey in Wessex (Payne *et al.* 2006), and topographic survey in Northumberland (Oswald *et al.* 2007) and Ireland (O’Brien and O’Driscoll 2017). The work engaged volunteers as a ‘citizen science’ project, an approach not without criticism (Harding 2017: viii–ix), but it has proved productive when undertaken with appropriate training and levels of professional guidance, a clear methodology and well-defined objectives presented in the Project Designs (for example Strachan 2013 and Strachan *et al.* 2019).

With the specific conclusions from each excavation presented in their respective chapters, our discussion here will consider the local, regional, and wider context of the forts. This begins with the significance of their landscape settings, their potential roles as foci for wider settlement, their size and vallation, the nature of their enclosing works and the logistics of construction. We then consider their interiors, functions and chronology, including longevity of their use, reasons for their abandonment and the taphonomy of artefact assemblages and radiocarbon samples. Finally, we will outline lessons learned, recommendations for future research, and consider aspects of management and presentation.

7.2 Landscape and contemporary settlement

The decision-making process behind the location of a fort, whether made either by an elite or a broader social group, must have been influenced by a combination of social, logistical, and topographical issues. The primary social factor behind location would have been intended function and several options exist: a seasonal meeting

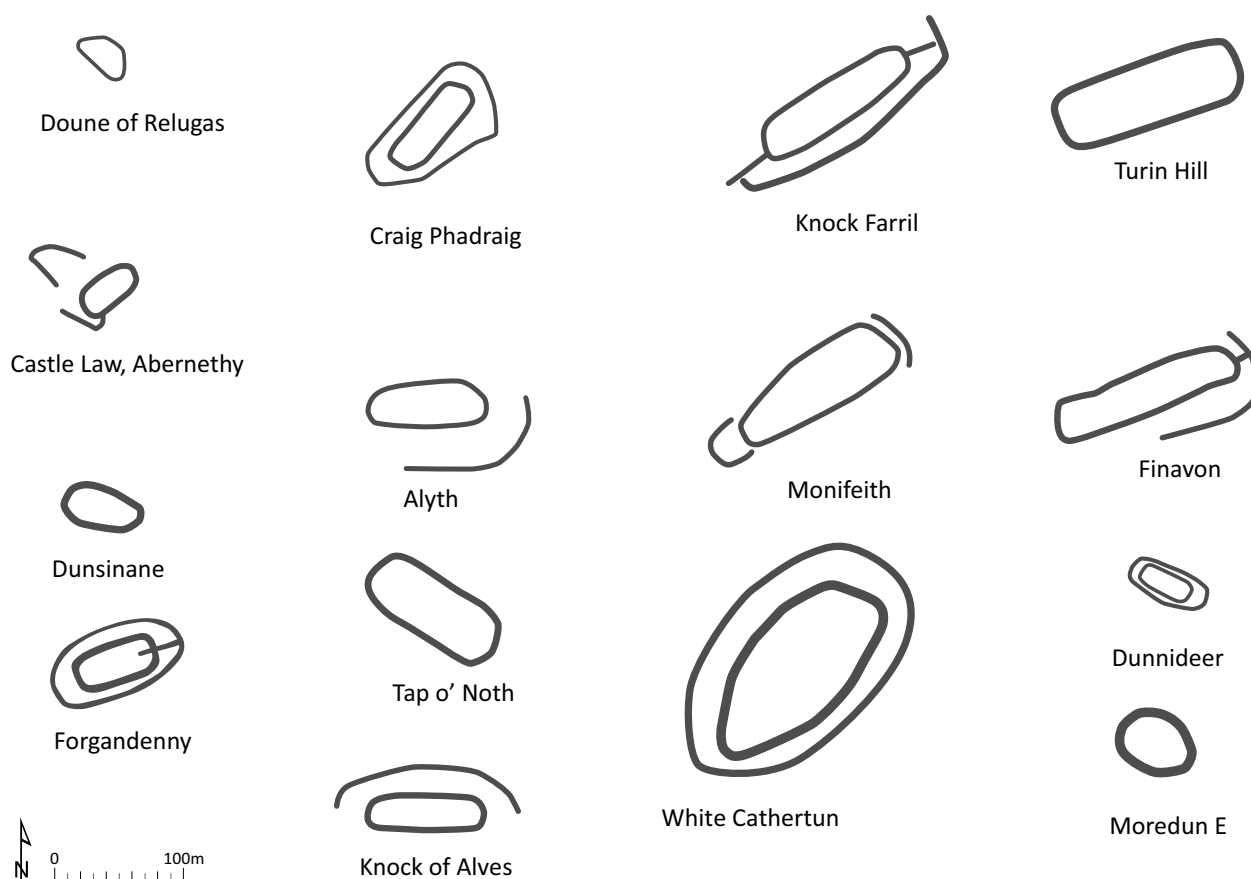


Figure 7.1: A selection of oblong and oval forts, based on Feachem (1966: fig. 5) with the addition of the fort enclosed by Wall E fort at Moredun.

place, a permanent settlement, a more temporary defensive refuge, a symbol of elite power, or a centre for trade. However, the significance of a place may also have been a consideration, perhaps influenced by previous activities, constructions, beliefs, or traditions. Logistical factors may have included the physical relationship of a location to existing settlement, resources and routeways, which may have already been in local use or for wider trade. The accessibility and availability of materials must also have been factors, although the full corpus of forts illustrates that the method of construction was usually adapted, for example through the increased use of earth where stone was less available. Perhaps understandably, given the nature of the enclosing works, there has been a focus on the defensive nature of locations in the past. More recently, the social dynamics behind construction have been more widely posited. For example, location may have been driven by visibility, not simply in terms of the traditional maxim of the domination of the local environs, but also in how sites were viewed and perceived from the surrounding landscape (Murray 2018; Lock and Ralston 2022: 61–2). These varied possible functions were not necessarily mutually exclusive, and forts may have delivered multiple roles simultaneously. In addition, their emphasis probably changed over

time, and influenced both the varied construction of different sites, and the development of individual sites.

Despite the common use of the term ‘hillfort’ outside Scotland, a large proportion of sites across Britain and Ireland occur at low altitudes: c. 40 % below 100 m OD, of which c. 23 % are below 50 m OD, while higher altitudes are predominantly found in Wales and Scotland (Lock and Ralston 2022: 64). More than half of the Tay group occur above 100 m OD with all three of our sites occurring in the mid-range of the sites at higher altitude (Figure 1.15). Analysis of the aspect of forts across Britain and Ireland found no strong preference for direction (Lock and Ralston 2022: 68–70). While this might suggest that visibility in the landscape a predominant factor, the nature and possible function of different fort types must also be considered.

The altitudes of the forts shown in Figure 2.1 (for details see Appendix A), along with Castle Law, Abernethy, are shown in Figure 3.89 and the morphological similarities between some of the fort types on either side of lower Strathearn, and the altitudes at which they occur, is striking. At the lower end, at around 50 m OD, The Roundel and Dow Hill are both similar in scale and vallation (Figure 1.12). At the other extreme, Castle

Law, Abernethy, Castle Law, Forgandenny, and the fort of Moredun Wall E have hilltop positions above 200 m OD (Figures 3.89 and 7.1) and are all small oblong/oval forts with massive timber-laced walls. On a lower summit between these extremes, the multi-vallate Moncreiffe fort at 180 m OD has similarities to Evelick in the Sidlaw Hills (Figure 1.12). A larger enclosure at Law of Dumbuils is morphologically reminiscent of the Rampart B and C forts on Moredun (Figures 1.12 and 3.94) and the larger fort beneath the small timber-laced fort on Castle Law, Forgandenny. These larger oval and sub-oval enclosures notably occur across a wider range of heights, between c. 100–275 m OD, suggesting that at the time they were constructed, function was the primary driver in their establishment over locational choice. The small timber-laced forts reflect changing function expressed through new architectural fashions, and the sequences of forts observable at Moredun and Castle Law, Forgandenny, confirm that these fashions and functions changed through time. In contrast, some sites, such as Castle Law, Abernethy, appear to have changed little throughout their occupation.

It is unlikely that all the forts around lower Strathearn were occupied at the same time. Rather than a hierarchy of sites, those that were in contemporary use more probably signal shifts in focus within broadly defined territories. Some idea of such territories has been recently explored through cluster analysis of wider regional patterns of forts (Maddison 2022: 374–377; figs 8.2 and 8.3). In this, Moncreiffe Hill was grouped with Strathearn and the west Sidlaw Hills, while Castle Law, Abernethy, was grouped with Fife sites. While key large sites were identified for some groups, such as Norman's Law in Fife (ID 31814), Kinpurney Hill (ID 32170) in the eastern Sidlaws, and the Brown and White Catherthuns in Angus (IDs 34969 and 35007), there is none of equivalent size for the Strathearn group. This may serve as a warning that such analyses should not be pursued too far. On the one hand we do not fully understand the relationship between the size of these larger fortified enclosures and their social status, and on the other to have any veracity the forts analysed must be demonstrated to be contemporary. Small forts may also have held considerable power, as the development of small, but very high-status forts in the early medieval period illustrates. It would appear there are Iron Age parallels in the oblong and oval series of forts with massive timber-laced walls.

The question of altitude and visual impact of these various fort types may be more complex than would superficially appear. The scale of the massive timber-laced walls of the oval forts on Moredun and Abernethy is perhaps misleading. Standing to 4 m or more in height, they were no doubt very impressive at close range but would have appeared relatively small when viewed

from a distance. The larger forts on Moredun may have been more visible due to their larger overall footprint. The visibility of smaller forts, such as The Roundel and Dow Hill, is even more difficult to assess. Neither have the advantage of a commanding hilltop location or large interior, and their presence may have depended more heavily on the line of approach and their multi-vallation. While this sort of variation suggests there is no direct correlation between the altitude and visibility, but clearly hilltop forts were more visible across much wider areas than those on lower terrain.

Hilltop locations were the most common topographical setting found in the Tay group (Figure 1.14) and at Moredun and Castle Law, Abernethy this makes them highly visible from both the estuary and the rivers in the straths below. The location of the forts on Moncreiffe Hill, overlooking both the Rivers Tay and Earn, arguably occupy the most controlling and key location of all the Ochil and Sidlaw group. While Moncreiffe fort has most visibility and influence over lower Strathearn to the south, Moredun has all round visibility of both its terrestrial and riverine surroundings. Both the locations on Moncreiffe Hill, and at Abernethy, speak of territorial control. How wide such territories extended is less clear. While larger forts, such as the Brown and White Catherthuns may have held regional significance extending to tens of kilometres (Dunwell and Strachan 2007: 93), the sphere of influence of smaller forts was probably more closely confined.

There has been no recent synthesis of Iron Age settlement in lower Strathearn and around the estuary. Sarah Winlow's (2010) review of Late Bronze Age environment, settlement and monuments is a useful starting place, but our understanding of contemporary settlement remains poor, compared to, for example, East Lothian (Haselgrove 2009) or Angus (Dunwell and Ralston 2008). However as in these areas, the forts cannot be understood in isolation, being one end, usually the most visible end, of a spectrum of enclosed sites which may have existed alongside unenclosed settlements. Whether constructed by a social elite or a broader social collective, the forts were clearly power centres to some degree, and would have performed socio-economic functions within the wider settlement of the area. It is probable that they controlled a wider network of settlement in the surrounding environs, as presented in the chapter conclusions for each excavation.

While our knowledge of possibly contemporary sites in the area (Figures 2.1 and 6.1) remains poor, two specific relationships between sites are noteworthy. The first is the fact that The Roundel and Dow Hill (Figures 2.1: 3 and 4), smaller forts on lower terrain which are of similar size and form (Figure 1.12), are

located at roughly similar distances from Moredun on either side of the hill. The Roundel appears to control the pass between Moncreiffe Hill and Kirkton Hill, and the River Earn below, while Dow Hill controls the south bank of the Tay. The second, though more tenuous, is the juxtaposition of unenclosed settlement with both curvilinear enclosures and rectilinear enclosures at both Dow Hill (Figures 2.1: 13, 22, 6 and 8) and Coates of Fingask (Figures 2.1: 14, 7 and 21). This could conceivably represent a sequence of unenclosed settlement being replaced by curvilinear enclosed settlement and then a rectilinear enclosure, but numerous alternatives exist and without excavation all must remain hypothetical.

While Castle Law, Abernethy can also be considered an estuarine fort, its position also dominates an important terrestrial route south across the Ochil Hills into central Fife (Figure 6.1). Indeed, the outer rampart at Abernethy was perhaps designed, at least in part, to extend the visual profile of the fort to the south and south-west, as much as to provide strength in depth on its most vulnerable side. Parallels for out-works used in this fashion can be found at Castle Law, Forgandenny (ID 26583); Knock Farril (ID 12782), Strathpeffer, and Finavon (ID 34813) in Angus. In controlling an important pass, its location is similar to The Roundel, and indeed, the early medieval fort of Clatchard Craig (ID 30074) which dominated the pass at the Den of Lindores c. 6.5 km to the north-east at Newburgh.

Finally, there is no doubt that the physical relationship of all three forts to the river network and the estuary provided a range of opportunities that may have been at least as important as the land surrounding them. The character of the rivers and estuary has changed significantly since prehistory, a result of land drainage and reclamation beginning in the medieval period. In the Iron Age, the fringes of both the rivers and estuary were characterised by more extensive intertidal mudflats lined with reeds, saltmarsh and coastal grasses, and regular islands occurred along the braided river channel of the Tay between Perth and Mugdrum Island at Newburgh (Strachan 2010: 20–1). The interface between water and land would have been much less defined, or even recognisable, and the various ecotones offered significant resources ranging from fish and birds to reeds and grasses, which the forts were well placed to collect and process. Further water offered rapid transport: and the value of short crossings of the Rivers Earn and Tay to the south and north of Moncreiffe Hill respectively, is illustrated in later periods by at least six historic bridge and ferry crossings, the greatest concentration in the whole estuary (Strachan 2010: 25, fig. 23). The terrestrial ‘island’ of the Rhynd, on which Moncreiffe Hill stands, was a key route connecting the land on either side of both rivers, and so acting as a bridge between land south of the River Earn

and north-east of the River Tay (Figures 1.3 and 2.1). The concentration of logboats from the Tay estuary, dating from the Bronze Age to early medieval period, indicates the importance of river transport (Mowat 1996; Strachan 2010: 129 fig 150). In addition, the wider estuary offered the potential for waterborne transport far further afield (Figure 1.1).

7.3 Type, size, and vallation

The classification of hillforts in England and Wales has long relied upon the analysis of vallation and topographic setting (Lock and Ralston 2022: 70–71), which, along with size of the area enclosed, remain key attributes for their study. In Scotland, where the term ‘fort’ was historically adopted, another dimension of analysis has been more concerned with distinguishing these sites from other defended settlement forms (Halliday 2019b: 58).

Type

Moncreiffe and the Ramparts B and C forts on Moredun are contour enclosures, of which in Scotland, the vast majority (72 %) take in an area of 1.21 ha or less (Lock and Ralston 2022: 79–81, fig. 3.6). By far most of the Tay group fall below this size, being less than 0.5 ha (Figure 1.11). Moredun Annexe D is best considered as an out-work of the Rampart C fort, to which it is clearly related. While Castle Law, Abernethy, and the Wall E fort on Moredun can also be described as contour forts, their morphology and the distinctive architecture of their walls places them among a recognisable series of forts found north of the Forth-Clyde isthmus, predominantly in the east of Scotland from the Tay estuary to Easter Ross. Oblong or oval on plan, they typically enclose relatively small areas within disproportionately massive timber-laced walls, and there is rarely evidence of an entrance. They are commonly, but not always, found on prominent hilltops, many within larger enclosures that are either earlier or later in date, and in some cases their walls are heavily vitrified (Feachem 1966: 67; Ralston 2006: 151; Cook 2010; Harding 2012: 16–7 and 86–7). Their massive walls can be viewed as an overstated display of defence in line with their apparent lack of an obvious entrance. As suggested for Finavon, Angus, it is possible their narrow entrance passages have simply become obscured by extensive rubble deposits from their collapsed wall-cores (Alexander 2002: 49). This is a possibility at Moredun, where the geophysical survey suggests a narrow gap on the north-west. However, there are other options. Following the first excavations at Castle Law, Forgandenny, Bell suggested an entrance passage may have existed above the height of the surviving wall faces, which were found to make a continuous circuit (Bell 1893: 18). Alternatively, the wall may have been constructed as a complete circuit

and access over this was via a timber superstructure. While the omission of an entrance passage may have eliminated a weak point in the defence, it would have significantly restricted access and precluded practical domestic use (Harding 2012: 17). This has led to the suggestion the group were not fortifications in the usual sense, but may have acted as non-domestic, ceremonial structures (Harding 2004a: 87).

The fact that many of the series are also heavily vitrified may be significant in this respect: the intense fires required might suggest a 'ritual closure' of a ceremonial site (Harding 2004b: 85–7), though it might equally signify deliberate destruction of a fortification by an aggressor. Either way, the process was only possible due to the presence of their timber and stone construction. While no evidence of *in situ* vitrification was found in Wall E at Moredun, the recovery of small amounts of vitrified material from Castle Law, Abernethy, could be argued to suggest localised vitrification in the upper works of the wall, or could more convincingly be explained by other processes which do not involve large-scale burning of the walls themselves. On balance, there is currently no real evidence of vitrification at the site.

The oblong series is a subset of a wider range of Scottish forts with massive timber-laced walls. These are predominantly a uni-vallate phenomenon, forts with multiple timber-laced walls being rare. Study of the oblong series is entwined with the Victorian excavations at Castle Law, Abernethy (Christison and Anderson 1899), as the drawings and photographs have informed every generation since. Thus, the timber-laced walls at Abernethy, rather than those discovered at Burghead (ID 16146), Moray, and Castle Law, Forgandenny, provided the type-site for Childe's 'Abernethy Complex' whereby he compared their construction with the *muris gallicis* described by Caesar at Avaricum (Childe 1935a: 193) and considered this alongside the material culture recovered from the sites (Childe 1935a: 236–7). While Feachem ironically excluded Castle Law, Abernethy, from the oblong series, along with four others that he considered no more than small contour forts (1966: 67–8), there is a strong case to include it, and now also the Wall E fort at Moredun, to the series. The latter has been added to the selection of sites shown in Figure 7.1, which is based on Feachem's illustration (1966: 67, fig. 5). It illustrates both relative size and morphological complexity, notably including parallels for the outer work at Castle Law, Abernethy. Dating of the series is considered below.

Size of enclosure and vallation

The selection of a threshold for the enclosed area of sites included in the *Atlas of Hillforts* was particularly

problematic in Scotland, Ireland, and Wales, where seamless continuums from larger forts to various forms of smaller enclosures exist, the dun being the most common in Scotland (Halliday 2019b: 68; Lock and Ralston 2022: 101). In terms of the British dataset, Scottish forts of any type are predominantly small, the majority (c. 57 %) being less than 1.22 ha (Lock and Ralston 2022: 106, fig. 4.1). Fortified enclosures were excluded from the *Atlas of Hillforts* if they enclosed less than 0.2 ha unless they fulfilled the other key criteria of defensive strength and dominant topographical position (Lock and Ralston 2022: 30–21; 101). The diminutive though heavily fortified Castle Law, Abernethy, in its spectacular setting, was in this class.

The significance of the size of enclosure in hillfort studies has been largely based on the assumption that there is some relationship between size and function. The internal areas of the sites excavated are shown in Figure 7.2. The very small areas (less than 0.2 ha) of Castle Law, Abernethy, and the Wall E fort at Moredun clearly set them aside from the larger enclosures of Ramparts B and C, as does the scale of their timber and stone walls, which are excessive in proportion to the space which they enclose. While the nature of construction at Castle Law, Abernethy, and Moredun are sufficiently similar to suggest a common intent, Moredun is somewhat larger in area. The size of enclosure might not necessarily reflect importance as this was dictated by the choice of the hilltop and hence space available. More importantly, the scale of their monumental walls is similar, and it was through display of this architecture that power was articulated; the ability to muster co-ordinated labour and resources. On that basis, as Moredun required significantly more resources, it could be argued as the site of superior importance.

However, while their walls were an ostentatious display of power, correlating with restricted access and limited space for domestic structures, Castle Law did produce finds suggestive of domestic occupation, along with unusual items of considerable prestige and ceremony. Finds such as the La Tène brooch, for example, are very rare and almost unknown from settlement contexts, and the rarity of linchpins suggests that wheeled vehicles may have been another signal of high status. Such items confirm the power centre of an elite, with status displayed both through an architecture that marshalled local resources on a spectacular scale, and in the material culture of those who occupied it. In effect they were proto-castles with parallels to the use of monumental architecture in, for example, the Norman keep. While they served as administrative centres of power, activity included ceremony, much of it designed to reinforce lordly power. The nature of power and administration may have been very different in the Iron Age, but it was probably expressed just as

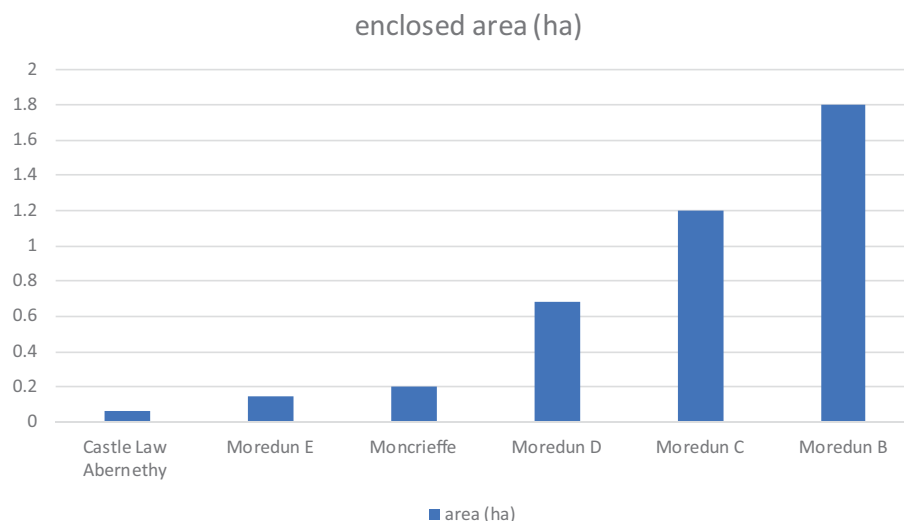


Figure 7.2: Relative areas of Castle Law, Abernethy (0.06 ha); and Moredun E (0.15 ha); Moncreiffe (0.2 ha); Moredun Annexe D (0.68 ha); Moredun C (1.2 ha); and Moredun B (1.8 ha).

potently through architecture, objects, and ceremonies that existed side by side with daily life. Thus Castle Law, Abernethy, produced everyday domestic finds as well as items possibly used in rituals, including the deposition of the linchpin in the cistern. An object possibly already associated with status; it may have either been detached from its wheeled vehicle for a considerable period before deposition or was perhaps purposefully detached directly prior to this act.

In contrast to the small power centre at Abernethy, the slightly larger multi-vallate enclosure on Moncreiffe appears far more suited to domestic occupation. With two almost opposing entrances, it is designed to be accessible, possibly even for wheeled vehicles. Further, while no evidence of was recovered, it is large enough to have contained up to 10–15 small roundhouses (Figure 2.32) and a population of 60–80 people. If Castle Law, Abernethy, and the Wall E fort on Moredun suggest an elite, then Moncreiffe appears more suited to housing a community. The successive earlier enclosures of Ramparts B and C Moredun B are much larger again. They may simply signal a much-increased population compared to Moncreiffe, or perhaps the inclusion of additional functions, such as the corralling of more livestock within the interior, the storage of produce, or additional activities such as markets or festivals. Rampart B on Moredun appears to have been replaced by Rampart C, representing a notable reduction in space, but with the addition of Annexe D, the overall area enclosed increased again, but this time perhaps with a formal separation of space and functions. The uneven and sloping interior of Annexe D, while more problematic for domestic occupation, could easily have contained livestock. Alternatively, this separation of space may have been to house industrial activity,

reducing the risk of fire or the impact of unpleasant by-products to the residential areas.

The scale of enclosure must also be considered in relation to the nature of vallation, and the distinction between uni-vallate and multi-vallate circuits has been widely employed in cataloguing fort types. Without excavation this can be problematic as surviving earthworks may reflect different episodes of construction and use rather than a planned design (Lock and Ralston 2022: 139). The early phases of enclosure at Moredun, through Ramparts B, C and D, and the much smaller timber-laced forts on Castle Law, Abernethy, and enclosed Wall E at Moredun were all uni-vallate. The ramparts of the former group are of a very different scale and nature of construction to the massive timber-laced walls of the latter, however. In contrast to these, Moncreiffe fort was probably always multi-vallate, if not from initial design, then through the additional outer lines of defence in an overall relatively short-lived scheme.

The common explanation for multi-vallation has traditionally been improved defence (Avery 1993 *passim*), creating defence in depth in response to the development of sling warfare. While there is currently no evidence for the use of projectiles from Iron Age Scotland, it may well have existed. Equally knowledge of southern military architecture may have travelled north. However, multi-vallation has also been argued as another expression of power, with the possibility that the act of construction had greater social significance than the finished work (Harding 2012: 13–14). This non-utilitarian role may have served to increase social cohesion for the occupying community, and perhaps its dependencies in the surrounding landscape, and enhanced the prestige of those permitted within

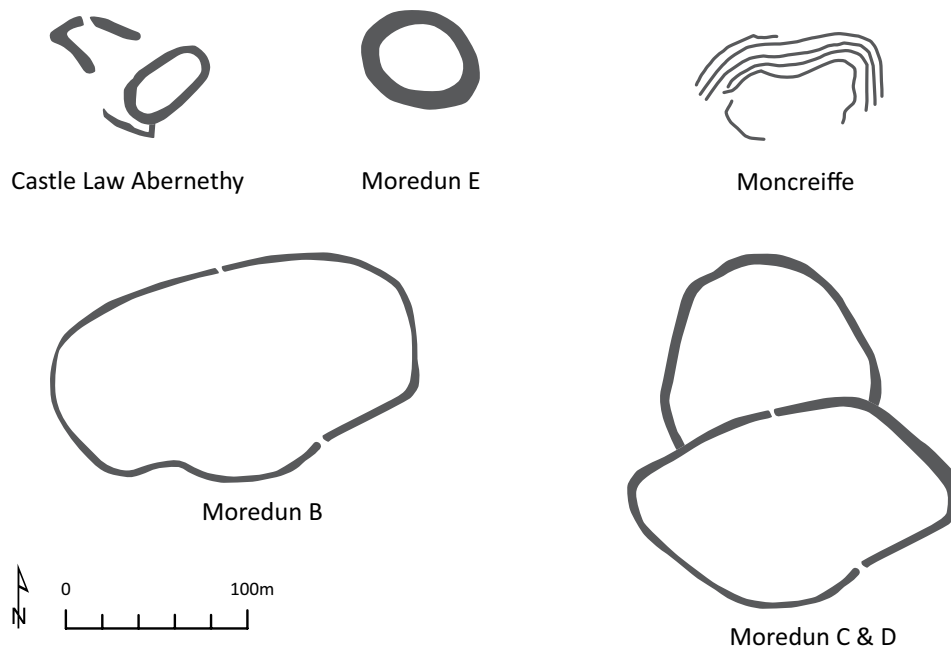


Figure 7.3: Plans showing the morphology, vallation and relative size of the forts.

(Bowden and McOmish 1987: 77; Dunwell and Strachan 2007: 92). Further, maintenance may have played an important social role by reinstating relationships and obligations. In these terms, the small timber-laced forts and the multi-vallate Moncreiffe may have shared social aspirations, albeit expressed in a very different architecture.

The comparison of the different forms of vallation can be usefully informed by the areas they enclosure, and hence the length of linear circuit (Figure 7.3). The smallest in area, Castle Law, Abernethy, and the Moredun Wall E fort, have the largest and most complex enclosing structures, requiring considerable amounts of stone and timber from their hinterland. Moncreiffe is not significantly larger than the Moredun Wall E fort, but employs multi-vallate simple ramparts of earth and stone, sourced more locally. The combined area of these multiple earthworks is close to the internal area they enclose, a feature noted in many small multi-vallate forts in south and eastern Scotland (Harding 2012: 13). Surprisingly, this is also the case, albeit to a slightly lesser degree, with the total area of the 5 m thick walls at Castle Law, Abernethy (Figure 6.8) in comparison to the area it encloses.

This proportional relationship between the scale of enclosing works, and area enclosed, is very different in the larger Moredun forts (enclosed by Ramparts B, C and D), where a large area is enclosed by a smaller, much simpler defence. In contrast to the constructional overkill at the smaller forts, their ramparts used much less stone and more earth, a readily available material.

Their construction would have been considerably easier than for the large timber-laced walls, utilising soil, turf, and bedrock along the line of the circuit or from convenient outcrops. Standing to around 1.5–2 m in height, with stone façades and a timber superstructure, they would still have presented a formidable barrier. However, their scale, in proportion to the area they enclose, suggests a pragmatic defence; a functional stockade against attack and to confine animals, rather than an exaggerated architectural display.

The replacement of Rampart B with Rampart C, rather being a reduction in size, can be considered further expansion when the addition of Annexe D is considered (Figure 7.3). This illustrates a successful population outgrowing Moncreiffe fort and the enclosure of Rampart B in succession.

In these terms, while internal area can be considered a good indicator of scale of occupation and function, the proportional relationship between circuits of defence and areas enclosed might display social aspirations of cohesion and identity or display the power of an elite. Architectural styles and innovations will have evolved to reflect nuanced differences in the meaning and value of the sites, while types of circuit, and the materials from which they were built, may have changed in response to evolving military tactics.

Defence or display?

As we have seen, a common and understandable tenant since the early days of hillfort studies is that they were

primarily built to defend their occupants, much like a prehistoric castle. The assumption was fuelled by, for example, the excavations at Maiden Castle, with its monumental ramparts, heavily defended entrances and a 'war cemetery' (Wheeler 1943; Harding 2012: 179–180). However interpretations have changed over time, and even here the ramparts have been argued as being less about defence and more about community (Sharples 1991: 264).

As a result, a diverse range of functions is now commonly recognised at forts, and while these probably varied in emphasis and changed through time, the overall corpus (Avery 1993) suggests that the majority were constructed with defence in mind, at least to some degree. Nevertheless, since the 1980s, the defensive capability of many forts, including multi-vallate examples, has been questioned, and the importance of other non-defensive functions, including, as has been noted above, vehicles for social cohesion or as ritual centres, has been argued (Armit 1997: 49–64; Dunwell and Strachan 2007: 92; Harding 2012: 177–178). Harding notes that the scale of monumental construction is often such that display of identity or status must have been a factor (Harding 2012: 89), an argument as easily applied to Castle Law, Abernethy as it is to the massive Maiden Castle Wiltshire. However, there is no simple division between display and practice; the very appearance of high walls or broad bands of banks and ditches can be argued as much a form of defence as any practical application they might have had in contemporary warfare.

The suggestion that some sites were 'not defensive' has often been based on a modern perception that their defensiveness was compromised by their location. For example, The Chesters, Drem (ID 56280), in East Lothian, is overlooked by an adjacent hill, supposedly jeopardising its defensive capacity, which includes complex multi-vallation (Bowden and McOmish 1987), but there is c. 80 m to the inner rampart from the nearest vantage point. For a society where there is no evidence of either arrows or sling-shot, this is unassailable range. On the other hand, that vantage point provides ample opportunity to impress the visitor with the depth of the defensive scheme. While Moredun is on a hilltop, and so not overlooked, this is not true of either Moncreiffe or Castle Law, Abernethy, and may, at least in part, explain the additional defences at both sites: through multi-vallation at Moncreiffe and the out-work at Abernethy. But the range from which they are overlooked is even greater than at Drem, rendering this supposed tactical weakness irrelevant. At both sites other requirements may have been the overriding factor in deciding location, such as access to surrounding resources such as farmland or the rivers, controlling routeways, or in visibility of display. However, even if unrequired, it was

clearly important that their tactically compromised positions were seen to be mitigated through additional physical defence.

While the depth of Moncreiffe's multiple lines of defence are disproportionate to the area they enclosed, this is a feature that can be seen elsewhere. It has already been noted in relation to examples in the dense concentration of small forts in south-east Scotland, but is also a feature of forts in north-east and east Scotland more generally, including a series of promontory forts and scarp-edge forts from the coast of Moray in the north to Bannockburn in the south (Rideout 1996; Harding 2017: 120–1). Within our study area, notable examples include the inland promontory forts of The Welton, Rait and Inchtuthil (RCAHMS 1994: 51–5), though one phase of the latter incorporated Roman masonry in its ramparts and must date from after the 1st century AD. It is also a feature of several other hilltop forts, including in Dunsinane (RCAHMS 1994: 51–4), which is perhaps another of the oval, timber-laced wall series. Morphologically closer parallels can be found in the forts at Broxy Kennels, Rosemount and Evelick (Figure 1.12), but this disproportionate ratio of 'enclosed' to 'enclosing' area is also found in the series of slightly larger oval multi-vallate forts, including Over Durdie and, within the immediate environs, The Roundel (Figure 1.12). Multi-vallation in these instances, as monumental constructions, can probably be seen as an indicator of the social status of the settlements they enclosed (Harding 2017: 121). In summary, defence and display were no doubt both important objectives influencing both the location of sites, and the nature of their enclosing architecture.

7.4 The architecture of enclosure: the nature of construction

The nature and methods of construction of the wall types vary at each fort, but one common feature is the use of Old Red Sandstone, which does not occur on either Moncreiffe Hill or Castle Law, Abernethy, and so must have been introduced onto the hilltops from the surrounding area. Notably, both sites occur on the edge of the Old Red Sandstone, Moncreiffe Hill to the north and Castle Law, Abernethy to the south (Figure 1.4). While it is not possible to identify any local quarries or outcrops at either site, it would have been widely available both as glacial debris and through quarrying on the lower slopes of either hill.

The use of Old Red Sandstone may have had symbolic meaning – bringing stone from the surrounding landscape to be incorporated in the structure perhaps had social or political value. It may have been selected because of its constructional qualities – it is soft and easy to shape. But it may also have been for aesthetic

design. While Old Red Sandstone is poorly represented among the artefacts, there are some exceptions, notably a disc bead, whorl roughout and gaming piece, where the material was probably chosen because of its visual appeal; a dark red colour, especially when wet, combined with small, sparkling quartz flecks.

The state of preservation and the evidence of robbing of the various ramparts and walls may inform our understanding of both the phasing of construction, and of taphonomy across the sites. Access analysis can help inform the local context of sites and potentially their wider landscape setting. Finally, the nature of construction can inform us about the social role of forts, coordination of labour, and perhaps specialisation.

Moncreiffe and the Moredun Ramparts B and C forts

The multiple ramparts at Moncreiffe, along with Moredun B and C, were of composite construction: with external and internal stone faces retaining an earth and stone core. They were constructed directly onto the bedrock, which was often manipulated to provide a secure base, and to win materials. At Moncreiffe, the series of ramparts was more terraced in nature, given the steeper slope of the hill, perhaps often with a low internal face to each rampart.

The wall-head would have required some form of capping, which ideally held together the outer and inner faces, and may have consisted of a range of materials including timber, stone and turf. The use of the latter material on the exterior of a stone-faced, earth-cored wall at Rainsborough Camp, Northamptonshire (Avery *et al.* 1967; Avery 1993), may have provided structural support to the wall face, but it may also have made them much less visible from afar.

Moredun Annexe D rampart

As outlined above, the Annexe D rampart appeared to contain more stone than Rampart C, retaining much more of its external and internal stone facing. This may simply reflect survival however, perhaps due to the downslope orientation of the excavated stretch, which has resulted in less collapse than found below both Ramparts B and C. It may also reflect less robbing of the Annexe D rampart than appears to have occurred along Ramparts B and C, presumably to win material for the construction of Wall E. The discovery of a median face within the rampart core may represent either a phase of rebuilding or deliberate strengthening of the wall as it dropped downslope at this point. The wall is not thick enough to suggest the classic *murus duplex*, where an internal revetment allows higher construction, nevertheless, this may be the first identification in Scotland of a related construction technique.

The timber-laced walls at Castle Law, Abernethy and Moredun in wider perspective

Ian Ralston

Introduction

The evidence for structural timberwork in wall-and-fill ramparts (as opposed to free-standing palisades or stockades) in Britain and Ireland falls broadly into two major series, on which there are numerous variants (Lock and Ralston 2022: chapter 5). Archaeological excavation of such ramparts developed in Britain and continental Europe from the second half of the 19th century.

Timber-framed types include vertical wooden posts, most commonly in the outer wall-face, sometimes in its inner face, and much less frequently within the wall-core. These vertical posts are often set in post-holes and may be interspersed with horizontal timberwork, which can also vary in its disposition, set in the wall-faces. In other cases, the vertical posts are separated by panels of dry-stone work. All timber-framed ramparts, however, must also have contained horizontal timber anchors embedded into the wall-cores for their stability. Generally, the major timber uprights of these must have been in place early in the construction process.

The other main type, normally described as timber-laced, have horizontal timbers incorporated in the wall-core and set at right-angles to the wall-faces, sometimes with the beam-ends apparent through lintelled apertures in the outer or both wall-faces. In addition, further series of timber beams placed longitudinally within the core, and thus running parallel with the wall-faces, have been identified by excavation. Timber-laced walls however lack the earthfast vertical posts that are characteristic of the timber-framed types; there are a few 'hybrids' that include transversal, longitudinal and vertical wooden elements known in Britain and on the nearer continent. Unless the internal timber scaffolding was designed and built at the outset, the more reasonable sequence of construction would see successive 'rafts' of horizontal timberwork inserted piecemeal as construction progressed. The implication is that these are thus substantially different constructions although both styles in Britain are broadly later prehistoric.

Timber-laced walls are not a uniquely British, even temperate European, phenomenon. There, a variant, the *muris gallicus*, was described in some detail by Julius Caesar during his siege of *Avaricum* during the Gallic War in the middle of the 1st century BC. He considered its defensive merits in terms of resistance to fire and to assault deploying battering rams. Further

afield, notably in northern Pakistan and neighbouring areas, this long-established traditional style of building (*kath-khuni* architecture) has attracted recent attention from engineers because of its capacity to resist and/or minimise collapse, notably during earthquakes. Timber-laced architecture is also in evidence elsewhere, for example in Turkey, although here the term seems to be used also for building styles including vertical wooden elements.

East and West indeed overlap, as remarked by David Christison, author of the original excavation report of Castle Law, Abernethy, who noted in 1899 that the British-officered Indian Army had repelled a siege at a timber-laced fort during the ‘Great Game’ on the North-West Frontier of British India a few years previously. The Chitral Expedition of 1895 will be discussed in a more detail in the concluding section of this account.

As presented in Chapters 3.4 and 6.2, there is every indication that Moredun Wall E and both walls at Castle Law, Abernethy, were timber-laced, an architectural type first investigated in Scotland in the later 19th century at Burghead, Moray and more locally at Castle Law, Forgandenny. Such timber-laced walls have been long known to be more common in the hillforts of the north of Britain than the timber-framed series (Cotton 1954; Lock and Ralston 2022). This preponderance would be enhanced if vitrified forts, frequently considered to be burnt examples of such timber-laced walls, were added to the equation (Lock and Ralston 2022).

Timber-lacing: wider comparisons and discussion

As noted above, there is an element of good fortune in the survival of horizontal voids in dry-stone façades once the timber battens they originally held have decayed. But there are continental comparators, notably the *muri gallici* of Iron Age Gaul in the 2nd and 1st centuries BC, and in some broadly contemporary continental constructions. The classic *muris gallicus* is a widespread western temperate European Late Iron Age fortification type; essentially a timber-laced wall infilled with earth or other materials, and with an external dry-stone façade punctuated by the apertures for the beam-ends of the transversals. An additional feature is the presence, at least intermittently, of iron spikes augered into the junctions in the internal timber framework. Attributable primarily to the 1st century BC, these are the ‘Gallic walls’ which encouraged Gordon Childe to use this term for Burghead, Forgandenny and Abernethy in the 1930s. It has long been apparent that late examples of that continental series, perhaps built in the 1st century AD as at Vertault in Burgundy (now reconstructed on site), display horizontal battens, in this case of the order of 0.25 m wide, running longitudinally in their external wall-face (Martin 1958: 308–10, figs 9–11). More recent work (Barral *et al.* 2019: fig 2.1),

however, demonstrates that the appearance of such horizontal battens or *longrines* in *muri gallici* wall-faces already occurred in the previous century and includes two distinct series: those where the horizontal battens are incorporated within the mass of stones (i.e. the blocking directly behind the facing stones) constituting the external façade; and those where they are apparent in the façade when viewed from the exterior. The latter are archaeologically easier to detect, assuming the wall-face survives to some height in good condition. In the later Iron Age of western temperate Europe, such horizontal battens also appear in the dry-stone façades of other styles of timber-framed walls (Barral *et al.* 2019: 22) not simply the *muris gallicus*. These include wall-and-fill ramparts constructed with vertical timbers set in their outer faces, such as examples identified at Metz in Lorraine and at Mont-Vully in Switzerland (Fichtl 2007: fig. 29). This combination is not recorded in Scotland, where in general vertical timbers in wall-faces (or indeed elsewhere within protohistoric rampart constructions) indicative of timber-framing remain rare.

Such horizontal battens also appear in the walls lining the entrance passages of gateways, as reconstructed at La Chaussée-Tirancourt in Somme, France (Ralston 2013: ill. 34). Their presence indicates the importance of these elements within the timberwork construction of these complex wall-and-fill ramparts; they are far from simply decorative embellishments to the façade. The most-recently discovered variant known to the author was discovered at the oppidum of Pons in Charente-Maritime, where even more exposed timber battens were present in both its inner and outer façades, in this case in association with internal timber-lacing that apparently lacked nails (Krausz 2019: fig. 10.12 A–C).

The foregoing brief rehearsal of some of the 2nd century BC to early 1st century AD continental evidence is made here as it provides an indication of the increasing architectural sophistication and variability present in wall-and-fill ramparts within temperate Europe. Recognition of structural details is manifestly enhanced by examining well-preserved examples; this is most clearly the case in regard to features in, or in very close proximity to, the external dry-stone wall-faces, which in many cases have been much reduced by settling, collapse and decay. The quality of preservation present in the faces of the ramparts at Moredun and Castle Law, Abernethy underscores their importance within the Scottish record; and shows that Scotland was integrally involved in the experimentation with variants of timber-lacing that characterised broadly the last few centuries BC.

The unexcavated Moredun and Castle Law, Abernethy, walls have at least the possibility that they may contain other features noted in continental examples.

For example, the presence of major nails fixing the intersections in the timberwork of *muri gallici* (Buchsenschutz and Ralston 2014) has its equivalents elsewhere in Scotland at Burghead and perhaps at Dundurn (Alcock *et al.* 1989), where their context was less fully described. To date, however, these clear Scottish examples are early medieval constructions. It is possible that Moredun and Castle Law, Abernethy in the last centuries BC may have represented more complex wall structures than the simple epithet ‘timber-laced’ implies, but this is meantime perhaps to be regarded as ‘not proven’, in Scottish legal terminology. While good preservation is not a proxy for necessarily complex structures, it undoubtedly provides the best conditions for their future recognition.

The walls at Castle Law, Abernethy and at Moredun, as understood in the light of their examination in this project, undoubtedly enhance understanding of the variations present in the long-lived tradition of timber-laced ramparts present in Britain and on the continent. Generally speaking, the wall-faces of structures of this kind are not particularly well-preserved, and in many cases it may be surmised that the decay, firing or dislodging of the timber components of their construction contributed to their collapse whether immediate or extending over time. The surviving detail for the former horizontal timber-work in both the wall-faces at Moredun is thus of particular interest, and intimates that this was a particularly elaborate construction. In comparable structures the wall-face visible from the interior of the site is often less elaborate than its external counterpart; but this is not a universal role as Young’s (1891) description of the lower fort at Burghead testifies.

More recent work has drawn attention to the significance of timber-lacing in vernacular buildings further afield, most notably in relation to their resistance to seismic shocks in earthquake-prone zones, for example in Turkey (although here what is termed timber-lacing can involve much more elaborate frames: e.g. Gülkan and Langenbach 2021) and in the vicinity of the Himalayas in South Asia (e.g. Hughes 2007; Carabbio *et al.* 2018, Bothara *et al.* 2022 provide many illustrations). Since Julius Caesar’s account of the qualities of the timber-laced *muri gallici* of first century BC Gaul, attention has often focused on the vaunted resistance of such constructions to assault by battering rams. Caesar also made direct reference to the supposed difficulty of igniting such walls.

Hughes (2000), in a preface to his consideration of the advantages of timber-laced constructions in earthquake zones, provides a comprehensive listing of the advantages of timber-laced construction, and several of these, more particularly related to circumstances in

later prehistoric Scottish walls, are worth rehearsing here. Such enclosure walls are generally established without built foundations, and often on sloping sites that can be liable to differential movement. If, as in the case studies here, there is evidence for the selection of facing stones, in some instances perhaps imported to the site, in most cases it would appear that the wall-cores are constructed from locally sourced rubble which is of variable quality. While the packing of the core may also include earth and other materials, there is little to ensure the stability of wall-cores other than rather haphazard wedging of stones against each other. Here the timber-lacing would come into its own by contributing to the stability of the wall-cores. Larger stones were normally employed in the internal and external wall-faces, but these are frequently of different sizes and are wedged in place with smaller packing and pinning stones. Normally large stones are not used at heights at which lifting them into place becomes increasingly strenuous.

In such cases, the addition of internal structural timbers strengthens the wall as a consequence of the tensile and elastic properties contributed by the wooden elements. In the case of simple horizontal timber-lacing of transversals and longitudinals, in contrast to more elaborate three-dimensional timber frames which can be constructed in advance of the stone work within which they will eventually be incorporated, the timbers are likely to have been set in place in stages as the wall was erected, more particularly if the wall timbers were inserted as a series of ‘floating rafts’ rather than as a completely superposed contiguous timber structure or cribwork. In the cases considered here, in the absence of more complete excavation, it is not possible to be sure which of these structural choices applies, although if the dimensions of the beam-holes and the vertical separation between the registers of them are indicative of the sizes of the timbers included in the wall (and it is accepted that all registers of transversal timbers penetrated the wall-face), a series of independent timber rafts seems more probable in each case.

In structural terms, timber-laced walls confer certain advantages over simple faced-and-uncompacted core types. With random rubble facings and loose, uncompacted and unmortared cores, they can be quick to construct, the timber lattice of transversals and longitudinals conferring structural strength and stability throughout the core. Compared to dry-stone walls, where foundation works may also be required, this stability of the core of timber-laced walls makes them easier to erect on uneven, indeed rugged, terrain. Other advantages are that any collapse should be restricted in extent because of the timber framework and thus less onerous to repair. Provided the timbers have not decayed, such walls can also be

dismantled and the construction materials re-used. The possibility of including corner joints and the inclusion of longitudinal timbers also ‘provide tensile resistance to out-of-plane movements’ (Hughes 2000). But timber-lacing is not without its disadvantages: it can catch fire and the inclusion of straight longitudinal timbers means curved walls present problems (as has been noted in relation to the slight angularity of the plan of the inner enclosure of Castle Law, Abernethy) and is a noteworthy feature of the plans of the gateless, oblong forts of north-east Scotland considered above (Section 7.3) and below (Section 7.7). Furthermore, moisture can distort the shape and size of the construction; and the timber framework concealed within the wall can be subject to attack by biological organisms etc. and may be prone to rapid decay.

From Caesar’s text (mentioned previously) and other sources it is plain that timber-lacing was commonly used as a component of fortifications, and for some of the same reasons – resistance to collapse – as have attracted more recent interest from engineers and others in relation to structural stability in earthquake zones. These include assault by battering rams or heavy catapults, and the use of mining or sapping. Caesar also mentions the difficulty of setting them on fire but, while this may have been the case where little timberwork was exposed, in other cases it seems a more contentious proposition. Aside from the well-attested use of fire, and the specific case of Roman military practices including the use of missiles, we have no direct evidence for the use of such means of assault in later prehistoric Scotland.

Such methods of attack against timber-laced walls continued to be used into the 1890s, notably on and beyond the periphery of British India on the North-West frontier. In the Hunza – Black Mountain campaign of 1891, standard 7-pounder Mountain guns, as supplied to Gurkha troops, targeted the timber-laced walls on the fort at Nilt (now on the Karakoram Highway in Gilgit-Baltistan, Pakistan) to ‘no effect’ (Hughes 2000). Its ‘great wall, carefully built of stones, and strengthened with massive timbers ... is fifteen feet to twenty feet in height and twelve feet thick ...’. On this, ‘guns of much heavier calibre than ours would have failed to make any impression’. These quotations are from an extended description of the capture of the fort which forms Ch XXIV of Knight’s (1895) account of this campaign. Four years later, in a continuation of the same campaigns, the tables were turned in that the timber-laced-walled fort with corner towers (of which there is a contemporary photograph: Anon 2022) at Chitral (Khyber Pakhtunkhwa, Pakistan) was besieged by Umra Khan and Pathans from Bajour while held, pending its relief, by Surgeon Major (later Sir) George Scott Robertson and an Indian and British force some

350 strong (Robertson 1898). The attackers attempted to set fire to one of the towers on the wall, to mine underneath it, and also deployed slings (as well as rifles) in their attacks – all techniques in use in the European Iron Age – even if not all in Scotland.

These Indian forts were evidently complex structures with high walls and towers. Contrastingly, the Castle Law, Abernethy, walls examined in both the late Victorian campaigns and in this project are – at least in terms of their superficial examination – less remarkable in that their form is less unusual within this architectural canon. Since their discovery, they have retained their importance in considerations of timber-laced forts partly because of their state of preservation, but also because of McIntyre’s plates, discussed above, which must rank amongst the highest quality images of hillfort defensive architecture recorded in the late 19th century, certainly in Britain.

Above, some aspects of the consideration of the differences between uni-vallate and multi-vallate are rehearsed. This issue is developed further by Lock and Ralston (2022: 139–57) and will not be considered in detail here. These authors make a distinction between ‘current morphology’ i.e. how the enclosing circuits look today, and what may be known from excavation or otherwise of their sequence of construction. The Moredun enclosure evidence rehearsed above highlights this distinction. In the case of Castle Law, Abernethy, what is remarkable is that the fort is partially bi-vallate and that both walls are manifestly timber-laced. Consideration of the field evidence above suggests that the main circuit and the external wall, set lower than it and limited to the western end of the site, were broadly contemporary. Such features may have been intended as much to enhance the external appearance of the site as to strengthen its fortifications: but at neither of the sites just mentioned do the out-works show signs of timber-lacing or vitrification. Castle Law, Abernethy, is unusual within Scotland in being partially bi-vallate, with both circuits incontrovertibly timber-laced.

Other examples which have evidence (of varying degrees of certainty) of two timber-laced ramparts (often indicated by evidence of vitrification) may be proposed but are relatively few. Relatively close to Abernethy is the c. 0.16 ha fort surrounding the Wallace Monument on Abbey Craig, Stirling (ID 47113). Its three ramparts are all reported to contain vitrified stone, but in one circuit this material is re-used. Restricted excavation on the other two circuits in 2001 and 2018 both provided evidence of burnt timber-laced walls including vitrified stones; the radiocarbon dates indicate two separate destructions of timber-laced forts here in the 1st millennium AD (Cook, M.J. *et al.* 2016). At An Cnap on Arran (ID 40219), a diminutive bi-vallate fort of 0.2 ha,

the core of the inner wall is locally vitrified and Paton (1928: 241) detected fired stones and charred wood in the outer bank. It is undated. At Dun Lagaidh in Wester Ross (ID 12142; Ross and Cromarty) Euan MacKie (2007) confirmed both intermittent vitrification of the inner circuit of a prehistoric fort underlying a dun and later castle, but also an eastern out-work which displayed both vitrification and beam-holes in its inner wall-face (MacKie 1969: pl. 1). In the case of Craig Phadrig, Inverness-shire (ID 13486), the existence of two burnt walls, the inner more heavily vitrified, has been established since Alan Small's exploratory excavations over 50 years ago, and the sequence has been clarified by recent work following storm damage at the site (Peteranna and Birch 2019). The inner vitrified wall, from which Small also noted horizontal carbonised timbers, is clearly of the later 1st millennium BC; the outer circuit, seemingly timber-laced in parts and only locally vitrified, is less securely fixed chronologically, but may be an additional circuit related to the major work. First millennium AD re-use of the site is however attested. In other cases, although vitrified stones have been recovered from two circuits of a fort, the evidence points to one having been vitrified *in situ*, but subsequently robbed to build the other, as at Duntroon, Argyll (ID 39450; RCAHMS 1988: 164–5, no. 257) and the more extensive Bruce's Camp, Aberdeenshire (ID 18586); somewhat similar circumstances seem to have prevailed in the later first millennium AD at the 'nuclear' fort at Dundurn, Perthshire (ID 24873; Alcock *et al.* 1989). A further contrast is provided by the evidence from the promontory fort at Cullykhan, Aberdeenshire (ID 19942), where two, very different, indications of timber-laced and timber-framed walling were found. Here, west of the later masonry castle, the traces of a wall containing both burnt timbers and vitrified material overlay evidence of occupation extending back into the first millennium BC, but the wall seems from initial radiocarbon dating to date from the first millennium AD. Contrastingly, at the western access to the promontory, a length of wall with an in-turned gate passage edged by dry-stone panels interspersed by vertical posts is likely to be of later prehistoric construction. In sum, the two different architectural styles represented at these different positions are likely to be wholly independent of each other. Another Perthshire site merits brief mention although the evidence from it is difficult to disentangle: Dunsinane Hill (ID 30660; Figure 1.7). Although this is a complex site in terms of its enclosures, the preferred view over recent years seems to be that the vitrified stones located on the hill, none of which seem to be *in situ*, are derived from an earlier fort whose original circuit is unclear (RCAHMS 1994: 55–57). There is certainly no evidence at present for two timber-laced and or vitrified walls here. Another site much impacted by stone robbing, cursory excavation and tree-planting in the 19th century and now difficult to analyse without further investigations

is the Laws of Monifieth, Angus (ID 33450). Here there are at least two walls containing vitrified stone, but whether this is *in situ* in both cases is unclear. Overlain by a broch and with numbers of finds, this site is at least predominantly later prehistoric. Lastly, the contentious case of Dunagoil, Bute (ID 40280) merits brief rehearsal. There is undoubtedly a heavily-vitrified fort on the rocky summit here, but the status of an intermittent outer work is disputed. While it is plain that visible vitrified stone in several sectors of this tumbled walling is re-used, leading RCAHMS to consider this outer enclosure (Harding 2004b: fig. 1) to be the product of a later agricultural landscape, Harding (*idem*: 8) noted 'signs of vitrification affecting the outcrop itself'... precluding re-use as an explanation. While the inner enclosure has produced an astonishing range of later prehistoric finds relative to the seemingly restricted areas that were excavated around the First World War, the outer enclosure is entirely undated. Harding (2017: 178–83) however envisaged it as a 'terrain fort', comprising a citadel complemented by broadly contemporary intermittent out-works.

In sum, this survey, albeit likely non-exhaustive, has produced only a small harvest (given there are 1481 confirmed forts *sensu* Lock and Ralston 2022 in Scotland) of such sites with two timber-laced or vitrified walls. Cullykhan's timber defences are chronologically separate; the same may apply in the case of Craig Phadrig. Abbey Craig appears to be a 1st millennium AD case of the phenomenon. Both timber-laced/vitrified components of Dun Lagaidh are probably 1st millennium BC, making it perhaps the best comparator at present for Castle Law, Abernethy, and highlighting how rarely this phenomenon has been confirmed in Iron Age Scotland.

The examination of the well-preserved timber-laced walls of Castle Law, Abernethy, and Moredun thus adds significantly to our understanding of the variability present in this important and widespread building style in and beyond Scotland. Their fuller excavation in the future would undoubtedly enhance the picture yet further.

7.5 The logistics of construction

Sources of stone: bedrock modification and the use of Old Red Sandstone

The construction of each fort was a massive civil engineering project requiring considerable planning regarding the availability and transportation of materials. Almost all the ramparts and walls inspected were constructed directly onto the bedrock, which in many instances had been levelled or reduced, in part to release stone. It is possible that a wide corridor either side of the line of rampart/wall was cleared, and

with smaller forts such as Castle Law, Abernethy, it is probable that the entire hilltop was cleared and levelled. This process would have made available timber, turf, and stone, but not in the quantities required for all types of construction, and additional materials from the surrounding area would also be required.

Being largely of earth and turf, the bulk of material to construct Moncreiffe and the Ramparts B and C forts on Moredun is assumed to have been won on site. In the sections excavated across these defences, the bedrock had been modified, as was shown more extensively at the monumental roundhouse. Depending on the nature of any timber superstructure, it is probable tree-clearance across a much wider area would have been required. By far the most significant amounts of stone and timber were required for the timber-laced walls at Castle Law, Abernethy and Moredun Wall E. At these forts, stone was required both in large blocks for the façades, and in huge amounts of smaller rubble for the wall cores. This must have involved the transportation of materials to the site from the surrounding landscape, perhaps including the re-use of existing materials from earlier structures. This is most relevant for Wall E at Moredun, which appears to be the last in a series of forts, and much of its material was probably robbed from redundant ramparts, especially Rampart C, which may itself have used materials from Rampart B. We should note, however, that in places these rampart faces survived to between 1.2 m and 1.7 m in height. This could suggest our premise of the likely sequence is incorrect, but more probably highlights the difficulty in extracting stone from collapsed earthen cored ramparts, making quarrying from the bedrock the most efficient method of procuring stone. Wall E may also account for quarrying at the monumental roundhouse.

While many forts display visible evidence of internal quarrying within the line of their ramparts, none has been identified at these sites, other than through the modification of bedrock. For the large timber-laced walls, it appears that fairly comprehensive levelling of the area to be enclosed was carried out. The profile of Castle Law, Abernethy, is roughly level across the hilltop (Figures 6.34 and 6.35), a common feature in small contour forts. It is difficult to confirm whether this is entirely the result of quarrying or in part a result of collapsed wall material. Other areas around Castle Law that may have been quarried include the gully separating the inner and outer banks on the west and outcrops around the pond to the north-west (Figure 6.8). Indeed, the pond itself may be the result of this; not only producing stone but creating a large body of water for animals while providing a physical barrier across the vulnerable west approach. It would also serve to visually emphasise the height of the fort walls. The scale of bedrock modification to the north-west of the fort remains uncertain, as the gully floor is obscured

by sediment and marsh, but at the very least it appears to have generated material for the banking of the dam that was designed to create the pond (Figure 6.38).

While much of the stone was clearly won locally, of more significance is the importation of Old Red Sandstone in considerable quantities for the construction of the Moredun and Abernethy timber-laced walls, and indeed, the Moredun monumental roundhouse. This must have involved considerable effort as it does not outcrop on either hilltop but only below a height of c. 30 m OD across the valley floor (Figure 1.4), to the south of Moncreiffe Hill, and north of Castle Law, Abernethy. The closest source of Old Red Sandstone to Moredun is c. 350 m due south, however this is c. 200 m below the fort and would have involved manipulating the stone up the extremely steep south face. A gentler approach from the west is perhaps more likely although the route longer. At Abernethy, the closest Old Red Sandstone occurs c. 330 m north of Castle Law, but with a similar height difference and steep incline as at Moredun. It is most likely that blocks were roughed out at source and refined on site. The stones, as they survive *in situ*, are too large and heavy to have been carried by one or two men, and imply a major logistical exercise, probably involving draught animals, sleds and perhaps wheeled vehicles. This perhaps could be part of the significance of the Castle Law linchpin, a symbol of the prestige of its owner and their command over the rocks and trees of the landscape used to build the fort.

Old Red Sandstone may have been selected primarily due to its workability: a soft stone that is much easier to shape into suitable blocks to create flat wall façades, with rectangular voids, than the volcanic bedrock. Another attraction may have been its visual impact and at Moredun, and at both walls at Castle Law, Abernethy, the Old Red Sandstone appears in horizontal bands along the façades (Figures 3.65; 6.13 and 6.18). A special significance in the relationship between people and geology has been demonstrated, in a Neolithic context, at the Ness of Brodgar complex in Orkney, where key spaces were not only enhanced through incised and pecked decoration but using red and yellow sandstones which contrast with the flagstone more commonly used across the site. In this instance the nearest source of the introduced sandstones was c. 10 km away (Card and Thomas 2012: 120–121), presenting a logistical challenge on a much larger scale. It is possible the inclusion of Old Red Sandstone had a similar relevance to the builders of Moredun and Abernethy, and perhaps the act of transporting different materials from the site's environs also held significance to those who used and viewed the sites.

Finally, we should not lose sight of competition between the elites and communities that populated this landscape. The chronological relationship between

the timber-laced forts on Moredun and Castle Law, Abernethy, is not known, and nor is it with Castle Law, Forgandenny, where again Old Red Sandstone was extensively used (Poller forthcoming). It may have been a fairly short-lived architectural trend and in the display of power and prestige invested in these structures, the possibility that each was attempting to build bigger and higher examples than its neighbours is an alluring image of the Iron Age of lower Strathearn in action.

Who built the forts?

The technical and logistical challenges of construction varied with the scale and complexity of design, and required the planning and coordination of materials, labour and skills. Smaller forts with relatively simple earth and timber ramparts may have been designed and executed using only local knowledge and skills. In contrast complex structures, such as brochs containing intra-mural stairs and rooms, may have required specialist expertise (Armit 2003). This may also have been the case for the massive timber-laced walls as both the scale of coordination, and the skill-sets required, may have been beyond even agricultural communities experienced in the construction of simpler forts. While they may have had the individual skills, such as quarrying, basic masonry, and carpentry, the main challenge would have been in the sheer scale of co-ordination, and the knowledge of how to combine stone and timber in a more complex form, as each raft of timbers was laid, stone facing blocks placed, and the core packed with rubble. On this basis, it is probable their construction required ‘specialists’, possibly from outside the community, as guiding minds to coordinate the existing unskilled and skilled workforce (Harding 2012: 89).

While some construction may have required expert guidance, ongoing maintenance most likely reverted to the local workforce that was directed to build the fort, probably relying on skills acquired during the original construction. Irish medieval records describe a client relationship between a freeman and a lord, to whom he is indebted with services including the excavation of the rampart around the Lord’s dwelling (Kelly 1988: 446). It has been suggested that status and the maintenance of ditches in the Iron Age acted as a focus for regular gatherings in the fulfilment of similar communal and social obligations (Ralston 1996: 145; Sharples 1991: 263).

Access: entrances and the landscape

The nature and orientation of confirmed and possible entrances can be useful in considering how sites operated, and perhaps give insight into other concerns of the builders. The opposing west and east entrances at

Moncreiffe, suggest a community primarily concerned with access into lower Strathearn to the south and west and the River Tay to the north, rather than to the estuary to the east. Notably, both take the form of an oblique passage (Lock and Ralston 2022: 208, fig. 5.11), rather than a simple gap; at the western the outermost ramparts extending southwards to form a sort of hornwork. Both also take advantage of the cliff-edge to the south, a tactical device further restricting an approach.

In contrast, the possible entrances through Ramparts B and C on Moredun, though none has been confirmed by excavation, face north and south-east. Access elsewhere on either circuit would have been more difficult on account of the topography, though not impossible. Nevertheless, their orientation suggests more of a focus on the northern slopes of the hill, and to the River Tay in particular, though the south-east entrance clearly provides easy access into lower Strathearn on the south.

The analysis of entrance orientation is confounded by the lack of visible entrances through the timber-laced walls at Moredun and Castle Law, Abernethy, as found in many of the oblong series of forts in eastern Scotland (*supra*; Harding 2012: 86–7). They may have been accessed through their walls above ground level, or their entrances may simply be buried and await discovery. The geophysical survey suggests a possible gap in Wall E at the north-west of the timber-laced fort, only excavation can confirm if this was an entrance. At Castle Law, Abernethy, the outer wall indicates that the defences were designed to address concerns with the western approach. It is possible that out-work may have included an entrance by creating a funnel in the intra-mural space approached from the north. Access at the end of this funnel may have been over the wall or through a passage at a higher level, and the short transverse wall, and possibly a gate on the strength of the pivot stones found in the 1890s, were designed to further restrict access to the foot of the wall at the entrance. With a breached gate, the intra-mural space would have acted as an enclosed ‘killing zone’ in front of the entrance, similar to many of the in-turned entrances of hillforts in southern England and the Welsh Marches.

7.6 Interior space: the function of forts

It has been suggested that the increasing number of hillforts with Late Bronze Age origins resulted from increased social instability at that time, while their development over the Iron Age may have seen their roles change and evolve (Harding 2012: 288–9). Given their diversity of form, and the considerable time spans over which they were used, different forts clearly fulfilled different functions and social roles at different times, and that these may also have changed over time at individual sites (Harding 2012: 27).

Domestic structures

Prior to the project, survey had identified three possible roundhouses within Moredun (Figure 3.7), one at Moncreiffe, and none within Castle Law, Abernethy. While only one of these, to the north of Wall E within Moredun was confirmed as a roundhouse, occupation at all three forts is confirmed by the domestic assemblages recovered. These include coarse stone tools, ceramics and querns, all typical of Iron Age settlements, such as: Grantown Road, Forres, Moray (Cook, M.L. 2016); Kintore, Aberdeenshire (Cook, M.J. and Dunbar 2008); and St Germain's (Alexander and Watkins 1999) and Port Seton (Haselgrove and McCullagh 2000), both in East Lothian.

As a result of the scale of excavation, relatively little can be said about the small roundhouse on Moredun. No features were identified apart from its low stone wall and its full plan remains unknown. Its relationship to the circuits of defences is also unknown, and indeed it could plausibly represent a completely independent phase of occupation. It was of a scale that could be envisaged in numbers within the fort(s), but as it seems unlikely that other examples would have been removed wholesale, it is not clear why this one building has remained visible above ground. Stone-walled roundhouses are rarely found in forts in the Perthshire area, perhaps suggesting that timber and turf were preferred. It is possible that the other buildings within the fort were of timber and turf, and the unusual stone wall indicates status. Its special rank, beyond the domestic use suggested by the majority of finds, is also suggested in the deposition of the zoomorphic ring-headed pin, an object of significant status. Perhaps this signals a domestic structure that developed a ritual function which gave it longevity beyond other similar structures.

The most significant domestic structure discovered at Moredun was the monumental roundhouse. This may either pre-date all the fort ramparts, and represent pre-enclosure settlement, or may have been enclosed by Rampart B. The closest parallels for it are in highland Perthshire (Strachan 2013), and so is of particular interest as a lowland outlier. Its construction is doubtless an expression of status and display, with massive 5 m thick walls being out of proportion to an internal domestic area of c. 10 m in diameter. The use of Old Red Sandstone in its outer wall face, as found in the timber-laced walls, may indicate a long-standing significance to the use of this material in the projection of status. Similarly, the incorporation of cup-marked stones in the outer wall face, visible only at the time of construction, may have been significant in permeating ritual beliefs into everyday life. The incorporation of cup-marked stones in souterrains in southern and eastern Scotland has been suggested as representing

the importance of agricultural production, control and surplus (Hingley 1992: 29), and a similar meaning of 'goodwill' might be intended for the Moredun building.

The building's unusual entrance passage, wider than in similar structures and perhaps with an outer wooden gate or door, may suggest later modification. Evidence of a massive burning event lay above occupation deposits, including a stone hearth, and while few objects were recovered, they included a cache of bone points used in textile production. While destruction by fire is undoubted, its origin, whether intentional or accidental is not known. The paucity of artefacts might suggest deliberate destruction after abandonment, as an unexpected fire may have left more evidence of household furnishings and personal objects. Most of the artefacts recovered were not from the interior but from the passageway and external deposits.

The siting of a monumental roundhouse on Moredun, is exceptional and atypical of forts in the area. The examples found in the uplands of north-west Perthshire (Strachan 2013) occur in isolation. At Glenduckie Hill fort (ID 30060), near Newburgh in Fife, a large building of presumed later Iron Age date appears to have been built over the fort. This is also the sequence for the later Iron Age broch, at Hurlly Hawkin fort (ID 32052), Angus (Taylor 1982) which produced Roman finds and post-dated the fort. The Roman Iron Age broch at Castle Craig, Auchterarder, was constructed used and demolished within several phases of fortification spanning c. 400 BC to post AD 800 (Poller forthcoming; ID 26048).

While the radiocarbon dating is unable to confirm with certainty the sequence of construction, the Moredun example, dating to the 4th to 3rd centuries BC, it is slightly earlier than the Black Spout, Pitlochry, which dated to the 2nd to 1st centuries BC (Strachan 2013: 56), and so important as an early example of the site type in the region. If it represents unenclosed settlement, it is in keeping with the upland examples, but as a feature within the fort enclosed by Rampart B, it would be significant as a rare monumental building enclosed within a fort. Either way, the building has contributed to our understanding of the development of monumental buildings and lowland brochs and their relationship to the episodes of fort construction ranging from c. 400 BC to the early centuries AD. It would appear the brochs of the end of this time period were the end product of a much longer architectural tradition of substantial stone buildings of status.

Agriculture, rivers and estuary

The good agricultural land in lower Strathearn supported large communities in the Neolithic and Bronze Age, primarily reflected by ceremonial and

burial monuments. Finds from these periods recovered at each fort may indicate small-scale activity, or at least confirm that people were drawn to these hilltops earlier in prehistory, long before the forts were built. The pollen evidence suggests Moncreiffe Hill was wooded until c. 750 cal BC, when the woodland is thought to have been reduced through tree clearance and then by grazing pressures. On Moredun, bare ground herbs, suggestive of large expanses of disturbed soil, may indicate unenclosed settlement on the hill between the 7th to 5th centuries BC (Chapter 5.5). All three forts are below 300 m OD, often seen as the limit for permanent farms, and so could have been occupied year-round, rather than seasonally, although this cannot be confirmed from the results.

The environmental assemblages from both forts on Moncreiffe Hill indicate the processing of both livestock and cereal crops. At Moredun the rich assemblage of cereals included barleys, emmer, emmer/spelt and oats, and their diversity suggests they were grown elsewhere (Chapter 5.3). Further, the pollen evidence does not support arable cultivation on the hilltop (Chapter 5.5), and the fertile soils of the lowlands of the surrounding environs are their most likely source. While cultivation at c. 400 m OD is known at Carn Dubh, Pitlochry between c. 1250–1000 cal BC (Tipping 1995: 73) this was before the nadir of the climatic deterioration that coincides with the Hallstatt plateau in the radiocarbon calibration curve (van Geel *et al.* 1996), and crop growing at this altitude may not have been possible in the area by the 7th–5th centuries BC.

While the drying, threshing and winnowing of crops probably occurred near to production, the milling of grain within the forts is supported by the recovery of saddle and rotary querns. Processed grain was therefore transported to the forts for storage prior to use, as dried cereal grain will keep much longer than milled flour. Typically, the storage of grain in hillforts is associated with deep pits and four- and six-post structures. Indeed, one proposed function of hillforts in the south of England and the Welsh Marches is as centres for agricultural storage and redistribution (Harding 2012: 203–8). The type of storage pits found in southern England are not found in Scotland, but four-post structures are a feature of many unenclosed settlements, for example in the pre-defensive phase at Broxmouth (Armit and McKenzie 2013: 32–3), though their function as granaries has yet to be demonstrated. Four-posters were also found outside the defences of the Lower Greenyards fort at Bannockburn (Rideout 1996: 232; ID 47244), but leaving aside the problems of interpreting these structures, there is no clear association with the forts. At Moncreiffe and Moredun the examination of the interior was too small a scale to test the storage hypothesis, though in principle

either may have been used in this way. The fact that the main processing of the crops seems to have taken place elsewhere, could indicate that longer term storage was also facilitated at other, yet to be discovered, locations and that grain was only brought to the forts for short-term storage and consumption. Logistically, some of the forts in the area at lower altitudes, such as Over Durdie and Dow (Figures 1.2 and 2.1), being set closer to areas of crop production, were better located to serve as storage and redistribution centres.

Rather than a source of arable crops, the Moncreiffe Hill probably provided grazing for the fort communities, and potentially also for those living in the lowland environs. Due to the scale of excavation, the bone assemblages from Moncreiffe and Moredun were limited, but cattle, sheep/goat and pig were all attested. There was insufficient evidence to identify the seasonality shown in the extensive Broxmouth assemblage, where the kill patterns confirm that many young calves and lambs were culled prior to winter (Armit and McKenzie 2013: 441–443). The larger forts enclosed by both Ramparts B and C on Moredun could have housed reasonable numbers of livestock, and the palisades around the pond may have prevented animals fouling the domestic water supply. Further, Annexe D, less suited to domestic occupation, may also have housed large numbers of cattle. Parallels may exist in annexes to forts in southern Scotland and Northumberland, as at Castle O'er (ID 67376), Dumfries and Galloway, where a fort annexe was apparently added as part of a wider network of linear earthworks designed to control animals (Mercer 2018: 198).

At Castle Law, Abernethy, grain milling may be attested by the saddle quern. However, as on Moncreiffe, the topography of the hill is not suited to arable cultivation and cereals were probably grown on the raised marine terraces to the north of the fort, on which modern Abernethy is located (Figure 6.1). Even with a suitable entrance, the very small fort interior would have seriously limited, if not precluded, corralling of stock in any numbers. Nevertheless, the external pond, if contemporary with the fort, would have provided sufficient water for a substantial herd. More comprehensively excavated lowland sites, such as Grantown Road, Forres, Moray, include enclosures thought to have housed animals (Cook, M.L. 2016). The bone from the unusual taphonomic context of the Abernethy cistern reinforces the picture from Moncreiffe Hill; cattle and sheep/goat, and to a lesser degree pigs, were probably butchered and consumed at the fort.

In addition to the use of terrestrial resources in their hinterlands, all three forts must also have benefitted from their proximity to the two major rivers and the

estuary. These offered various ecotones accessible on foot for exploitation, and access to semi-marine and marine resources by boat. The rivers and estuary would also have provided transport links inland and out to sea, through which the fort communities could engage with others much further afield. These routes may explain how some of the artefacts found their way to the sites. Use of the estuary in this fashion has been demonstrated from the Late Bronze Age through logboats and possibly larger plank-sewn vessels (Strachan 2010: 176–179).

Industry

In addition to evidence of domestic occupation, the finds from all three sites confirm varied everyday industrial and craft activities, including metal-working, shale-working and textile production. While blacksmithing was probably ubiquitous on all settlements, the recovery of high-status La Tène metalwork from Castle Law, Abernethy, and Moredun indicates the existence of a well-connected elite. While there is no evidence either were manufactured on site, the recovery of a crucible with copper residue from, Castle Law does suggest specialist metal-working was present. Minor differences in metal-working assemblages can determine social hierarchies at settlements (Hunter 2009: 155–6), and the Moredun zoomorphic ring-headed pin, and the La Tène spiral ring from Castle Law are clearly indicators of wealth, albeit of a single person rather than the site itself.

Symbols of power or statements of community?

The idea of fort architecture as an expression of power or social cohesion has been outlined, and various social models have been suggested as the basis of why this occurred. These range from the command of an elite within a hierarchy to ‘flatter’ more egalitarian structures (Hill 2006), and the anarchic society explored to interpret forts in south-eastern Scotland (Armit 2019). Whatever the model adopted, the coordination of such large-scale constructions required the control of both material resources and labour, the latter powered by an agricultural economy able to provide sufficient surplus and animals necessary. As we have seen, the construction of the smaller forts, being more material and labour intensive, may have been as onerous as for the larger forts with simpler enclosing defences. The other variable, the time required for construction, may have ranged from a one or two years, driven by a large, orchestrated group, to a longer period, perhaps lasting several years carried out by smaller numbers. The overriding factor dictating both, was the extent of control: the social reach of the guiding minds who developed and executed the project. This may have included territorial geographical ownership, and services due, whether from a small group drawn locally or a larger group from a wider region.

A strong case for an elite displaying power over people and place can be made by the high-status artefacts from Castle Law, Abernethy, along with its small internal area and restricted access through its monumental timber-laced walls. By extension, this case can also be made for the fort enclosed by Wall E on Moredun. Similarly, the relatively small internal area of Moncreiffe fort, in proportion to its multiple lines of defence, can be also seen as ostentatious display beyond the requirement of its inhabitants.

The case for an elite controlling the larger forts on Moncreiffe Hill is less secure. On one hand it is tempting to suggest that larger enclosures accessed through multiple entrances signals a more egalitarian community. However, there is nothing inherent in their construction to indicate they were not commissioned by a ruling elite, and indeed that elite might be argued for the earlier phases at Moredun through the high-status zoomorphic ring-headed pin.

The main difference between the smaller and larger fort types is in their potential to house inhabitants: their inclusivity. The labour required to build Castle Law, Abernethy must have been drawn from a dispersed workforce living in its wider hinterland. In contrast, the workforce who built the larger forts on Moredun may well have also occupied them. Whatever the social model preferred, in addition to the display of power, or community identity, the act of construction may have been a major factor in the exercise, whether affirming the control of an elite or improving social cohesion of a more egalitarian community.

Ritual and ceremony

As with the ritual and ceremonial monuments of the Neolithic and Bronze age, the construction and occupation of forts must have included elements of ritual and ceremony (Armit 1997: 49–64), some of which may have been embodied physically within their structures. As a result, evidence of ritual activity can be found both within the fabric of the defences, and within deposits associated with occupation of their interiors.

The deliberate deposition of human remains within the Moredun monumental roundhouse, at some point in the 2nd century BC, is the firmest indication of this, though its context is not fully understood. Limited cremated remains of at least two individuals, recovered from the destruction deposit beneath the tumbled rubble, could conceivably represent casualties of the fire that destroyed the building, however, were more likely were deposited after the fire event, but prior to collapse of the building’s walls. The soil micromorphology suggests that the burnt deposits below the rubble were reworked biologically as a soil, a process that implies they were exposed for at least 40–200 years. This raises

intriguing possibilities regarding the individuals; had lived in the building? or were they descendants of those who had lived there? and rather than a foundation deposit, should it be considered a destruction deposit?

The recovery of human remains from Scottish Iron Age contexts is still relatively rare due to the acidic soils predominant over the greater part of the mainland, but they are found in small numbers within various settlement types in Atlantic Scotland and the Northern Isles (Cook, M.L. *et al.* 2018). Research suggests diverse and evolving treatment of these remains in these contexts, with a single interpretation improbable (Armit and Ginn 2007). A human skull with drill holes from Hillhead, Caithness, for example, suggests suspension for display (Tucker and Armit 2009: 214–16) possibly as a war trophy or an ancestral relic, but other possibilities include more general curation and disposal practices.

Similarly, while the incorporation of multiple cup-marked stones into the fabric of the monumental roundhouse, and potentially in Wall E, at Moredun, may have been accidental, they may have been intentionally included as ancestral objects. As such they may represent the permeation of beliefs into the structure and hence the everyday lives of those who used them, as suggested for the incorporation of cup-marked stones in souterrains. In these rather different structures, it has been suggested they represent the importance of agricultural production, surplus and control (Hingley 1993: 29).

A ritual dynamic might also be found at Castle Law, Abernethy as while we have argued that its monumental architecture projects the power of an occupying elite, its restricted access and limited space must have inhibited their domestic occupation (Harding 2012: 87). Restricted access may signify exclusion to other ends, potentially with parallels with the ritual aspects of sites such as the shaft at Mine Howe (Card and Downes 2003), and the well at Gurness broch, both in Orkney.

Unfortunately, we still know little of the chronology of construction or abandonment at Castle Law, or of the context of the small but spectacular assemblage of high-status artefacts recovered in the 1890s. Thus, it is difficult to place the site within the general patterns of fort construction, occupation, and abandonment, either regionally in eastern Scotland or further afield. The radiocarbon date from the bone extracted from the cistern spans the 3rd – 4th centuries BC, which concords with the date of the copper alloy brooch, but other items, such as the linchpin and the decorated shale bracelet may be rather later. These are all high-status items that would not be out of place in the assemblages from sites such as Traprain Law, East Lothian (Hunter 2013; ID 56374) and Dunagoil (ID 40291), Argyll and

Bute (Harding 2004b). The final centuries of the 1st millennium BC were a period of increased ritual deposition and the abandonment of forts (Hunter 2019: 324). Furthermore, it is clear from the insertion of burials post-abandonment into Iron Age monuments all over Scotland (see Tucker 2010 for Atlantic Scotland and Armit and McKenzie 2013: 187–8 for an example at Broxmouth, East Lothian) that the significance of place often transcends the traditional definitions of occupation and abandonment. We should be wary, therefore, of assuming that the remarkable assemblage from Castle Law were all deposited while the interior of the fort was occupied, particularly as many came from the cistern and are implicated in acts of deposition. Watery places were a favoured location for the deposition of high-status items, and the preferential deposition of long bones has been suggested as evidence of ritual feasting at Deskford, Moray (Hunter 2019). This might conceivably explain the bone assemblage recovered from cistern at Abernethy.

Unfortunately, both the lack of context for the Castle Law finds and more robust chronology, strictly limit our understanding of the character of occupation and use of the site. The same is true of the Moredun forts. Further excavation might solve issues around construction, occupation and abandonment, but unless further caches of items were discovered this would not resolve the circumstances in which the existing assemblage was deposited. The presence of a Neolithic stone axe and the Bronze Age timber at Castle Law may indicate items that were curated over centuries, but, as the Neolithic dates from Moncreiffe Hill show, may be no more than accidental inclusions. Likewise, while the impressive range of Iron Age material from Castle Law is probably the residue of occupation by an elite, it could conceivably represent some other significance of this place long before the fort was constructed, or after it was abandoned. These are all themes for future research on these sites and elsewhere.

7.7 Chronology and taphonomy

with Derek Hamilton

The history of the dating of hillforts in Britain and Ireland, has been conveniently summarised elsewhere (Harding 2012: 37–8; Lock and Ralston 2022: 312–313), along with a discussion of current approaches (Hamilton and Haselgrove 2019).

Taphonomy and terminus post quem

The radiocarbon dates must be considered in the context of the process of rampart or wall construction. This broadly involves the collection of material, whether stone, turf or earth, from a wide area along the line of enclosure, and in some cases from further afield.

As this may lead to some mixing of materials from unknown sources, the processing of charcoal samples needs to ‘ensure a secure taphonomic association between the death of a single entity and the context from which it was recovered’ (Hamilton *et al.* 2022: 368). This sounds much easier to achieve than often proves the case. Timber incorporated into a rampart/wall will not necessarily come from freshly felled trees and may have been salvaged from earlier structures. Earth and stone rampart cores by their very nature are composite deposits and will often have incorporated material from a wide range of contexts, potentially including charcoal, seeds of divergent dates and midden deposits containing bones. Broadly, samples from such material can only provide a *terminus post quem* for the construction of the rampart or wall (Ralston 2006: 151). The issue is the potential interval between the *terminus post quem* and the onset of construction. Hence the emphasis above on a single entity, for example short-lived roundwood charcoal or articulated bones, from a taphonomically secure context – where it can be shown that the briefest of intervals occurred between the life of the short-lived sample and the event to be dated.

Summary of the radiocarbon dates

At Moncreiffe, a total of eight radiocarbon samples were dated.

- Neolithic activity on the hilltop was identified by two radiocarbon dates of the late 4th millennium cal BC.
- Bayesian analysis of the other six radiocarbon dates, assuming a single phase, suggests Iron Age activity began in 595–405 cal BC (95% probability), or in 510–415 cal BC (68% probability) and ended in 400–135 cal BC (95% probability), or 390–305 cal BC (68% probability): an overall span of 20–440 years (95% probability), or 40–205 years (68% probability).

At Moredun:

- A total of 18 Iron Age radiocarbon dates were modelled as a simple bounded phase, and suggested activity began in 480–260 cal BC (95% probability), or 440–385 cal BC (68% probability) and ended in 325–15 cal BC (95% probability), or 165–90 cal BC (68% probability): an overall span of 85–400 years (95% probability) or 230–355 years (68% probability).

At Castle Law, Abernethy, two dates were recovered that demonstrated;

- Middle Bronze Age activity (1370–1120 cal BC; 95% probability) as evidenced by oak charcoal from the fort interior;

- Iron Age activity (370–170 cal BC; 95% probability) from the date on animal bone recovered during antiquarian excavation of the cistern.

There are two main phases of fort construction in Scotland, the Iron Age and the early medieval period, each no doubt driven by changing socio-economic climates. First and foremost, the radiocarbon dates and material culture suggest none of the three sites was occupied in the early medieval period and that they belong to the initial period of fort construction in the Iron Age. As is common with many prominent sites (Haselgrove 2009: 231), however, all three also appear to have been the focus for earlier activity.

It is not possible to confirm with certainty the precise sequence of construction between either the three forts themselves, or the multiple phases of construction on Moredun. This is a result of the character of the available charcoal samples and their contextual taphonomic associations. At Moncreiffe, the ramparts all have earthen cores retained by stone faces and of seven dated samples, two are Neolithic, signalling the mixed character of these deposits and warning that though the later dates are all Iron Age, their taphonomy must be considered equally suspect. Indeed, the latest of the other five rampart dates – 400–210 cal BC (95% probability; SUERC-61632) – comes from the core of the innermost, Rampart A, which occupies the prime topographical position for a defensive work enclosing the hilltop. If, as this position suggests, the four concentric ramparts are a single defensive scheme, then this date serves as a *terminus post quem* for the construction of the whole fort. This date also approximates to the single date from an occupation derived deposit in the interior – 410–230 cal BC (95% probability; SUERC-57073). Together, these two assays anchor the later end of the Bayesian model to 400–135 cal BC (95% probability) or 390–305 cal BC (68% probability), based on an assumption that the Iron Age dates represent a single period of activity. As the lapse of time between the formation of the sample and construction area is unknown, at best, these spans represent the earliest possible date for the construction of the defences of the fort, at worst they are no more than a *terminus post quem*. While the precise date of construction is uncertain, the start of the model at 595–405 cal BC (95% probability), or 510–415 cal BC (68% probability) presents us with evidence of an otherwise undocumented phase of Iron Age activity on this hilltop, which if the artefacts, including pottery, also incorporated into the rampart cores serve as a guide, also included occupation.

This earlier evidence of Iron Age occupation on the Moncreiffe hilltop is of some significance because it precedes any dated occupation on the higher summit of Moredun Top. In the case of the forts there, some of the

same taphonomical issues are in play and there are no taphonomically secure samples to date the construction of Ramparts B and C, Annexe D or the timber-laced Wall E. Furthermore, 13 of the 18 dates not only calibrate to a period where the probability distribution is bimodal, but the dates from both the monumental roundhouse and Rampart B are also both slightly earlier and slightly later than this period, indicating that the activity represented in both areas either lasted for two or three centuries or that one or both incorporate residual or intrusive material. Accordingly, the Bayesian model cannot be sub-divided below a single period of activity, which began in 480–260 cal BC (95% probability), or 440–385 cal BC (68% probability) and ended 325–15 cal BC (95% probability), or 165–90 cal BC (68% probability).

Taphonomically, the most secure radiocarbon dates from Moredun unquestionably come from the monumental roundhouse. The catastrophic fire preserved charcoal deposits from its hearth, plank flooring, roofing timbers and burnt thatch. While one of the dated flooring planks appears to be slightly earlier than the rest, the other seven dates are closely grouped, and the two from the hearth, alder and roundwood hazel respectively – 390–200 cal BC (95% probability; SUERC-76164) and 380–190 cal BC (95% probability; SUERC 76165) – are as close to a destruction date for the building as we could hope to get, although another date from burnt roofing material, alder roundwood, is slightly later again – 360–140 cal BC (probability 95%; SUERC-76162). Assuming that none the timbers and the firewood on the hearth were salvaged from some earlier structure, which is very probable, the construction of the monumental roundhouse can probably be placed after the earliest Iron Age occupation of the Moncreiffe hilltop, and possibly before the fort defences were first erected there.

The taphonomic problem with the samples from the monumental roundhouse come with cremated human remains that were also found beneath the collapsed rubble within the interior. A rib from these returned a date of 200–40 cal BC (95% probability; SUERC-77003), which is manifestly later than any of the other dates from the structure, and indeed is the latest of the 18 Moredun assays. This is one of the dates that falls at the later end of the calibration curve ‘wobble’, which suggested the possibility the samples included residual or intrusive material, and given the discrepancy with the other dates, almost certainly indicates that the cremated bone is a later deposit. While stratigraphically this material was in the destruction deposits beneath the rubble from the upper walls, the soil micromorphology showed that the internal destruction deposits were biologically active soils that may have lain open for a considerable period (anything from 40 to 200 years) before the rubble deposits were

deposited. It is therefore likely that the cremated remains were deliberately deposited in the ruins of the building, perhaps an offering associated prior to the demolition of its surviving upper works, possibly to provide materials for other structures.

The sequence of construction of the fort defences on Moredun Top largely rests on the topographic survey. The first enclosure appears to have been formed by Rampart B, which contoured round the hill and enclosed the monumental roundhouse some distance downslope from it. The three dates relating to Rampart B are all *terminus post quem* contexts, one from the old ground surface buried beneath the rampart and two from its core, one of the latter from a burnt timber. Two of the dates are 400–210 cal BC (95% probability; SUERC-65164 and -76172), representing the old ground surface and the burnt timber, but the third is slightly later at 360–110 cal BC (95% probability; SUERC-65165). There is no known stratigraphic relationship between the Rampart B and the monumental roundhouse, and while they could have co-existed, the rampart may equally be later. These dates are much the same as the latest of the *terminus post quem* dates from Moncreiffe Hill.

The only radiocarbon date relating to Rampart C is of 350–60 cal BC (95% probability; SUERC-65166) obtained from birch charcoal from the old ground surface beneath the rampart. Another *terminus post quem* context, this date broadly chimes with those from Rampart B, and indeed the monumental roundhouse. Its stratigraphic relationship with both the monumental roundhouse and Rampart B, as shown on the topographic survey (Figure 3.7) suggests it was later than both. Material from the monumental roundhouse were incorporated into Rampart C. Material accruing upslope behind Rampart C is likely the result of later levelling, erosions, quarrying, or even antiquarian excavation of the building. Whether there were periods of abandonment in this sequence is unknown. Like so many of these *terminus post quem* contexts, the rampart of Annexe D produced a date of 380–180 cal BC (95% probability; SUERC-65167), but it was stratigraphically later than both Ramparts B and C, having been built over the former and abutting the latter. Unfortunately, radiocarbon dating cannot elucidate an absolute chronology for the span of these events, and so they may have occurred in quick succession, or after periods of abandonment.

The final phase in the fort sequence on Moredun is thought to be the construction of the massive timber-laced Wall E. This is in part suggested from the probable stratigraphy in the topographical survey, and in part predicated on the assumed relationship between such forts and outlying defences elsewhere, including on the opposite side of the valley at Castle Law, Forgandenny.

Ironically, the old ground surface beneath Wall E produced one of the earliest dates from the whole site – 540–380 cal BC (95% probability; SUERC-65168) – while a date of 380–190 cal BC (95% probability; SUERC-76156) from hazel roundwood charcoal above an area of paving on the uppermost surviving deposits of the wall core was not associated with any *in situ* burning, and is likely to be residual material from earlier activity – providing another *terminus post quem* for construction. A slightly later date of 340–50 cal BC (95% probability; SUERC-76160) was returned for birch charcoal from the fill of a gully or construction cut immediately to the rear of the wall, but its precise relationship to the date of construction is also uncertain. As a result, it is unfortunately of little value in disentangling the relationships between the various structures.

One of the most striking aspects of the radiocarbon dates from Moredun is that they form such a compact group. The overall span of activity was 85–400 years (95% probability; Figure 3.88), or 230–355 years (68% probability). Involving a four- or five-fold sequence of fortification, this suggests a remarkable pace of change with simple calculations giving individual spans of 17–80 years at the 95% probability, and 46–71 at 68% probability. Such figures are easily accommodated within the much shorter durations that are beginning to emerge from detailed radiocarbon chronologies for settlements elsewhere (Hamilton and Haselgrove 2019). In this case a child who witnessed the construction of one of the ramparts may have lived to see the construction of the next. While it is not possible to confirm continuity of occupation, it is at least likely that this sequence of fortifications was built by consecutive generations.

The span of Iron Age activity at the site of Moncreiffe fort starts rather earlier at 595–405 cal BC (95% probability), but otherwise the defences there were certainly constructed within the span of activity on Moredun. While conceivably there were phases of abandonment when neither summit was occupied, it may be more correct to consider the forts as elements in a sequence of fortification on the hill in which the focus moved from one summit to the other, according to the evolving needs demanded by the community that occupied them.

A parallel may exist in the Brown and White Caterthuns, Angus; two forts set c. 1 km apart on the hilltops of a ridge overlooking Strathmore. While their defences are of very different character, their development may at least have overlapped to serve a range of functions as a single entity (Dunwell and Strachan 2007: 91). In the south of Britain, smaller forts were often abandoned, and either restructured or replaced by larger examples assuming more important roles in the community (Cunliffe 2002:

384–88). On Moncreiffe Hill, the sequence, and social change it reflects, may be even more complex; from a monumental roundhouse suitable for only a single-family group, to a series of larger sprawling enclosures probably containing whole communities, followed by control and display expressed through a smaller fort of massive construction from which the greater part of the community may well have been excluded.

Abernethy, Moredun Wall E and the dating the timber-laced, oblong forts

At Castle Law, Abernethy, the Victorian excavations were so thorough that very few suitable charcoal samples were recovered for dating. Rigorous review of their contexts resulted in only two dates being assayed. The first was Bronze Age, from a burnt timber within the interior, and the second, of 370–170 cal BC (95% probability; SUERC-82632) dated animal bone recovered in the 1890s from the cistern. This confirms that some, if not all, of the faunal remains it contained, as with the material culture, relates to Iron Age activity.

Unfortunately, no dating material was recovered from the fort walls, however as noted above, the site's morphology and timber-laced walls have parallels in the series of small oblong and oval, apparently entrance-less, forts found in north-east Scotland (Figure 7.1). Their chronology has long been considered (Feachem 1966; MacKie 1969; Alexander 2002) and both the late 1st millennium BC (Armit 1997: 108; Ralston 2006: 151) and the early medieval period (Halliday 1991; Ritchie 1995) have been suggested for their origin. A review considering dates of c. 500–200 BC for activity at Dunnideer (ID 18128), Aberdeenshire, concluded that the series date from the last four centuries BC, with a much tighter floruit of c. 300–150 BC (Cook, M.J. 2010: 86–7). Since then, Dun Deardail, near Fort William has been dated to between 480–305 BC and 330–230 cal BC (95% probability) (Cook, M.L. *et al.* forthcoming), and burning of the massive timber-laced rampart at Craig Phadrig (ID 13486), Inverness, has been dated to the 4th to 3rd centuries BC (Peteranna and Birch 2019).

All of the evidence from this project indicates that both Castle Law, Abernethy, and the Wall E fort on Moredun are Iron Age in date, and in both cases early medieval material is conspicuous by its absence. Further, no evidence of later reconstruction, as found at Craig Phadrig (Peteranna and Birch 2019), was recognised at either site and given the good preservation of their walls, it is likely any modification would have been recognised. In conclusion, while it was not possible to date their construction with certainty, it is suggested that both Castle Law, Abernethy and Moredun, should be considered part of this Iron Aged series (Figure 7.1). With the publication of the new work contained in

this volume, and over the next few years at Castle Law, Forgandenny (Poller forthcoming), Dun Deardail (Cook, M.L. *et al.* forthcoming) and Tap o' Noth (Gordon Noble *pers comm*) our interpretations of this group of forts look set to be considerably refined.

End of use

While we have clear evidence of the destruction of the Moredun monumental roundhouse, there is no evidence of how any of the forts went out of use. While transposition between Moncreiffe to Moredun Top is possible, our chronological framework is insufficiently robust to confirm any sequence, other than that the earliest dated Iron Age activity was on the site of Moncreiffe. Importantly, the lack of any Roman or early medieval material suggests that all the forts were decommissioned prior to the 1st century AD as confirmed by the radiocarbon dates. These suggest activity at Moncreiffe ended c. 400–135 cal BC (95% probability; Figure 2.26; *end: Moncreiffe Iron Age*), though as outlined this may also coincide with the date of the fortified phase there, and at Moredun c. 325–15 cal BC (95% probability; Figure 3.87; *end: Moredun Iron Age*), essentially the date at which the cremated human remains were deposited in the ruins of the monumental roundhouse. These dates broadly concur with the picture in East Lothian, where there appears to be a decline in fort use over the last two centuries BC, with defences falling into disrepair (e.g. Haselgrove and McCullagh 2000; Haselgrove 2009: 230).

Many timber-laced forts in Scotland were burnt at the end of their use, vitrifying their stonework (Lock and Ralston 2022: 429–438; Harding 2012: 188–90), but it does not seem to have been the case at either Moredun or Castle Law, Abernethy. The small amounts of vitrified material recovered from Moredun Wall E were either the result of other processes or may have been imported from the monumental roundhouse. The larger pieces of vitrified material from Castle Law, which cannot be connected to industrial processes, may support historic references to vitrification there, however no *in situ* evidence of wall burning was found at either site, and so any such event must have been very small-scale and localised to the upper walls, hence leaving no trace in the areas excavated. This is supported by the good condition of the walls at both sites. In many forts timber-lacing is only known through the presence of vitrified material in the core rubble, or in cases like Tap o' Noth, Finavon and Knock Farril, from the huge masses of exposed fused stone. As Moredun demonstrates, but for excavation, the character of the preserved wall, displaying the detail of its construction, would have remained unknown.

The absence of evidence for catastrophic burning at Moredun and Abernethy may betray something of

differing histories at these oval forts. If they were places of power as has been argued, the elites that occupied them appear to have survived events that elsewhere saw some of both their close, and more distant, neighbours dramatically eclipsed. A burning timber-laced fort must have been spectacular and visible far and wide over many days. The statement of destruction was the very antithesis of the declaration of power originally projected by its construction. The occupants of the forts on Moredun and Castle Law, Abernethy, may have been more successful in the exercise of their power.

The (lack of) early medieval activity?

Finally, it is significant that all three sites have been shown to be of the Iron Age, and that no diagnostically early medieval artefacts recovered. This is particularly important for Moredun which since the 1950s has been mooted as a possible 'nuclear' fort (Stevenson 1949; Feachem 1955: 79–80; 1963: 145; Alcock *et al.* 1989: 206–7; Alcock 2003: 189; Harding 2012: 170). Stevenson initially envisaged these high-status sites, consisting of a summit citadel surrounded by a hierarchy of descending courts enclosed by out-works, as being conceived and constructed in one phase (Stevenson 1949). Excavations at Dunadd (ID 39564), Argyll and Bute, however, revealed evidence of a sequence of enclosure from the 4th to 1st centuries BC, and no evidence of a citadel accompanying the early medieval occupation over the 6th to 9th centuries AD (Lane and Campbell 2000). At Dundurn (ID 24873), near Loch Earn, no Iron Age dates were recovered, and a first phase summit enclosure dating from the 7th to 9th centuries AD, followed a hypothetical palisade of late 6th to early 7th century date (Alcock *et al.* 1989). Similarly, at the recently excavated King's Seat (ID 27172), Dunkeld, while a series of three very different styles of enclosure suggested a possible sequence from the Iron Age, only early medieval dates were recovered (Strachan *et al.* forthcoming). More recently still, reassessment of archived material from the destroyed Clatchard Craig (ID 30074), on the Tay at Newburgh, Fife, has suggested a short sequence of construction in the early medieval period only (Noble *et al.* 2022). In summary, while some early medieval forts were rebuilt on the footprint of an Iron Age predecessor, others were clearly built *de novo*.

A signature of these early medieval high-status forts is a characteristic finds assemblage including evidence of both iron and precious metal-working, and imported goods indicating trading links across Europe, notably including E-ware ceramics, glass vessels and beads. Even the relatively minor interventions at Dunollie (Alcock and Alcock 1987; ID 23027), Dundurn (Alcock *et al.* 1989) and Dunbarton (Alcock and Alcock 1989; ID 43376), produced examples of these items, as has recent excavation at King's Seat, Dunkeld (Strachan *et*

al. forthcoming). Given the scale of excavation, their absence at Moredun is significant.

However the absence of early medieval activity at the forts on Moncreiffe Hill does not equate to the complete abandonment of the area. In the early-mid 1st millennium AD the pollen record on Grange Hill attests to the synchronous expansion of bare ground herbs, suggestive of large expanses of disturbed soil. These are the same genera (*Plantago* major and *Papaver rhoeas* type) that established between the 7th to 5th centuries BC, coinciding with the earliest evidence of Iron Age activity at the site of the Moredun fort, though not the construction of any defences. Their re-appearance certainly suggests activity around Moredun Top, but there is no archaeological evidence for any refurbishment of the defences or artefacts to suggest prolonged occupation or activity on the site.

It is understandable why the plan of Moredun suggested a 'nuclear' fort when the supposed class was identified by Stevenson in the late 1940s. At that time morphology was considered the solution to the absence of diagnostic finds from Iron Age forts. This thinking was complemented by the erroneous belief that the one or two phases usually detected was a true reflection of the complexity of the typical Iron Age fort. Excavation of Broxmouth (Armit and McKenzie 2013) dispelled this myth, but 'nuclear' forts continue to be regarded as the exemplars of early medieval power. While the morphology of Moredun may superficially resemble the classic 'nuclear' forts, its scale is actually very different. The total footprint of Moredun (2.2 ha) is significantly larger than Dundurn or King's Seat, Dunkeld (both 0.2 ha), or indeed Dunadd (0.44 ha). However, the possibility of a link to the documented battle of *Monad Croib* in AD 729 may also have proved too alluring. As a result, our excavations on Moredun are another cautionary tale regarding the attribution of date by simplistic morphology.

7.8 Lessons learned and research potential

The excavations have successfully addressed the research objectives, providing new evidence for the date, function, and activities at each fort. However, the limited scale of excavation, focussed primarily on enclosing works, has left many questions unanswered and inevitably raised new ones. Common to each site, therefore, there is the potential for future research to further investigate aspects of enclosure, while prioritising the fort interiors and their environs, both immediately outside the enclosures and in the wider landscape.

The confirmation of at least five successive phases of enclosure on Moredun Top has been an important first step in understanding the development of the

site. Important also, is the paucity of early medieval material. The larger-scale of excavation at Moredun, while still limited, has highlighted the importance of appropriately scaled interventions: smaller trenches over Wall E, for example, would almost certainly have missed much of the timber-lacing detail, and probably failed to reach bedrock. The timber-laced walls at Abernethy and Moredun would ideally have been excavated in plan and section to explore their structure in detail. Time and resources were simply not available to undertake this immense task but would be a worthy objective for future excavation. More comprehensive excavation may be able to identify phases or work, and perhaps the entrance suggested by the geophysics at Moredun. While the project recovered much new information about the spectacular character of these walls, this should not distract from the potential of the other ramparts at Moredun for further work. These have only been explored in narrow sections which may not wholly reflect the full history of their construction.

The Moncreiffe work confirmed the presence of a recently questioned fort, providing evidence of its construction and date of occupation and demise. It also suggested hilltop activity since the Neolithic, though we are far from understanding what this involved. Targeting the nature of pre-Iron Age activity should also be a priority; was there permanent occupation, or just sporadic visits? Was it a hunting base in early prehistory? Why was no Neolithic activity identified on neighbouring Moredun? The interiors of the Moredun forts also remain largely unknown, and in addition to identifying the nature of other internal buildings, further study should prioritise the nature of the pond, and the interior of Annexe D. At Castle Law, Abernethy, the re-assessment of the material assemblage from the early excavation has proved invaluable and highlights the value of returning to archives when available. Castle Law does appear to be a special place, combining such high-status metalwork in such a small site. If there is a candidate for comprehensive excavation at a fort of this type, Castle Law's diminutive scale would surely make it an achievable contender.

Future research also needs to explore the relationship of the forts to other sites in their environs, and particularly the lowland unenclosed and enclosed settlements. In terms of the other forts in the immediate area (Strachan 2012; Figure 2.1), the relationship between the Moncreiffe and Moredun with The Roundel and Castle Law, Forgandenny will become clearer in due course (Poller forthcoming), but the dating of Dow Hill should be a priority. Another candidate for excavation is Evelick, also known as Pole Hill, set dramatically on the edge of an escarpment overlooking the Carse of Gowrie (RCAHMS 1994: 53–5; ID 28108). While larger than Moncreiffe, it shares several features in common, including a dramatic cliff

location, a pear-shaped morphology, at least four lines of ramparts and two entrances. Another fort worthy of investigation is Deuchny Wood near Perth (ID 28217). An oval fort with a single rampart, it has produced a stone lamp, hammerstones, and a fragment of shale bracelet (Boog Watson 1923) and re-survey through the *Hillforts of the Tay* project (AOC 2016) and recent air photography (Figures 7.4 and 7.5) suggest it may have been more oblong in form with a collapsed rampart on the west side.

Combined, the *Hillforts of the Tay* and *Strathearn Environment and Royal Forteviot* (Poller forthcoming) projects will significantly improve our understanding of the nature of forts in the area (Figure 1.6). As outlined above, their function can only really be fully appreciated through enhanced knowledge of contemporary settlement patterns and other aspects of Iron Age life. Breakthroughs in understanding may come from short-term research programmes which go beyond single sites to examine larger territories, but others will evolve through locally based, piece-meal work over the longer term, as outlined in Chapter 1.1.

7.9 Management and presentation

These three investigations were delivered by Perth and Kinross Heritage Trust, with a wide range of partners

and associated expertise, to explore an important aspect of Perthshire archaeology. This approach, engaging a range of institutions, units, universities, museums, and local societies to get involved in research, has for long been encouraged (Haselgrove and McCullagh 2000: 189). Each site has its unique history of intervention and past and current land-use and all three sites are scheduled monuments. In addition to research, the *Hillforts of the Tay* project also aimed to address conservation, management, and presentation of forts to the public (Chapter 1.1).

Arguably, the most significant destructive impact at all the sites has been from past woodland. At Moncreiffe, the site had all but disappeared and was almost lost (Chapter 2.1), its rediscovery only fully confirmed by the recent excavations. At Moredun, a large area of trees was cleared from the east side of the hilltop to minimise their continued impact on the remains while improving the ‘readability’ of the remains and providing views across the estuary (Figure 7.6). Encroaching vegetation, such as gorse, broom, bracken, and natural tree regeneration, is an ongoing issue at Castle Law, Abernethy, and to a lesser degree at Moredun Top. A 10-year monitoring and management plan will mitigate these issues within reason until 2028. Moncreiffe and part of Moredun are in the ownership of the Woodland Trust Scotland, which has a management plan for



Figure 7.4: Deuchny Wood fort in 2015 following tree clearance (Crown Copyright: HES).

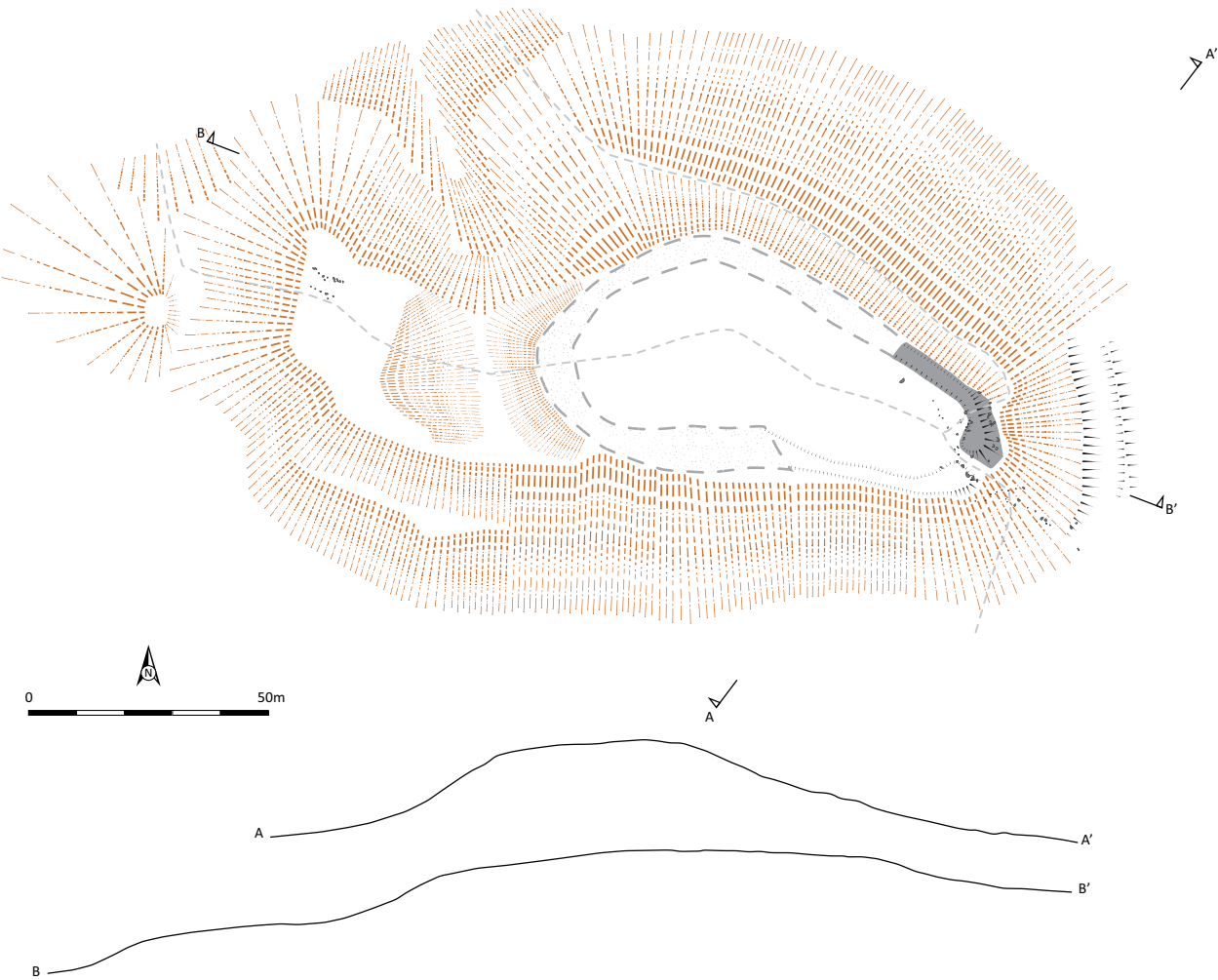


Figure 7.5: Deuchny Wood fort: a candidate for the oblong series?

the whole woodland in their care. They are now alert to the status and value of the forts. The remaining part of Moredun and Castle Law, Abernethy are in private ownership and in due course their ongoing management will be an issue for the owners and Historic Environment Scotland.

Human impact at the sites is in part a result of their reputation, going back to Pennant (Chapter 1.4) as beauty spots with spectacular views. This was no doubt the reason for the landscape aspirations of the estate with the introduction of paths at both Moncreiffe and Moredun. This interest may even explain the possible unrecorded antiquarian wall-chasing at Moredun, if they are not in fact more evidence of the widespread, small-scale quarrying, which also remains an undated enigma. At Abernethy, the most significant human impact was the late Victorian excavation. While this was hugely beneficial archaeologically, post-excavation care was non-existent, and the trenches were left open, possibly to display its construction. The recent work has confirmed the detrimental effect that this had, with the collapse of almost all the walls photographed in

the early report. A path to the hilltop from Abernethy village remains well-used, again to allow the public to take in the view. As a result, public recreational access now has little impact, but both Moredun and Abernethy have been subject to illegal metal detector activity since the excavations. It is not known whether it was an issue pre-excavation.

With good physical access, intellectual access was provided during the project through a suite of products ranging from a full education programme with local schools, site tours and open days, on-site interpretation (Figure 7.7), a booklet (Strachan 2020) and leaflets, an online Virtual Reality model and Minecraft models by young people. The results of the project are due to be shared, and finds displayed, at the new Perth Museum, to be opened in 2024.

7.10 Conclusions

Forts are relatively frequent in the hills surrounding the Tay estuary and its interface with lower Strathearn. This probably reflects combinations of



Figure 7.6: Tree removal carried out through the project, improving the 'readability' of the fort, views across the landscape from it, and visibility of the previously hidden southern entrance (Crown Copyright: HES).

socio-economic factors, such as population density and social development on the one hand, and the agricultural capacity to create a surplus to support their construction and use on the other. Our task has been to explore these themes and given the relatively modest scale of the *Hillforts of the Tay* project, it has been broadly successful in achieving the ScARF objectives presented in Chapter 1.8.

- An outline chronology has been established for activity at each fort, confirming Moredun as a sequence of Iron Age structures rather than an early medieval 'nuclear' fort. A first-stage model for its development has also been proposed.
- The project successfully employed geophysical survey to assess enclosure interiors. This added to our understanding of activities within each fort interior, notably including the identification of the monumental roundhouse within Moredun.
- The results have contributed to the debate as to why hilltops were chosen for habitation. This has considered both their terrestrial setting and their riverine and littoral context. This helps to inform our understanding of how the hills, rivers and estuary were perceived in antiquity.
- The various roles of 'hillforts', whether as tribal capitals, (seasonal) meeting places or elite

residences has been explored, and variation across time and space recognised. In due course, when combined with the results of the SERF project (Poller forthcoming), the results may refine the region's Iron Age diachronic social models.

- Diversity of enclosure forms has been explored, notably with respect to multi- and uni-vallation, and the oblong series of timber-laced forts, along with the social contexts of these enclosed places.

The move from Moncreiffe to the larger forts of Moredun B and C suggest a growing, prosperous community, expanding in population and territorial reach. While these larger forts were probably occupied by discrete, self-supporting social units, this cannot have been the case for the small timber-laced forts on Moredun and Castle Law, Abernethy, where the labour of construction would have been well beyond the small number of people that could have occupied their interiors. Their construction suggests socio-political change introducing an elite and increased social hierarchy, all reflected in the latest prestige architectural design. Such power centres must have interacted with other settlements in the area in ways commensurate with their status. Just as the forts of the



Figure 7.7: On site interpretation at Moncreiffe fort, accessed by the Woodland Trust Scotland path network.

early medieval elites were relatively small but strongly defended, so were the timber-laced forts like Moredun and Abernethy. Their potential as local caputs may indicate that the increased social hierarchy of the early medieval period was already well developed in the Iron Age.

Only a small fraction of the forts recorded in Scotland have been investigated (Lock and Ralston 2022: 43–47), but the three reported here, the volume in preparation on the SERF Project (Poller forthcoming), and recent

work at King’s Seat, Dunkeld and at Broxy Kennels, Perth will make a substantial contribution in this field. It is an apt tribute to the antiquaries who a little over a century ago pioneered research through their excavations on Castle Law, Forgandenny, and Castle Law, Abernethy. They would surely be delighted that their efforts have not been forgotten, and that Perth and Kinross in general, and the Tay and Strathearn in particular, are back where they belong as one of the best studied regions in Scotland.

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Appendices

Appendix A: Archaeological sites in the area

Details of possible and probable contemporary sites in the environs of Moncreiffe Hill (Figure 2.1) and Castle Law, Abernethy (Figure 6.1). Summarised and mediated data based on the Perth and Kinross Historic Environment Record and the National Record of the Historic Environment.

Figure 2.1: Moncreiffe Hill

MAP	MPK	Canmore	NGR	Name	Site type	Summary description
1	MPK3203	28058	NO 1312 1989	Moncreiffe	fort	See Chapter 2
2	MPK5232	28025	NO 1361 1995	Moredun	fort	See Chapter 3
3	MPK3448	28352	NO 1148 2009	The Roundel	fort	Cropmarks of an oval enclosure of c. 0.27 ha, on a spur at the foot of Hilton Hill, with at least five concentric ditches on the north side, and with an entrance to the north-west. Excavations (Lewis 2009 and Poller 2013) have confirmed multiple ditches in areas not producing cropmarks. See Figure 1.12.
4	MPK6454	70801	NO 1486 2147	Dow Hill	fort	Cropmarks of an oval fort of 0.85 ha with up to three concentric ditches. Breaks in the circuit may indicate entrances, and two ramparts and ditches are extant in the wooded flanks of the hill. See Figure 1.12.
5	MPK3171	28020	NO 1014 1695	Law of Dumbuils	fort	Earthworks of a uni-vallate oval fort of c. 0.65 ha: excavated by SERF (Poller 2010). See Figure 1.12.
6	MPK6776	78312	NO 1530 2127	Coates of Fingask	oval enclosure / unenclosed settlement	Cropmarks of an oval enclosure measuring c. 50 m by 30 m internally; and c. 40 m to the E of this, a penannular ring ditch of c. 5 m in diameter, with pits and a possible souterrain.
7	MPK14796	259873	NO 1236 1769	Kilgraston	circular enclosure	Cropmark of a possible circular enclosure c. 35 m in diameter. Two arcs of narrow ditch indicate the north and south of the enclosure. There is a possible entrance to the west.
8	MPK6604	73120	NO 1660 2080	Elcho	oval enclosure	Indistinct cropmarks of a possible single-ditched, oval enclosure. No estimate of scale available.
9	MPK6450	70797	NO 1071 1810	Dunbarney Quarry	oval enclosure	Indistinct cropmarks of a possible single-ditched, oval enclosure.
10	MPK5430	28205	NO 1687 2192	'Keiter's Loch', Kinfauns	crannog	Reference in the OS Name Book (1860) to a house, which had stood in a then drained loch, have been suggested as evidence of a possible crannog. The site has since been destroyed.
11	MPK6449	70796	NO 1102 1817	Dunbarney Quarry	unenclosed settlement	Cropmarks of at least two ring-ditches, one c. 17 m diameter, the other c. 7 m in diameter, in an area with numerous pits scattered over a distance of c. 350 m east to west.
12	MPK3467	28373	NO 1409 2151	Grange of Elcho	unenclosed settlement	Cropmarks of two souterrains: one c. 15 m in length, the other c. 25 m in length, with a possible side passage. A macula separating these is possibly an associated roundhouse.
13	MPK3346	28244	NO 1574 2121	Coates of Fingask	unenclosed settlement	Cropmarks of a probable roundhouse, c. 10 m in diameter, and souterrain around 25 m in length, to the north-west of this.
14	MPK14797	259874	NO 1217 1761	Kilgraston	unenclosed settlement	Cropmarks of a possible souterrain c. 20 m in length and a possible ring-ditch, c. 6 m in diameter.
15	MPK6452	70799	NO 1664 1996	Fingask	unenclosed settlement	Cropmarks of oval features, possibly roundhouses and a possible souterrain, 12 m in length.
16	MPK6563	73103	NO 1573 1909	Wallacetown	unenclosed settlement	Cropmarks of a possible souterrain, c. 25 m in length.

MAP	MPK	Canmore	NGR	Name	Site type	Summary description
17	MPK6605	MPK6605	NO 1571 2072	Coates of Fingask	unenclosed settlement	Cropmarks of a possible souterrain, c. 15 m in length
18	MPK6458	70801	NO 1473 2136	Dow Hill	unenclosed settlement	Cropmarks of a possible souterrain, c. 20 m in length, and other irregular features.
19	MPK3525	28436	NO 1247 2271	Barnhill	unenclosed settlement	A souterrain, discovered in 1904 during road construction, was photographed prior to demolition, and small finds were recovered.
20	MPK6451	70798	NO 1087 1776	Carmichael Cottages	unenclosed settlement	Cropmarks of a possible souterrain, c. 8 m in length, with other irregular features.
21	MPK3200	28055	NO 1185 1775	Ballendrick	rectilinear enclosure	Cropmarks of a roughly D-shaped, single-ditched enclosure, measuring c. 25 m from north-west to south-east by 20 m transversely.
22	MPK6375	68440	NO 1590 2104	Coates of Fingask	rectilinear enclosure	Cropmarks of a bi-vallate sub-square enclosure, c. 35 m in width.
23	MPK6608	73124	NO 1646 1746	Culfargie	rectilinear enclosure	Cropmarks of a possible uni-vallate rectilinear enclosure c. 40 m from north-north-west to south-south-east 20 m transversely.
24	MPK3160	28009	NO 1730 1950	Muirhead	rectilinear enclosure	Cropmarks of an uni-vallate rectilinear enclosure, c. 70 m from north-north-west to south-south-east by c. 50 m transversely.
25	MPK3163	28012	NO 1327 1934	Moncreiffe House	metal working site	Excavation of the stone circle in 1974 identified a final phase of use by metal-workers casting leaded bronze and smelting iron (Stewart <i>et al.</i> 1987).
26	MPK12072	179646	NO 1080 1980	Kirkton of Mailer	shale bead	A piece of shale bead used in a bracelet or necklace choker, of suggested Iron Age or early medieval date (Hallyburton <i>et al.</i> 2000).
27	MPK6991	79787	NO 1467 2215	Sleepless Inch	logboat	Records of a possible oak logboat recovered from '...the bed of the Tay, at Sleepless Island'. One end was missing but it measured 6.7 m in length. It does not appear to have been preserved (Mowat 1996).
28	MPK3471	28377	NO 1282 2160	River Tay, Perth	?logboat fitting	A faceted wooden peg, possibly a fragment of a logboat (Mowat 1996).
29	MPK20028	358757	NO 1100 2000	Kirkton of Mailer	Romano-British brooch	Romano-British trumpet brooch fragment (L 34.5 mm). Metal detecting find.
30	MPK3085	27933	NO 1740 1650	Carey	Roman Camp	Cropmarks of a 47 ha Roman temporary camp and enclosure of probable 1st century date (Jones 2011).
31	MPK17721	293724	NO 1077 2148	St Magdalenes	?Roman watch tower	Cropmark of a circular enclosure suggested as a possible watch tower by the Roman Gask Project: produced an indistinct geophysical anomaly.

Figure 6.1: Castle Law, Abernethy

MAP	MPK	Canmore	NGR	Name	Site type	Summary description
1	MPK3069	27917	NO 1829 1533	Castle Law, Abernethy	fort	See Chapter 6
2	MPK3222	28086	NO 1849 1233	Beins Law	fort	Documentary reference to a fort (Leighton 1840), mapped by the OS 6 inch map, Perthshire (1861). No trace and the site is now below an off-road driving course.
3	MPK3089	27938	NO 1697 1584	Aberargie	oval enclosure	Cropmarks of a roughly oval enclosure, c. 30 m from north-west to south-east by c. 24 m transversely containing a ring-ditch c. 4 m in diameter, possibly a roundhouse.
4	MPK3090	27939	NO 1693 1575	Aberargie	unenclosed settlement	Cropmarks of a probable roundhouse c. 13 m in diameter.
5	MPK7080	85846	NO 1678 1557	Aberargie	curvilinear enclosure	Cropmarks of a possible enclosure with a possible second concentric ditch.

MAP	MPK	Canmore	NGR	Name	Site type	Summary description
6	MPK3130	27979	NO 1501 1580	Newbigging	oval enclosure	Cropmarks of an oval enclosure c. 55 m in diameter.
7	MPK4636	30128	NO 2201 1791	Clunie Field	oval enclosure	Cropmark of an oval enclosure c. 36 m from north-west to south-east by 20 m transversely.
8	MPK3134	27983	NO 1785 1625	Dunmore / Carey	curvilinear enclosure	Cropmarks of a sub-circular enclosure, c. 80 m in diameter, immediately south of the south-east corner of the Roman marching-camp.
9	MPK3157	28006	NO 1609 1546	Glenfarg House	unenclosed settlement	Cropmarks of numerous sub-circular and oval features, possibly roundhouses.
10	MPK3158	28007	NO 1587 1525	Glenfarg House	unenclosed settlement	Cropmarks of numerous subcircular features, possibly roundhouses.
11	MPK3120	27969	NO 1757 1605	Broadwell	unenclosed settlement	Cropmarks of a possible roundhouse c. 13 m in diameter.
12	MPK3127	27976	NO 1634 1622	Netherton	unenclosed settlement	Cropmarks of a possible roundhouse c. 20 m in diameter.
13	MPK3135	27984	NO 1790 1590	Glenfoot	unenclosed settlement	Cropmark of a possible roundhouse c. 5 m in diameter.
14	MPK3122	27971	NO 1964 1816	Ferryfield of Carpow	unenclosed settlement	Cropmarks of a possible roundhouse.
15	MPK4627	30101	NO 2038 1785	Carpow	unenclosed settlement	Cropmarks of a probable roundhouse with a possible enclosure nearby.
16	MPK4629	30104	NO 2078 1784	Carpow	unenclosed settlement	Cropmarks of a penannular ring-ditch c. 5 m in diameter with an entrance on the south.
17	MPK14963	269136	NO 2090 1780	Carpow	unenclosed settlement	Cropmarks of a possible roundhouse in the south-east corner of the Roman fortress.
18	MPK20074	360589	NO 1460 1544	Balmanno	unenclosed settlement	Possible cropmark of a roundhouse.
19	MPK4630	30105	NO 2086 1797	Gillies Burn	unenclosed settlement	Cropmarks of a possible roundhouse, c. 8 m in diameter, and souterrain, both on the line of the eastern rampart of Carpow Roman fortress.
20	MPK4633	30124	NO 2186 1779	Clunie Field	unenclosed settlement	Cropmarks of at least two roundhouses, c. 12 m in diameter, c. 25 m apart, and a souterrain c. 18 m in length.
21	MPK4634	30125	NO 2176 1772	Easter Clunie	unenclosed settlement	Cropmarks comprising a row of at least two, and possibly four, maculae, possibly representing roundhouses, the easternmost with a souterrain.
22	MPK13481	185848	NO 1925 1655	Abernethy Primary School	unenclosed settlement	Multi-period features excavated in 2000 included a possible paved area, an Iron Age stack yard and a severely truncated souterrain.
23	MPK3136	27985	NO 1865 1584	Pitversie	rectilinear enclosure	Cropmarks of a sub-rectangular enclosure, c. 50 m east to west.
24	MPK6608	73124	NO 1646 1746	Culfargie	rectilinear enclosure	Cropmarks of a rectilinear enclosure, c. 40 m from north-north-west to south-south-east by 20 m transversely.
25	MPK3129	27978	NO 1700 1660	Carey	rectilinear enclosure	Cropmarks of a square enclosure c. 30 m across within the north-west of the Roman temporary camp: their relationship is not known.
26	MPK5536	27937	NO 1673 1580	Aberargie	rectilinear enclosure	Cropmarks of a rectilinear enclosure, c. 47 m from east to west by c. 30 m transversely, containing a line of pits and a possible roundhouse c. 7 m in diameter.

MAP	MPK	Canmore	NGR	Name	Site type	Summary description
27	MPK4624	30081	NO 2071 1789	Carpow	Roman legionary fortress	Cropmarks of the 11 ha Roman fortress associated with the Severan campaigns (c. AD 208–212).
28	MPK3085	27933	NO 1740 1650	Carey	Roman camp	Cropmarks of a Roman temporary camp and enclosure of probable 1st century date.
29	MPK6135	77396	NO 1885 1655	Station Road, Abernethy	quern	The upper stone of an Iron Age rotary 'beehive' quern, found in the garden of Gordon Cottage, Station Road, Abernethy.
30	MPK20017	358730	NO 2000 1800	Carpow	strap mount	An unusual Iron Age copper-alloy strap mount found west of Carpow fortress, in the 'massive' style of north-east Scotland. In a figure-of-eight form (the rings bearing trumpet decoration) with a central enamelled circular field with triskele design.

Appendix B: Moncreiffe small finds catalogue

The small finds (abbreviated here as 'SF') were assigned individual numbers in the field. Abbreviations used: Dpt - depth, D - diameter, g - grammes, H - height, L - length, mm - millimetre, max - maximum, min - minimum, T - Thickness, Wgt - weight and W - width.

The ceramics (Dawn McLaren)

(SF415) Body sherd; abraded. Very little of the original surfaces survive. Fabric is a fine sandy clay, with frequent, small mica/quartz flecks with organic (now burnt out) and inorganic inclusions consisting of angular rock fragments up to 17 mm in diameter; hard fired; incompletely oxidised. Undiagnostic. Fabric A; Vessel 2. L 30.3 mm, W 19 mm, T 8.5 mm. Wgt 3.6 g. Tr. 4, Context [416].

(SF1021) Three body sherds from an extremely coarsely-made thick-walled bucket or barrel-shaped vessel. Two sherds are small body sherds, only one surface of each survives. The third sherd is a large body sherd with coarse coil junctions visible on both the external and internal surfaces; very little attempt to mask or properly knit together. The fabric is a fine sandy-silt clay with frequent shiny mica/quartz flecks and approx. 25% angular rock inclusions (ave. D 10 mm) and occasional voids from burnt-out organics (rush stems/grass?). External surface smoothed when wet, with some accidental surface impressions (grass/hair). The clay was fired hard with a pale buff-grey exterior, mid-brown to dark-grey core and on the internal surface some finger swipes and organic impressions visible. Almost no curvature to the sherd, suggesting large vessel. Edges are, in the main, fresh but one long edge is softened from weathering. Spots of surface sooting on exterior. Fabric A; Vessel 1. L 84 mm, W 67.2 mm, T 16 mm. Wgt 125.4 g. Tr. 1A, Context [005].

(SF1022) Two joining body sherds of a handmade low-fired vessel. Only external face survives, internal face lost and core exposed. Fabric is a fine sandy-silt with approx. 30% angular rock inclusions (D c. 8.5 mm) and some voids that may be from burnt-out organic matter, hard fired with a pale buff-grey exterior and mid-brown core. External surface smoothed when wet, some fibrous impressions (hair?, grass?) made when surface of clay was wet but appear random and incidental rather than purposeful decoration. Fabric A; Vessel 1. L 41 mm, W 32.5 mm, remaining T 13 mm. Wgt 11.7 g. Tr. 1A, Context [005].

(SF1026) Thirty-one body sherds from a crudely-made, thick-walled, steep-sided, bucket or barrel-shaped vessel. Curvature of sherds is so slight as to suggest a large vessel with an internal D of approx. 260 mm, although the body appears to be so unevenly produced that it is difficult to estimate the diameter

with any certainty. The coil junctions are distinct; there appears to have been little attempt to mask or properly knit together the joins on both the exterior and interior surfaces. Distinct finger smears on internal surface. Sherds are inconsistently abraded: often abrasion restricted to a single edge whilst the other edges are fresh, but no joins were recognised, probably due to the friable condition of the pieces. The fabric is a fine sandy silt, frequent mica/quartz flecks which appear natural to the clay, c. 20 - 30 % angular rock inclusions (average D 10 mm) and impressions/voids from burnt-out organics. Unevenly fired hard, pale buff coloured exterior, red-buff external margin, dark brown-grey core, pale buff-grey interior. Patches of dark brown residue/sooting on exterior. Fabric A; Vessel 1. Largest sherd: L 103 mm, W 81 mm, T 16 - 18 mm. Wgt 675.8 g. Tr. 1A, Context [005].

(SF1030) Ten sherds and 5.6 g of small fragments under 10 mm in diameter; includes one fragment from the junction of steep-sided walls and flat base of a crudely-made thick-walled coil-constructed vessel. Finger smears in interior made during shaping. Exterior smoothed when wet with frequent hair and grass impressions on surface. Very little attempt to mask or effectively knit together the junctions between the coils both on the external and internal surfaces. The fabric is a fine sandy silt, frequent mica/quartz flecks which appear natural to the clay, c. 20 - 30 % angular rock inclusions (ave. D 10 mm) and impressions/voids from burnt-out organics. Fired hard, pale buff coloured exterior, red-buff external margin, dark brown-grey core, pale buff-grey interior. Patches of dark brown residue/sooting on exterior. So unevenly produced it is difficult to ascertain the original diameter. Six sherds, only one surface survives. Based on the curvature of the largest surviving sherd, the vessel had an internal D of at least 200 mm. Fabric A; Vessel 1. Largest sherd L 62 mm, W 65 mm, T 18mm. Wgt 151.4 g. Tr. 1A, Context [005].

The coarse stone (Dawn McLaren)

Quernstones

(SF201) Grinding stone. Sub-oval flat sandstone slab, one vertical but curving face and squared end survive; the opposite edge and end are damaged. The surviving faces are rough and pitted but one fairly flat face has patches of abrasion, particularly around the circumference of the curving edge suggestive of use as a grinding stone or quern. The wear is not consistent, nor is there trace of wear at the centre of the face as would be expected from typical use as quernstone, therefore the function is not transparent. Surviving L 206 mm, W 184 mm, T

38.4 mm. Tr. 2, Context [202].

- (SF221) Saddle quern fragment. Approximately 50% of saddle quern is represented by a rounded end fragment of a plano-convex ovoid ?granite/dolerite boulder, fire-cracked and heat-damaged, resulting in loss of half of stone. Grinding face is gently convex on both longitudinal and transverse planes, pitted towards the centre of the face and displays evidence of extensive wear in the form of smoothing and polishing from use, particularly around the circumference of the grinding face. Peckmarks around the surviving edges indicate rudimentary shaping of stone prior to use. Surviving L 208 mm, W 224 mm, T 67–82.5 mm. Tr. 2, Context[202]/[206].
- (SF411) Grinding stone/rubbing stone. Sub-rectangular water-rounded cobble, plano-convex in section, recently broken at the tip of an older, existing, fractured end. The flat face is gently convex in profile, smoothed and lightly abraded with shallow linear scratchmarks visible, particularly towards the ends. L 148.5 mm, W 88 mm, T 49 mm. Unstratified.

Cobble tools

- (SF220) Grinder. Water-worn ovoid cobble of a dense and heavy lithology (granodiorite with feldspar flecks). Surfaces are water-rounded but naturally pitted as the result of softer matrix of stone eroding, leaving harder quartz-rich and feldspar clasts protruding. One rounded end of the cobble is modified as the result of faceted abrasion, resulting in a well-developed oval area (36.5 x 43 mm) of wear; six distinct facets are detectable reflecting the idiosyncrasy of use of the tool. L 94 mm, W 55 mm, T 51 mm. Tr. 2, Context [206].
- (SF223) Grinder. Water-worn flattened ovoid quartzite-rich cobble with smooth, naturally rounded surfaces, slightly irregular in shape, curving asymmetrically towards one narrow blunt end which is chipped as the result of natural processes. The opposite wider rounded end has a very ephemeral band of abrasion (10 x 32 mm) limited to the tip of one corner, immediately adjacent to a smooth, naturally flat face. Discrete patches of polish and shine on this surface are the result of natural quartz-rich clasts and not indicative of use. L 81.5 mm, W 68 mm, T 35.5 mm. Tr. 2, Context [208].
- (SF402) Grinder. Angular plano-convex spall from the surface of a water-rounded cobble, broken as the result of heat-damage, probably through use as a pot boiler. One fractured edge is abraded (18 x 29 mm), consistent with wear from use as a grinder although poorly developed suggesting limited use. Surviving L 55.5 mm, W 56.5 mm, T 20.5 mm. Tr. 4, Context [401].
- (SF403) Lightly-used pounder. Naturally square, blunt end of cobble broken from a sub-rectangular,

water-rounded (?arkosic sandstone) stone, original dimensions unknown. Tip of one rounded corner is flattened by a discrete well-developed, pitted facet (20 x 27 mm) formed as the result of use as a pounder. Surviving L 61.5 mm, W 64.5 mm, T 53.5 mm. Tr. 4, Context [404].

- (SF504) Possible worked stone. Low plano-convex, sub-triangular greywacke cobble with naturally pitted water-rounded surfaces and edges. One flat face is distinctly smooth and even with a slight sheen, particularly towards the centre of the face, possibly the result of use as a smoother or similar but may be the result of natural asymmetric wear. L 114.5 mm, W 96.5 mm, T 34 mm. Tr. 5, Context [501].
- (SF1015) Abraded stone. Small ?greywacke cobble, oval but tapering at both ends forming naturally blunt rounded tips. The surface of the stone is rounded apart from one flat smooth face, slightly bevelled. The rounded faces of the stone are scratched and abraded with clear linear striations running parallel to longitudinal axis of cobble, wear concentrated towards each of the rounded ends. L 95.5 mm, W 42.5 mm, T 29.5 mm. Tr. 1A, Context [003].

Spindle whorl

- (SF2001) Sub-circular flat disc of fine siltstone/sandstone, irregular in plan with faceted abraded edges indicating an attempt to shape and smooth; one edge displays damage in the form of an angular chip. Off-centre, misaligned and very narrow bored bi-conical perforation (min. D 4.5 mm; max. D 10.5 mm). One face has broken across a natural horizontal bedding plane of the rock and may have resulted in abandonment of the roughout. L 42.5 mm, W 43 mm, T 10.5 mm. Tr. 2A, Unstratified.

Whetstone

- (SF2003) Angular fragment from a bar-shaped whetstone, only one original edge and surface survives, all other surfaces are fractured and a small cuboidal fragment is all that remains of the tool. One surviving edge is abraded, gently dished and stained from use. Surviving L 38.5 mm, T 41.5 mm, T 30.5 mm. Tr. 2A, Context [002].

Maul or hammerstones

- (SF409) Heavy duty stone maul. Sub-square fragment with wide, rounded ends and edges, rounded corners, wedge-shaped in profile, detached from a water-rounded quartzite-rich cobble. The stone has been modified by the production of a pecked shallow crescentic notch (W 41 mm) on both opposing edges just below mid-height to facilitate an organic binding or hafting, both damaged during subsequent fracturing of the stone whilst in use.

The peckmarks of both notches are softened as the result of being rubbed by the pliable material of the binding which has also caused a band of light polish and abrasion across the extensive face between the notches. One wide blunt end of the stone is regularly and severely fractured from use with vigorous physical force which has resulted in the stone splitting obliquely through the height and width of the stone causing one half of the stone to detach, now lost. The opposite wide rounded end of the stone is naturally smooth with shallow diffuse peckmarks, also from use. Consistent with Pickin (1990) Type 3a. Surviving L 173 mm, W 176 mm, T 94 mm. Tr. 4, Context [404].

(SF2009) Large oval angular spall, convex in section, wedge-shaped in longitudinal profile, with angular broken edges, which has detached from the face of a water-rounded large cobble or boulder. The surfaces are scored and scratched. Possibly a sherd detached from the face of a heavy-duty maul/hammerstone. Surviving L 176 mm, W 153 mm, T 42 mm. Tr. 2, Context [014].

(SF2010) Convex water-worn face of a large ovoid ?greywacke cobble split obliquely across length of stone resulting in the production of an oval, wedge-profiled spall. The rounded surface of the spall is covered in longitudinal scratches and gouges suggestive of damage during heavy use, concentrated towards the thin, rounded, fractured edge of the fragment. The direction of breakage is contrary to the grain of the stone suggestive of breakage due to percussive impact, possibly during use as a heavy duty hammerstone or maul. Surviving L 227 mm, W 132 mm, T 56.5 mm. Tr. 2, Context [014].

(SF2012) Large flat sub-circular plate of coarse-grained pink-buff stone, detached from a sub-rounded boulder, fractured longitudinally from one direction through the width of the stone resulting in the loss of both faces of the stone and much of the end from which the impact was delivered. Collected in the field due to the unusual form and way the stone has fractured but there are no unambiguous signs of use. Possible sherd from a heavy-duty maul or hammerstone. Surviving L 176 mm, W 164 mm, T 7.5–30.5 mm. Unstratified.

Hollowed stone

(SF412) Lamp or mortar. Approximately 50 percent of a neatly-shaped hollowed stone, broken longitudinally across the hollow, resulting in the loss of one half of the stone and causing damage to one rounded end. Quite roughly produced from a fine red-sandstone cobble, edges are uneven but generally D-shaped. The upper surface is pitted but flattened around the circumference of the shallow

wide conical hollow that has been pecked into the centre of the face; a patch of dark staining (?sooting) is present on one edge. The hollow is 42 mm in maximum diameter and is 24 mm deep; interior is pitted from manufacture. A smaller, shallower and more roughly produced hollow (D 30.5 mm; 8.5 mm deep) is present at the centre of the opposite face. Surviving L 95 mm, T 46.5 mm. Tr. 4, Context [413].

Other

(SF303) Possible gaming piece/trinket. Small water-rounded spherical pebble, surfaces even and naturally smooth. Found beside shale bangle fragment SF302. Examined under magnification; displays no evidence of modification or wear to the surfaces. D 15.6–16.5 mm. Tr. 3, Context [304].

The worked shale and related materials (Fraser Hunter)

(SF1) Bead fragment; terminal of what may be a globular bead with flattened ends. Parts of surface lost from flaking. Perforation flares at surviving end from 6 to 8 mm. D 16, remaining H 7 mm; Wgt 0.71g. Cross-checking in material indicates this is jet. Tr. 1A, Context [001].

(SF302) Bangle in final stages of abrasion when it laminated and snapped. Near-rectangular section, internally flat, externally rounded. Interior has vertical abrasion scars; abrasion on other surfaces is less directional. Internal D c. 90–95 mm (7%). L 28 mm, remaining W 14.5 mm, remaining T 6 mm; Wgt 1.85 g. Some bedding planes visible – uncertain whether it is cannel coal, canneloid shale or shale. Tr. 3, Context [304].

The chipped stone (Rob Engl)

Secondary worked pieces

(SF224) Retouched blade made on grey flint, proximal and distal breaks with fine denticulated retouch along the length, surfaces burnt. L 30 mm, W 17.5 mm, T 7 mm. Tr. 2, Unstratified.

(SF1017) Leaf-shaped arrowhead made of red Buchan flint, 50 % invasive retouch, regularly thinned, impacted point. Fresh condition. Conforms to Green's (1980) Type 4a–g. L 25 mm, W 15.3 mm, T 3.8 mm. Tr. 1A, Context [002].

(SF1018) Core-rejuvenation flake made on honey coloured flint, simple platform with pronounced bulk and truncated distal end. Fresh condition. L 17.6 mm, W 30 mm, T 8.7 mm. Tr. 1A, Context [002].

(SF1023) Tertiary quartz flake made on translucent grey quartz of good quality. L 16.4 mm, W 11 mm, T 4 mm. Tr. 1A, Context [002].

(SF1024) Tertiary quartz flake made on translucent grey quartz of good quality. L 14 mm, W 11.6 mm, T 8 mm. Tr. 1A, Context [002].

Chips, flakes and shatter

A full detailed catalogue is presented in the site archive.

The vitrified material (Dawn McLaren)

(SF210) Vitrified ceramic. Angular fragment of possible vitrified ceramic, heavily heat-affected on one face

but displays gradient in colour and texture from red-brown, friable, heat-affected clay to a vesicular, glassy, dark grey vitrified material. Not magnetic. L 40.5 mm, W 37.5 mm, T 22 mm. Wgt 12 g. Tr. 2, Context [201].

(SF2014) Low-density vitrified material. Fractured amorphous fragment of dark-brown/grey low-density, glassy, vesicular slag. Patches of red-brown and pale yellow-grey fuel ash slag adhere. Not magnetic. L 57.5 mm, W 41 mm, T 25.5 mm. Wgt 25.4 g. Tr. 2A, Unstratified.

Appendix C: Moredun small finds catalogue

The small finds (abbreviated here as 'SF') were assigned individual numbers in the field. In years 2 and 3 they were prefixed with the letter code of the trench they were recovered from (e.g., SFC001 = Small Find number 001 from Trench C etc.). A number of unstratified finds were made by volunteers during the excavations that cannot be located to specific trenches or areas. These are referred to here as general finds (abbreviated to 'GF'). Abbreviations used: Ave – average, Dpt – depth, D – diameter, g – grammes, mm – millimetre, RT – retents, T – Thickness, Wgt – weight and W – width.

The ceramics (Dawn McLaren)

The ceramics have been classified and described below by vessel (abbreviated to 'V'). A full detailed catalogue is presented in the archive.

- V1 Seven body sherds, two small and fragmentary, most missing the interior surfaces but where they survive, patches of residue are present. The fabric (fabric 1) is a fine sandy clay with frequent small quartz/mica flecks, occasional >5 % rock inclusions (largest grit D 5 mm) and is incompletely oxidised. External surfaces have been hand-smoothed when wet with patches of light sooting. Largest fragment L 44.5 mm, W 33 mm, T 11-16 mm. Wgt 38.2 g ((SFA045), Wgt 32.5 g; (SFA047), Wgt 5.7 g)). Context [A011].
- V2 Two body sherds with no diagnostic features. The fabric (fabric 1) is a fine sandy clay with frequent small quartz/mica flecks with < 5 % angular grits, the largest of which is L 8 mm. Patches of dark brown residue on interior. Distinct finger impression on internal surface of largest sherd. Largest fragment L 66 mm, W 37 mm, T 12.5 mm. Wgt 35.8 g. (SFA067). Context [A018].
- V3 Seven small body sherds and a spall from a handmade coil-constructed vessel displaying various levels of abrasion from light to moderate. The fabric (fabric 1) is a fine sandy clay with frequent small quartz/mica flecks, occasional grits protrude through the surfaces. The fabric has fired hard but is incompletely oxidised with an orange-brown exterior, purple-brown margins and dark-brown core and interior. Largest sherd L 45.5 mm, W 25.5 mm, T 12-13.5 mm. Wgt 32.6 g ((SFA070), Wgt 22.49 g; (SFA094), Wgt 3.4 g; (RT) Wgt 3.8 g)). Context [A030].
- V4 Small spall from one face of a handmade, low-fired ceramic vessel. Fabric (fabric 2) is a fine sandy clay, fired hard, with frequent flecks of quartz and possibly mica which gives the fabric a sparkle with less than 5 % rock inclusions including angular white/black igneous grits (D c. 2 mm). Occasional organic impressions on surfaces. L 26 mm, W 12.5 mm, T 10 mm. Wgt 4.2 g. (SFA115). Context [A104].
- V5 Three abraded body sherds from a large steep-sided vessel broken across S-shaped coil junctions. External surface hand-smoothed when wet. Fabric (fabric 2) is a fine sandy clay with frequent small quartz/mica flecks, fired hard, red-brown exterior, dark red-brown external margin, dark brown-grey core and internal margin, red-brown interior. Occasional organic impressions on surfaces. Ext. D at least 160 mm. Largest sherd L 46.5 mm, W 36.5 mm, T 15 mm. Wgt 32.52 g. (SFA122). Context [A113].
- V6 One body sherd from a large steep-sided vessel, broken across coil junction. Finger impression on internal surface, external surface hand-smoothed when wet. The fabric (fabric 1) is a fine sandy clay with frequent natural flecks of quartz/mica with occasional (< 5 %) angular grits and has been fired hard with a buff-brown exterior, grey-brown core and buff interior. L 44 mm, W 33.5 mm, T 14.5 mm. Wgt 18.4 g. (SFA129). Context [A103].
- V7 Body sherd of large steep-sided vessel produced from a coarse sandy-loam fabric (fabric 3) with moderate angular rock (ave. D 12 mm) inclusions and occasional burnt-out voids from organic (grass/rush) inclusions. Both surfaces have distinct organic impressions. Exterior has patches of sooting whilst the interior has patches of dark residue adhering. L 43.5 mm, W 31.5 mm, T 14 mm. Wgt 33.7 g. (SFA095). Context [A030/A034].
- V8 Three body sherds, not re-joining, from a thick-walled, steep-sided large vessel, fairly crudely produced with plain surfaces; lightly abraded. Diagonal coil junctions noted on sherd from (SFB002) and little effort has been made to obscure or effectively knit the coil junctions. Finger smears and organic impression on external surface. Internal surface is sooted in patches. Fabric (fabric 5) is a fine sandy clay with frequent quartz/mica flecks, occasional c. 10 % angular grits (ave. D 9 mm) and organic inclusions, fired hard. Buff-orange exterior and interior, grey brown core and margins. Min. ext. D 220 mm. Largest sherd: L 98 mm, W 85 mm, T 20 mm. Wgt 176.4 g ((SFB002), Wgt 142.8 g; (SFB003), 2Wgt 0.8 g; (SFB012), Wgt 12.8 g)). Contexts [B001], [B002] and [B004].
- V9 Five body sherds, undecorated and broken across poorly joined coil junctions. Two sherds are missing the internal surfaces (SFB013); the rest of the sherds are lightly abraded. The fabric (fabric 4) is a fine sandy clay with frequent c. 35 % large angular grits (?dolerite; c. 12 mm) fired hard with pale buff-brown exterior, buff-grey interior and mid-grey-brown core. Surfaces hand-smoothed when wet but grits protrude. Largest sherd: L 68 mm, W 56 mm, T 13.5-15.5 mm. Wgt 103.2 g ((SFB010), Wgt 18.7 g; (SFB012), Wgt 20.2 g; (SFB013), Wgt 8 g; (SFB016), Wgt 56.3 g)). Contexts [B005] and [B007].

- V10 Four heavily abraded body sherds, the external surface lost from one displaying its buff-coloured interior and grey core. The sherds display clear coil junctions and spalls have detached from the external surface where grits protrude. The fabric (fabric 2) is a fine sandy clay with frequent quartz/mica flecks, occasional angular grits (ave D 9 mm) and organics, fired hard. The largest surviving sherd of V10: L 48.5 mm, W 55 mm, T 17 mm. The next largest surviving sherd: L 31 mm, W 18 mm, T 15 mm. Wgt 62.2 g ((SFB003), Wgt 6.8 g; (SFB006), Wgt 4.1 g; (SFB011), Wgt 51.3 g)). Contexts [B001] and [B002].
- V11 Twelve body sherds from a crudely made, large, steep-sided, thick-walled vessel. The external surface has been hand-smoothed when wet; some finger smears are recognisable on the surface. Grits protrude on both exterior and interior. Encrusted dark-brown residue is present on the inner surfaces. The fabric (fabric 4) is a fine sandy clay with frequent quartz/mica flecks and > 25 % angular rock inclusions (ave. D 10 mm) which has fired hard with a yellow-orange-buff exterior, red-brown interior and dark brown core and margins. Largest sherd is L 43 mm, W 42.5 mm, T 14.5 mm. Largest fragment L 48 mm, W 34.5 mm, T 15 mm. Wgt 97.9 g ((SFB003), Wgt 40.9 g; (SFB007), Wgt 6.8 g; (SFB011), Wgt 47.4 g; (RT) Wgt 2.8 g)). Contexts [B001] and [B002].
- V12 Five sherds, four of which rejoin into two pieces, from a very thick-walled, crudely made decorated bucket-shaped vessel. Very crude coil junctions with no attempt made to mask or strongly knit. The exterior has been hand-smoothed when wet but occasional large grits protrude; the interior has frequent large protruding grits, the largest being 21 x 7 mm in size. The exterior has been decorated by horizontal, or near horizontal, parallel bands formed by deeply-impressed linear rush or grass stems (W 2–5 mm). The fabric (fabric 4) is a fine sandy clay with frequent small quartz and mica flecks and frequent > 30 % large angular rock inclusions which has fired hard but is incompletely oxidised. At least 200 mm internally D; 220 mm externally. D. Largest re-joined sherd L 99 mm, W 82 mm, T 20.5 mm. Wgt 269.2 g. (SFB007). Context [B001/B002].
- V13 Single spall from the external face of a handmade, low-fired ceramic vessel; internal face lost. Brown oxidised surfaces. Fabric of fine sandy clay with frequent small quartz/mica flecks. L 29 mm, W 17.5 mm, T 8.5 mm. Wgt 4.3 g. (SFC016). Context [C014–17].
- V14 Two small body sherds consisting of a fine sandy clay fabric (fabric 4) with small flecks of quartz/mica and approximately 20 % angular grits, fired hard with an orange-buff exterior, dark brown interior and core, displaying poorly knitted coil junctions. Finger impressions on interior. Largest sherd: L 38 mm, W 30 mm, T 16 mm. Wgt 20.9 g ((SFB004), Wgt 15.7 g; (SFB009), Wgt 5.2 g)). Contexts [B001] and [B004].
- V15 Large plain body sherd and sherd from the basal angle of a large thick-walled, steep-sided vessel. Surfaces have been hand-smoothed when wet with clear finger smears on the surface. Coil junctions are poorly joined with little attempt to mask or strongly knit, and patches of residue are present. The fabric (fabric 5) is a fine sandy clay with frequent small quartz/mica flecks, occasional small angular rock inclusions (ave. D 8 mm) and occasional burnt-out organic voids. The curvature of the sherd is too uneven to allow an accurate estimation of diameter but vessel must have been at least 250 mm external diameter. Largest sherd: L 96.5 mm, W 67 mm, T 16.5 mm. Wgt 166.1 g ((SFC040), Wgt 119.6 g; (SFC041), Wgt 46.5 g)). Context [C004].
- V16 Extremely thick body sherd from a crudely produced thick-walled, steep-sided, large handmade pot. Coil junctions are incredibly crude with little attempt to mask or securely knit. External surface is buff-grey in colour, core is pale grey and internal face is dark brown, coated in patches of dark-brown encrusted residue. Fabric (fabric 6) is a fine sandy clay, frequent natural mica/quartz flecks which give the clay a sparkle, as well as occasional large angular grits (ave. D c. 11 mm) and occasional burnt-out organics visible on both the external and internal surfaces. L 83 mm, W 51 mm, T 24 mm. Wgt 5.5 g. (SFC148). Unstratified.

Ceramic objects (Dawn McLaren)

- (SFC005) Small clay ball. Fine, slightly sandy-silty clay with frequent natural small mica/quartz flecks. Sphere has been hand-shaped with smooth surfaces, occasional small organic impressions and short linear impressions (?fingernail marks made during shaping) and has been lightly fired to a pale buff-brown colour. Sooting is present in a single area only. D 21.5 x 23 mm. Wgt 9.9 g. Context [C004].
- (SFC007) Small clay ball. Fine, slightly sandy-silty clay with occasional natural small mica/quartz flecks. Hand-shaped into a slightly flattened sphere with even smooth surfaces, couple of short linear impressions, possibly nail impressions made during production. The sphere has been evenly fired to a mid-brown colour throughout. D 23 x 27 mm. Wgt 12 g. Context [C011].

Iron (Dawn McLaren)

Due to the extent of corrosion on the surfaces of the iron objects from the site, measurements have been taken, where possible, from X-rays and record the dimensions of the surviving metal core.

- (SFA113a) Fine chisel tip. Fine square sectioned iron bar, broken at one end; the opposite end has been flattened at the end on two opposing faces, creating short, squared tip. Remaining L 43.7 mm; shank: D 3.5 mm; tool tip: W 5 mm, T 1.7 mm. Wgt 1.8 g. Context [A113].
- (SFA113b) Four short lengths of a fine iron strip twisted evenly along its length. Two fragments comfortably re-fit; the other two are undoubtedly part of the same object but do not cleanly join.. X-radiography demonstrates the presence of an even but widely spaced series of small circular (drilled) holes, each D c. 1.5 mm, along the length of the strip, each of which is empty with no trace of any original attachment. Only one of the fragments convincingly tapers to a narrow rounded point at one end, probably the original terminal of one end of the strip, but all other fragments are broken at both ends implying that the full length is not represented by these four fragments. A further piece was recovered as SFA118. The function of this strip is unknown. Remaining (minimal) L 164.5 mm, W 6.8–7.4 mm, T 2–2.5 mm. Wgt 9 g. Context [A113].
- (SFA118) Short length of a narrow, flat, rectangular strip, broken cleanly across the width at both ends (now slightly rounded though conservation cleaning). The strip curves upwards at both broken ends and a small circular (drilled) hole is visible towards both ends. A third perforation (D c. 1.4 mm) is visible by X-radiography at the point where the strip bends. Probably a further fragment of (SFA113) but no longer joins. Remaining L 24.8 mm, W 4.9 mm, T 1.7 mm. Wgt 0.7 g. Context [A114].
- (SFA126) Small nail or tack, substantially complete but head severely damaged, with only a small portion of one edge remaining. The straight shank is oval in section and tapers strongly to a narrow tip. L 29.4 mm; shank: W 4 mm, T 3 mm. Wgt 0.9 g. Context [A113].
- (SFA132) Fragmentary object, unidentified. Flat iron strip, tapering in width in both directions and folded in half rather unevenly so that the two 'arms' lie at diametrically opposed directions. Both arms are broken at different heights and tips lost; only the folded middle portion of the object survives. The original form and original dimensions are unknown. Remaining L 27 mm, W 27.2 mm, T 4–7 mm. Wgt 6.8 g. Context [A113].
- (SFA148) Unidentified spall. Small triangular spall or corrosion blister, detached from the surface of an iron object. Remaining L 11.5 mm, W 8.5 mm, T 6.5 mm. Wgt 0.7 g. Context [A119].
- (SFA153) Robust sub-rectangular flat plate, only one original long edge survives; the other three edges are broken and ragged preventing certain identification. The surviving long edge is straight but swells mid-length to accommodate a sub-

square hole with rounded corners (D 11.5 mm). Despite conservation treatment to stabilise, the iron remains very friable with crumbs detaching from the extensive faces during handling. One face in particular is much deteriorated and the original surface has laminated, causing distortion to the profile of the fragment. The opposite face has two expansive corrosion blisters (one, c. 12 mm from edge of perforation, 29.6 x 35 mm; the other is present on the opposing corner of the fragment, 23 x 33.3 mm). Remaining H 58.5 mm, W 87.4 mm, T 5.5–7 mm. Wgt 153 g. Context [A117].

- (SFC111) Ring fitting fragment. Approx. 50 % of the circumference of an annular ring fitting, oval in section (W 4 mm; T 3 mm). An oblique forged junction is visible by X-radiography adjacent to one broken end. Ext. D 52 mm; Intern. D 43.5 mm. Wgt 7g. Context [C104].

Copper alloy (Fraser Hunter and Dawn McLaren)

- (SFB014/B015) (FH) Copper-alloy zoomorphic ring-headed pin, originally inlaid (probably with glass). Cast in one piece (as a lost-wax casting) with a disc riveted to the outer curve of the shank. The pin was deposited intact but is now in three pieces; the breaks are old ones across points of weakness (where the disc was riveted, and across a casting flaw, an air-bubble within the shank; the extreme tip is also lost). These breaks probably occurred after deposition owing to soil pressure or soil movement. This probably also explains the loss of parts of the disc margin. Otherwise, the pin is in excellent condition with a fine patina marred by only a few corrosion hollows.

The sub-circular-sectioned shank tapers gradually to the tip, which projects forward over the last 15 mm (as it survives) to aid retention within the cloth when in use. The upper half of the pin forms an S-shape, the upper tip formed into a bird's head which curves round to touch the centre of the S. The lower 'knee' of the S had been flattened (in the casting, modified by later filing) to receive an attached disc held by a rivet; the hole for this rivet was drilled after casting from both sides, slightly misaligned (D c. 2.5 mm); the rivet (D c. 1.5 mm) had an expanded head on the disc side, concealed originally by overlying inlay.

The flat saucer-shaped disc curves up at the edge to form a shallow wall with a beaded rim formed by a groove. The rear of the disc bears two concentric incised compass-drawn circles (D 15 and 25 mm), carved with a U-sectioned point (and thus most likely done in soft wax rather than hard metal). Their base shows that the line was outlined in several turns, as

there are several overlapping grooves. The form and decoration was made in the wax model. The inner surface shows clear elongated oval hammermarks (5 x 2 mm). Inlay material was set into this disc without any retaining rivet; a roughening of the surface around the rivet by scratching, and the very slight incurve of the upper rim, would have helped to retain a material such as glass but would have been insufficient to hold coral.

The upper half of the pin forms an S-curve, the upper part mimicking a bird, the lower supporting the riveted disc. From the lower part it flows in a smooth curve, becoming asymmetrically oval in section, expanding to a rounded lobe with three teardrop-shaped recesses probably representing the bird's wings and body. An integrally-cast collar sits between this and a ball-shaped element representing the head, pierced by an oval eye, with a down-curved bill expanding to a rounded tip pierced with a comma-shaped void. This latter piercing was intended to be openwork, as the internal surfaces are well-finished and smooth, whereas the 'eye' and 'wings' were once inlaid as their surfaces are less well-finished. It is likely that this inlay was glass, retained by adhering to the uneven surface of the recesses and (in the case of the eye) the contortions of the space, recessed immediately behind each eye and constricted between them.

The eye and wing recesses are emphasised by a cast-in thin raised margin, outlined after casting by incised grooves. A series of fine punched dots decorate the upper part of the bill. They are restricted to this area, indicating they are not polished-out casting flaws.

Cast in one piece with a well-finished surface showing occasional fine file-marks. Disc formed and decorated in the wax and then cast, with some hammering to shape it. No real traces of wear beyond some abrasion around the shank/S-bend junction, which is probably quite recent.

L 158.5 mm, W 42.5 mm, T of head portion 16.5 mm; disc D 30 mm, H 2.5 mm, sheet T 0.5–0.7 mm; shank D 5.3 mm at rivet, 4.7 x 4.5 mm at bottom of S, 4.5 x 4.1 mm at lower break. Wgt 48.92 g. Context [B005].

(SFC037) Working waste or degraded object. Very small trail of molten-looking copper alloy, small and narrow and amorphous in shape. L 12.8 mm, W 9.1 mm, T 1.6–3.5 mm. Wgt 0.5 g. Context [C024].

(SFC060) Repair patch. Fine, U-shaped strip bent over the damaged rim of a wooden vessel (T 5 mm), secured in place by a small handmade rectangular-headed rivet with its shank hammered flat on the

internal surface. The upper portion of the patch has been damaged and is lost and the only portion of the wooden object to survive has been that protected by the metal fitting. Max. L 20 mm, W 15 mm, T 0.3 mm. Wgt 0.95 g. Context [C028].

(SFE005) Working waste. Two amorphous and uneven fragments, each comprising an agglomerate of small flat angular broken up or clipped sheet fragments, globular blebs and granules. Possibly part-melted scrap. L 25.8 mm, W 12 mm, T 9.8 mm. Wgt 3g; L 17 mm, W 13.3 mm, T 11.5 mm. Wgt 3 g. Total Wgt 6 g. Context [E008].

RT Possible working waste or degraded object. Two small amorphous spalls of corroded copper alloy and associated crumbs, possibly detached from a completely degraded bronze object or working waste. One is a small globular prill (D 3 mm). The other is amorphous with broken edges (L 5.7 mm, W 5 mm, T 1.6 mm). Composite Wgt 0.11 g. Context [A029].

RT Possible working waste or degraded object. Thirty-two small, fractured fragments of corroded copper alloy. Most of the pieces comprise fractured flat angular fragments, perhaps from a degraded sheet metal object but also include three sub-spherical nodules. Working debris? Wgt 0.9 g. Context [E008].

The chipped stone (Rob Engl)

A full detailed catalogue of the chipped stone can be found in the site archive.

The coarse stone tools (Dawn McLaren)

Saddle querns

(SFA106) Large thin triangular spall detached from the grinding face of a larger sandstone saddle quern. The fragment that remains represents a portion of the grinding face, broken from near one end of the slab, the tip of which is lost, and much of one side and the opposite end of the face also lost. The fragment is wedge-shaped in cross-section and the original proportions and form of the stone are unknown. The grinding surface extends the length and is smoothed and abraded from use. Cutting through this abraded surface is a circular concentration (Diam 38.5 mm) of peckmarks (ave. D 3 mm), surrounded by a more dispersed spread of pits and peckmarks from secondary use as a working surface. The near central position of the concentration of pits suggests that this secondary use occurred after the stone had broken. Remaining L 234 mm, W 175 mm, T 21.5–71 mm. Wgt 2,908.9 g. Context [A105].

(SFC005) Large granodiorite cobble or small boulder, possibly a glacial erratic, rectangular in plan with

one squared end with rounded corners remaining; the opposite end is damaged and a large proportion lost, along with one long edge and the corners from opposing ends. Only c. 40 % of the original circumference of the stone survives. The fragment that remains is thick, plano-convex across the transverse axis and wedge-shaped in profile longitudinally. One extensive face, incomplete due to the damage to the edges, has the remains of a gently dished abraded facet from grinding (remaining L 232 mm, W 193 mm). The grinding facet is smooth but with regular pits resulting from a combination of the natural loss of dense clasts during use and from dressing to deliberately roughen the surface. A band of polished abrasion is visible around the surviving blunt rounded end and adjacent long edge. Remaining L 232 mm, W 204 mm, T 84.5–117 mm. Wgt 5.75 kg. Context [C002].

(SFC006) Irregular sub-rectangular, almost kite-shaped flat slab of pitted basalt with angular edges and ends, very crudely fractured to shape. The base is uneven and appears as though very roughly cleaved from a larger, thicker block. Both long edges, uneven and undulating, appear to have been roughly trimmed to shape and to reduce mass. One wide blunt and squared end is damaged but modified, the face tapering towards a narrower opposite end which is fractured and damaged. The extensive face is naturally pitted and unevenly concave (particularly prominent on the short axis) but lacks evidence of an attempt to dress. The edges of the grinding face extend to the surviving edges of the slab but are smoothed and lightly polished at the widest point as the result of abrasion and rubbing through use. Patches of more recent scoring and scuffing of the faces are also in evidence from damage sustained during excavation. L 323 mm, W 198 mm, T 63 mm. Wgt 950 g. Context [C002].

(SFC053) Corner from a thick sub-rectangular fine red sandstone slab, cleaved from a larger block or outcrop. The sub-rectangular slab has broken diagonally across the width, across a wide oval grinding surface, resulting in the loss of three corners of the slab, and the original dimensions are unknown; the remaining corner is also damaged. Only a portion of the original grinding facet survives which is at least 200 mm in width, distinctly dished and abraded from use. Remaining L 222 mm, W 240 mm, T 56.5 mm. Wgt 4,570.1 g. Context [C020].

Rubbing stones

(SFA074) Large rectangular green-grey schist cobble, split longitudinally through its thickness to create flat face and plano-convex cross-section. Long edges are irregular and uneven with limited evidence of trimming, overlain by fresh damage. The grinding

face is gently convex on both short and long axes, with a band of well-developed smooth polish from abrasion on the curving edge of the face at the blunt rounded end and the opposing surviving corner. The edges at these areas are rounded with bevelled abrasion suggesting use in conjunction with a larger saddle quern with a deep dished grinding face. Grinding face is pitted from wear with patches of smoothed abrasion. L 303 mm, W 200 mm, T 77 mm. Wgt 7.1 kg. Context [A032].

(SFC049) Extremely friable, large sub-rectangular cobble of blue-green schist, plano-convex in cross-section with smooth rounded corners. Recorded during excavation as a possible rubbing stone with flat surface (possible grinding face) facing downwards and not observed in detail. Completely disintegrated during excavation. Photographed as record. L 290.5 mm, W 151 mm, T 58–66 mm. Context [C029].

(SFD003) Irregular sub-square water-rounded cobble of a pale brown-grey siltstone with frequent natural white fleck inclusions, thick and plano-convex in section, one rounded end remaining, the other fractured and lost (unclear if due to use). Flattened face appears smoothed and abraded from use as an abrasive. Remaining L 100 mm, W 101 mm, T 66 mm. Wgt 1,012.6 g. Context [D001].

Quern or rubbing stone

(SFC042 19) fragments, no longer joining, of an exceptionally friable and fragmentary, heat-affected granite cobble, with traces of use as a rubbing stone or saddle quern. Noted during excavation as a possible worked stone. Because it was highly friable as a result of heat damage, a block-lift was attempted, but the stone disintegrated on drying. Only two edge fragments displayed pitting, abrasion and polish from use. Not possible to say with confidence whether this was a saddle quern or rubbing stone. Min. L 230 mm, W 150 mm, T 77 mm. Wgt 2,681.9 g. Context [C019].

Rotary quern

(SFA018) Two joining fragments from the edge of a possible disc-shaped quernstone, of a very coarse sandstone with frequent, small, rounded, dense grits. Fragments represent < 25 % of the circumference and no handle or socket survives to allow identification as either an upper or lower stone. Well-developed wear is noted on grinding face in the form of circumferential band of polish, abraded quartz grains/clasts and concentric striations from abrasion. Surviving portions of the original curving edge have been roughly pecked to shape. Approximate original D c. 350–380 mm, T 58.5

mm. Wgt 1,892.3 g. (for archive purposes: Larger fragment L 221 mm, W 122 mm, T 58.5 mm. Wgt 1,622.7 g; Smaller fragment L 55 mm, W 83.5 mm, T 46.5 mm. Wgt 269.6 g. Context [A001].

Cobble tools

Grinders

Table A: Characteristics of grinders amongst the assemblage. 'R' denotes remaining dimension.

SF No	Context No.	L (mm)	W (mm)	T (mm)	Single or faceted wear	Notes
101	Spoil	73.5	82.5	66.5	faceted	Well-developed wear in a band around 80 % of circumference.
115	102	116.5	68.5	43.5	single	Oblique abrasion facet at one end; scratch-marks and scores from abrasion on both faces
A086	A023	86	94.5	51	faceted	Three distinct flattened facets at one end and around circumference of opposite end
A101	A101	74	66	40	single	Off-centre narrow band of abrasion at one end; light use. Some percussive damage to adjacent end but unclear if ancient or recent
A127	A114	101.5	68.5	67.5	faceted	Bipartite oval area of abrasion at one end, asymmetric; light use at opposite end.
A133	A116	102.5	63.5	45	faceted	Abrasion on both ends; one later damaged and broken
B017	B002	101.5	71.5	62	faceted	Both ends worn; well-developed faceted abrasion
C035	C024	R24	R44	T27	faceted	One end only; fire-cracked
C046	C029	101	30 - 79	32 - 70	faceted	Both ends worn, one more extensively than the other; asymmetric wear.

Pounders

Table B: Characteristics of pounders amongst the assemblage. 'R' denotes remaining dimension.

SF No	Context No.	L (mm)	W (mm)	T (mm)	Single or faceted wear	Notes
603	600	124.5	72	49.5	single	Both ends, oval facets
A014	A001	113	66.5	56.5	single	Both ends, one displays forceful use
A021	A007	82.5	66.5	34	faceted	Interrupted wear around circumference including sharp, angular gouges
A063	A012	84	55	32	single	Both ends; light use
A139	A118	R72.5	43.5	39	faceted	Three distinct pitted facets at surviving end
B005	B002	62	46	34	single	Oval facet at one end, rounded
C040	C024	R63.5	R69	R13	single?	Partial facet survives; broken
D101	D101	72	61.5	41	single	Both ends

Hammerstones

(SFA009) Hammerstone. Irregular ovoid water-rounded cobble of mid-brown dense volcanic rock (?basalt), tapering in width and thickness at both ends, which are fracture damaged as the result of use with heavy physical force. Remaining L 124 mm, W 78 mm, T 77.7 mm. Wgt 877 g. Context [A001].

(SFA141) Hammerstone. Thick ovoid fine sandstone cobble. All surfaces, with the exception of a portion of one face, are lost due to severe fracturing of the edges, causing irregular spalls to detach from both long edges and faces of the cobble. L 107.5 mm, W 77.5 mm, T 62.5 mm. Wgt 851.9 g. Context [A116].

Smootherers

Table C: Characteristics of smootherers amongst the assemblage. 'R' denotes remaining dimension.

SF No	Context No.	L (mm)	W (mm)	T (mm)	Wear
114	107	66.5	52	39.5	Smoothing and abrasion from rubbing on one extensive face; band of red-brown residue along adjacent long edge (damaged)
A001	A001	136.5	43.5 – 52	38.5	Flat face smoothed, patches of polish concentrating along one long edge, associated patches red-brown residue
A024	A012	118	79.5	49	Flat face smoothed from rubbing; red-brown staining across face concentrating along one edge
A125	A114	119	87	25.7	Interrupted curvilinear bands of staining/waxy residue flank curving long edges on one face; centre of opposite face stained, associated with light abrasion. Some residue on edges
B008	B001	R79.5	35.5	19	Broken; one long edge coated in dark brown residue, extending on to one damaged extensive smooth and abraded face
C003	C002	101	65.5	38	Both faces smoothed; patches of dark-brown staining towards rounded edges of both faces with corresponding polish
C018	C002	95.5	60	48	One flat face smoothed though rubbing; build-up of waxy red-brown residue and associated sheen
C028	C011/ C013	108	47	17	One face flattened and smoothed associated with dispersed patches of dark red-brown staining; fire-cracked
C052	C028	99	79	46	Dark brown/black staining at centre of one smooth face, associated polish

Burnisher/polishers

(SFA027) Blocky, sub-ovoid, water-rounded cobble, squared at one end which is (unintentionally) chipped; opposite rounded narrow tip is pitted but may be incidental. One extensive convex face has a high sheen from rubbing/polishing towards the centre of the face. L 124.5 mm, W 62 mm, T 56.5 mm. Wgt 700.5 g. Context [A012].

(SFA036) Flattened, ovoid, water-rounded pebble, concentration of polish towards the centre of both faces, particularly pronounced on one face. L 70 mm, W 53 mm, T 19 mm. Wgt 112.7 g. Context [A013].

Whetstones

(SFA007) Elongated tapering bar of dark blue-grey hard schist, broken during excavation at the narrowest end resulting in the loss of the rounded tip. One long, almost vertical, straight edge has been smoothed and flattened as the result of abrasion, particularly towards the centre of the face, probably from use as a whetstone. The surviving wide, blunt, rounded end displays patches of abrasion from light use as a grinder. L 170 mm, W 15.5–32.5 mm, T 14.5–16.5 mm. Wgt 163.9 g. Context [A001].

(SFC001) Small, elongated, ovoid, water-rounded sandstone pebble, broken at one end; original length unknown. One face has a longitudinal area of abrasion and associated polish that may be the result of wear. Poorly-developed wear suggestive of light use. Remaining L 44 mm, W 18 mm, T 10 mm. Wgt 9.8 g. Context [C001].

Strike-a-light

(SFA170) Fragmentary, water-rounded, ovoid quartzite cobble with naturally smooth surfaces. A large spall has detached from one edge removing all of one side and much of one face and end of the stone. At the approx. original centre of both extensive convex faces are a series of very shallow linear gouges, probably made by repeated striking as a strike-a-light. Later metallic transfer (from excavation) is present on both faces, obscuring possible use-wear. L 103.5 mm, W 83 mm, T 58 mm. Wgt 652.7 g. Tr. A, Unstratified.

Combination tools

Table D: Characteristics of combination tools amongst the assemblage.

SF No	Context No.	L (mm)	W (mm)	T (mm)	Wear
100	Unstratified	123	74	56.5	Smoother/working surface. Primary wear as smoother, concentration of smoothing from rubbing, dark brown staining and slight sheen at centre of one face; secondary use as working surface evidenced by scores and gouges to same surface and towards one end of opposite face

SF No	Context No.	L (mm)	W (mm)	T (mm)	Wear
A006	A001	76	68	44	Grinder/brusher. Rounded corners of squared end display faceted abrasion; both extensive faces display build-up of light sheen and fine striations from rubbing
A008	A001	112	86	53	Pounder/smoothen/working surface. One end lost in antiquity, remaining end flattened through pecking; one flat face softened by abrasion through rubbing associated with staining and waxy red-brown residue; deep area of percussive marks suggesting expedient use as working surface
A019	A001	78	57	53	Grinder/smoothen. Both rounded ends abraded; two convex faces smoothed from rubbing, associated with red-brown staining and light sheen
A107	A103	85.5	60	28.5	Pounder/smoothen or brusher. Corner of naturally squared end pitted from use; adjacent smooth surface has distinct sheen from rubbing but lacks staining
A119	A114	126.5	65.5	40.5	Pounder/hammerstone/working surface. One end pitted from heavy pounding; opposite end lost and fractured; both convex faces irregularly pitted and scored
B007	B001	114	59	58.5	Strike-a-light/smoothen. Dispersed red-brown strike marks at apex of one convex face overlying area of rubbing associated with a light sheen
D002	D001	94.5	67.5	46	Grinder/pounder. Three rounded corners of sub-rectangular cobble flattened due to abrasion; fourth corner is pitted and chipped suggesting use with force

Sharpening stones

(SF605) Thick triangular block of whinstone, edges and both faces angular and uneven, possibly cleaved from a thicker piece of rock. One flat smooth vertical face has a well-developed series of linear striations running parallel to the longitudinal axis of the surface, overlapped towards the middle of the face by a series of short oblique scores, the result of use as a sharpening stone. L 254 mm, W 158 mm, T 68 mm. Wgt 3,843 g. Context [600].

(SFA157) Irregular, angular, fractured whinstone block,

almost pyramidal after breakage, the original form and size of the parent stone is unknown. One irregular, fractured face has a series of six elongated, linear scores covering the central area, radiating out from that point towards the narrow tip and fanning out towards the wide rounded end. The scores (ave. L 82 mm, W 2 mm, Dpt 0.5–1 mm) are fresh and V-shaped, tapering to a point at the terminals. The middle three lines overlap and merge. Base has been trimmed to sit flat and steady during use. L 210 mm, W 132 mm, T 134 mm. Context [A117].

(SFC015) Two joining flat, plate-like fragments of fine sandstone, all edges angular and broken making it impossible to determine the original form or dimensions. A series of elongated, longitudinal scores run along the centre of one smooth face, parallel to the long axis, perhaps from sharpening blade edges or more likely point/pin tips. Two fresh scores radiating from one corner of the face are likely excavation damage. Remaining min. L 173 mm, W 53–89.5 mm, T 10–12.5 mm. Wgt 212.9 g. Context [C002].

Working surfaces

(SFA055) Thin, sub-square fragment, plano-convex in section, probably split from a larger ovoid, water-rounded cobble/boulder. One wide, rounded end and a damaged gently-curving long edge remain, both regularly chipped and fractured probably to trim the stone prior to use; the opposite end and edge have broken cleanly after use resulting in an angular squared fracture. The flatter of the two extensive faces is covered in an irregular and dispersed series of circular peckmarks (D 3–7 mm), short linear scores (ave. L 12.5 mm) and gouges (ave. W 3 mm), probably from use as a working surface. The opposite convex face is unmodified. The original dimensions of the stone are unknown. Remaining L 198 mm, W 183 mm, T 51 mm. Wgt 2,221.3 g. Context [A007].

(SFA124) Sub-rectangular slab of arkose (?), surfaces weathered and pitted. One concave face and adjacent bevelled edge have a series of small pits concentrated towards the angular edge between the concave face and the bevelled edge facet. Collected on site as a possible working surface, but since cleaning the peckmarks are less clear, and it is ambiguous whether the pitting is the result of use as a working surface or due to differential weathering. L 167 mm, W 88.5 mm, T 39.5 mm. Wgt 926.1 g. Tr. A, Unstratified.

Grinding stones

(SFA103) Small sub-square, plano-convex, block of fine sandstone. With the exception of one uneven end

and a corresponding adjacent patch on the convex upper surface, the surfaces of the stone have been heavily modified as the result of faceted abrasion from use as a grinding stone. Five distinct facets are present around the edge; most are smooth and have been worn at a slight angle from vertical; one is distinctly concave (W 16 mm) across the transverse plane from abrasion, probably to shape and smooth an item with a curving convex profile (?shale armlet). The base is very slightly convex and smooth from wear, with two narrow bevelled edges at opposing corners. The upper face has three distinct flattened and convex facets which overlap and converge at the apex of the stone. L 42.5 mm, W 41.5 mm, T 26.5 mm. Wgt 58.3 g. Context [A106].

(SFA173) Sub-rectangular, thick, plano-convex, water-rounded, grano-diorite boulder with asymmetric rounded edges and ends, one of which has a straight bevelled end. Flat face is dished on both planes, particularly pronounced across transverse axis. Face is pitted and polished from use. Well-developed polish and abrasion present around the circumference, and patches near the centre of the face from wear. The base is convex but now damaged; multiple spalls have detached and face is now friable. Currently sits at a 35-degree angle, but unclear if this reflects the original pitch of the stone during use. Remaining L 326 mm, W 268 mm, T 148 mm. Context [A130].

(SFB008) Small red sandstone disc, wedge-shaped in profile. Edges are faceted through abrasion and flat faces also may have been abraded. Unclear if abrasion is to shape or from use. L 22 mm, W 21 mm, T 14 mm. Wgt 8 g. Context [B001].

(SFC049) Fragment of a thick, rectangular block of red sandstone, probably detached from a larger slab or outcrop. Fractured rounded end and two parallel straight vertical long edges survive; opposite short end fractured and lost. One flat extensive face is abraded, following the longitudinal axis of the stone, cut though by occasional dispersed pits. Surviving L 230 mm, W 138 mm, T 96 mm. Wgt 4,187 g. Context [C002].

Spindle whorls

(SFB013) Small, fine-sandstone, disc-shaped stone with D-shaped edges, faceted through abrasion to shape, and smooth but damaged around c. 1/3 of the circumference. Central perforation, counter-sunk on one face only (max. D on surface: 12.5 mm) and slightly expanded mid-point on opposing edges of both faces (max. D 8.5 mm; min. D 5.5 mm), perhaps reflecting the idiosyncrasies of use-wear. D 39 mm, T 12 mm. Wgt 30.5 g. Context [B002].

(SFB011) Thick, red sandstone disc, edges roughly fractured and abraded around circumference

to shape, but some areas of the edges remain unmodified. Wedge-shaped in profile. Both faces are flat but with areas of damage in the form of small peckmarks present towards the centre, perhaps marking out an intended position of a perforation. L 54 mm, W 40 mm, T 24 mm. Wgt 91.3 g. Context [B005].

Stone lamps

(SFA032) Small flat, sub-circular sandstone block with angular, vertical or near vertical fractured edges, trimmed to shape and to reduce bulk, causing oblique spalls to detach from two opposing corners. At the centre of one face is a large, deep, circular pecked round-based hollow (D 63.5 x 67 mm, Dpt 21 mm), the interior of which displays a combination of peckmarks and gouges from manufacture; the toolmarks soften slightly at the rounded base. Patches of dark staining are present on the edges of the hollowed face and on the vertical edges of the stone, perhaps sooting from use as a lamp, although the stone lacks any other evidence of heat discolouration/damage. The flat base has a concentration (D 12 mm) of shallow peckmarks at the centre, possibly from expedient use as a working surface or, more likely, an attempt to begin manufacture of a hollow which was abandoned in favour of the other surface. L 104 mm, W 97 mm, T 34.5 mm. Wgt 464.8 g. Context A006.

(SFA039) Flattened, spherical sandstone cobble, edges and rounded base roughly pecked to shape; these surfaces remain roughly dressed with no apparent attempt to smooth or finish, but the dressing has been evenly executed. A large, round-based hollow (D 72.5 x 75.5 mm, Dpt 31.5 mm) has been pecked into the centre of the naturally convex surface of the cobble, leaving a narrow rim between the perimeter of the hollow and the edge of the stone. Patches of this rim, the edges and the base are sooted. L 141.5 mm, W 133 mm, T 76 mm. Wgt 1945.2 g. Context A011.

(SFB014) Irregular, sub-ovoid water-rounded ?greywacke cobble with convex upper and lower surfaces. A large, oval, round-based hollow (D 63 x 56.5 mm, Dpt 21 mm) has been produced at the widest area of one face, slightly off-centre. Peckmarks from manufacture are visible in the interior of the hollow, softened by subsequent use. Patches of dark discolouration occur on the rim, probably from sooting during use. Other than the hollow on one face, there is no trace of modification to the stone. L 130.5 mm, W 86.5 mm, T 42 mm. Wgt 603.1 g. Context B002.

(SFC020) Irregular, sub-rectangular fragment of mid-brown sandstone, split from a block. All edges angular, fractured and uneven, but apparently intact.

A deep, oval, round-based hollow (D 54.5 x 74 mm, Dpt 34 mm) at the centre of an irregular fractured face, is designed to occupy as much of this surface as possible. Below the lip around the circumference of the hollow are fine, vertical, gouge marks and small peckmarks from manufacture, working traces softened towards the base of the hollow. Just below the rim of the hollow on the interior is a ring of dark sooting, except where the rim has sustained some damage post-use. The only attempt to shape the stone appears to be the uneven convex base, possibly deliberately cleaved from a larger block of sandstone. L 146 mm, W 93 mm, T 54 mm. Wgt 728.5 g. Context C002.

Pivot stone

(SFC014) Large, robust, elongated rectangular slab with vertical, straight edges; one short end has broken across the width and the original length is unknown. Ground into one extensive face, towards one short end, are two deep and well-developed oval hollows. The larger of these is situated immediately adjacent to the damaged corner, the centre being 146 mm from the short end of the slab and has worn through the corresponding area of the diametrically opposed long edge. The hollow (D 145 x 185 mm, Dpt 79 mm) is smoothed and abraded with striations, suggesting oscillating wear; this wear extends beyond the edge of the hollow, to the short edge of the slab. The adjacent long edge has a long, narrow, distinct rubbed and abraded bevelled facet (W 27–40 mm), extending from the edge of oval hollow to the opposite corner of the slab. At the same end of the slab as the hollow just described, but situated adjacent to the opposite long edge and corner, is a second smaller oval hollow (D 55 mm, Dpt. 36 mm) which displays the same type of wear as that observed in the larger facet; like the larger oval hollow, the wear extends towards the edge of the slab (L 129 mm, max. W 96 mm). The adjacent corner is bevelled and has been smoothed, creating a concave facet. Remaining L 764 mm, W 257 mm, T 120–148 mm. Context [C002].

Bead

(SF120) Disc-shaped, red-sandstone bead, vertical faceted abraded edges, damaged in two areas resulting in the loss of small chips from the edges. Central circular bored perforation (max. at surface D 5.3 mm; min. D 4 mm). D 24 mm, T 6.3 mm. Wgt 4.1 g. Context [109].

Possible gaming pieces

(SF600) Small faceted ovoid quartzite-rich pebble, surfaces mid-brown in colour. Plano-convex in

section. Surfaces are smoothed and polished from handling and repeated rubbing, particularly concentrated at the centre of the flat face. L 22 mm, W 20 mm, T 8 mm. Wgt 5.5 g. Context [600].

(SF604) Small sub-spherical sandstone ball, with frequent angular quartz clasts, one of which protrudes abruptly from the otherwise smooth and rounded surfaces. No pecking or abrasion of the surfaces to indicate deliberate shaping. Appears to be entirely natural but retained as unusual. D 22.5–25.5 mm. Wgt 19.2 g. Context [600].

(SFC015) Small flat oval red sandstone disc with D-shaped edges. No obvious evidence of toolmarks or working traces but shape is unusual for a natural stone and may be a small gaming piece or trinket. L 19 mm, W 17.5 mm, T 8 mm. Wgt 2.8 g. Context [C014].

Cup-marked slabs

Two of the cup-marked slabs were assigned context numbers [A009] and [A010] in the field rather than small find numbers and are indicated below with their numbers in brackets rather than being prefixed with 'SF'.

(SFA034) Thick, rectangular, red sandstone slab, fractured to shape on three sides with near vertical squared long edges and ends but lacking evidence of detailed dressing. Reverse face shows a large flat fracture surface where the slab has been cleaved from a larger block. The upper surface is marked by three distinct circular cup marks: the first, is located towards one acutely angled corner, 26 mm from long edge, and is a small shallow pecked circular hollow (D 36 mm, Dpt 11 mm); the second is a small but deep hollow, oval in shape (D 17 x 30 mm, Dpt 6.5 mm) located just off-centre on the same face; the third is a very pronounced conical circular hollow (D 51.5 mm, Dpt 21 mm) fresh in appearance and located only 16 mm from long edge. Peckmarks and scores are noted around the edges of the third cup mark. The cup-marked surface is pitted and uneven with frequent small angular voids which may be natural hollows produced by detached clasts; the surface appears weathered. L 458 mm, W 263 mm, T 120 mm. Context [A010].

[A009] Large, rectangular, sandstone slab with two possible cup marks on upper surface. The larger hollow (D 68 mm, Dpt 15 mm) is situated towards the mid-point of the longer of the two long edges on the exposed face. A second, smaller cup mark (D 23 x 27 mm, Dpt 1.4 mm) is on the same face, off-centre towards the edge of the short, squared end. Max. L 320 mm, W 160 mm, min. T 60 mm (Not fully exposed, left *in situ*). Context [A020].

[A010] Slab not fully exposed, but has two clear adjoining cup marks, one slightly smaller (D 50

mm) than the other (D 75 mm). The larger appears secondary as it overlaps slightly and is deeper. Both cup marks are encircled by a shallow curvilinear groove (min. L 100 mm, W 27 mm). Two further possible peckmarked hollows visible on edges were not fully exposed. Min. L 210 mm, W 220 mm, min. T 64 mm. Context [A020].

(SFC019) Large, thick, flat sub-rectangular slab of sandstone, detached and removed from a larger outcrop as indicated by smashed, angular fractured edges cut through existing peckmarked decoration. The decoration consists of at least 24 circular cup marks and pecked sinuous curvilinear motifs. Only one small portion of the original edge of the boulder survives towards one corner, on the short end of the slab. Adjacent to this, positioned around the mid-point of this fractured end is a cluster of 13 cup marks ranging in size from small (ave. D 12 mm), medium (ave. D 30 mm) to large (max. D 56 mm). Surrounding this are further dispersed hollows. The opposite end of the slab is more damaged and generally devoid of markings. Just beyond the mid-point on the long edges is a long curving, sinuous pecked channel or groove, which runs from one edge to the opposite side, varying in W (33 – 48 mm) and D (11.5 – 18 mm); it incorporates at least one pre-existing circular cupmark, and branches out in two places towards the centre of the face to join with two further cupmarks. At the mid-point along one long edge is a further portion of a narrow curving groove, the ends lost by the fracturing of the slab. In the space defined by this curving line is a single cup mark and an area of damage. Many of the peckmarked features are softened as the result of weathering. The reverse face is fractured and uneven where it has been detached from a larger boulder or outcrop. L 715 mm, W 505 mm, T 144–164 mm. Context [C002].

(SFC053) Thick, angular, fractured slab of sandstone, with its long edges curving gently towards a fractured, asymmetrically broken narrow end; the opposite end is wider and squared. On one face, towards the tip of one narrow corner of the asymmetric end, is a circular pecked cup mark (D 82 x 86 mm, Dpt 12 mm). Recorded but not retained. L 620 mm, W 280 mm, T 19 mm. Context [C004].

(SFE016) Thick, rectangular slab of yellow sandstone, apparently detached from the right-angled corner of a much larger slab and trimmed at both ends; one is angular and pointed, the other is squared and vertical with peckmarks and fractures surviving from dressing. The fracture down the long edge has half sectioned at least one, and possibly two, pecked cup marks. Towards the original corner of the flat face is a large, pecked oval cup mark (D 55 x 74.5 mm, Dpt 22 mm). 37.5 mm from the innermost edge of this, slightly off-centre, is a further pecked cup

mark (D 36 x 46 mm, Dpt 18 mm) flanked on two sides by a curvilinear groove (W 13 mm, c. Dpt 1 mm). 26.5 mm from the opposing trimmed edge of the slab is a further shallow cup mark (D 36 mm, Dpt 4 mm). L 330 mm, W 180 mm, T 132 mm. Unstratified.

Possible weight roughout

(GF 100) Thick, stone disc produced from a fragment of dense dark brown ?basalt with quartzite inclusions. Edges formed by fracturing and pecking to create vertical edges around c. 80 % of the circumference; the remaining being more uneven, perhaps the result of breakage during use. Both faces are pitted and uneven. Perhaps an unfinished disc-shaped weight? L 75.3 mm, W 73 mm, T 32.6–36.5 mm. Unstratified surface find by John Robb.

Sandstone discs

(SF301) Small flat sandstone disc. Edges roughly flaked to shape and then abraded to smooth but remain uneven as though unfinished. No sign of modification to either face. L 44.5 mm, W 43 mm, T 10.5 mm. Wgt 34.2 g. Context [307].

(SF305) Curving edge fragment from a thin, flat, disc of sandstone. Edge fractured to shape, but not abraded to smooth or finish. Both faces are flat and fairly smooth. Original D approx. 80 mm. L 35 mm, W 24 mm, T 8.5 mm. Wgt 11.1 g. Context [314].

Notched stone

(SFC010) Notched stone in two joining fragments. Irregular, thick and flat fragment of red sandstone, now triangular in plan due to breakage, which has occurred longitudinally down one long edge, and is damaged transversely across width and the remains of a short, irregular, pecked and gouged notch (W 18 mm, remaining Dpt 21 mm). It is unclear if this notch represents the remains of an uneven perforation or whether the damage to the edges on either side of the feature are the extent of the stone at the time of use. The curving edges of the notch are lightly softened though wear. Remaining L 147.5 mm, W 133 mm, T 34 mm. Wgt 524 g. Context [C002].

The fire-cracked and heat-affected stones

Table E: summary of the fire-cracked and heat-affected stones.

SF no.	Context no.	Short description
408	409	Fire-cracked cobble fragment
417	409	Fire-cracked cobble fragment
422	420/422	Three angular fire-cracked fragments of granite cobble

SF no.	Context no.	Short description
423	420/422	Heat-damaged cobble
A044	A011	Fire-cracked spall detached from surface of larger block
A047	A012	Heat-discoloured pebble
C009	C001	Spall detached from surface of fire-cracked cobble
C044	C019	Fire-cracked cobble
C045	C002	Two joining fragments of fire-cracked cobble
C045	C019	Spall detached from surface of fire-cracked cobble
C047	C029	Disintegrated fire-cracked ovoid cobble in 17 fragments
C048	C002	Fire-cracked cobble fragment
E013	E001	Fire-cracked cobble

The worked shale and related materials (Fraser Hunter)

Gathered material and blanks

(SFA073) Gathered shale block, split and broken. Two edges naturally straight, one snapped to shape, one broken. Surface unmodified. L 119 mm, W 77 mm, T 20 mm. Wgt 158.90 g. Trench A.

(SFC057) Spall from the top of a small early-stage roughout, sub-rectangular with rounded corners, flaked and snapped to shape and subsequently abraded. Surviving face cut to flatten it; some subsequent abrasion. Abandoned owing to lamination. L 54 mm, W 42 mm, T 9 mm. Wgt 14.07 g. Shale. Context [C025].

Perforated roughouts

(SFA116) Probably roughout fragment; the one original edge has been flaked and snapped to a curved form, other edges broken, faces unmodified. External D c. 95 mm; L 41 mm, W 23 mm, T 8 mm. Wgt 4.68 g. Shale. Context [A113].

(SFA169) Perforated roughout at early stage. Edges flaked, snapped and in places cut to rough circle, with subsequent abrasion over about a third of the circumference. Central bifacial perforation made with fine gouge used vertically. The perforation was completed but seems to have caused spalling on both faces, leading to discard. D 89 mm, W 87 mm, T 18 mm; perforation min. 11 x 13.5 mm. Wgt 92.36 g. Laminar character; shale. Tr. A, unstratified.

Perforated roughouts, initial finishing

(SFA010) Flat, broad roughout in three joining fragments (around 20 % is lost, probably recently), the faces unmodified. Outer edge bifacially knife-cut with abrasion in progress; inner edge retains some traces of vertical gouges from its creation but has mostly been knife-trimmed smooth and abraded. Notably irregular in width and form. Ext. D 121 x 115 mm, intern. D 54 mm, W 23.5–24.5 mm, T 10–12 mm. Wgt 80.19 g. Shale. Context [A002].

(SFA020) Sub-rectangular section with rounded edges. Faces abraded. Interior rounded by knife-cutting (no abrasion); knife-facets still visible on exterior, abrasion in progress. Intern. D 80–85 mm (37 %), L 106 mm, W 19–21 mm, T 11.5–14.5 mm. Wgt 42.19 g. Shale. Context [A011].

(SFA026) Outer edge cut to circular shape; perforation shows vertical channels from a fine gouge (W 3 mm); surviving surface has abrasion scars, but has laminated. (Ext. D c. 140 mm (15 %); L 60 mm, W 27 mm, T 9 mm. Wgt 12.92 g. Shale. Context [A012].

Final finishing

(SF206) Spall from near-complete bangle with near-vertical inner edge and flat, broad upper face with abrasion scars. Too small to estimate diameter; L 13.5 mm, remaining W 9 mm, remaining T 2 mm. Wgt 0.23 g. Shale. Tr 2, Context [221].

(SFC044) Bangle broken in final stages of polishing. Oval section, flattened on interior, which has circumferential abrasion scars; the exterior has much finer abrasion scars all over, and in places residual facets from shaping. Intern. D 65 – 70 mm (30 %); L 70 mm, W 12 – 13.5 mm, T 13 mm. Wgt 10.87 g. Conchoidal, with little lamination – cannel coal. Context [C002].

Finished bangles

(SFA096/A112) Two joining fragments of a D-sectioned bangle fragment. Interior vertical, with faint circumferential abrasion scars; edges rounded, exterior well-finished. Some use-wear. Intern. D 85–90 mm (20 %), L 35.5 mm, W 9 mm, T 11.5–12 mm. Wgt 6.61 g. Grey shale with noticeable banding. Tr A, A113 and Unstratified.

(SFA120) Repaired bangle. D-sectioned fragment with fine bevels on inner edges. Well-finished with no toolmarks; use-wear. After fracture one end was squared and smoothed for repair, but presumably broke a second time. Intern. D c. 105–110 mm (but unreliable owing to small size; 9 % survives); L 31 mm, W 8–8.5 mm, T 14.5 mm. Wgt 3.90 g. Dark, compact material with conchoidal fracture and discontinuous laminations; cannel coal. Context

[A113].

(SFC003) Repaired bangle, with part of the mount still surviving. Oval section, irregular in places; well-finished, with no toolmarks but some use-wear. After breakage an iron plate was fitted to the interior, surviving as fragments or corrosion traces, defining an oval form, attached through one surviving cylindrical perforation (D 2 mm) which presumably had a pair in the lost area. Although corroded, the fragment does not show obvious characteristics of a rivet so it may be an integral tang carefully burred on the exterior, though a rivet would be much easier to make; its damaged condition does not allow certainty. The surviving edge shows a faint marking-out line on the interior to demarcate the plate's intended extent. Internal D 80–85 mm (13 %), L 36.5 mm, W 7.5 mm, T 8.9–10.3 mm. Wgt 2.50 g. Dark, compact material with laminar structure and conchoidal fracture – shale. Tr C. Topsoil.

(SFC004) Lentoid-sectioned bangle fragment, slightly asymmetrical with a more rounded exterior, the interior with slight bevels towards the edges, offering a hint that this may come from removal of a central core. The interior shows circumferential and angled abrasion scratches; exterior well-finished. Some use-damage. Intern. D 60–65 mm (22 %), L 46 mm, W 6 mm, T 10 mm. Wgt 3.40 g. Grey shale. Context [C004].

(SFC012) Repaired bangle. D-sectioned fragment, the exterior very well-finished and polished, with use-scratches; interior shows circumferential abrasion scars. After it broke one end was abraded square, and a knife-cut facet created a bevel on each inner edge, presumably to modify the bangle's fit. Other end is broken, indicating it broke after this repair. Intern. D 65–70 mm (23 %), L 54 mm, W 9.5–10 mm, T 12.5–13 mm. Wgt 6.75 g. Compact material with conchoidal fracture and no visible laminations; cannel coal. Context [C002].

(SFC030) Repaired bangle. D-sectioned fragment, well-rounded profile curving into vertical interior. Very well-finished; traces of smoothed knife facets internally, otherwise no toolmarks. It snapped across the band and was repaired, with a drilled central transverse perforation (D 2mm), which subsequently broke again. Exterior shows use-wear. Intern. D 85–90 mm (21 %): 63 mm, W 9.5 mm, T 10.2–11.0 mm. Wgt 5.88 g. Hints of lamination and slight conchoidal fracture suggest shale or canneloid shale. Context [C002].

Other item

(SFA017) Ring pendant roughout, broken in final polishing. Near-circular section; faint abrasion scars most pronounced in interior but present all over, indicating it was in final stages of preparation

when it broke. Intern. D 18 mm, ext. D c. 40 mm (45 %), W 10.5 mm, T 10 mm. Wgt 3.60 g. Dark, laminar shale. Context [A001].

Undiagnostic

A series of shale chunks were recovered which could come from roughouts or perhaps working debris, but are too broken-up to identify their character and whether any edges are original.

(SFA015) L 23 mm, W 16.5 mm, T 5 mm. Wgt 0.83 g. Context [A007].

(SFA016) One original face and one original straight edge, but worn condition makes it impossible to assess technology. Perhaps a roughout fragment. L 31.5 mm, W 18 mm, T 10 mm. Wgt 2.78 g. Context [A001].

(SFA060) L 34 mm, W 20 mm, T 6 mm. Wgt 2.59 g. Context [A001].

(SFA062) Peckmark on one face. L 20 mm, W 13 mm, T 4 mm. Wgt 0.80 g. Context [A001].

(SFA105) L 29 mm, W 15 mm, T 11 mm. Wgt 2.50 g. Context [A105].

Stray find

PMAG Acc. No. 1998.106 Fragment of worked jet/cannel coal, probably from a bracelet or bangle. Cut-marks are evident and the piece may have been unfinished due to breakage. It has a D-shaped cross-section and measures L 21 mm. It was found in 1981 beside the track in the interior of the fort at NGR NO 1364 1988 (Information from Perth Museum and Art Gallery).

Worked bone (Fraser Hunter)

(SF132) Perforated bone roundel possibly from scapula of large mammal (J Robertson, *pers comm*) knife-trimmed to a circle with the edges abraded to smooth them off. Parts now lost, probably recently. Surface charred: one side entirely blackened, the other partly. Central small biconical perforation, worn to a circle on one side and an oval on the other; polished from use but no evidence of rotary wear. D 50.5 mm, T 4–8.5 mm; perforation D min. 2.5 x 4 mm, max. 8 x 6 mm (oval), 8 x 7.5 mm (circle). Context [118].

(SFC012) Group of burnt antler points, slightly distorted from the heat. Restored from fragments; all but two small pieces join or are plausibly related, giving a total of six items. They represent variations around a theme. The butt end was usually cut square or at an angle (sometimes with several preliminary cuts). The section was faceted from knife-trimming, becoming circular towards the point. Where intact this was blunted and polished from use and, in one case, showed circumferential wear from something

wrapping around it. Two are well-used, two little used, and two apparently unfinished. Two taper towards the butt, in one case resembling a double-pointed item, though the lack of wear indicates only one end was used. Context [C013].

1. Both ends lost; squared butt end with additional cut; square section, becoming circular at polished point. L 60.2 mm, W 4.5 mm.
2. Intact, slightly curved from heat. Trimmed to D-section with oval-sectioned tip. Butt cut square with step at end and other transverse cut-marks below. Tip blunted and polished from wear with faint circumferential ribbing over final 12 mm. L 56.5 mm, W 4.5 mm, T 3.8 mm.
3. D-sectioned; irregular snapped butt with transverse cuts; tip of circular-sectioned tip lost; shows polish. L 56.7 mm, W 4.7 mm, T 4.3 mm.
4. Sub-square section, angled butt; circular-sectioned point with slight polish and step fracture from (ancient?) loss of tip. Min. L 51 mm, W 4.3 mm, T 4.3 mm.
5. Facetted ovoid section, becoming circular to ends; double-pointed, neither with use polish. Irregularity of one suggests it was unfinished and/or not intended as the tip. L 47.7 mm, W 4.8 mm, T 3.9 mm.
6. Two non-joining fragments are likely to be from a single implement. Ovoid-sectioned tip tapering to a facetted point, probably unfinished and certainly unused (L 42 mm, W 4.3mm, T 3.7 mm). Rectangular-sectioned butt, slightly tapered and cut square. L 16.6 mm, W 4.6 mm, T 3.3 mm.

Appendix D: Castle Law, Abernethy, small finds catalogue

The small finds (abbreviated to 'SF') were assigned individual numbers in the field. Abbreviations used: Dpt - depth, D - diameter, ext - external, g - grammes, H - height, intern - internal, L - length, mm - millimetre, T - Thickness, Wgt - weight and W - width.

PART 1: The 2017 small finds (Dawn McLaren)

The ceramics

(SF004) Body sherd from a thick-walled, handmade, coil-constructed pot. External surface hand-smoothed when wet and has a light coating of soot from use. Same fabric as SF 013 but thicker. Vessel 2. L 37.5 mm, W 31 mm, T 16 mm. Wgt 15.1 g. Tr. A, Context [103].

(SF011) Three body sherds and a small quantity of fragments under 10 mm in diameter from a thick-walled, coil-constructed, handmade pot, broken across coil junctions. Same fabric as SF 013. Vessel 1. L 49 mm, W 48 mm, T 15 mm. Wgt 54.6 g. Tr. A, Context [106/7] interface.

(SF013) Three sherds, two body and one possible rim sherd/sherd broken across thick coil junction, from a handmade coil-constructed pot, each sherd broken cleanly across junctions. The fabric is a fine sandy clay, hard fired with 40 % angular grit inclusions (?granodiorite - black with white flecks). Incompletely oxidised - grey-buff exterior, salmon-pink interior. Exterior of the sherd is sooted. Approximate ext. D 280 mm; approximate Intern. D 260 mm; dimensions of largest sherd: L 57 mm, W 39 mm, T 13.5 mm. Vessel 1. Wgt 39.1 g. Tr. A, Context [106/7] interface.

(SF032) Body sherd from a thick-walled, steep sided pot, clear coil junctions visible. Same fabric as (SF013). Completely oxidised, pinky-buff colour. Vessel 1. L 54 mm, W 35 mm, T 14 mm. Wgt 24.6 g. Unstratified.

(SF033) Body sherd from a thick-walled steep-sided vessel of fairly crude production. The surfaces have been hand-smoothed when wet but grits still protrude. Fabric is a fine sandy clay, fired hard, with 30 % angular rock inclusions. Very similar to the fabric observed amongst the Moredun assemblage. External surface is red-buff in colour, core and internal margins/surface are dark brown/black. Interior is coated in patches of encrusted residue. Vessel 3. L 61.5 mm, W 47.5 mm, T 15.5 mm. Wgt 48.8 g. Unstratified Trench A.

The coarse stone

(SF001) Quern fragment. Fragment of a broken oval sandstone cobble, plano-convex in section, with water-rounded surfaces (possibly due to glacial

action or water-wear), broken obliquely from one rounded corner across the face of the stone resulting in the loss of one end and approximately half of one edge. Approximately 55 % of the circumference survives: half of this surviving edge is naturally rounded and unmodified, the remaining portion is uni-facially fractured, perhaps to shape prior to use. The flatter of the two faces has been smoothed and worn as the result of use as a grinding surface, regular peckmarks from dressing the surface are present but have been softened as the result of use. Patches of light polish have developed where abrasion during use has focused. Surviving L 230 mm, W 251 mm, T 45 mm. Tr. C, Context [101].

(SF002) Pounder. Water-rounded flattened ovoid greywacke cobble, the wide blunt rounded end is damaged at both corners, one incidentally as indicated by the fresh angular fractured surface, the other is pitted as the result of use as a pounder. The opposite end of the stone tapers towards a broken narrow tip, also fractured; the extent of weathering of this facet is inconsistent with damage as the result of wear and likely pre-dates use. Surviving L 121.5 mm, W 95 mm, T 45 mm. Tr. A, Context [103].

(SF012) Working surface/anvil stone. Large ovoid sandstone cobble, water-rounded with smooth surfaces. Collected in the field due to damaged end where rounded tip of cobble has broken off leaving an uneven concave fracture surface but this is water-rounded demonstrating that the damage is the result of natural processes prior to use. Wear is present in the form of several irregular deep scores, gouges and pits on the convex upper surface of the cobble, concentrating towards the surviving rounded end. L 259 mm, W 181 mm, T 95 mm. Tr. B, Context [105].

The non-ferrous metal-working evidence

(SF029) Possible copper-rich stone. Angular, fractured triangular fragment of mid-brown granular rock with frequent bright green speckled inclusions. The vertical broken edges have clear sub-rounded inclusions of bright green ?copper which fill minute voids in the stone. L 47.5 mm, W 39.5 mm, T 23.5 mm. Tr. A, Context [123].

(SF024) Crucible sherd. Spall from the rounded base of a hemispherical crucible. The fine clay has fired to a pale grey colour, becoming porous and brittle as the result of heat damage. The smooth convex external surface is glassy with streaks of red-brown residue and patches of translucent pale green glassy vitrification indicative of a copper-based alloy, probably bronze. The internal surfaces are poorly preserved; the small patch that does survive is coated in a purple/brown residue, again suggestive of a copper alloy. The original dimensions of the crucible are not possible to determine from the

surviving fragment but probably similar to that from Finavon, Angus (Childe 1935b: 72, figs 14 and 16). L 33 mm, W 26 mm, T 11.5 mm. Tr. A, Context [123].

The vitrified material

(SF003) Five amorphous fragments of vitrified material.

Two fragments are clearly vitrified and heat-affected pieces of stone, one of which has become partially molten along one long edge. The other three fragments consist of a black glassy vesicular vitrified material, incorporating angular heat-affected pieces of stone. These are not classifiable. Not magnetic. Wgt 1017.6 g. Largest fragment: L 137 mm, W 86 mm, T 70 mm. Tr. A, Context [102].

(SF005) Fractured angular fragment of dense, glassy, black vitrified material, detached from a larger fragment. Few original areas of the original surface survive but are vesicular where present. Not magnetic. L 37.5 mm, W 30.5 mm, T 22.5 mm. Wgt 17.8 g. Tr. B, Context [105].

(SF025) Fractured angular fragment of vesicular vitrified material, dark-brown to grey in colour, frequent air bubbles. All surfaces fractured. Not magnetic. L 25 mm, W 14.5 mm, T 13 mm. Wgt 5.1 g. Tr. A, Context [123].

Victorian items

(SF007) Heel Cleat. Incomplete fragment of a horse-shoe shaped iron heel cleat, detached from the heel of a work boot. Probably 19th/20th century. Original H 5.5 mm; max. W 62 mm; arm W 12.5 mm; T 5.5 mm. Tr. A, Context [102].

SF022 Victorian halfpenny, mint date unknown. Worn, corroded and surfaces obscured by soil and corrosion. D 25.5 mm, T 1.5 mm. Tr. B, Context [022].

PART 2: The antiquarian assemblage (Dawn McLaren)

The artefact assemblage recovered during the late-19th-century excavations at Abernethy was discussed in detail by Joseph Anderson in the original site report (Christison and Anderson 1899: 28–33). Some objects were discussed in great detail by Anderson whilst others were mentioned in brief. The Hillforts of the Tay project afforded the opportunity to revisit the assemblage, allowing reclassification of some items and re-appraisal of their function and date. The catalogue below presents descriptions of the extant artefact assemblage within National Museums of Scotland's collection. Only one item, a large portion of an iron blade interpreted by Anderson as a possible spearhead fragment (Christison and Anderson 1899: 32, hereafter abbreviated to Anderson with the page number) was not confidently located amongst the surviving assemblage. The copper alloy brooch (X.GP 30) survives but was not available

for analysis at the time of examination so the details provided below regarding its description draw heavily on Anderson's original observations. The individual items are referred to by the NMS accession number (= X.GP) Several iron objects have been accessioned under the same number (X.GP.40). These were presumably found as a group but this is not referenced by Anderson (1899).

Ceramics

(X.GP 55) Pottery sherds. Four sherds of coarse handmade pottery, potentially from four distinct vessels. (Anderson 1899: 33):

Sherd 1: plain, undecorated, thick body sherd produced from a very fine sandy-silty clay, fired hard and oxidised buff-brown with c. 30 % large angular grits (W 4–18 mm) of black/white crystalline rock, possibly dolerite or granodiorite. Grits protrude on internal surface but have been masked on exterior by the application of a thin slip, smoothed when wet with occasional organic swipe marks (?grass). Distinct diagonal coil junctions visible on fracture surface. L 59 W 48 T 26 mm. Wgt 59.7 g.

Sherd 2: plain, undecorated, body sherd from a thick-walled vessel, produced from a fine sandy-silty clay with c. 20 % of angular ?whinstone grits, some of which are quite large (max. D 7.5 x 12 mm; ave. D 8 mm). External surface slipped to mask grits but several protrude and surface surrounding these is cracked; interior smoothed when wet with a distinct finger-print visible. The exterior is oxidised white, the interior is a mid-brown colour and lightly stained from use. L 62 mm, W 60 mm, T 18 mm. Wgt 56.8 g.

Sherd 3: plain, undecorated, body sherd from a thick-walled vessel, produced from a medium sandy fabric with abraded and weathered surfaces and occasional, c.10 %, large angular granodiorite grits (max. W 17 mm; ave. W 7 mm). Fabric has fired hard with an oxidised external surface, mid-brown interior and core. Exterior smoothed when wet but no obvious slip. Vessel had a minimal intern. D of 160mm. L 55 mm, W 37 mm, T 18 mm. Wgt 40.8 g.

Sherd 4: large body sherd from a barrel- or bucket-shaped vessel, diagonal coil junctions seen on fractured edge. Produced from a fine sandy-silty clay with moderate quantities (c. 15 %) of angular grits dominated by whinstone rocks (max. W 11 mm; ave. W 8 mm). Sherd broken across a coil junction. Exterior smoothed when wet, possibly slipped, with frequent fingerprints visible on surfaces. Fabric has fired hard with oxidised exterior. L 85.5 mm, W 69.5 mm, T 15 mm. Wgt 91 g.

X.GP 24 Ball. Irregular ovoid ball of fired clay, incomplete. Approximately 60 % survives, one end having been broken and lost; the irregular fractured edge demonstrates ball consists of two superimposed

pieces of clay which have been moulded together, shaped and the surfaces smoothed to an even finish. The fabric is a fine sandy-silty untempered clay. A series of small indentations on the surface appear to be rodent teeth marks. Similar clay balls are known from Traprain Law, East Lothian (Curle and Cree 1916: 68, fig 40, 7), Clachard Craig, Fife (Close Brooks 1986: 165, no 105) and Moredun (McLaren, *supra*). (Anderson 1899: 33). Remaining L 34.5 mm, W 30 mm, T 25 mm. Wgt 26.4 g.

Bone and antler

(X.GP46) Antler handle. Hollowed cylindrical segment of antler tine or branch, surfaces pared with a knife blade to remove most of the rubicose surface texture with the exception of one narrow strip. Blade facets from working are present across the surfaces but have been softened from wear and handling; distinct chatter marks visible across the surfaces particularly towards the socketed end. Handle has split (post-excavation?) longitudinally from this end: one split runs the length of the handle, the other c. 27 mm from the narrower cut base. Terminal of the handle is convex (D 24.5 x 26 mm) with distinct knife/saw cuts around the periphery; the socketed end (D 22.5 mm) has more distinct knife/saw cuts around the periphery where it has been detached from the tine and the cancellous tissue hollowed out to accommodate a long rectangular-sectioned tang (D 10 x 12 mm; Dpt 28 mm). Interior of socket is iron-stained but also traces of copper-rich corrosion products around the aperture of socket. Surfaces highly polished from handling. (Anderson 1899: 31, fig. 15). L 79.5 mm. Wgt 52.1 g.

(X.GP48) Shed roe deer antler, unworked. L 153 mm.

(X.GP53) Pronged bone implement. Small mammal bone, naturally curving along length, proximal articular head has been removed and the bone split longitudinally exposing the hollow marrow cavity and the split end shaped into two curving narrow prongs which are worn asymmetrically, one to a narrow point (L 51 mm; W 9.5 mm), and the other rubbed down to a narrow stub (L 10 mm; W 6 mm). The distal articular head survives but appears worn from handling. L 173 mm.

Wood (Anne Crone)

(X.GP41) Fragment of a lathe-turned bowl. Only a chord of the original bowl survives but this includes the rim and some of the base. The fragment is 130 mm across and stands 36 mm high. It is estimated that the bowl may have been D 210 mm at the rim and was probably round-bottomed in profile. The bowl is 5 mm thick at the rim which is everted. The bowl displays a sharp shoulder some 10 mm below the

rim, at which point the walls thicken to 11 mm, before tapering away to 4 mm as the bowl curves under to the base. Just above the shoulder the bowl is pierced by a hole which now measures 3 x 4 mm across but was probably originally round. There are several concentric grooves on the internal surface, indicating that the bowl was lathe-turned.

(X.GP42) Fragment of lathe-turned lid. The maximum dimensions of the surviving fragment are 105 mm by 90 mm. The rim of the lid survives, and the current curvature suggests an original diameter of 180 mm; Anderson (1899: 32–3) estimated a diameter of 8 inches or 200 mm, the difference presumably because of the distortion caused by drying out. The rim of the lid is W 17 mm (Anderson 1899 reported $\frac{3}{4}$ inch or 18.75 mm) and Dpt 15 mm; it is curved in profile around the outer edge but is flat on both the upper and inner faces. On the interior the rim joins the body at a sharp angle and in that junction there are multiple fine concentric grooves indicating that it was lathe-turned. The body of the lid is 8 mm thick and in profile it would have been very shallow, possibly dome-shaped. It is the near vertical angle at which the rim meets the body that suggests a lid, but it is possible that it could have been a shallow platter.

Chipped stone

(X.GP25) Worked flint, cloudy grey-brown in colour, fractured surfaces. L 26 mm, W 17 mm, T 11 mm. Wgt 5 g.

(X.GP26) Worked flint, dark grey in colour, water-rounded cortex survives at one end. L 27.5 mm, T 19 mm, T 9 mm. Wgt 5.3 g.

Worked stone

(X.GP17) Stone lamp. Ovoid gneissose cobble, plano-convex in profile, damaged at one blunt rounded end, V-shaped scar at middle of long edge and cracked between two corners, probably the result of heat damage. A large but fairly shallow round-based hollow (73.5 x 64 mm; Dpth 24.5 mm) has been pecked into the upper surface. The surface of the cobble around the hollow is covered in dark staining and soot-rich residue. Extending from the edge of the hollow, off-centre, at the damaged end of the stone is a shallow, pecked, sub-circular notch (W 17 mm) probably to hold the wick. (Anderson 1899: 29–30, fig 12). L 137 mm, W 96–97.5 mm, T 60–78 mm.

(X.GP18) Stone lamp. Thick, sub-rectangular micaceous sandstone cobble, surfaces water-rounded with a deep, round-based, oval hollow (W 56 x 57.5 mm, Dpt 44.5 mm) pecked into the centre of one face. Interior of the hollow is fairly smooth with few toolmarks from production surviving. The rim and

external surface are sooted with some heat damage to the surfaces, and a band of black waxy residue adheres to the interior of the hollow just below the rim. Extending from the edge of hollow at one rounded corner is a crescent-shaped shallow notch (W 12 mm), probably for the wick. (Anderson 1899: 29–30, fig 13). L 111.5 mm, W 82.5–86.5 mm, T 62.5–65.5 mm.

(X.GP19) Ground stone axe. Narrow sub-rectangular axehead of green-grey calc-silicate hornfels banded in appearance with frequent natural sub-spherical pits across the surfaces. Narrow asymmetric bipartite blade (W 50 mm, H 29.5 mm), abraded to shape, convex in profile on both faces but severely chipped on oblique cutting edge from use. Flat faces, parallel long convex edges, both of which show irregular patches of damage. Butt end is narrow, blunt and squared, cut off obliquely by the natural cleavage of the stone overlain with a light sheen from handling/use. (Anderson 1899: 29, fig.11). L 103.5 mm; blade W 50 mm, H 29.5 mm, T 28.5; butt: W 46 mm, T 19.5 mm.

(X.GP20) Possible grinder. Triangular water-rounded cobble, fine green-grey, quartz-rich greywacke. Slight damage to each of the blunt narrow rounded corners, only one of which looks consistent with damage resulting from deliberate use, in the form of a convex abraded facet (9 x 20 mm). (Anderson 1899: 30). L 114.5 mm, W 76 mm, T 32 mm.

(X.GP21) Sandstone fragment, carved?. Thick, triangular-shaped, angular, fractured chunk of coarse-grained sandstone. All edges are broken and only one original surface survives which displays a series of five closely and evenly spaced parallel curvilinear grooves. Regularity and lack of distinctive toolmarks is suggestive of natural geological feature but this is not certain. Surviving L 68 mm, W 64.5 mm, T 48.5 mm.

(X.GP22) Shale burnisher. Irregular sub-rectangular block of shale or cannel coal, tapering in width and thickness at one end, opposite end naturally square with rounded corners, detached from a larger angular block. Blunt tapering point faceted from abrasion though rubbing and polishing, wear concentrated in convex facets on the more extensive faces, adjacent rounded corner and adjacent irregular oblique edge with less well-developed areas of abrasion observed on the opposite vertical edge and convex face. Towards centre of narrow, angular, stepped surface are a series of shallow gouge marks. (Anderson 1899: 30). L 139.5 mm, W 24.5–65.5 mm, T 33.5 mm.

(X.GP27) Shale ring-pendant. Circular in plan with ovate cross-section, D-shaped smoothed external surfaces and biconical interior with striations from production. One face is markedly more convex than the other but surfaces have even level of

sheen resulting from deliberate smoothing and use. Central aperture (D 23–24 mm) is not perfectly circular due to a concentration of wear in one discrete area. Similar to an example from Finavon, Angus (Childe 1935b: 76, fig 16). (Anderson 1899: 30, fig.14). D 45.5–46 mm, T 10–11 mm.

(X.GP28) Decorated shale bangle fragment. Segment of a dense cannel coal (slight wood grain-like structure visible on fractured ends), broken around the mid-section across an incised band that runs around the middle of the external surface; one end broken with a stepped angular fracture surface, the opposite end has broken cleanly. The surviving surface has a narrow-raised collar around the periphery of the edge and a series of equally spaced oblique grooves around the circumference making up a rope-like design. Fine striations from working are visible on the internal surface. Int. D c. 67 mm; ext. D c. 90 mm. (Anderson 1899: 30). Surviving L 55.5 mm, W 10 mm, H 9–9.5 mm.

Copper alloy

(X.GP29) Spiral finger ring. Very fine and delicate ring consisting of a thin, flat, bronze strip (W 3 mm, T 1 mm), tapering at both ends to a blunt narrow tip (W 2 mm), twisted around on itself three times. One 'face' of the ring is highly polished with a well-developed patina; opposite face is weathered and the polish has deteriorated. (Anderson 1899, 31, fig. 16). Ext. D 18.5 x 20 mm, Int. D 13 – 16 mm, T 14 mm. Wgt 7.4 g.

(X.GP30) La Tène I brooch. Substantially intact brooch consisting of a curving bow with integral catch plate and separate pin attached to the head of the bow by a looped spring with external chord. The catch plate is very shallow, only slightly taller than the pin itself and terminates in a narrow tip which curves upwards at an angle to the axis of the pin. The middle of the bow is decorated by a concave transverse moulding flanked with a line at each end. Anderson suggests that the tip of the bow would have terminated in a knob, now lost and that the brooch measured 2¼ inches (57 mm) in length (Anderson 1899: 32, fig. 17; Childe 1935b: 76). Not available for examination. Description drawn from Anderson 1899.

(X.GP31 and 32) Hemispherical mounts. Two small hemispherical bronze sheet metal perforated domes, possibly intended to conjoin. One is intact, the other is broken and only two fragments remain. Intact example is a small, rounded, almost flat-topped hollow dome with an irregular flattened flange around the periphery which has an irregular protrusion at one area of the edge which may be damage. Apex of the dome is perforated; circular hole (D 2.4 mm) made by piercing the sheet from

the exterior. The second example survives as two rejoining fragments, broken across the perforation, representing c. 65 % of the circumference. (Anderson 1899: 31). D 9.5 x 10.5 mm, H 3.5 mm, sheet T 0.2–0.5 mm.

Iron

- (X.GP35) Iron pin (?derivative of ring-headed pin). Short tapering circular-sectioned shank (D 4 mm), broken at narrowest end towards the tip. At the opposite end the iron rod has been bent at an acute angle to form a swan's neck, from which projects a short-flattened stub that appears to be the beginnings of a damaged head. Original form unknown but is reminiscent of a copper alloy example from Hammersmith, Middlesex (Dunning 1934: 273, fig.2 no 6). Surviving L 53 mm.
- (X.GP36) Ring-headed pin. Intact, produced from a fine circular-sectioned iron rod (D 3.5 mm), surfaces damaged by post-depositional corrosion. Large ring-shaped head (D 23 mm, H 25.5 mm) formed by looping the rod around on itself, the tip of which closely abuts the swan neck, kicking out slightly at the extreme tip. Below the neck, the elongated circular-sectioned shank is straight with no distinct taper. This is an early Iron Age type (Dunning 1934: 283, fig.7, no.1). L 98.5 mm.
- (X.GP37) Linchpin. Simple loop or ring-headed linchpin of Manning's (1985) type 1a, with robust sub-square sectioned shank (W 8.5 – 9 mm; T 9.5 mm) terminating in a squared tip. Below the looped head, the bar elegantly contracts in width (W 7 mm) but expands in thickness (T 12 mm) and is perforated transversely with a narrow rectangular slot (L 13 mm, W 3 mm) to facilitate a leather strap. Head L 124mm, W 30.5 mm, T 34 mm.
- (X.GP38) Spearhead/bolt. Substantially complete conical iron spearhead, tapering from open oval-shaped socket (D 21 mm) to narrow but blunt faceted tip. Socket has broken across a circular perforation (D 5 mm) 13 mm from open end resulting in the loss of one third of the circumference. Below perforation the tip has been hammered to create a lozenge cross-section, tapering to narrow tip (W 13 mm, T 9 mm). L 73.5 mm.

Several iron objects have been accessioned under the same number (X.GP40). These were presumably found as a group but this is not referenced by Anderson.

- (X.GP40) Intact iron comb or toothed scorer. Squat, flat, expanding blade, the long working edge (W 29 mm, T 3.5 mm) of which is serrated with sharp triangular teeth and curves strongly at almost right-angles

to the blade back (H 11 mm). Extending from the narrowest end of the tool is a short, rectangular-sectioned tang. L 64.5 mm; blade: L 25 mm; tang: L 39.5 W 4–7.5, T 4.5 mm.

- (X.GP40) Fine short chisel. Short iron bar, sub-square in cross-section expanding gently in width from a damaged narrow blunt head or tang (W 6.5 mm, T 6 mm) to a wider obliquely-angled tip, hammered on both faces to create a strong bipartite chisel-like blade (W 8 mm, T 3.5 mm) for fine working. L 44 mm.
- (X.GP40) Unidentified. Elongated, narrow and thin shard of an iron object, perhaps a ferrule suggested by the slight curvature of the short axis. L 48 mm, W 12.5 mm, T 3.5 mm.
- (X.GP40) Ferrule fragment. Approximately 55 % of the circumference of a short cylindrical or conical collar, slightly oval in plan rather than strictly cylindrical, broken across a square perforation (D 6.5 mm). Original edge of the open end of the socket survives but the opposite end has broken; original height of ferrule is unknown. Max. D 37 mm, min. D 30 mm; surviving H 32 mm; T 4 mm.
- (X.GP40) Possible re-worked knife blade fragment. Heavily damaged blade (W 17.5 mm, T 2–4 mm) with straight back and parallel cutting edge, triangular in cross-section, broken or cut squarely at mid-length resulting in the loss of the tip. Only broken stub of slightly off-centre rectangular tang survives (L 14.5 mm, W 8.5 mm, T 4.5 mm). Back of tang curves strongly creating a distinct shoulder and there is a distinct right-angled choil between the cutting edge and tang. The surviving surfaces of the blade and tang preserve mineralised organic and a small rectangular headed rivet (D 4.5 x 5.5 mm; H 9.5 mm) is present approx. 4 mm from the back of the blade, 6 mm from the shoulder, suggesting a repair to the handle which covered at least 20 mm of the blade beyond the shoulder, or re-working of the knife blade for a secondary purpose. Original length of blade is unknown. Surviving L 48 mm.
- (X.GP40) Conical ferrule or spearhead. Oval closed socket, (ext. D 19 x 21 mm, int. D 12 mm) which retains traces of possible mineralised organics, tapering to a narrow point (D 10 mm), the extreme tip of which has been lost as the result of corrosion. Iron heavily degraded and little original surface survives. Surviving L 69 mm.

Other

- (X.GP23) Coprolite, shards of bone visible. L 28.5 mm, W 28 mm, T 23.5 mm. Wgt 13.8 g.

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Despite a resurgence in Scottish fort studies, few sites have been investigated, and fewer still at the scale reported in this volume. Over 2014-17, Perth and Kinross Heritage Trust, working with AOC Archaeology Group, excavated three hilltop forts on the Tay estuary to explore both their enclosing works and internal buildings, and uncovered an impressive assemblage of small finds.

At Moredun fort on Moncreiffe Hill, a previously unknown monumental roundhouse, a rare La Tène bird-head brooch, and evidence of shale bangle industry were uncovered. At Castle Law, Abernethy, excavated in the 1890s and the type-site of Childe's 'Abernethy complex', re-excavation prompted reassessment of the artefacts from original excavations to reveal new evidence of the deposition of artefacts and animal bones within its cistern. Excavation of the enclosing works of these sites, and Moncreiffe fort, suggest an evolution of fort defences from simple earth and stone ramparts to massive timber-laced walls – the *murus Gallicus* described by Caesar – reflecting high status sites with restricted access for a social elite.

Hillforts of The Tay was part of the *Tay Landscape Partnership Scheme*, a community heritage initiative and the results of this citizen science project make a significant contribution to establishing Tayside as a well-studied area for the site type both within Scotland, and further afield.

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