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ARO51: A Bronze Age cemetery, Sawmill Field, Helensburgh, Argyll and Bute

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ARO51: A Bronze Age cemetery, Sawmill Field, Helensburgh, Argyll and Bute

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Summary

An early Bronze Age cemetery was discovered at Sawmill Field near Helensburgh in 2020. The remains of a kerbed cairn, three stone-lined cists with cremations, and six burial pits with pottery vessels and mostly with cremations, were excavated by a team of GUARD Archaeologists. The cairn and its kerb had been badly damaged by the breakage and removal of stones, probably through subsequent quarrying and ploughing; the cists had lost their permanent lids, and to some extent also their contents, again likely through ploughing.

The cemetery was located on a low terrace above the shoreline with a southern aspect. However, the recovery of flint tools dating from prior to 8400 BC indicate late Upper Palaeolithic or early Mesolithic activity at this site long preceding the cemetery. About 5,000 years later, in around 3,500 BC, a late Neolithic cairn was built with a curved kerb or façade of upright slabs either side of a stone-built burial chamber, and with possibly a standing stone, similar to other Clyde Group style cairns. The central part of the cairn was subsequently badly damaged and the chamber was dismantled and probably reused for the later cists.

From the middle third millennium to the middle/late second millennium BC, the remains of the cairn were targeted for a new type of burial – that of cremation, with remains enclosed in a stone-lined cist constructed below ground level. The oldest dated (2467 – 2290 BC) was Cist 2, which was built within the cairn behind its façade and covered by stones from the cairn. It contained no human remains when excavated, but fragments of pyre material were found in its fill. The burial of this material from the funeral pyre may have been sufficient to represent the dead (whether present or missing) and was therefore important it its own right in the burial customs.

Cist 1, the largest of the three cists, and Cist 3 were constructed at least three centuries later c. 2140 – 1930 BC in the Early Bronze Age: Cist 1 in the centre of the arc of the façade, and Cist 3 at its northern end. Both contained the cremated remains of at least two adults and a sub-adult, and the backfilling material of Cist 1 contained the remains of at least another adult, but no grave goods were found in them. However, the discovery of part of a Food Vessel in topsoil to the north-east of the cairn could indicate the original extent of the cairn or perhaps of other lost cists and the disturbance of their contents. The long span of time between these cist graves indicates the lasting memory of burials here, probably due to the prominence of the cairn itself or by a standing stone. The reuse of the burial place at different periods may have reinforced land ownership or connections to ancestors.

The place was revisited between 50 and 300 years after the cist burials, at a time in the first half of the second millennium BC when the burial rituals had changed again, to that of using a pottery vessel as a receptacle for the cremated remains then buried at the bottom of a pit. Most of the cremated remains that were found from this phase of use in the Early Bronze Age included one or two adults and a sub-adult together: a phenomenon not unusual for the time. The remains of at least 14 adults and 6 sub-adults were recovered from the cemetery but others may have been lost with the destruction of parts of the cairn. The remains represent multiple individuals that may have been cremated together and were collected and buried as part of the same rite. As with remains encountered in some earlier Neolithic chamber tombs, where only part of the skeletal remains were kept, there might have been more than a single place where cremated remains were deposited. Thus, the number of individuals identified during analysis only represents a minimum number. Furthermore, the incomplete nature of the remains does suggest that the rite of cremation and burial were more important than keeping/collecting and burying the person as whole.

This cemetery complex is not only chronologically diverse, it also reflects the differences in the burial rites and material culture. The pottery vessels could reflect the age, gender, social status or origin of the human remains that they contained, as well as changing ideas and influences over time. The burial of multiple people together, part of the same burial rite and possible part of the same cremation process indicates the importance of the cremation rite and the community rather than the individual and the preservation of its body as a whole.

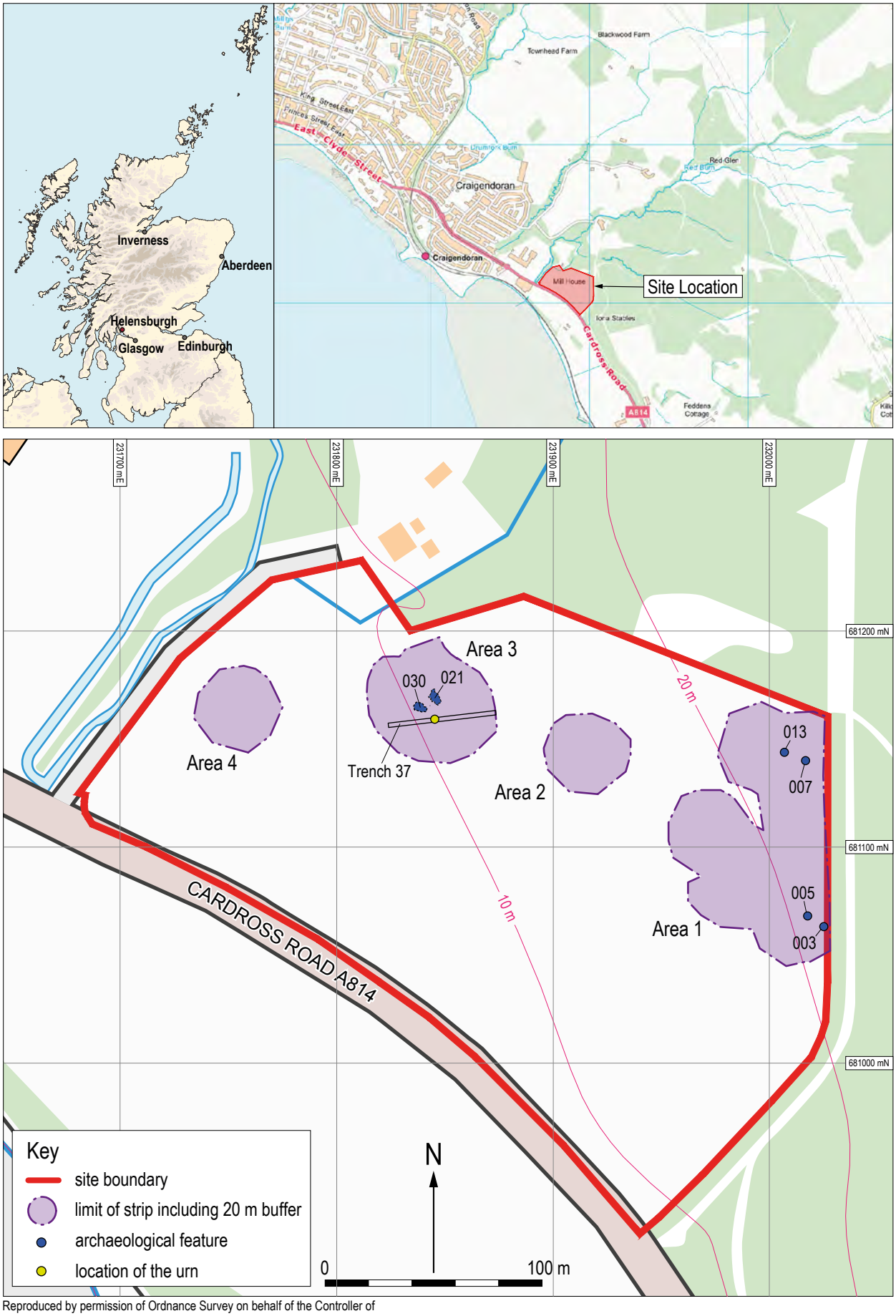

Figure 1: Location plan.

KEYWORDS: Upper Palaeolithic, early Mesolithic, late Mesolithic, Neolithic, early Bronze Age cemetery, cairn, cists, burial pits, cremation deposits, Food Vessel, urns.

Introduction

GUARD Archaeology Ltd was commissioned by Bellway Homes to undertake the excavation of archaeological remains first uncovered during an evaluation by trial trenching at the site of the development at Sawmill Field, Helensburgh (Ruiz-Nieto & Perez Fernandez 2020).

The site is located just above the coast at NGR: NS 3188 8110 (Figure 1), on a low terrace, between 10 m to 13 m above sea level. With good views to the south it also faces the confluence of Gare Loch and the Firth of Clyde. The single green field site is demarcated by Cardross Road to the south, a trackway, Red Burn, and the Hermitage Academy to the west, a farm to the north-east, and by woodland to the north and west. The site is situated on sedimentary bedrock overlain by raised marine deposits comprising well-draining sand and gravels (British Geological Survey 2022).

Archaeological background

A previous archaeological desk-based assessment (Atkinson 2005) revealed that the development site was most likely part of the Camis Eskan estate, which was established in the seventeenth century. An evaluation immediately to the west of the present site, prior to the construction of Hermitage Academy, identified features most likely relating to drainage, cultivation and planting in connection with the designed landscape within the Camis Eskan Estate in the first half of the nineteenth century (WoSAS Event ID: 3268). St Blaine's Chapel (Canmore 42501) is thought to have been located within or nearby to the Sawmill Field development site, although no trace of it remains today. The chapel was erected by 'an early Laird of Colgrain', which is now known as Camis Eskan (RCAHMS).

There are a number of prehistoric funerary monuments located in a 6 km radius. These include Cameron Home Farm cairn, a Scheduled Monument (SM3011), 360 m SW of the farm and located more than 5 km to the north-east of the present site. This cairn probably dates to the Bronze Age and is visible as an oval, flat-topped grass-covered mound of stony material measuring 30 m by 22 m and is c. 2.5 m in height. The monument is situated c. 100 m above sea level with views over Loch Lomond. Other cairns further east include Carman Muir, a group of cairns located on the break of a slope (CANMORE ID: 82243) c. 5.5 km to the SE, with another similar cairn also known as Carman Muir measuring 7 m in diameter and c. 1 m high (CANMORE ID: 82250). To the NNE, c. 4 km from the site, is the possible Bronze Age Bannachra circular cairn located at a height of 30 m OD on ground sloping towards the Fruin Water. It measures 20 m in diameter and 2.6 m in height as recorded. At Midross, Loch Lomond, c. 6 km to the NE, three urn burials and two cremations were uncovered and excavated between October and November 2003 (CANMORE ID: 281508). Finally, across the mouth of Gare Loch between Portkil Bay and Meikleross Bay, a Cinerary Urn was discovered around 1853 during ploughing. This find-spot, later reburied, lay on a broad natural terrace at the base of a short steep natural bank (CANMORE ID: 41434).

Results of the excavation

After the initial evaluation demonstrated that significant prehistoric archaeological features were present on the site, an excavation was carried out to identify and record all potential archaeology. The results of the excavation in Area 1, but mainly Area 3, are described below.

Mesolithic remains

Three isolated pits (003, 005, 007) and linear feature (013) with no apparent grouping were recorded on the eastern part of site Area 1 (Figure 1). Pits (003 and 005) were situated 10 m apart from each other, while pit (007) and linear feature (013) also c. 10 m apart from one another were located further north.

Analysis of the botanical remains identified possible domestic hearth waste in pits (003 and 005), from which a modern date of cal AD 1686–1926 (UBA-47667, 112 ± 22 BP) indicating recent disturbance of a much older feature. (Table 1). Pit (007) contained significant amounts of poorly preserved possible oak, smaller quantities of

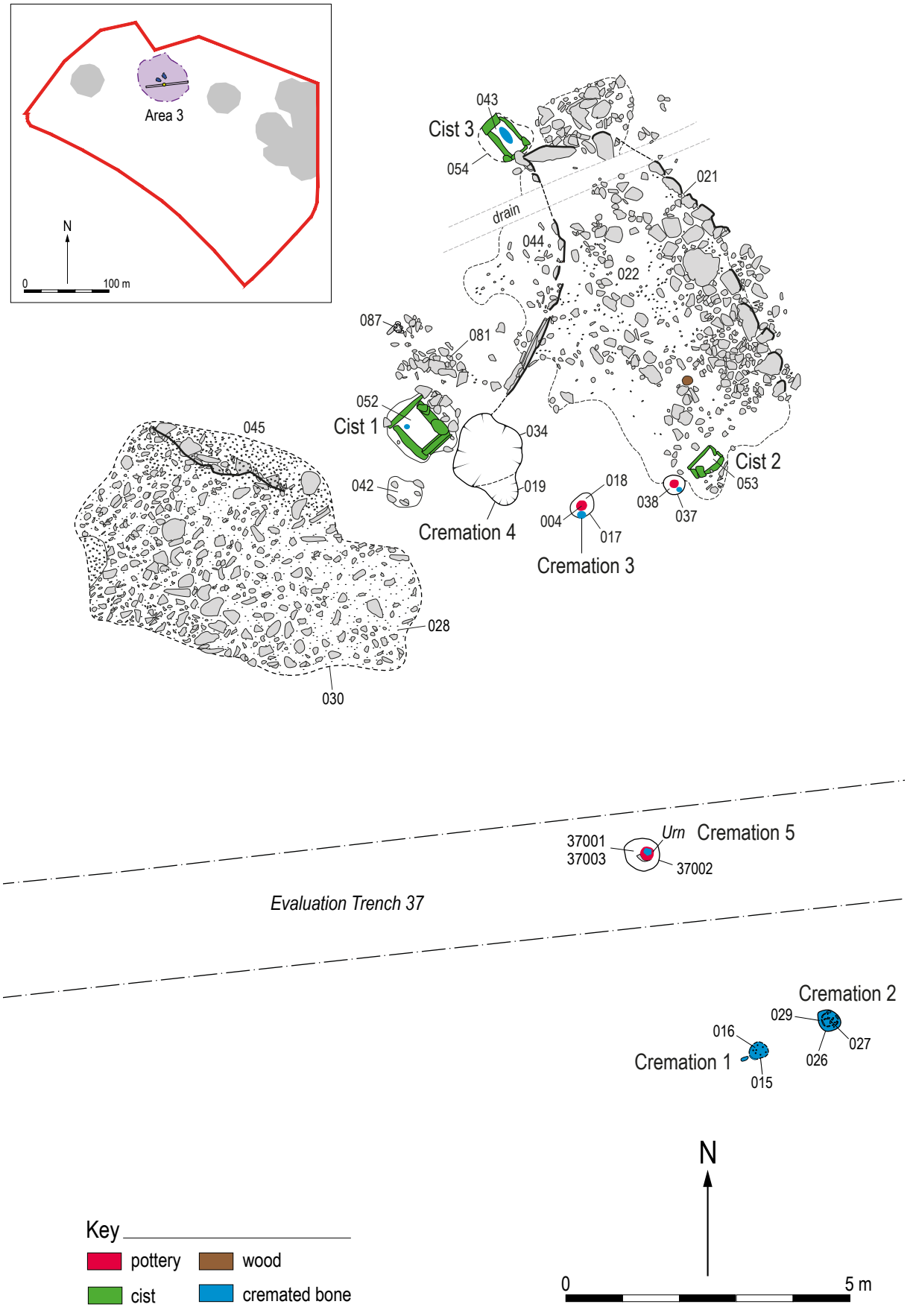

Figure 2: Plan of features in Area 3.

possible elm charcoal and traces of hazel nutshell. Radiocarbon dating of a hazel nutshell produced a late Mesolithic date of 7317–7040 cal BC (UBA-47668, 8123 ± 43 BP). The poor preservation of these botanical remains indicates that they were subject to high temperature burning or repeated burning. The fill (014) of linear feature (013) produced small amounts of hazel charcoal, but not enough to suggest the remains of a burnt hurdle or fence.

Most of the lithic assemblage consisting of water-rolled broadblades suggests similar dates to pit (007), the late Upper Palaeolithic or the early Mesolithic. Most of the lithics were either unstratified or found within the topsoil, and those found associated with features were intrusive and most likely include in their backfills (see Lithic analysis below).

Bronze Age funerary remains

Area 3 was located in the northern part of the site, where the Bronze Age funerary remains included three stone-lined cists and remains of a possible cairn, five burial pits with urned cremations and one burial pit with an un-urned cremation deposit and a miniature Collared Urn (Figure 2).

Figure 3: General view of Area 3. Taken from the west.

The cists

All three of the pits for the stone-lined cists were dug into the subsoil and were sub-rectangular or rectangular in shape (Figure 3).

Central to the burial complex was *Cist 1*, consisting of a large burial pit (039), measuring 1.30 m by 0.86 m by 0.65 m. The cist (052), orientated N/S, was built of four large stone slabs (046-049) supported with sand and gravel (040) infill to the pit sides. Levelling stones (051) on its eastern and northern sides (Figures 4 and 5) were similarly supported. The cist was overlain by dark sandy silt and gravel (041) with frequent stones, which were interpreted as the collapsed and shattered remains of a capping stone or stones. Cremated bone was recovered from within the internal sand and gravel fill (050) of the cist from which a total of three individuals, two adults and a sub-adult, were identified. Analysis of the cremation remains revealed an early Bronze Age date of 2138–1933 cal BC (UBA-47676, 3652 ± 33 BP).

The burial pit (086) of *Cist 2* was the smallest in size at 0.85 m in length by 0.77 m in width and 0.29 m in depth. It was located to the east of Cist 1 and towards the edge of the surviving cairn material (see below), and like the latter was orientated N/S. The cist (053) was constructed from roughly-dressed sandstone slabs (065-068) with packing stones (069) on its south-east and north-east sides, and it was backfilled with sand and gravel (090), but there were no surviving cap stones (Figures 6 and 5). It had a floor formed of flat and sub-angular stones (083), overlain by two different fills but no cremated remains or grave goods were recovered from within it. Carbonised remains of Maloideae (crab apple, rowan, hawthorn family) recovered from its lower fill provided an early Bronze Age date of 2467–2290 cal BC (UBA-47671, 3894 ± 29 BP).

The northernmost feature in the excavated area was *Cist 3*, comprising a burial pit (062) that contained a large sub-rectangular cist (043) orientated NW/SE. It was 1.1 m long by 0.9 m wide and 0.4 m deep, slightly smaller than Cist 1 described above. It was similarly constructed of four large upright slabs (055, 056, 058 and 060) placed within it and the void behind the slabs was infilled with sand and gravel (063) (Figures 7 and 5). Another three smaller stones (057, 059 and 061) sat directly on these four slabs to

Figure 4: Cist 1 after excavation. From the east.

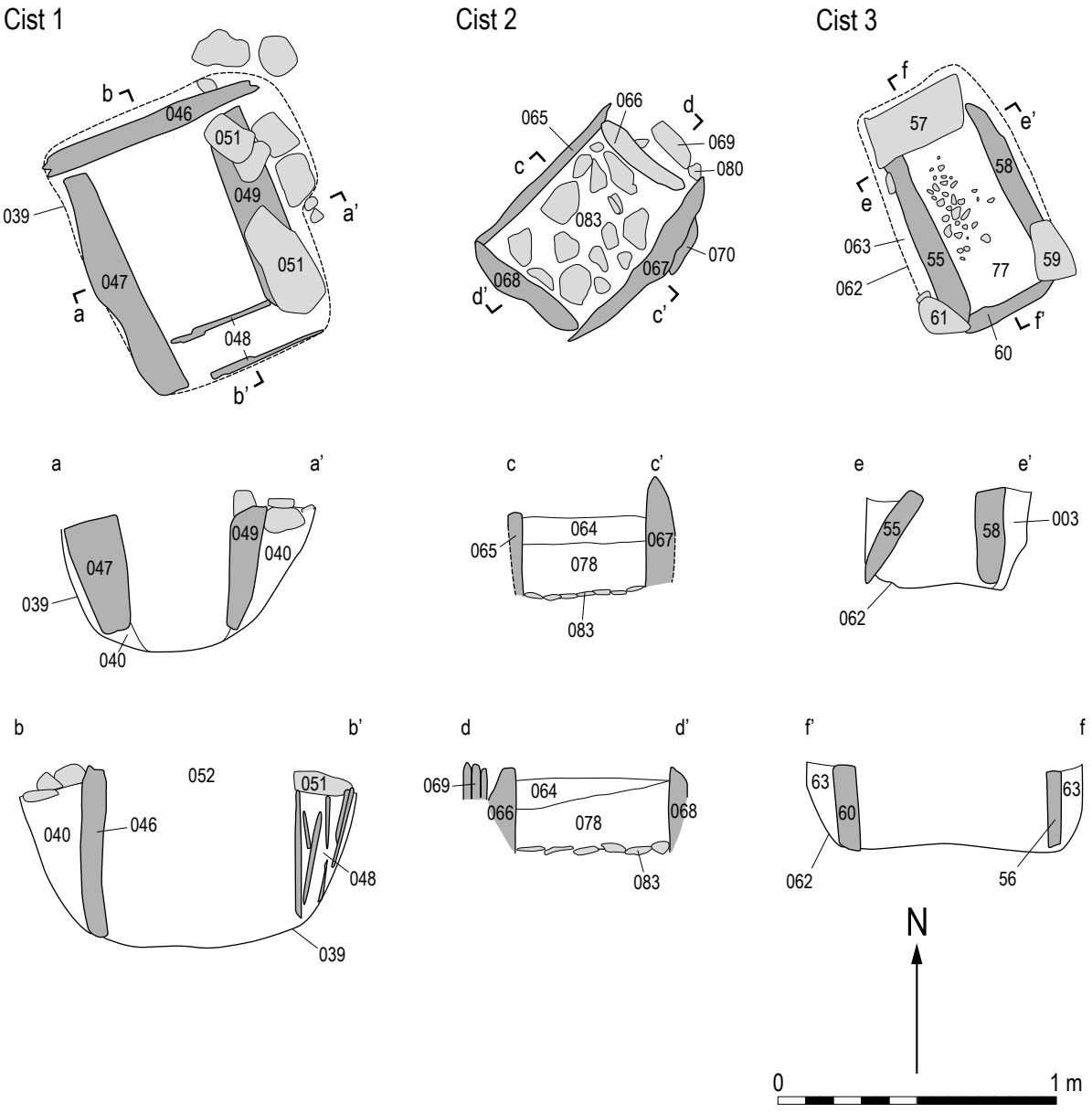

Figure 5: Plans and sections of cists 1, 2 and 3.

Figure 6: Cist 2 during excavation. From the east.

Figure 7: Cist 3 with contents. From the north-east.

level them to receive the capstone (054), which measured 0.99 m by 0.69 m by 0.07. A cremation deposit (077) was recovered from the centre of the cist floor and represented the remains of a minimum of three individuals, two adults and a sub-adult. Analysis of the remains indicated that some of the adult remains were of a possible male while others represented a possible female. Radiocarbon dating of the cremated bone provided an early Bronze Age date of 2136–1950 cal BC (UBA-47677, 3660 ± 26 BP).

Pit with urn

To the west of Cist 2, was a small sub-circular pit (037) (Figures 2 and 8) containing an intact miniature Collared Urn (Vessel 5) in its western portion, along with a scarce amount of cremated bone remains of either human or animal origin, and intrusive fragments of lithics (CAT 22 and CAT 31). Radiocarbon dates from alder charcoal revealed an early Bronze Age date for this pit of 1882–1689 cal BC (UBA-47670, 3459 ± 29 BP).

Figure 8: Pit 037 during excavation. From the east.

Curved stone features and the cairn

Intimately linked with the cists were the remains of a cairn and what has been interpreted as two halves of a curvilinear stone facade. The larger half (044) formed an arc that measured 3.40 m in length by 0.34 m in width and some of its stones survived up to 0.21 m in height from the ground surface (Figures 2 and 9). It commenced from the near the north-east side of Cist 1, and it continued north to end almost abutting one end of Cist 3. The second half of the feature (045), also formed an arc or a discontinuous extension of (044) (Figure 10), and it was located under the north extremity of an area of stone (030) forming the south-western part of the cairn. It measured 2.40 m in length by 0.34 m in width and individual stones survived up to 0.13 m in height. Situated two metres away from its east end was Cist 1, but there was no stratigraphic relationship between them or either of the cists. In fact, Cist 1 may have almost abutted the arc of stone in its SE quadrant if the feature had been continuous. Apart from Cist 1, the area within the arcs comprised natural sandy silt with small and medium stones (080 and 085).

Figure 9: Structure 044 before excavation. From south-east.

During the excavation, it was thought that the arcs of stone may have formed part of a curved structure (Figure 2 and 3), with the packing material in each suggesting that stone or wooden posts may have been positioned within them. The stones may have also formed a formal edge or kerb to a cairn (021 and 030), which comprised one course of angular to sub-angular sandstone slabs of different sizes mixed with sandy silt. Some of the stones to the NE are large enough to indicate that they may have formed a kerb (021). Much of the middle portion of the cairn had been removed by later activities (Figure 11), to such an extent that it is impossible to evaluate is shape and extent.

Figure 10: Curved structure 045 before excavation. From south-west.

Figure 11: General view of cairn material 022 and 030. From the west.

The NE cairn material (022) covered Cist 2 and burial pit (037) and 4 m to the south-west was another deposit of cairn material (030) composed of a similar accumulation of sandstone pieces and soil. Hazel (*Corylus*) charcoal from this material provided a radiocarbon date of 1896–1693 cal BC (UBA-47669, 3485 ± 34 BP).

Within the space delimited by the two curvilinear stone arcs, but lying centrally between them and 1.10 m from Cist 1 to the south, was a slab of stone interpreted during the excavation as a possible standing stone or marker stone (Figure 12). The slab, SF 050, measured 0.28 m in width by c. 0.05 m in thickness and survived 0.36 m in height. It was located within a circular pit filled with sandy gravel and supported by three medium-sized packing stones (089). The stone surface was considered to have been decorated with cup-marks but further examination identified them as fossils (pers. comm. Beverley Ballin Smith). The stone had derived from an interface zone between sandstone and fossiliferous limestone.

Figure 12: Standing stones pit 088. From the north.

Urned cremation burial pits

A total of five cremation burial pits with urns, including one from the evaluation phase, were excavated across the site (Figure 2). Two of them, burial pits (017 and 019) (Cremation 3 and 4 respectively), were located between Cists 1 and 2. Another set of two burial pits (015 and 026 Cremations 1 and 2 respectively) were located further to the south-east, c. 4.50 m from the first two cremations burial pits. The remaining cremation burial pit (37002) recovered during the evaluation, was located in between these two groups of cremation burial pits (Figure 2).

All the cremation burial pits were oval or sub-circular in plan and measured between 0.23 m to 0.71 m in length by 0.19 m to 0.6 m in width and were between 0.14 m and 0.35 m deep. They had similar fills of dark sand and gravel deposits with frequent charcoal and burnt bone inclusions. Most of them had inverted urns containing the cremated bones, with the exception of pit (019) where its highly fragmented urn was found in an upright position. No grave goods were retrieved from any of these burial pits other than the vessel which contained the cremation deposit and the possible bone artefact recovered within the cremation deposit in burial pit (37002).

Cremations 3 (017) and 4 (019) contained multiple burials within their funerary vessels. While at least a possible male adult, an indeterminate infant and an indeterminate young child were identified during analysis of the inverted Cordoned Urn (Vessel 3) of Cremation 3 (Figure 13), an adult and a sub-adult of indeterminate sex were identified in the urn in Cremation 4. This pit (019) was heavily truncated by a tree (034) on its north side (Figure 14). Its vessel (Vessel 4), described as an urn with a foot ring and placed upright was heavily fragmented by the tree and later agricultural activities on site. Analysis of the cremated bone retrieved from several samples and small finds from the fill of the tree-throw revealed the remains of at least one adult of indeterminate sex. Radiocarbon dating of the cremated remains from each of the burial pits provided early Bronze Age date ranges between 1890–1697 cal BC for Cremation 3 (UBA-47674, 3486 ± 30 BP) and 1877–1636 cal BC for Cremation 4 (UBA-47675, 3440 ± 26 BP).

Figure 13: Cremation 3 with vessel, during excavation. From the south-west.

Figure 14: Cremation 4 and tree-throw hollow. From the south.

Cremation 1 (015) contained a highly fragmented inverted Beaker (Vessel 1) from which the remains of at least an adult of indeterminate sex were recovered from its upper fill (Figure 15). Dating of the cremated bone revealed an early Bronze Age date between 1872–1627 cal BC (UBA-47672, 3426 ± 25 BP) (see Table 1). Cremation 2 located to its east contained a multiple cremation deposit of at least three individuals in a Collared Urn (Vessel 2) which was lifted whole during the excavation and excavated under laboratory conditions (Figure 16). The fully calcified remains including two adults, one of them a possible female and an indeterminate sub-adult, provided an early Bronze Age date between 1879–1547 BC (UBA-47673, 3414 ± 44 BP).

Figure 15: Cremation 1 prior to excavation. From the south-west.

Burial pit (37002) was found in isolation, in contrast to the other burial pits, which seem to be placed in pairs. The inverted urn was placed on top of a flat stone with another two smaller flat stones covering its base near the top of the pit. It was lifted whole from the site and its contents were excavated in laboratory conditions. Analysis of the cremated remains revealed at least two adults with one of them a possible male adult mixed with few animal bones and an artefact made of animal bone.

Figure 16: Cremation 2 prior to excavation. From the north-west.

Deposits and unstratified Food Vessel

Situated to either side of Cist 1, in an area heavily disturbed by tree roots, deposits (042 and 081) were recorded and excavated. Deposit (042) was dark orange sandy silt 0.13 m thick with fragments of bone, flint and quartz. A total of 74.5 g of cremated bone were recovered from it representing at least two individuals, a possible adult and sub-adult of indeterminate sex.

Deposit (081) comprised an accumulation of medium to small sized sub-angular sandstone fragments, measured 0.40 m by 0.30 m by 0.15 m in thickness, and was different in character. It was considered to be part of the cairn, similar to (021 and 030) that covered the area.

During topsoil stripping a number of unstratified sherds of a highly decorated tripartite Food Vessel (Vessel 6) were recovered north of cairn material (021) and Cist 3 (pers comm. Eddie Perez Fernandez). Although fragmented, the size and number of sherds allowed an almost complete reconstruction of the pot profile.

Specialist Reports

Although the concentration of archaeological activity in Area 3 is the focus of this publication, other areas of the project area have provided additional background material that aid understanding of wider landscape changes and activities. They are therefore included here.

Radiocarbon dating results

A total of eleven samples were selected for dating at the CHRONO Centre at Queens University, Belfast: two from pits in Area 1, including one cremation pit, and the remainder from the excavation in Area 3 from both cremations and other prehistoric features (Table 1).

Radiocarbon dating results evidenced three different phases during the use of Area 3 as a funerary complex. The oldest phase, dated to the mid/late third millennium was represented by isolated Cist 2. This phase was then followed, approximately two centuries later on the late third/early second millennium by the inclusion of two further cists containing cremations deposits of multiple individuals. The last phase represented by the cairn and the burial pits with urn and un-urned multiple cremations was dated to the late third/early second millennium BC.

UB No	Sample	Context	Material	Radiocarbon Age BP	Calibrated 1-sigma (68.3% probability)	Calibrated 2-sigma (95.4% probability)
UBA-47667	2	Area 1, 006 fill of pit 005	Alnus cf glutinosa	112 ± 22	cal AD 1695–1714 cal AD 1717–1725 cal AD 1811–1826 cal AD 1830–1838 cal AD 1843–1853 cal AD 1855–1862 cal AD 1866–1872 cal AD 1877–1899 cal AD 1903–1916	cal AD 1686–1731 cal AD 1686–1731
UBA-47668	3	Area 1, 008 fill of pit 007	Corylus avellana nutshell	8123 ± 43	7173–7157 cal BC 7145–7098 cal BC 7085–7052 cal BC 1878–1841 cal BC	7317–7267 cal BC 7260–7226 cal BC 7193–7040 cal BC
UBA-47669	13	Area 3, 028 cairn material	Corylus cf avellana	3485 ± 34	1825–1790 cal BC 1782–1749 cal BC	1896–1735 cal BC 1717–1693 cal BC
UBA-47670	20	Area 3, 038 fill of pit 037	Alnus cf glutinosa	3459 ± 29	1873–1845 cal BC 1818–1801 cal BC 1776–1740 cal BC	1882–1730 cal BC 1723–1689 cal BC
UBA-47671	29	Area 3, 078 deposit in Cist 2	Maloideae	3894 ± 29	2459–2394 cal BC 2389–2343 cal BC	2467–2290 cal BC
UBA-47672	6	Area 3, 016 fill of pit 015, Cremation 1	Cremated cortical bone	3426 ± 25	1863–1855 cal BC 1767–1758 cal BC 1751–1686 cal BC 1651–1645 cal BC	1872–1846 cal BC 1814–1805 cal BC 1774–1627 cal BC
UBA-47673	7	Area 3, 029 fill of pit 025, Cremation 2	Cremated cortical bone	3414 ± 44	1764–1761 cal BC 1749–1626 cal BC	1879–1840 cal BC 1826–1789 cal BC 1784–1611 cal BC 1575–1563 cal BC 1553–1547 cal BC
UBA-47674	16	Area 3, 018 fill of pit 017, Cremation 3	Cremated cortical bone	3486 ± 30	1878–1861 cal BC 1857–1841 cal BC 1825–1790 cal BC 1782–1765 cal BC 1760–1750 cal BC	1890–1739 cal BC 1713–1697 cal BC
UBA-47675	18	Area 3, 020 fill of pit 019, Cremation 4	Cremated cortical bone	3440 ± 26	1869–1849 cal BC 1771–1733 cal BC 1719–1691 cal BC	1877–1841 cal BC 1824–1794 cal BC 1780–1669 cal BC 1654–1636 cal BC
UBA-47676	24	Area 3, 050 internal fill of pit 039 for Cist 1	Cremated cortical bone	3652 ± 33	2125–2094 cal BC 2040–2007 cal BC 2004–1958 cal BC	2138–1933 cal BC
UBA-47677	25	Area 3, 077 Cremation deposit in Cist 3	Cremated cortical bone	3660 ± 26	2129–2090 cal BC 2043–2014 cal BC 1999–1976 cal BC	2136–2077 cal BC 2067–1950 cal BC

Table 1: The radiocarbon dates.

Botanical evidence

By Susan Ramsay

Introduction

This archaeobotanical report details the processing, analysis and interpretation of carbonised botanical remains recovered from samples taken during the excavations by GUARD Archaeology Ltd.

Methodology

Sample processing and macrofossil analysis

A total of 30 bulk samples were analysed for the presence of botanical remains. The bulk samples were processed by flotation, using standard methods and sieves of mesh diameter 1 mm and 500 µm for flots and 2 mm and 4 mm for retents from flotation.

Dried flots and sorted retents were examined using a binocular microscope at variable magnifications of x4 - x45. For each sample, estimation of the total volume of carbonised material >4 mm was made and all charcoal >4 mm was identified unless this proved impractical, in which case a known percentage of the charcoal was identified and this percentage is noted in the results tables. All carbonised cereals, seeds and other plant macrofossil remains were also removed and identified.

The testa characteristics of small seeds and the internal anatomical features of problematic charcoal fragments were further identified at x200 magnification using the reflected light of a metallurgical microscope. Reference was made to Schweingruber (1990) and Cappers *et al.* (2006) to aid identifications. Vascular plant nomenclature follows Stace (1997) except for cereals, which conform to the genetic classification of Zohary and Hopf (2000).

Results

Results are discussed in the same order as presented in the Data Structure Report (Ruiz-Nieto and Perez-Fernandez 2020) i.e. by area and then by feature groupings within each area. The full results tables are presented as Tables 2 and 3.

Area 1

Area 1 was located on the highest terrace in the north-east part of the site. Four negative cut features were excavated within this area.

Two sub-circular pits (003 and 005) were located in the south-east of Area 1. The fill (004) of pit (003) produced only a trace of hazel nutshell and indeterminate cinder, whilst the fill (006) of pit (005) produced traces of alder charcoal and indeterminate cinder. A sample of Alnus glutinosa (alder) from this fill returned a modern radiocarbon date of cal AD 1686–1926 (UBA-47667, 112 ± 22 BP). These carbonised assemblages may represent modern domestic hearth waste scatter across the site.

	Area	Area 1			
	Feature group	Negative cut features			
	Context	004	006	008	014
	Sample	001	002	003	004
	Description	Fill of possible pit (003)	Fill of possible small pit (005)	Fill of possible pit (007)	Fill of linear feature (013), slot 1
Volume of charcoal >4 mm		<2.5ml	<2.5ml	5ml	<2.5ml
Charcoal					
Alnus cf glutinosa	alder	-	2 (0.02g)	-	-
Corylus cf avellana	hazel	-	-	-	6 (0.09g)
cf Quercus spp	cf oak	-	-	22 (1.04g)	-
cf Ulmus spp	cf elm	-	-	7 (0.24g)	-
Indet cinder / coal	indet cinder	3 (0.07g)	1 (0.01g)	-	-
Seeds (carbonised)					
Corylus avellana nutshell	hazel nutshell	1 (0.02g)	-	2 (0.05g)	-

Table 2: Archaeobotanical remains from Area 1.

Table 3: Archaeobotanical remains from Area 3.

	Area	Area 3														
	Feature group	Funeral complex: Cist and pit with small vessels					Pit cremations cluster		Deposit	Cairn Material		Funeral: Curvilinear structures, standing stones & cists				
	Context	038	064	078	083	090	027	031	042	022	028	040	050	080	085	089
	Sample	020	028 (1A, 1B, 1C, 1D, 1E, 1F, upper middle)	029 1E, 4A, 4B, 4C, 4D, 4E	043	042	007	010	021	011 Qu4	013	019	023	026	040	041
	Description	Fill of pit (037)	Upper fill of cist (053)	Fill of cist (053)	Bottom deposit of cist (053)	Fill of cut (086) / cist (053)	Fill of cremation 2 (026)	Fill of cut (015) / beneath cremation 1	Deposit SE of cist (052) and E of cremation 4	Fill of cairn material (021) / quadrant 4	Fill of cairn material (030) / quadrant 3	Fill of cist (052)	Upper Fill of cist (052)	Fill of linear structure (045)	Fill of linear structure (044)	Fill of post hole or standing stone (087)
Vol charcoal >4 mm		30ml	5ml	<2.5ml	<<2.5ml	<<2.5ml	<2.5ml	<<2.5ml	<<2.5ml	2.5ml	<2.5ml	<<2.5ml	-	<2.5ml	<<2.5ml	-
Charcoal																
Alnus cf glutinosa	alder	17 (0.87g)	-	4 (0.03g)	-	-	-	-	-	-	-	-	-	-	-	-
Betula spp	birch	-	-	-	-	-	4 (0.13g)	-	-	-	-	-	-	-	-	-
cf Betula spp	cf birch	-	3 (<0.01g)	-	-	-	-	-	-	-	-	-	-	-	-	-
Corylus cf avellana	hazel	16 (0.66g)	1 (<0.01g)	-	-	1 (<0.01g)	-	-	-	-	1 (0.04g)	-	-	-	-	-
Maloideae	rowan type	-	10 (0.19g)	1 (0.02g)	-	-	-	-	-	-	-	-	-	-	-	-
Prunoideae	cherry type	-	1 (0.20g)	-	-	-	-	-	-	-	-	-	-	-	-	-
Quercus spp	oak	-	145 (0.70g)	-	-	-	-	-	-	2 (0.01g)	-	-	-	1 (0.01g)	-	-
cf Quercus spp	cf oak	-	2 (0.02g)	1 (<0.01g)	2 (<0.01g)	-	-	-	2 (0.01g)	-	-	-	-	-	-	-
Salix spp	willow	8 (0.30g)	5 (0.13g)	-	-	1 (<0.01g)	-	-	-	1 (<0.01g)	-	-	-	-	-	-
Ulmus spp	elm	70 (5.79g)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indet charcoal	indet charcoal	-	3 (<0.01g)	-	-	-	-	-	-	-	-	-	-	-	-	-
Indet cinder / coal	indet cinder	-	3 (0.04g)	-	-	-	-	1 (<0.01g)	1 (<0.01g)	2.5ml (1.33g)	2.5ml (1.04g)	5 (0.26g)	-	12 (0.12g)	2.5ml (0.72g)	-
Cereals (carbonised)																
Hordeum vulgare sl	barley	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Indet cereal	indet cereal	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-

A further circular pit (007) and a linear feature (013) were located in the north-west of Area 1. The charcoal assemblage from fill (008) of pit (007) contained significant amounts of possible oak and smaller quantities of possible elm charcoal, but the preservation was poor, suggesting high temperature burning or repeated burning. Traces of hazel nutshell were also recorded, radiocarbon dating of hazelnut shell from this fill was dated as 7317–7040 cal BC (UBA-47668, 8123 ± 43 BC), indicating late Mesolithic activity. The fill (014) of linear feature (013) produced small amounts of hazel charcoal, but not enough to suggest the remains of a burnt hazel hurdle or fence.

Area 3

Area 3 was located in the south-west of the site, on the lower terrace, where a Bronze Age cremation urn was uncovered during the archaeological evaluation of the site. The excavation revealed cairn material, two linear structures, three cists, four cremations and a possible pit, all of which are thought to be part of a Bronze Age funerary complex.

Cairn material

Two areas of cairn material (021 and 030) were discovered during excavation. The matrix (022) between the stones of cairn (021) produced only traces of oak, willow and cinder, while the matrix (028) between the stones of cairn (030) produced traces of hazel charcoal, cinder and a single carbonised barley grain. Hazel charcoal from this fill was submitted for radiocarbon dating and returned as 1896–1693 cal BC (UBA-47669, 3485 ± 34 BP), placing this burning activity in the early middle to latter part of the Bronze Age period. The quantities of charcoal recorded from these deposits of cairn material was very low and it is not possible to say whether it is directly related to the construction of the cairn or whether it may just be residual from earlier occupation on the site.

Curvilinear structures, standing stone and cists

A number of funerary features were located below cairn material (021 and 030). A curvilinear feature (044) was located under the west corner of cairn (021) but its fill (085) produced only traces of indeterminate cinder. A second curvilinear feature (045) was found under the north area of cairn (030). Its fill (080) produced a trace of oak charcoal and some indeterminate cinder. As with the cairn material, the carbonised assemblages from these curvilinear features does not indicate burning associated with the use/construction of these features and are more likely to be residual from earlier occupation.

The space defined by the two curvilinear features contained a possible standing stone located within a pit (088). The fill (089) of pit (088) did not produce any carbonised botanical remains.

Cist 1 (052) was located in the middle of Area 3, between the two curvilinear features. The cist was formed from four large upright slabs, within a pit (039). The pit was backfilled with sand and gravel (040), which contained only traces of indeterminate cinder. The internal fill (050) of the cist produced cremated bone, but no evidence for charcoal and only a single indeterminate cereal grain. It is unlikely that the cereal grain is related to the cist fill and is probably redeposited. The lack of charcoal in the cremation deposit suggests it was careful sorted before it was placed in the cist.

Funeral complex: cist and pit with small vessel

Cist 2 (053) was located under the southern corner of cairn material (021). The cist was formed from four slabs, with no evidence of a capstone. Its floor (083) produced only traces of possible oak charcoal. The slabs were contained within a pit (086) that was backfilled with sand and gravel (090) that produced traces of hazel and willow charcoal, suggesting that this charcoal is probably older than the construction of the cist. The inside of the cist contained two fills, (064 and 078). The lower fill (078) produced only small amounts of alder, rowan type and possible oak charcoal. A sample of Maloideae charcoal revealed a radiocarbon date of 2467–2290 cal BC (UBA-47671, 3894 ± 29 BP). The upper fill (064) produced a very diverse charcoal assemblage, although none of the charcoal types were present in large quantities. Charcoal recorded included cf birch, hazel, rowan type, cherry type, oak and willow, but no cremated bone was found in either fill.

To the west of this cist was a small, sub-circular pit (037) that was filled with sandy silt (038) with stones, charcoal and burnt bone. The charcoal assemblage was dominated by elm charcoal, with smaller amounts of alder, hazel and willow. Elm was also seen in pit (007) from Area 1 but is generally scarce in Scottish archaeobotanical assemblages. Alder charcoal from fill (038) produced a radiocarbon date of 1882–1689 cal BC (UBA- 47670, 3459 ± 29 BP) placing this feature in the early Bronze Age period.

Pit cremations cluster

A total of four cremations were located during excavation but only two were analysed for this report. Cremation 1 was contained within an oval pit (015). The lower fill (031) produced only traces of indeterminate cinder. No sample from the upper cremation deposit (016) (listed in the DSR as containing charcoal, bone and pottery) was available for analysis.

Cremation 2 was located within a small circular pit (026), beneath an inverted Bronze Age vessel SF 17. The fill (029) of the urn SF 17 produced only small amounts of birch charcoal, suggesting that the cremation deposit had been sorted prior to deposition.

Deposits

In the centre of Area 3 on its north side was deposit (042), which lay close to Cist 1, Cremation 4, standing stone (087) and cairns (021 and 030). It produced only traces of possible oak and cinder, again suggesting redeposited material from earlier occupation.

Discussion

The Data Structure Report suggests that the features in Area 1 may represent settlement activity, contrasting with funerary features in Area 3.

Most of the features from Area 1 produced only traces of charcoal with only pit (007) producing possible oak and elm charcoal. Although oak charcoal can often suggest the presence of structural remains, the addition of elm might suggest this is hearth waste of some kind. However, the presence of elm may indicate an earlier prehistoric date for this pit since pollen evidence suggests elm became relatively scarce in Scotland around 5500-6000 years ago (Ramsay and Dickson 1997). Some fragments of hazel nutshell were also identified from Area 1, which may indicate domestic occupation but the quantities of nutshell involved are very small.

The funerary features in Area 3 are thought to be Bronze Age in date, based on the urns and burial practices identified during excavation. However, little carbonised botanical material was recorded from these features. The majority of the funerary assemblages contained just traces of charcoal and cinder with no evidence that this material was specifically related to the funerary practices themselves. It is more likely that this charcoal is redeposited from earlier occupation on the site.

The only funerary features with significant charcoal assemblages were Cist 2 (053) and pit (037). The charcoal assemblage from the upper cist fill (064) suggests hearth material but it isn't clear why this would be present in the upper fill of the cist when no bone was present. If this is the remains of pyre fuel, this would imply the bone had disintegrated, although this did not happen elsewhere on the site. If this is not fuel from a cremation pyre then it may suggest that the remains of a fire associated in some way with the funerary ritual were deposited in the upper fill of the cist.

The fill (038) of pit (037) contained a mixed charcoal assemblage but with a very significant amount of elm was also present. As discussed above, elm is rare in the pollen record from central Scotland after 5500-6000 years ago (Elm decline) and so this may suggest these pit fills are early Neolithic or Mesolithic in date and significantly earlier than the Bronze Age funerary features.

Cremated bone analysis

By Iraia Arabaolaza

This report focuses on the cremated bone found across Area 3. In particular those cremated human remains recovered from two (Cists 1 and 3) of the three cists found on site and four cremation pits (015, 017, 019 and 026) as well as the cremated remains recovered within an inverted Collared Urn found during the evaluation works. Additional cremated remains recovered as small finds or samples were also analysed as well as those cremated remains recovered as retents during sample processing. Where possible the excavation of the human bone was carried out in spits of 25 mm thickness.

Methodology

The cremated bone was passed through stacked sieves with mesh sizes of 10 mm, 5 mm and 2 mm. All the bone over 10 mm and 5 mm was sorted into either specific or main skeletal elements where preservation allowed, then catalogued and weighed. Bone material less than 5 mm was visually inspected for any diagnostic skeletal elements and catalogued and weighed. The bone fragments were then weighted, and the largest and smallest bone fragments were measured to identify the range of fragment size. Some fragments were recorded as unidentified, i.e. those that could not be identified as specific or main skeletal elements. The bone from the < 2 mm fraction was scanned and any diagnostic fragments recorded.

The bone was recorded in accordance with the British Association of Biological Anthropologists and Osteoarchaeologists/Chartered Institute for Archaeologists standards for human bone analysis (Brickley and McKinlay 2004) and Historic Environment Scotland framework for the treatment of human remains in Archaeology (Historic Scotland Operational Policy Paper 5, 2006).

Preservation

The process of cremation is one of dehydration and oxidation of the organic component of the body. As it combusts the bone mineral re-crystallises resulting in bone shrinking, distorting and fracturing (Holden *et al.* 1995). As a result, cremated bone is more friable and susceptible to mechanical damage than un-burnt bone.

All of the bone within the present assemblage was assessed for preservation based on two criteria, its overall surface appearance and the percentage fraction size of each deposit. Factors influencing preservation include the original cremation ritual, the collection and the burial of the deposit. Post-depositional processes including weathering such as freeze/thaw, water percolation and mechanical compression from heavy machinery can result in surface changes and fragmentation to the bone. Other factors influencing bone preservation include the archaeologist's skill during excavation and subsequent handling of the bones following removal from the soil. All these factors can result in further bone deterioration and fragmentation.

Determination of species

The distinction between human and animal bone is more difficult when the bones have been cremated. This is due to the cremation process shrinking, warping, fragmenting and changing the colour of the bone. It therefore changes the main characteristics in which the identification is based such as the size, morphology, density, surface texture and colour of the bone (Gejvall 1963; McKinley 1989). Animal bone does, however, have a greater ratio of cortical to trabecular bone and the trabecular bone structure itself is finer thus allowing a determination of species.

Possible animal bone was identified together with human remains within cremation burial pits (37002), pit (017) (Cremation 3) and pit (026) (Cremation 2) while some remains from burial pit (037) were too small to differentiate between animal or human. All remains recovered from the retents were also unidentifiable and considered either animal or human.

Minimum number of individuals

The minimum number of individuals (MNI) was calculated by identifying any repeated skeletal element from the same side (left/right) or different age categories (see Table 4).

Location	MNI	Weight of cremations (g)	Age and sex	Burial type
Pit 37002, from evaluation (Cremation 5)	3	1971.9	Two adults (one possible male and one possible female. One is of Middle Adult age) and a possible sub-adult of indeterminate sex	Burial pit with cremation within inverted vessel, underneath the cremation vessel fragments of a Beaker were found
Cist 043 (Cist 3)	3	1651.1	Two adults (one possible male and one possible female. One is of Middle Adult age) and a possible sub-adult of indeterminate sex	Cremation deposit inside capped cist, no grave goods
Cist 052 main fill 050 (Cist 1)	3	2827.6	Two adults (one male) and a sub adult 6 years of age +/- 24 months of indeterminate sex	Cremation deposit inside capped cist, no grave goods
Cist 052 backfill (Cist 1)	1	36.4	An adult of indeterminate sex	Cremation deposit inside capped cist, no grave goods
Pit 37 (Cremation 5)	1	2.7	A possible adult of indeterminate sex	Burial pit, cremation within fill associated with grave good - small upright accessory vessel
Cremation pit 015 (Cremation 1)	1	140.2	A possible adult of indeterminate sex	Burial pit with inverted cremation vessel but only 30% of it, disturbed
Cremation pit 026 (Cremation 2)	3	3541.4	Two adults (one possibly female) and indeterminate sub-adult	Burial pit with cremation inside inverted vessel
Cremation pit 017 (Cremation 3)	3	855.5	One adult and two possible sub-adults. The adult was a Middle Adult age (35-50 years old), possibly male. One sub-adult was between 4 and 6 years of age, and the other an infant between birth and 1 year old	Burial pit with cremation inside inverted vessel
Cremation pit 019 (Cremation 4)	2	111.2	An adult and a possible sub-adult, both of indeterminate sex	Burial pit with cremation, only base of vessel preserved, very disturbed by tree
Deposit by cairn	2	74.5	An adult and a sub-adult both of indeterminate sex	Deposit found 0.40 m south-east of cist 052 and 1.20 m to the east of Cremation 4
Totals	22	9240.6		

Table 4: MNI and cremation weights.

Age at death

The methods employed in the determination of age at death in cremated remains are the same as those used on inhumation: dental eruption and epiphyseal fusion in sub-adult remains and degenerative changes in auricular surface, pubic symphysis and sternal rib ends and cranial suture closure in adult remains (Bass 2005; Brooks & Suchey 1990; Buisktra & Ubelaker 1994; Lovejoy et al. 1985; Meindl & Lovejoy 1989; Scheuer & Black 2004).

Very few of these methods were applicable to the cremated bones discussed below, due to the lack of preservation and conservation of the skeletal elements. Consequently, the different age categories identified in these cremated remains were based largely on observations of the size and thickness of fragments of skull and of cortical bone, as well as epiphyseal fusion and dental development. Even though these observations can be quite problematic, since the bone elements can shrink up to 15% during the cremation process, different age categories were identified on the cremated remains recovered from several contexts. The main age category was either adult or sub-adult, although when preservation allowed further age categories were used. Adult refers to individuals older than 18 years of age while sub-adult refers to any individual less than 18 years of age (see Table 5). This differentiation was based on the cranial size and thickness and cortical bone thickness. However when preservation allowed, dental development and epiphyseal fusion as well as degenerative changes on the auricular surface were also use to determine the age at death of the remains.

Categories	Age
Foetus	< birth
Infant	b – 3 years
Child	3 – 12 years
Adolescent (AO)	12 – 20 years
Young Adult (Yad)	20-35 years
Middle Adult (Mad)	35-50 years
Old Adults	50 years +
Sub-adult	Refers to any individual less than 18 years of age
Adult	Individuals of adult size and development where no more precise indicators of age are present

Table 5: Age categories (based on Buisktra and Ubelaker 1994).

Biological sex determination

The sex determination of human remains is based on pelvic and cranial morphology, and post cranial metric data. Two biological markers were identified on two different fragments of frontal bone in cremation pit (017), which suggested a possible male sex for these remains, while pubic symphysis recovered from cremation pit (026) indicated a possible female sex. Further biological markers were observed in the remains in Cist 3, were a possible female and a possible male were determined based on morphological traits visible on the frontal bones, and in Cist 1, were a male sex was recorded based on the nuchal crest from a occipital bone and orbital margin of a frontal bone. A possible female sex was determined based on the femoral head measurement and a possible male was identified based on the morphological traits of the greater sciatic notch of the pelvis and the nuchal crest from a occipital bone in pit (37002).

Non-metric traits

The non-metric traits, as their name indicates are not measurable traits, and are simply recorded as present or absent. Some of them are related to genetic causes while others are thought to be linked with the environment, occupation and lifestyle. Consequently, they are generally used to identify and compare different genetic groups.

A single cranial ossicle was recorded in spit 3 of cremation pit (017) as well as in spit 9F of Cist 1, which suggests a non-metric trait. However, as both of them were found in isolation without an associated skull fragment, its exact location on the skull was not possible to determine. A metopic suture (SF 003) was visible on the frontal bone fragment recovered from cremation pit (017).

Pathology

Evidence of disease or trauma can be identified on cremated bone although differential diagnosis is made more difficult due to the very fragmented nature of the remains. Surface erosion and none or only partial survival of the appropriate skeletal element can also hinder diagnosis of any pathological condition. Studies have shown that certain disease groups and trauma have been recorded from cremated bone. These include degenerative joint disease, dental disease and infections including periostitis and osteomyelitis. All the bone within the assemblage was observed for evidence of pathology.

Some degenerative changes in form of porosity were visible in a distal femoral joint surface (knee joint), and osteophytes were present in a possible vertebral articular facet (spine), the distal joint surface of a metacarpal (hand/finger joint) and the iliac spine of a pelvis fragment from Cremation 3 recovered from cremation pit (017). Dental pathology was also observed in Cremation 3, a labial caries was identified in maxillary second premolar between the junction of the enamel and the root as well as a groove dental enamel hypoplasia (DEH hereafter) and possible pitting of the enamel (Figure 17). A possible buccal abscess was also recorded on a left mandibular fragment recovered from cremation 3, close to the second deciduous molar.

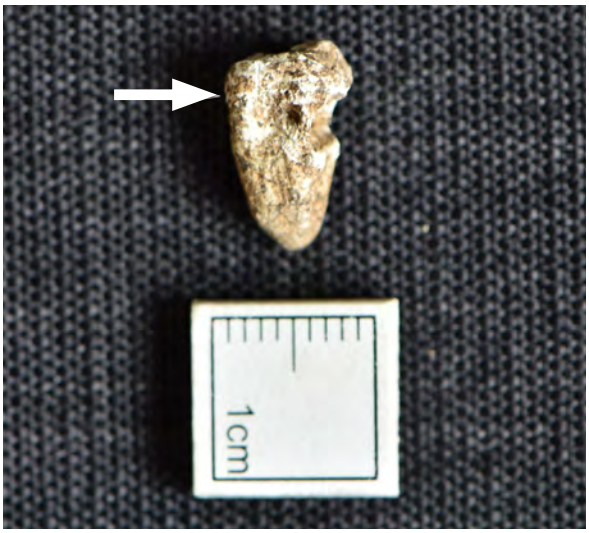

Figure 17: Cremation 3 - dental enamel hypoplasia and possible pitting of the enamel.

Although no degenerative changes were observed, abnormal shape was noted on the dens of an adult axis vertebra in Cremation 2, burial pit (026). Slight Schmorld nodes were also recorded on inferior aspect of three middle/ lower thoracic vertebrae as well as a possible compressed fracture on the body of one of them (Figure 18). An unidentified lumbar vertebra's body was recorded as having more pronounce concavity on its inferior anterior aspect too in pit (37002) suggesting a possible degeneration of the vertebral disc. While a thoracic vertebra from the same burial presented a Schmorl's node, a common spinal disc herniation.

Figure 18: Cremation 2 - possible compressed fracture of unidentified thoracic vertebra.

Degenerative changes were also observable as osteophytes in an undetermined vertebral body and at the anterior aspect of dens of axis recovered within Cist 1 (Figure 19), indicating spinal joint disease.

Figure 19: Cist 1 - evidence of spinal joint disease.

Cremation process and mortuary practice

The colour of the bone from each context was recorded as this can give some indication on the temperature in which the bones were burnt. The colour range varies from brown/orange (unburnt), to black (charred; c. 300°C), blue and grey (up to c. 600°C) to the fully oxidised white (>c. 600°C) (Shipman *et al.* 1984). In this assemblage the bones were mostly white, although some occasional light grey/ blue coloured bones were recorded too. This range indicates that the bones were subjected to a temperature between 645°C and <940°C. Most of the grey/blue colours recorded were visible either in the trabecular or interior of the bone, although some were also recorded in the outer surfaces of some, which indicates their exposure to a lower temperature in the pyre.

Most of the cremated bone showed surface cracking, with transverse cracks and U-shaped cracks noted along long bone shafts. Some warping was also noted on occasional bones in Cremation 3 pit (017) and Cists 1 and 3, while a note of one bone was made in Cremation 2. These cracks indicate that when the bone was cremated it was still "green" or covered with flesh (Buisktra & Ubelaker 1994). However vertical splitting was also noted which is often indicative of the bones being dry or without flesh when the cremation occurred although irregular vertical splitting, has also been noted in "green" bones (Buisktra & Ubelaker 1994). Slight erosion was also noted on several of the cremation remains across all the studied cremations.

The total weight of the cremated bone found in each context varied depending on the burial deposition as well as later disturbance either by truncation or bioturbation of the site. As indicated by McKinley (1993) the average weight of a modern complete cremated skeleton is 1615.7 g for a female and 2283.5 g for a male. Although, some of the cremations deposited within pit (026) (Cremation 2 weighed 3367.6 g), pit (37002) (1971.9 g) and both Cists 1 and 3 (2827.6 g and 1651.1 g respectively) were either similar or exceeded the average weight of a complete adult cremation, all these were multiple cremation deposits and as such were just a small fraction of the average weight. This suggests that all cremated bone found on this

site had been selected, re-deposited and move from their original pyre sites into pits and cists.

The smaller average weight of the bones as well as the absence or small number of some of the elements is a common trait in some Bronze Age cremations. It could be due to few causes: taphonomic agents, secondary deposition of the remains after their initial cremation and the possible selection of certain bones or by an unintentional avoidance of some fragments, maybe due to their size, when collecting them. McKinley also states the possibility of another (or more) "unknown location" for this bone, i.e. somewhere other than the burial place, or the pyre site. It compares with ethnographic evidence from the nineteenth century Aborigines, where cremated bone was given to mourners as keepsakes (McKinley 1997). The small cremation deposit recovered from pit (037), only 2.7 g of cremated bone was recovered along with grave goods, could be explained as a 'token deposition'.

Animal bone fragments were identified in burial pit (37002), pit (017) (Cremation 3) and pit (026) (Cremation 2) while some remains from burial pit (037) were unidentifiable and recorded as either human or animal in nature. It is unknown whether these animal bones were part of the cremation process and burnt alongside the corpse or added later as part of deposition and burial, or even later intrusion from an unrelated feature. A possible pyre good, a worked animal bone artefact possibly made from a radial shaft of an Ovis/Sheep, was recovered during analysis of the urned cremation from pit (37002) (Figure 20). The cremated bone artefact, possibly a scoop, was cut and trimmed so that the shaft of the bone became a tapering handle and the head of the bone a rough asymmetrical bowl. It measures 72 mm in length and 20 mm in width. Although the piece is heavily calcined the shaft was relatively smooth and the edges of the bowl were rounded and its tip was worn. The evidence suggests that this piece may have been used as part of the cremation rituals, placed on the cremation itself and later deliberately recovered and deposited with the human remains in the urn, thus becoming a grave good. No pyre sites were observed during excavation although recent research by Henriksen (2019) notes the lack of physical evidence for burning during reconstruction cremation experiments using pig carcasses.

Results of the analysis

Eight cremation features were identified during excavation at the Area 3 in Sawmill field. They were either found within graves - Cists 1 and 2 or within cremation pits (015, 017, 019, 026 and 037). The inverted urn found in Trench 37 during the evaluation is also included in the results of this analysis. All these are described in detail here. Further cremation remains were also recovered from retents during the sample processing, however most they were unidentifiable and recorded as either human or animal bone.

Figure 20: Animal bone scoop or spatula.

Cist 1 was located at the centre of Area 3 between curvilinear features (044 and 045), just southwest of Cist 3. Fragments of cremated bone were recovered from its backfill (040) material and its internal fill (050). A small amount of cremated bone was recovered and recorded as small finds SF 051 and SF 052 from its backfill (040). A total of 14.5 g and 21.9 g of cremated bone was retrieved from these small finds respectively and the skeletal remains included mostly skull and cortical bone fragments. However a single fragment of an articular facet of a possible thoracic vertebra was also identified in SF 051. A minimum number of an adult of indeterminate sex was identified in both these remains. The bone appeared completely calcined, apart from sporadic blue/grey colour recorded in the interior of one of the cortical bones in SF 051 which indicates that it was exposed to a lower temperature. Cracks, some of them diagonal, vertical and horizontal were observed along with slight erosion.

The main cremation deposit was concentrated on the main cist fill (050). The cremation deposit recovered in spits as sample (024) weighted 2827.6 grams in total. Most of the skeletal elements were recorded including skull, lower and upper limb, vertebrae and ribs and teeth roots and crowns. A minimum number of three individuals, two adults and a child were observed based on repeated skeletal elements, unfused epiphysis and dental development. Moreover, a male sex was determined for one of the adults based on a nuchal crest, and a possible male based on an orbital margin. Degenerative changes associated with spinal joint disease were visible in an unidentified vertebral body and the articular facet of the second cervical vertebra. These changes can lead to the most frequently identified disease in any archaeological population, osteoarthritis. There are two types of osteoarthritis, primary osteoarthritis whose aetiology is multifactorial, the most common causes being age, repetitive biomechanical stress and trauma, and secondary osteoarthritis caused as a result of other pathological conditions (Ortner 2003). Due to the fragmentary nature of the cremated remains it was not possible to determine the cause of these degenerative changes.

Cist 2, located underneath the southern corner of cairn (021) did not revealed any cremated remains. To the west of the cist, cremation pit (037) was located. A small intact decorated vessel SF 043 and a lithic fragment SF 044 were recovered within this pit along some cremated bones. Analysis of the cremated bone retrieved from the pit fill (038) revealed a very small cremation weighing only 2.7 g from which cortical bone fragments of a possible adult of indeterminate sex along with other unidentifiable cremated bone fragments were identified.

Cist 3 contained cremation deposit (077) in the centre of its floor. A total of 1651.1 g of cremated bone were retrieved from this cist representing at least three individuals, two adults and a sub-adult based on the different skull size and repeated skeletal elements. Based on a fragment of auricular surface a possible Middle Adult age category was determined for an individual. Sexual dimorphic bones present at various frontal bones indicated a possible female (based on orbital margin) and possible male (based on orbital margin and glabella). Most of the bone was white in colour with occasional bones presenting light grey/blue colouring mainly in the interior of the bone and few showing green and orange/rusty stains. Those with orange/rusty colour had what appeared to be calcified surfaces too, which it might suggests that they were result of taphonomic changes occurred following interment (Figure 21). Some U-shaped cracks and horizontal cracks were recorded on the cremated bone surfaces with slight surface erosion and longitudinal cracks noted too, which suggests that when the bone was cremated it was still “green” or covered with flesh.

Figure 21: Sacral bone fragment showing calcification.

Further west, cremation pits (017 and 019), both of them with remains of funerary vessels were encountered. Cremation pit (017) (*Cremation 3*) had an inverted vessel at its centre. Most of the cremated remains were recovered in spits from within this vessel SF 004, with a further 49.3 grams of cremated bone were recovered as SF 003. Based on dental development and the size of the certain skeletal elements, at least three individuals, a possible adult and two possible sub-adults were identified in this cremation. The dental development of the sub-adults suggested that one of them was a younger child between 4 and 6 years of age while the other was an infant between birth to 1 year of age. The age of the adult remains were also tentatively determined based on an incomplete auricular surface which indicated a Middle Adult age (between 35-50 years). Sexual dimorphic traits were visible on two fragments of frontal bone, indicating a possible male sex for some of the remains (Figure 22). Most of the skeletal elements were identified along the whole sample which weight 855.5 grams.

Figure 22: Sexual dimorphic traits on a frontal bone, indicating a possible male sex.

The weight of all cremated bone recovered from cremation pit (019) (*Cremation 4*) and placed in an urn positioned upright was significantly lower at 71.1 grams. This pit was heavily truncated by a tree at its north side from which further cremated bone, 40.1 grams, was also recovered. The identified skeletal elements recorded were mostly limb cortical bone fragments with few skull fragments with the rest being unidentifiable remains. A minimum number of two individuals, an adult and a possible sub-adult were identified in this cremation deposit based on the skull size and thickness.

Approximately 4.5 m south-west of these cremation pits another pair of cremation pits (015 and 026) were identified. Cremation deposit (016) (*Cremation 1*) was located in the upper fill of pit (015), along with the fragmentary remains of an inverted urn (SF 012 and SF 013). A total of 140.2 grams of cremated remains were collected from this fill as a sample. The remains were identified as a possible adult of indeterminate sex, with all the skeletal elements represented throughout the spits.

Located adjacent to cremation pit (015), was cremation pit (026) (*Cremation 2*) also with an inverted urn. A total of 3,367.6 grams of cremated remains were recovered from its main deposit (029) with a further 173.8 grams retrieved from fill (027). The minimum number of individuals from this cremation was calculated as three individuals. This was determined based on repeated skeletal elements from the same side (left/right), two sets of left hamate as well as two sets of right atlas were identified in it suggesting at least two adult individuals, with a further sub-adult individual indicated by the smaller size of a vertebra.

The urn recovered during the evaluation was located half way between cremation pits (017 and 019) and pits (015 and 026). A minimum number of two adults and a sub-adult were calculated in this cremation, based on repeated skeletal elements, two sets of lateral cuneiforms and petrous bones and smaller size of a rib bone. Some of the remains were identified as a possible adult male, based on the greater sciatic notch and the nuchal crest from an occipital bone. While the articular surface of a pelvic fragment provided a Middle Adult age ranging between 35 – 39 years. A measurement taken from the femoral head suggested a possible female sex, however as the bone shrinks during cremation this result can be misleading. A total of 1971.9 g of cremated human remains were recovered from this cremation deposit. The remains mixed throughout the spits with gravel and pebbles, represented all the skeletal elements and included remains of animal bone. An artefact made of animal bone was also recovered within the deposit.

Further cremated remains totalling 74.5 g were retrieved from deposit (042), located south-east of Cist 1. A minimum number of two individuals were determined during the analysis of these remains, an adult and a sub-adult both of indeterminate sex.

Discussion

The treatment of the dead varied during the prehistory, ranging from crouched inhumations in cist burials to urned or un-urned cremations, either as isolated features or as part of a burial complex. At Sawmill Field the preferred burial rite appears to have been cremation, either deposited in stone-lined cists with capping stones or within vessels in small burial pits. The presence of all these features and grave goods associated with funerary rites indicates the use of this area as a cemetery complex.

Most bones within the assemblage were fully oxidised with temperatures over 600°C attained during the firing process. It suggests that the corpse was positioned on the pyre stack where heat and oxygen would have circulated most freely, and combustion would have been complete rather than partial. The few bones that were noted to be grey/blue were generally on the internal area of the bones that would have been subject to less heat. Green stains were recorded in some of the bones from pits (15, 17, 26, 37002) and Cists 1 and 3. Similar stains had also been found in other sites as at Crantit (Roberts 2001) and Sannox Quarry, Isle of Arran (Arabaolaza 2012). The stains could be indicative of copper alloy-based items in contact with the bone when burning (Buisktra & Ubelaker 1994). The orange rusty colour recorded in pit (019), Cist 1 and particularly Cist 3 in some cases in association with possible calcification were thought to be the result of taphonomic changes that occur after burial.

All the bone assemblages retrieved from Sawmill Field have substantially fewer bones than that weighed in the average modern cremation (see above), indicating that none of the cremation remains were complete burials. This lack of completeness is even more apparent in those cremation depositions which comprised the remains of more than one individual. The incompleteness of burials, particularly so with cremations, is often assumed to be due to non-survival of the bone either as the result of human pre-burial actions and/or post-depositional decomposition processes. The latter include how effective the combustion process was, the sorting and collecting of the bones post-burning from the collapsed pyre material, and the burial conditions with weathering, such as freeze/thaw and the soil chemical properties. These are significant factors in bone erosion. Excavation and handling of the bones after lifting are also further significant factors. Research by Henrikson (2019, 294) on reconstructed pyres using pig carcasses has postulated that the collection of bone following the cremation process is easier than envisaged and complete collection of body parts is achievable in a relatively short amount of time. He suggests, as others do, that the incomplete body parts found within a single burial is a deliberate choice made by those collecting, rather than post-depositional processes or the increased effectiveness of the combustion method resulting in fewer bones surviving. These burials have been described as 'token' burials with the burial 'rite' or rites more important than the burial itself. The small cremation deposit from burial pit 037 found together with an intact vessel and a lithic artefact suggests that this was a token deposit placed together with other grave goods, but it might have had the same purpose as a complete burial.

The lack of pyre material on site indicates that the cremations were secondary depositions rather than primary burials and were deposited away from their pyre location. Their collection and placement in urns and cists indicates a deliberate selection and deposition. However, as all skeletal elements were present, the selection does not seem to favour a particular skeletal element above others. Post-depositional factors such as bioturbation, particularly evident in Cremation 4 and the truncation by later agricultural activity, which might have also affected the remains collected as part of deposit (042), would have also reduced the preservation and completeness of the cremation deposits.

Conclusion

The bone assemblage at Sawmill field has revealed that cremation was the most common method of body disposal/modification practiced on site. The cremation deposits probably represent symbolic deposition rather than actual burial, although many missing skeletal remains from either burial pits or cists could have been deposited in several different contexts across the site, given as token to mourners, or could have been the result of later disturbance by ploughing or bioturbation, as noted in pit (019) (Cremation 4). The surface texture of the bones, cracks and warping suggest that most of the bones were fleshed prior to burning. Most of the burials were multiple cremation deposits with two or three individuals or at least an adult and sub-adult recorded in each assemblage. However, the number of adults was double that of the number of sub-adults. Sub-adult remains, based on the thickness of the skull, rib size, dental development and epiphyseal fusion were found alongside adult remains in both Cists 1 and 3 and cremation pits (017, 019, 026 and 37002). This is quite common in prehistory and could suggest they were cremated at the same time (McKinley 1997). There were only two grave goods, with the exception of the funerary vessel containing the cremation deposits. The first was an upright small accessory Collared Urn found in burial pit (037), next to the empty stone-lined Cist 2. This burial pit contained the smallest deposit of cremated bone placed in the pit itself and not inside a vessel, contrary to the rest of the burial pits. The second grave good which it might have been a pyre good too as it was cremated was an animal bone artefact, a possible spatula, was found within the urned cremation in burial pit (37002).

Prehistoric pottery

by Beverley Ballin Smith

Introduction

This collection comprises a total of eight funerary vessels from the site. They are all connected with the cremation rites and the burial of individual people, but are also linked to the presence of cists constructed beneath a cairn. The vessels recorded here display the common range of wares made and used during the early part of the Bronze Age, and reflect different beliefs and rites associated with the disposal of the dead.

Analysis and description of the pieces

The assemblage is a collection of prehistoric pottery. All the sherds were gently brushed before analysis and were examined using a x6 hand lens. Their attributes and statistics were compiled in an archivable table devised using Microsoft Excel. The assemblage was analysed according to the revised guidelines for the study of prehistoric pottery of the Prehistoric Ceramics Research Group (2010) and its Standard for Pottery Studies in Archaeology (2016), as well as the CIfA's Standards and Guidance for the collection, documentation, conservation and research of archaeological materials (2014, revised 2020), and the Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives (2014, revised 2020).

During the evaluation of the site a pottery vessel (Vessel 1A) and sherds of a second (Vessel 2A) were found in Trench 37. The exposure of a wider area around the trench (Area 3) during the excavation revealed a further six vessels. The composition of the total assemblage is displayed in Table 6. Where possible, sherds have been counted, but many had disintegrated to crumbs.

Two vessels (Vessels 1A and 5) were recovered by hand as whole or nearly complete vessels. Vessels 2 and 3 were also recovered by hand but survived as only the upper half of pots, as their bases and lower portions had disintegrated. Vessels 2A was discovered in the soil samples surrounding Vessel 1A, and Vessel 1 only survived as parts of the rim that were collected by hand. Vessel 4 was retrieved from soil samples from the site of its

deposition, and Vessel 6 was collected by hand during the topsoil stripping of Area 3. Although further soil samples were collected, only one small fragment (weighing 0.9 g) of stray pottery was found.

The total weight of sherds is recorded in Table 7. Apart from Vessel 5 which is a complete miniature vessel, all other vessels including the consolidated Vessel 1A, are incomplete, and therefore the recorded weights are only those of the sherds of partial vessels. The three collared urns Vessels 1A, 2 and 3 were large heavy vessels. If the base of Vessel 1A had been present the total weight of that urn would have been probably just over 4 kg, and this indicates that Vessels 2 and 3 may have been equally as heavy, or heavier, given their average wall thicknesses. Although little of Vessel 4 survived, its wall thickness was in excess of 14 mm, and its base was 21 mm thick, suggesting that this could have been the heaviest vessel of the assemblage.

Both Beakers were thinner vessels than the urns with average wall thicknesses of 9.6 mm but the Food Vessel was a squat, relatively thick-walled vessel.

The wall thicknesses and weights of these vessels were largely determined by the size and amount of stone temper added by the potter to the clay. Although the composition of the rock temper was similar across all vessels where it could be recorded, the size of the individual pieces was generally coarse to very coarse. The percentage of stone in the clay, for example in consolidated Vessel 1A was high, probably c. 40% or more. Generally, the rock temper included angular fragments of sandstone, with probably psammite and pelite (lightly metamorphosed sandstones, BGS 2022), with some quartz pebbles and quartz sand, all were available locally. Some individual pieces of rock temper from Vessels 2 and 3 were measured to be in excess of 10 by 10 mm and were therefore responsible for the weights of the pots, their thick walls, and the visible temper showing through the vessel's surfaces in some cases. The same raw materials appeared to have been used for both Beaker vessels, but the rock inclusions were slightly finer. Coarse inclusions were also added to the clay of the Food Vessel.

In addition to stone, organic materials were probably also added to the clay mix. Although this was not verified in all vessels, it was likely to have been the case.

Vessels	Near/ complete vessel	Rims	Carinations	Bases	Bodies	Crumbs
Trench 37						
1A	1					
2A		1		2	45	*
Area 3						
1		7			7	*
2		9		9	78	*
3		2			38	*
4			2	7	19	*
5	1					
6		3			14	*
Totals	2	22	2	18	201	

** crumbs present*

Table 6: Sherd compositon.

Vessels	Vessel type	Total sherd Nos	Total weight (g)	Average wall thickness (mm)
1A	Collared Urn	1	3800	11
2A	Beaker	48	529.7	9.6
1	Beaker	14	74.6	9.6
2	Collared Urn	96	3134.4	12.5
3	Cordoned Urn	40	1801.6	10.7
4	Urn with foot ring	28	683.3	14.5
5	Collared Urn	1	738	10
6	Food Vessel	17	425.3	11
Totals		245	11187.8	

Table 7: Sherd/vessel thickness and weight.

Post-depositional changes

One important aspect of vessel manufacture on this site was that sufficiently high firing temperatures were not reached to fuse the temper and clay together in most of the vessels. This lack of fusion has had a significant impact on the survival of the vessels. The preservation of Vessel 5 is good, but the remainder of the vessels is generally poor. It has already been mentioned that the base of Vessel 1 had been lost. The vessel was inverted in the ground, and although it was placed in a pit lower than the base of the topsoil, and with a capping of small stones, it would appear that the base may have crumbled away due to poor firing and possibly due to the weight of farm machinery passing over it.

The lower portions of Vessels 1 and 3 may have disintegrated over time into the constituent parts of clay and stone, leaving only the rim and some sherds of the former, and the upper part of the vessel of the later as evidence. Vessel 2 became distorted in its pit, possibly from the weight of farm machinery or due to a plough dragged through to the top of the subsoil. Vessel 4 was a highly fragmented vessel that continues to fragment, and it was disturbed by tree roots and other activities close by. Vessel 6 was disturbed or removed from its original burial context, possibly one of the cists, and is unstratified.

Manufacture of the pottery

The raw materials of the pottery are mentioned above, mostly sandstone and metamorphosed sandstones, with the addition quartz and igneous materials from the Clyde Plateau Igneous formation of Ben Bowie to the north-east. Some of the rock temper is crushed stone, prepared deliberately for inclusion, while other pieces have rounded edges and surfaces indicative of a water-borne source. The Red Burn runs past the site to the north-west, but it partly skirts the hill of Ben Bowie and therefore may have made igneous materials available to the potters. As far as it is possible to ascertain there is little difference in the range of temper used for the manufacture of the vessels indicating the use of the same or similar resources over time. Amounts of rock temper to clay might have varied, but the ingredients of the recipe more or less remained the same.

It is highly likely that all the vessels began with the potter opening up a lump of clay by using the thumb-pot method. Once the base of the vessel took form, coils of clay were added to give height and shape to the pot. This was most noticeable in Vessel 5 where three coil joins are visible as bumps and slight depressions from manipulation by the potter's fingers. Coil joining and finger moulding are visible at the changes of angle of the vessel shape such Vessel 6, and also Vessel 1A. Additional moulding marks are also noticed to fix clay slabs to the pot body to form the collar of collared urns such as Vessels 1A, 5 and possibly also Vessel 2. Vessel 3 is slightly different in that it has a cordon at the base of the neck, and at the junction of two coils.

Most of the rims are flat-topped or flattish (Vessels 1A, 2A, 1) and the Vessel 3 rim has a concavity and ridge to its interior surface. The remainder are pointed and rounded with bevels to the interior (Vessels 2, 5 and 6).

A variety of different types and shapes of vessels were manufactured. The smallest pots are the Beakers, with Vessel 1 having a rim diameter of 160 mm, but that of Vessel 2A could not be measured accurately because it is distorted. The Food Vessel has a rim diameter of 180 mm and a possible base diameter of c. 100 mm. The intact Vessel 5, a miniature Collared Urn has a rim diameter of 100 mm with a base measuring 60 mm in diameter. The collared urns and the Cordoned Urn have rim diameters of between 240 mm and 260 mm. The base of V2 is 180 mm in diameter, but that of Vessel 4 which is represented only by its base is 220 mm. This exaggerated diameter is caused by the addition of a roll of clay attached externally at its base edge.

Individual vessel descriptions

Trench 37 – Vessel 1A

This is a conserved and consolidated Collared Urn, with a surviving height of 230 mm (Figure 23). Its 250 mm diameter rim is complete, as is most of the vessel except for the bottom c.15 mm of its wall and the base. The latter is estimated to have been c. 110 mm in diameter. The rim is flat topped and forms part of a collar, 62 mm deep. The bottom of the collar it protrudes c. 15 mm from the vessel body. Approximately 70

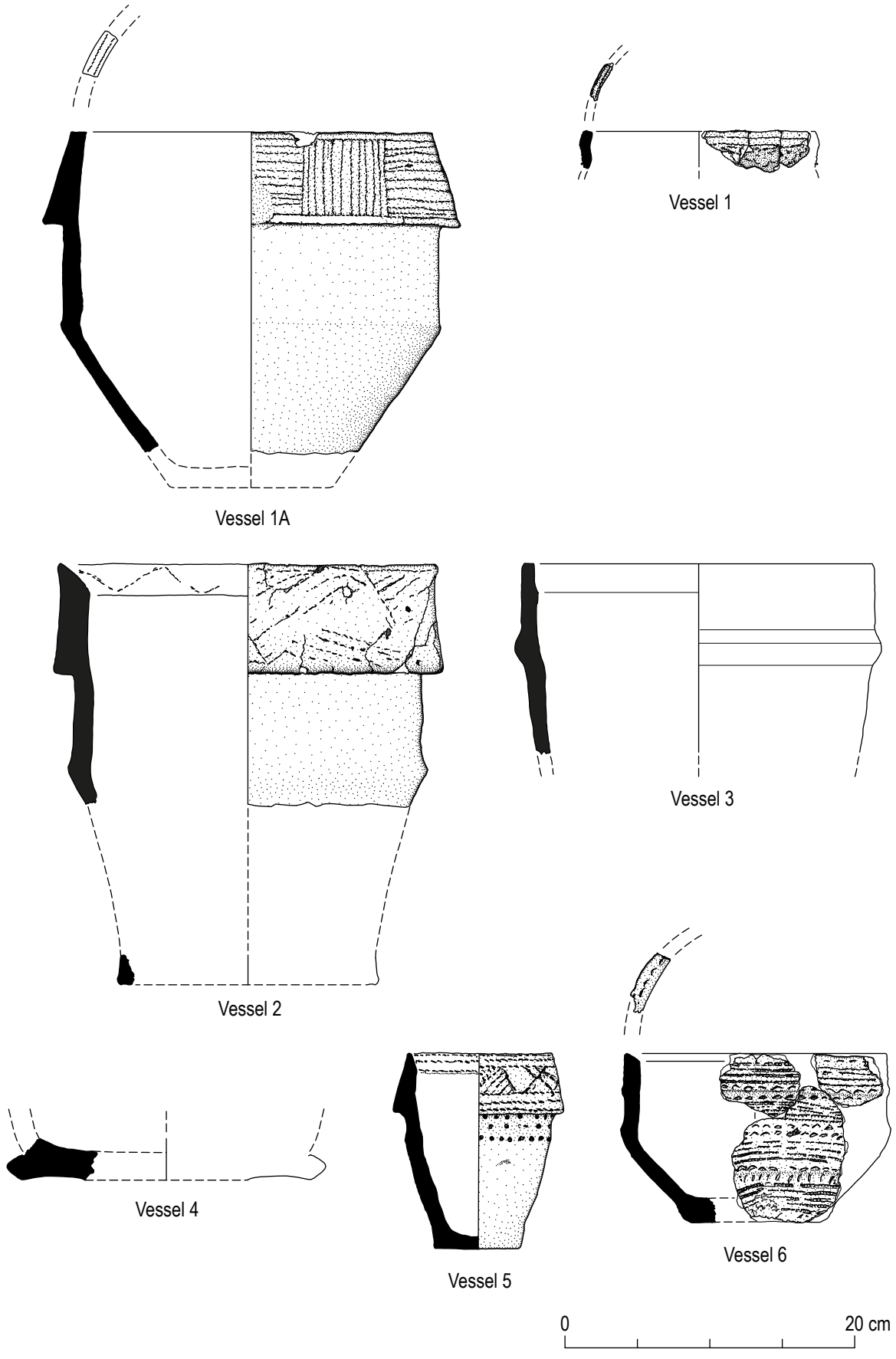

Figure 23: Vessel 1A collared urn, Vessel 1 Beaker, Vessel 2 collared urn, Vessel 3 cordoned urn, Vessel 4 base of vessel, Vessel 5 miniature collared urn and Vessel 6 tripartite Food Vessel.

mm below the bottom of the collar is a weak carination, which forms the junction between the upper and lower parts of the vessel. Apart from the collar and the rim top, the rest of the pot is plain and both exterior and interior surfaces are smooth. The joining of coils at the carination and of the collar to the body is noted on the interior of the vessel by areas of slight concavity where finger moulding marks are evident. The rim top has a simple design of two parallel lines of impressed cord (spun or twisted twine) running round it. However, the collar is highly decorated all over with lines of reasonably fine impressed cord. A horizontal line of impressed cord at the top and bottom of the collar forms a border and defines a c. 55 mm wide field to the design within it. Approximately c. 60 mm wide bands of alternating vertical (12 lines) and horizontal (11 lines) parallel lines of impressed cord form the pattern around the collar. The design is fairly regular and reasonably well executed.

During its excavation, the pot was recorded as being positioned inverted on a stone base (SF 004) and a number of smaller stones may have covering its (now missing) base.

Trench 37 – Vessel 2A

These 48 sherds of Vessel 2A were found in the fill of the same pit which produced Vessel 1A. They are fragments of a Beaker vessel in very poor condition (not illustrated). The pot was not well-fired and it is continues to disintegrate into its constituent parts. Most sherds have lost one or both surfaces and the pottery is extremely fragile. Where surfaces survive they indicate that that pottery was smoothed but finger moulding marks are also visible.

A partial rim survives, but although it is missing its outer surface, is retains evidence of decoration in the form of an impressed line of cord running around its flat top. There may have been additional lines but only the evidence of the innermost has survived. An attempt to record the rim diameter was made, but its shape could be distorted as a measurement of c. 240 mm appears too large for this type of vessel. A body sherd with part of the base edge, and a second sherd that is an inner part of the base, are also identifiable. There are no other diagnostic or decorated pieces.

It appears that the majority of the vessel is missing, and it is suggested it was disturbed and possibly broken when Vessel 1A was put in the ground, suggesting it possibly indicates an earlier grave in the same place.

Area 3 – Vessel 1

The six sherds of this pot are the remains of a Beaker vessel (Figure 23). It has a rim diameter of c. 160 mm and approximately 20% of it is present. The rim is flat topped and slightly uneven and inturned. Its top is incised with two lines of twisted cord, and only two lines of horizontal cord, positioned 5 mm apart, survive on the exterior of the rim. Much of the surface of the vessel has been lost through lamination but there is a suggestion on the largest sherd that there was a carination c. 26 mm below the rim, indicating that the rim had broken off from the body at a coil join.

Due to the abrasion and lamination of the sherds, the finishing of the vessel has not survived. However, the application of a corded design suggests the pottery was smoothed before decoration. The interior of the sherds is also smooth and the occasional grass mark is visible.

Another eight pieces of seemingly hard-fired blocky pottery may have been a single sherd when excavated, but has later fragmented and laminated. It is undecorated and the rim, if it is one, is flat topped. The exterior of the sherd has also laminated. One sherd may be burnt, but it is uncertain if this is part of Vessel 1 or another vessel entirely.

Area 3 – Vessel 2

This is a large Collared Urn with a rim c. 260 mm diameter (Figure 23). Approximately 73.5% of the rim is present. The pot was lifted in a block of soil and excavated under laboratory conditions. This vessel, like Vessel 2A, was also not fired at high enough temperatures as the pottery is extremely fragile and liable to disintegrate into its individual components. The most significant part surviving of this vessel is its collar, with c. 50% present, and with a large portion of the body. However, the rim and collar has detached from the vessel body along the coil join. Parts of the flat base (9 sherds) have survived to indicate that it measured 180 mm in diameter (c. 7.5% is present) and had

a rounded basal angle. There are also 11 sherds with a carination, which suggests the pot profile changed below the collar to slope to a narrower base.

The rim top is narrow, rounded and has a deep 20 mm bevel to the interior, which is decorated by a single line of impressed cord applied in a wide zigzag. The collar is 75 mm deep, slightly concave, burnt in part, and decorated by deep lines of impressed cord (a loose and fairly coarse twist). The decorative motive appears to have been filled chevrons but the design of the best preserved part of the rim is fairly random in execution (see Figure 23).

Due to abrasion and lamination the finishing of the vessel has not survived, but the occasional grass mark is visible, indicating that wiping and smoothing of both surfaces would have occurred after manufacturing but prior to the incising of the decoration.

Area 3 – Vessel 3

This is the upper half of a plain urn that was inverted in its pit with the lower part of the vessel and the base missing (Figure 23). The vessel is not conserved and is preserved with bandages and supports. It has survived as a rim with a straight neck and a cordon. Its rim diameter measures c. 240 mm and approximately 98% of it is present. A portion of the rim was examined and it is flat-topped with a concavity to the interior ending in a ridge or shallow ledge c. 20 mm below the rim top. This is not a bevel as such. The vessel also has a prominent cordon c. 60 mm below the rim, which protrudes c. 5 mm from the vessel wall and has a rounded profile.

The exterior of the vessel was smoothed but it is now abraded. Grits are visible below the surface that have caused cracking of the clay. Some surface grass marks are also noted that suggest packing or wiping the vessel with dry grass or straw. There are prominent finger indentations internally from the joining of the coils.

Area 3 – Vessel 4

This vessel comprises 28 sherds that are the remains of a plain, smooth urn that was highly fragmented. . There is a suggestion of a slight cordon on two sherds, and the rim of the vessel is missing. However, the vessel was largely destroyed by tree roots and the effects of a subsequent tree throw.

The most prominent pieces of this vessel are base sherds, which together indicate a diameter of c. 220 mm, and approximately 10% of it survives. The base was unevenly moulded but its sherds are unusual because they are supported and surrounded by a ring of moulded clay that is attached to the exterior of the base. This ring is chamfered, it protrudes 10 mm away from the body of the vessel and its base, and its slightly pinched edge is raised above that of the bottom of the base (Figure 23). The unusually thick base is slightly hollowed underneath. This unusual foot ring may be an expedient repair or support to what may have been a large thick vessel that may have been unstable on its base.

Area 3 – Vessel 5

This is an intact, decorated miniature Collared Urn 135 mm high (Figure 23 and 24). The diameter of its rim is 100 mm and that of its base is 60 mm. It has a 40 mm deep collar that angles away from the vessel to protrude c. 9 mm from it at the collar base. The worn rim top is slightly rounded has a 14 mm wide interior bevel, which is decorated by three horizontal parallel lines of impressed twine that was loosely twisted. At least three coil joins can be identified in the interior of the vessel from the impressions left from moulding marks. The base, made using the thumb pot method, is flat but its interior has a rounded profile. The collar appears to be a slab of clay added to the vessel body, which also forms the rim. Immediately beneath the collar the body is slightly concave due to moulding the body and collar together. Three horizontal parallel lines of impressed twine decorate the collar at the top by the rim forming a band 10-15 mm wide and also along its bottom edge to a similar depth. Between these lines is a c. 15 mm wide field decorated by slightly randomised but oblique plain and filled triangles made by impressed twine. The body of the vessel is decorated immediately below the collar by a 20 mm band of three rows of a circular motif incised by a round, fine bone or a twig of 2-3 m diameter. The motifs are positioned c. 10 mm apart in the top row, in the middle row they are slightly wider spaced, and those on the bottom row are positioned every 5 mm apart. The rest of the

vessel is plain. It has not been possible to record the rock temper used in the vessel's construction because it is intact and no temper was noted protruding through its surfaces. Although the rim is slightly abraded, the vessel is general smooth and well made.

Figure 24: Vessel 5 miniature Collared Urn.

Area 3 – Vessel 6

Five large sherds and some smaller fragments of a highly decorated tripartite Food Vessel were recovered during topsoil stripping (Figures 23 and 25). The sherds are abraded but the decoration is predominantly well-defined. It has been possible to reconstruct an almost complete profile of the pot, apart from the bottom of the base which is missing. However, it is calculated that the vessel would have been c. 120 mm high. The pot is small but has a c. 180 mm diameter rim measurement of which 12.5% is present. The total weight of the sherds is 425.3 g.

The rim is straight externally but bevelled to the interior. The bevel carries a single line of horizontal fingernail impressions positioned 4-5 mm apart running round the middle of it. On the vessel exterior, the first cordon is reached 25 mm below the rim top. It is a weak, rounded feature, projecting only c. 2-3 mm from the vessel body. The distance between it and lower cordon is c. 30 mm. The lower cordon is slightly larger and more prominent than the upper, and from it the vessel wall angles at c. 45° angle to the base of the vessel. Finger moulding marks are noted on the pot interior where coils were joined during the formation of the lower cordon.

Figure 25: Vessel 6 Tripartite Food Vessel.

The decoration is described from the rim to the base. A 10 mm field immediately below the rim top is decorated with a single row of horizontal fingernail impressions positioned 4-5 mm apart. Below it are four horizontal lines of comb impressions. Due to abrasion and also to their application, the lines are not all continuous. The 5-6 teeth of the comb were irregular in length, and approximately 1-2 mm thick. The first cordon is decorated with horizontal fingernail impressions creating moon-shapes either side of its apex. Between the cordons are another four lines of impressed comb design, but again abrasion has removed some of the continuity of each line. The second or lower cordon is decorated in the same way as the upper, with another four rows of intermittent comb impressions below it. The decoration is continued by another row

of horizontal fingernail impressions, but below them is a row of vertical fingernail impressions. Five discontinuous rows of comb impression take the decoration down almost to its base. Evidence of a fingernail impression just above the base-edge is uncertain.

Loss of the base has caused much surface damage immediately above it, with corresponding loss of some of the decoration. In general, the vessel appeared to be well-finished but without stone temper protruding through its smoothed surface.

Vessel form, function and distribution

All the vessels (Beakers, Collared Urns, the Cordoned Urn and the Food Vessel) described above are intimately associated with burials and burial rites in a roughly 13 by 13 m square area excavated as Area 3 but initially identified by the earlier evaluation Trench 37. Within this area were three cists, none of which contained pottery vessels, although two of them had intact lids, and six burial pits with urns or Beakers. Most, but not all the vessels contained cremated bone, as some cremated bone was found in the pit fills rather than the pot, for example burial pit 3, which contained Vessel 5. The number of features and vessels associated with burials suggest this was a small cemetery for cremated human remains, most of which were covered under a cairn that had been badly truncated and denuded.

Vessels 3-5 were located beneath the south-eastern part of the cairn, although its central part had been completely truncated, and Vessels 1 and 2 were buried in pits some 12 m further to the south-east beyond the extent of cairn material. The location of Vessels 1A and 2A in Trench 37 lay to the south of the cairn, and may have had no direct relationship to it. Vessel 6 is unstratified but appeared not to have been derived from a pit. It seems to have been found to the north-west of Cist 3. The most likely interpretation of the origin of this vessel could be Cist 2, a small and fairly shallow burial place, which had lost its capping stones and its contents. It is possible the contents of the cist dragged out by a plough when its capping stones were lost, and moved several metres to the north-west.

The currency of the use of these vessels for burial is the early Bronze Age, probably no earlier than 2200 BC and no later than c. 1550 BC (ScARF 2021, Bronze Age, Section 1). There are common attributes among most of these vessels of the use of spun/twisted twine for decoration. The similarity of decoration of tops or bevels of rims of Vessel 1A, 1 and 5 with incised lines is interesting suggesting some common identity or time frame for manufacture and burial, but the design of the rim decoration of Vessel 2 is different. The collars of urns exhibit greater variety of motif and competency but impressed twine remains the common link. Miniature urn Vessel 5 is the only Collared Urn with additional decoration on its body, but it is Vessel 6 the Food Vessel which diverges completely in its decoration. The use of fingernail impressions as well as a comb for decoration implies the acceptance of other tool types and decorative motifs, and perhaps its existence suggests a different time-frame or a variation in burial customs.

Discussion

Comparison with other sites and chronology

Sheridan in her 2004 chapter on Scottish Food Vessels, discussed the variety of funerary vessels that were commonly in use during the early Bronze Age, and importantly their overlapping currencies (ibid, figure 89) between c. 2100 to c. 1600 BC. Further refinement of their forms and dating was produced in tables by ScARF 2012 (Chronology Tables 1 and 2) based largely on research on the Southern British Bronze Age by Needham, and others working in Scotland. Concerning the two earliest types of vessels found at Sawmill Field, the Beakers and the Food Vessel, the human remains associated with Vessel 1 (the Beaker) produced a radiocarbon date range of 1872–1627 cal BC (UBA-47672, 3426 ± 25) of the middle to later early Bronze Age. Unfortunately, a radiocarbon date for the Food Vessel is not possible due to it being unstratified, but in general its currency is considered to be slightly earlier, between 2200 to c. 1750 BC (ScARF 2012, Table 2).

There is very little remaining of either of the two Sawmill Field Beakers (Vessels 1 and 2A), and none of the sherds was in good enough condition for comparative purposes. The location of Vessel 2A is interesting as it was found in the same pit as the much larger Collared Urn Vessel 1A. There are at least two plausible scenarios surrounding its deposition: firstly, it could have been deposited

before the urn, and secondly, it could have been deposited at the same time as the Collared Urn. Whereas the urn was more or less complete when excavated, the sherds of the Beaker vessel were not identified as a second vessel until post-excavation analysis. Their poor condition suggests that they had been in the ground some time and that Vessel 2A was damaged before the urn was buried. However, their spatial and temporal relationship remains unclear.

Both Beakers were found in pits when excavated and were not associated with the cists or the cairn, and their direct contact with the subsoil and soil may account for their poor condition. In contrast, the sherds of Vessel 6, the Food Vessel, were in much better condition although the pot had been removed from its original place of deposition. Its condition might suggest that until recently it had been in a protected environment such as a cist, possibly Cist 2, as has already been argued. Vessel 6 is a small example of a Food Vessel, but it is not a miniature. Its decorative motifs created by a comb and fingernail are commonly found in Scottish examples. However, few similar vessels have been found in the surrounding area. One reconstructed vessel from Millburn, Vale of Leven in West Dunbartonshire is similar in size, form and to some extent decoration (NRHE, Canmore 42371) indicating some regional expression of design along the coast from Dumbarton to Helensburgh. A number of Food Vessels were found in cists in a cemetery at Dunure Road, Ayrshire, including three with combed motifs (Sheridan 2007a, 94-100, Illus 40-42). They exhibited a wide range of sizes, forms and decoration, indicating the variation, fluidity of design and meaning of this vessel type.

Two Collared Urns, a miniature Collared Urn, a Cordoned Urn and an unspecified urn were all found in pits within the south-eastern parts of the cairn, or to the south of it. The Collared Urns share characteristics: their predominantly large size (except Vessel 5), their deep decorated collars, interior rim decoration and carinations (except Vessel 5), enabling the vessels to narrow to their bases. Their currency falls towards the end of the early Bronze Age, between 1750 and 1550 BC (ScARF 2012, Table 2). A small decorated Collared Urn, similar in size to Vessel 5 was found together with a large urn (with a similar collar decoration to Vessel 1A) at Fordhouse Barrow, Angus, which was dated earlier to between 1930–1730 cal BC (SUERC-2731, 3510 ± 35 BP) (Sheridan 2007b, Fig 14.2 no. 6). All the collared urns from this site had similar dates between 1882–1547 cal BC. As expressed by Sheridan (ibid, 165-166) these vessels also demonstrate considerable variety in their design and also in relation to the funeral practices that took place. It is clear from the excavation at Sawmill Field that three of the urns were inverted in their pits but that Vessel 5, the miniature Collared Urn was placed upright in its.

There is some similarity between the vessels from Sawmill Field and those found in three small cemeteries at Midross, Loch Lomond, excavated in the early 2000s (Ballin Smith 2007). A number of complete and near complete Collared Urns were found, including Vessel 11 with rim bevel decoration of two parallel lines of impressed cord, and a collar with horizontal lines of cord top and bottom and vertical lines of impressed cord in between. Beaker sherds and an accessory or miniature vessel formed part of the assemblages. Cremated human bone was dated from two vessels (1 and 2) in cemetery area 6.1 providing date ranges at 95.4% probability of 1900–1690 BC (SUERC-20343, 3480 ± 35 BP) and 1920–1740 cal BC (SUERC-20342, 3510 ± 30 BP). The cremated human bone dated from Vessel 11 in cemetery area 13 provided a date range of 2040–1880 cal BC (SUERC-20351, 3605 ± 30 BP).

There could be some association between the burial of Vessel 5, the small Collared Urn, in a pit on the periphery of the cairn and its situation close to Cist 2. In other regions, such as Aberdeenshire where Curtis and Wilkin (2019, 236) have studied Beaker burials, a small number of smaller accessory vessels were found linked with other urns and closely associated with the cremation rites and cremation burials. This is not the case at Sawmill Field but these two small vessels (Vessels 5 and 6) have a story to tell regarding their purpose and role in the cremation rituals and beliefs, in the identity of the individual, and in their burials in a pit and possibly also in a cist.

The relationship of the cairn, cists and pottery vessels

There is little good building stone available on the site, suggesting the stone used for the construction of the cists was most likely quarried

and brought some distance to the burial site. The cairn itself was built of field stones possibly originating in the till deposits, but the stone for its linear curved structure might have also been quarried. There is a direct association between the cairn and the cists, but the distinct absence of vessels found in the latter features is unusual. All the urns were found in pits dug into the subsoil, situated with a seemingly loose connection to the cairn. Their deposition in the ground with human remains (where they have survived) indicates the knowledge of and continuity of the place for burial. The cists and the cairn were the earliest features of the cemetery, with the urns denoting later burial rites. It has already been suggested that one Beaker (Vessel 1A) could have been moved or dislocated and certainly the Food Vessel (Vessel 6) was not in its original position, indicating perhaps contemporary as well as more recent disturbances of the site. The loss of approximately two-thirds of the cairn in more recent times may indicate there has been a corresponding loss of other burials and vessels, and the cemetery may have been larger.

Conclusions

Small cemeteries such as this with the survival of funerary pots often lead to more questions than answers. What was special about this place? What was placed in the cists, and why the change to disposal of the cremated remains of the dead in a pot in a pit in the ground? The more we find and excavate these special places with their elaborate vessels, the more we realise what we do not know. The vessels described here are one part of changes in the belief systems during the early Bronze Age and in methods of disposal of the dead, and the preservation of human remains in a complexity of pottery forms and designs which had meaning. Untangling these meanings and beliefs is an ongoing task.

Lithic assemblage

by Torben Bjarke Ballin

Introduction

It is relevant to the interpretation of the lithic assemblage that the archaeological site at Sawmill Field includes two slight terraces orientated NW/SE; the higher of these lies in the north-eastern area of the site at approximately 24 m OD; the second terrace to the south-west lies between 11 m and 13 m OD (Figure 1). The area below the lower terrace is at approximately 4 m to 5 m OD towards the south-west of the site. The upper terrace may be Late Glacial, whereas the lower may be associated with the Main Holocene Transgression (MHT). In the local area, the MHT reached a water level around 12-14 m OD (Ballantyne and Dawson 1997, 39).

The purpose of the present report is to characterise the lithic artefacts in detail, with special reference to raw-materials, typo-technological composition, and on-site distribution. From this characterization, it is sought to date and interpret the lithic finds.

Assemblage

From the excavation at Sawmill Field, 71 lithic artefacts were recovered. They are listed in Table 8. In total, 90% of this assemblage is debitage, whereas 4% is cores and 6% tools.

Raw materials – types, sources and condition

The assemblage includes two types of raw materials: flint (42 pieces) and quartz (29 pieces). The flint is generally fine-grained and highly discoloured (white). The cortex of most cortical flints is abraded, suggesting that almost all flint was collected from a local pebble source, such as a beach wall; however, it is also possible that the cortex was abraded when the parent site was submerged and the assemblage as a whole rolled in the tidal zone. Research by Harding *et al*. (2004) indicates that most of the flint in the Scottish south-west and the southern part of western Scotland (including the Southern Hebrides) may be of the same age (Upper Cretaceous) as the so-called Antrim flint, and that it eroded out of chalk cliffs then extending from Northern Ireland to Scotland (Smith 1880). Most likely, the procured

pebbles would have been in the 40-60 mm size category (the largest of the flints has a GD of 52 mm).

Type	Flint	Quartz	Total	Rolled
Debitage				
Chips	55	26	81	68
Flakes	15	14	29	20
Blades	6	1	7	4
Microblades	1		1	1
Indeterminate pieces	6	2	8	
Total debitage	83	43	126	93
Cores				
Split pebbles		3	3	
Irregular cores		1	1	
Bipolar cores	1		1	
Total cores	1	4	5	
Tools				
Short end-scrapers	1		1	1
Strangulated blades	1		1	1
Oblique truncations	2		2	2
Pieces with edge-retouch	1		1	1
Total Tools	5		5	5
Total	89	47	136	98

Table 8: General artefact list.

With one exception (CAT 8), all flints are discoloured (white) and from somewhat to heavily water-rolled. This suggests that the pieces may represent a coastal site which was submerged or destroyed by the later Mesolithic MHT, and the finds subsequently redeposited across the present and probably adjacent fields. CAT 8 is a regular blade with parallel lateral sides and dorsal arrises, and it is of the dark-grey colour commonly associated with late Neolithic Grooved Ware sites (Ballin 2011). The raw material of this piece may be imported Yorkshire flint (Antrim flint from the local area tends to be more opaque).

Three unstratified indeterminate pieces (CAT 5, 6 and 7) are heavily burnt and vitrified or slaggy. It is thought that they may be post-medieval pieces representing industrial processes such as lime burning for fertilizer. In total, six fire-crazed pieces were retrieved.

Three-quarters of all quartz is chips. One blade fragment is of white milky quartz (CAT 1). The raw material for this piece may have been procured locally, either from the nearby coast or from river banks (Ballin 2008). Like the flint, most of the quartz has been water-rolled, probably when the fields were submerged by the MHT.

The assemblage

Debitage

In total, 64 pieces of debitage were recovered from the site (Table 8). The debitage includes 33 chips, 17 flakes, seven blades, one microblade and six indeterminate pieces. The technologically definable flint flakes are generally characterised by pronounced bulbs of percussion, whereas four technologically definable blades are characterised by slightly less pronounced bulbs and lips. One flint flake and two quartz flakes are bipolar, and one flake is characterised by platform collapse. Blade CAT 21 was detached from an opposed-platform core.

The blades of this site are more regular than those produced by direct hard technique, but slightly less regular than one would have expected if they had been produced by punch technique or pressure-flaking. This, in conjunction with the discrete bulbs, the presence of some lips and the facts that several blades are slightly twisted (e.g. CAT 9), indicates that the blades may have been produced either by direct medium-hard or direct soft technique (Sørensen 2006).

Only two blades are intact: CAT 8 (41 by 12 by 6 mm) and CAT 21 (34 by 11 by 8 mm). As mentioned above, CAT 8 may post-date the assemblage in general, whereas CAT 21, which is not water-rolled but heavily discoloured – probably forms part of the pre-MHT assemblage. As shown in Figure 26, the unmodified and modified flint blades and blade fragments have an average width of 10.7 mm, peaking at width 11-12 mm. The thickness of the blades varies between 4-8 mm, that is, they are relatively thick.

Cores and tools

Only three cores and three tools were recovered. Two cores are split pebbles of quartz (CAT 70 and CAT 71); one flint core (CAT 23) is a bipolar core; and the tools include one strangulated blade (CAT 11), one truncated blade (CAT 2) and one piece with edge-retouch (CAT 9).

The two split pebbles (CAT 70 and CAT 71) are of roughly the same size, with a GD of 102-108

mm; one flake has been removed each. CAT 23 is a bifacial bipolar core with one reduction axis (one set of opposed terminals), and it retains some cortex on either face. It measures 25 by 19 by 9 mm. It is not water-rolled but notably discoloured.

CAT 11 is a proximal-medial blade fragment with a strangulation (opposed lateral notches) immediately above the platform-edge. It measures 23 by 14 by 5 mm. The two opposed notches may simply be a hafting device, and the piece may be a broken knife. However, as the assemblage is a broadblade assemblage pre-dating the MHT, it must date to either the early Mesolithic or the late Upper Palaeolithic, and it could possibly be either the fragment of a very simple tanged point (Fosna-Hensbacka and Ahrensburgian points can be exceptionally plain) or represent an attempt to make one. During the Fosna-Hensbacka period (Bang-Andersen 1995, Fig. 5g) and the Ahrensburgian (Clausen 1995, Abb. 10, 6-8), tanged points were occasionally made by producing two opposed notches at the proximal end of a blade and then breaking the blade in the notches (microburin technique) to form a tang. This piece is notably water-rolled.

CAT 2 is the distal fragment of a blade with an oblique truncation; it may be the remains of a small knife. It measures 15 by 9 by 4 mm and is notably water-rolled. CAT 31 is a small, heavily rolled hard-hammer flake with an oblique truncation. It measures 12 by 9 by 4 mm, and it is probably too thick and irregular to be a microlith, and it may be too small to be a knife. Its function is presently unknown.

CAT 9 is a short blade with retouch along most of its left lateral side and possibly some use-wear along the opposite edge. It is slightly water-rolled.

Distribution

All lithics are either unstratified pieces or pieces from topsoil, or they are redeposited, residual pieces which entered the features with their backfill. Probably redeposited lithics were recovered from cairn (022 and 0280, Cists 1 and 2, pits (003 and 037), linear structures (044 and 045), Cremation 1 and a deposit east of Cremation 4. All these features contained lithic artefacts which were discoloured (corticated sensu Shepherd 1972) and/or water-rolled, informing us that they are irrelevant to the interpretation of the features.

Dating

As mentioned above, the second terrace is located between 11 m and 13 m OD and probably associated with the MHT (Main Holocene Transgression) as, in the local area, the MHT reached a water level around 12-14 m OD (Ballantyne and Dawson 1997, 39). This suggests that the water-rolled broadblade assemblage pre-dates the MHT which occurred towards the end of the Mesolithic period around 5630-5440 cal BC (ibid, 39). Broadblade assemblages pre-dating the MHT must be either late Upper Palaeolithic or early Mesolithic, as the transition between early Mesolithic broadblade assemblages and late Mesolithic microblade assemblages has been dated to c. 8400 cal BC (Saville 2008). Similar assemblages, including broadblades, water-rolled

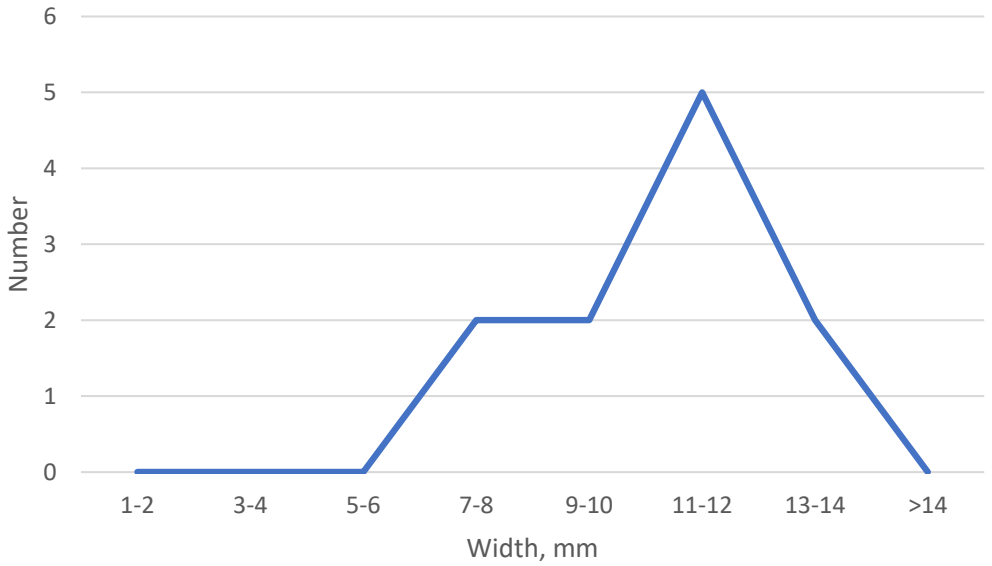

Figure 26: The width (mm) of all unmodified and modified flint blades and blade fragments.

material and broad microburins have been found near Campbeltown on Kintyre e.g. the so-called 'Larnian' assemblages from Dalaruan-Millknowe (Breuil 1922) and the Albyn Distillery (McCallien and Lacaille 1941); both sites located at c. 10 m OD) (Lacaille 1954).

The finds include no strictly diagnostic pieces, but the fact they represent a broadblade assemblage, and pre-date the MHT, suggests a date prior to c. 8400 cal BC. The strangulated blade CAT 11 is an interesting piece, as it cannot be ruled out that this may be the basal part of an exceedingly plain tanged point (and as mentioned above, some Fosna-Hensbacka and Ahrensburgian tanged points are exceptionally simple pieces), or it may represent a failed attempt to produce a tanged point by producing two opposed notched at the blade's proximal end and then attempting to break the piece by microburin technique to form a tang (Bang-Andersen 1995, Fig. 5g; Clausen 1995, Abb. 10, 6-8). Weber (2012, 142) points out that some Hamburgian points were produced by single- and double-notch microburin technique, and Madsen (1992, 115) mentions this type of microburin technique in his analysis of the finds from the Hamburgian site Jels in southern Jutland. However, Hamburgian points tend to be somewhat larger and more sophisticated pieces (cf. Ballin *et al.* 2018).

Discussion

Apart from blade CAT 8, which is highly regular and not discoloured or water-rolled, and which may therefore post-date the MHT, all other pieces are either notably discoloured or water-rolled. It is thought that they pre-date the MHT, and the fact they also represent a broadblade industry, suggests a date prior to 8400 cal BC (Saville 2008), that is, either the late Upper Palaeolithic or the early Mesolithic. They have clearly been redeposited and they are residual pieces of no interest to the interpretation of the site's post-MHT features. They are, however, relevant to the discussion of the earliest prehistory of Scotland.

The strangulated blade CAT 11 may simply be a tool with opposed hafting notches, but it cannot be ruled out that the piece represents an attempt in the late Upper Palaeolithic to produce a tanged point by double-notch microburin technique, an approach known from for example the Fosna-Hensbacka Complex and the Ahrensburgian.

Micromorphology analysis

by George Macleod

Summary

Multi-element analysis was used to help to determine if there were discernible differences between controls and three cists: Cist 1 (052), Cist 2 (053) and Cist 3 (043) excavated at Sawmill Field. Multi-element analysis was applied to control and cist samples to ascertain difference in the soil element concentrations and to determine the utilisation of the features.

Introduction

26 samples were sent to the University of Stirling for multi-element analysis using X-ray Florescence (XRF). The samples were collected from in and around features 1117 and 661 identified during the archaeological excavation.

Areas that have seen past human occupation and settlement have a propensity to have an increased intensity of certain elements within the soil such as Zinc (Zn) associated with Lead (Pb) and Tin (Sn) that could be related to metal working (Cook *et al.* 2005). Elevated levels of Phosphorus (P), Barium (Ba) and Manganese (Mn) can be linked to previous site activity such as soil augmentation for agricultural purposes and the disposal of organic waste. Similarly, the analysis of Calcium (Ca), Strontium (Sr) and Potassium (K) are also examined to determine and interpret sites thought to have been utilised as human settlement (Entwistle *et al.* 1998). Increased concentrations of Iron (Fe) and Manganese (Mn) can be related to the application of pigments to dwellings or butchery areas (Entwistle *et al.* 1998; Parnell *et al.* 2002; Wilson *et al.* 2008). However, this can also indicate that there has been an increased level of waterlogging in the soil (Lindbo *et al.* 2010).

Multi-element soil analysis on the samples recovered was utilised to access the difference in the elemental composition of the soil within the cists comparative to the control samples collected during excavation. Furthermore, the analysis will determine if substantial organic deposits have been present in the cists.

Methodology

22 bulk soil samples were collected from the floor deposits of the three cists at Sawmill Field along with a further five control samples by the archaeological team: sampling was at 5 cm and 10 cm spit depths. Eleven elements commonly identified in increased intensity at archaeological sites were considered for statistical analysis (Cook et *al.* 2005; Entwistle *et al.* 1998; Parnell *et al.* 2002; Wilson *et al.* 2008).

Pellets of 5 cm diameter were prepared by pressing approximately 10 g of air-dried soil, previously sieved to 2 mm, to a pressure of 12 tonnes using a Perkin-Elmer press. Element concentration determination was performed with XRF spectrometry using an Energy Dispersive Thermo Scientific NITON handheld XL3 Series analyser. Five replicates were measured per sample for quality control.

Basic statistical analysis was performed using MINITAB 17 statistical analysis software to determine the difference in the elemental concentrations. Ratios were utilised to provide comparative analysis of the elements using a ratio of the element under investigation to Aluminium, the second most abundant mineral in the lithosphere (Schlesinger 1997, 89).

Results

The XRF provided details of the concentration of 36 chemical elements in the samples from Sawmill Field. An initial examination of the data showed that most of these elements appeared in very small concentrations; therefore, nine elements displaying increased concentrations were selected for statistical analysis.

The subgroup of nine elements comprised: Strontium (Sr), Rubidium (Rb), Manganese (Mn) Chromium (Cr), Calcium (Ca) Potassium (K), Barium (Ba) and Phosphorus (P) and Sulphur (S). Additionally, Aluminium (Al) identified as one of the most abundant element in soils (Schlesinger 1997, 89) was also chosen to determine if initial soil composition was different between the sample locations and the controls.

Basic statistical analysis (Table 9) of the samples indicated that the highest mean concentrations of all the elements was found in Cist 3. The increased concentrations of all elements were derived from sample 22 Cist 3 (a cremation deposit found in the fill of cist 43, spits A to J and 2 levels, Spit 2E) (Table 10).

		Sr	Mn	Cr	Ca	K	Ba	P	S	Al
Cist 1	Mean	30.61	297.40	77.86	11792.94	11638.96	314.39	5028.49	146.56	41529.61
	Median	28.67	301.45	65.56	12810.49	11509.10	318.63	5228.27	134.89	40499.59
	SD	4.36	91.53	26.00	6543.67	871.30	34.64	2350.69	40.54	5750.26
Cist 2	Mean	32.73	365.25	73.16	6036.12	14989.94	363.17	4345.21	114.35	47324.33
	Median	33.29	380.81	76.86	5984.37	15603.56	365.22	4286.45	134.00	49919.54
	SD	4.33	110.31	13.60	2087.43	1756.73	22.16	1583.06	65.22	5043.49
Cist 3	Mean	72.07	505.19	97.85	66249.68	15629.95	493.18	27448.78	194.31	49888.01
	Median	72.89	460.06	78.34	67831.33	15328.84	485.40	29247.29	201.71	46214.57
	SD	28.89	185.04	43.88	55332.84	5732.84	90.04	22014.74	71.09	13219.42
Controls	Mean	21.55	136.56	62.31	2123.39	9933.18	262.95	1934.32	154.22	34911.36
	Median	21.96	195.07	68.52	2374.95	10317.60	259.07	1924.74	131.59	33264.44
	SD	4.90	126.90	14.63	655.12	2372.86	52.28	177.49	85.06	30684.16

Table 9: The mean, standard deviation (SD) minimum and maximum elemental concentrations in the samples and controls (ppm), Cist 3 mean concentrations are is highlighted as being the highest in all elements.

Sr	Mn	Cr	Ca	K	Ba	P	S	Al
123.91	856.19	197.84	46242.38	27982.97	683.22	20863.29	143.92	77084.932

Table 10: Sample 21 concentrations of the nine sub-elements and Al from Cist 3.

Figure 27 displays the difference between the elemental ratios in sample 22 and the controls. It is evident that high levels of ratio of elements are observed in the control samples, with Sr, Mn, Cr and Ba all having higher ratios that sample 22. Rb and S displaying higher ratios in sample 22.

Figure 28 displays the difference between the elemental concentrations in the samples using a ratio concentration of the element to Al, thus providing comparative data; aluminium being the second most abundant mineral in soils (Schlesinger 1997, 89). It is evident that there is variability in elements between and within the samples. Cist 2 displays the lowest ratio of all elements when compared to both the controls and Cist 1 and Cist 3. Cist 1 is comparable with most control sample ratios, with only Ca, Ba and P having greater ratios. Cist 3 displays the highest ratios of Mn, Cr, S and Mg.

Interpretation

This multi-element analysis identified that there was increased concentrations of Mn, Cr, Ba and S in most sample locations (Figure 28). The soils within the samples were formed from parent material that was derived from the Clyde Plateau Volcanic formation (British Geological Survey 2022); rich in basalt, thus levels of Al and Mg and elevated.

Increased level of Mn, within and between samples, except Cist 2 points to prolonged and sustained waterlogging in these areas (Lindbo *et al.* 2010), with soils from this location containing clays, and having the ability to retain water (Dudoignon 2007). The increased concentration of Mn may relate to its dissolution, translocation and precipitation, the element translocating to areas of increased concentration (Lindbo *et al*.

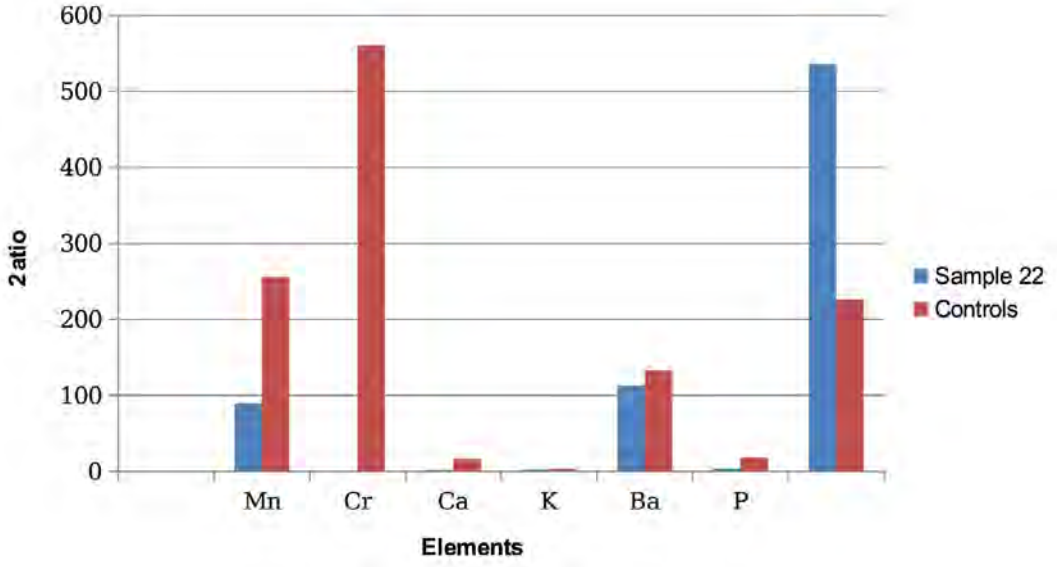

Figure 27: Comparison of the sub-elements in sample 22 to the mean in the control samples using a ratio of elements/Al.

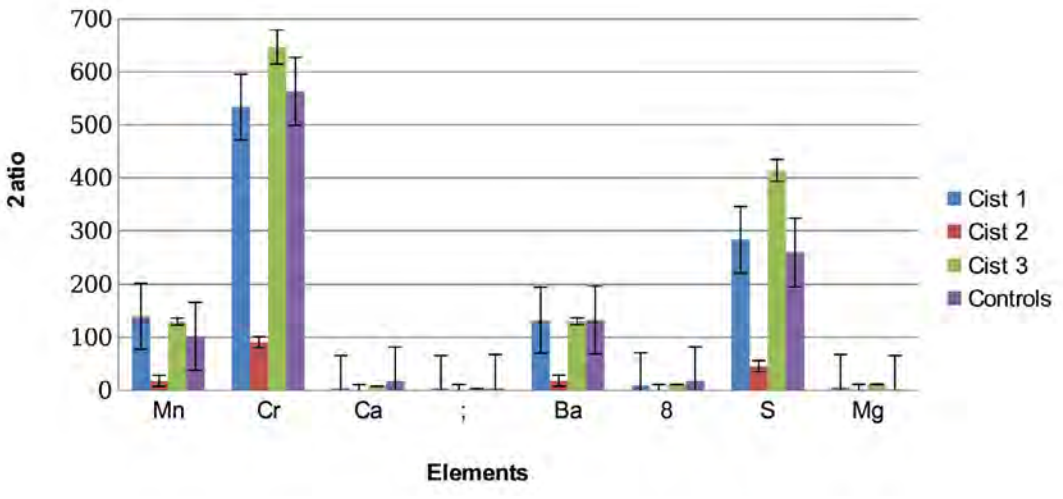

Figure 28: A comparison of the ratio (Element concentration/Al) within the sub-group of nine elements in the samples (Cist 1, Cist 2 and Cist 3) and the controls.

2010). The lower concentrations of Mn in Cist 2 points to the prolonged process of waterlogging not taking place.

Increased element concentrations were identified in sample 22. This was comparatively higher than the other samples from cists 1 and 2. These samples were compared to the controls utilising a ratio measurement to allow for comparative analysis. It was evident that the element signatures of S were higher than that of the controls. The results point to the leaching of Cr, Ca and P from this location and could be related to change in the cation exchange capacity of the soil there (Wilson *et al.* 2009). Increased level of S and the leaching of P, Ca and Cr in this sample points to a lowering of the soil pH, with acidic conditions favouring the retention of S (Janaway *et al.* 2002 287).

Conclusions

Multi-element analysis was undertaken on soil samples collected during archaeological investigations at Sawmill Field of three cists, with subsequent control samples also being collected away from the archaeology.

Difference in the element concentrations were identified in the cists, with Cist 3 having the most significant differences, with these derived from one particular sample; sample 22. It was evident that S was being retained in the soil within the area around sample 22 of Cist 3, while leaching of P, Ca and Cr was occurring. It is speculated that this relates to a decreasing soil pH at this locale.

Variability in the concentration of Mn was identified in most samples and controls, and is indicative of prolonged and sustained waterlogging. The only sample location this did not apply to was Cist 2.

The multi-element analysis provided an overview of the elemental composition of the cist samples; however, it did not provide evidence of increased organic deposition in the cists or the control samples.

General Discussion

By Iraia Arabaolaza

The Bronze Age remains found at Sawmill field indicate funerary activity on the site ranging over a 500 year period and dating to the early Bronze Age. The early Bronze Age funerary complex is in a similar topographical and geographical position as other cremation cemeteries or funerary urns found in the vicinity such as Midross by Loch Lomond, or find-spots like Portkil Cinerary Urn and the Millburn, Vale of Leven Food Vessel (Figure 29) placing this site within a wider local Bronze Age funerary landscape.

The oldest burial on site, based on a radiocarbon date between 2467 – 2290 cal BC, was the empty stone-lined Cist 2. Analysis of the soil micromorphology indicated that no human remains were present in it. However, presence of possible pyre material or hearth remains was recorded in its upper fill. The fact that possible pyre material was placed within its fill suggests that it might have fulfilled another function within the funerary rite. Examples of empty cists have been found elsewhere in Scotland. At Blairbuy in Dumfries and Galloway (Bailie 2012) two empty cists were recorded associated with an early Bronze Age cist with an inhumation, while at Sannox Quarry on the Isle of Arran an empty cist was noted together with an early Bronze Age cist containing a cremation, a tripartite Food Vessel and scale-flaked flint knife (Arabaolaza 2014). At Blairbuy, the author suggested that the empty cists might have been constructed in advance of future use by the members of the community but the analysis of the soil chemistry indicted that they had never contained human remains. A similar purpose was also considered at Sannox Quarry. However, it was also suggested that they might have represented monuments to those who died elsewhere or whose bodies were missing. The presence of possible pyre material suggests another third cause. As noted by Downes (2005, 160) some of the cists or pits excavated in Orkney, only contained pyre debris, which could indicate that pyre debris was as important as the cremated remains in the cremation rites and worth the same burial treatment.

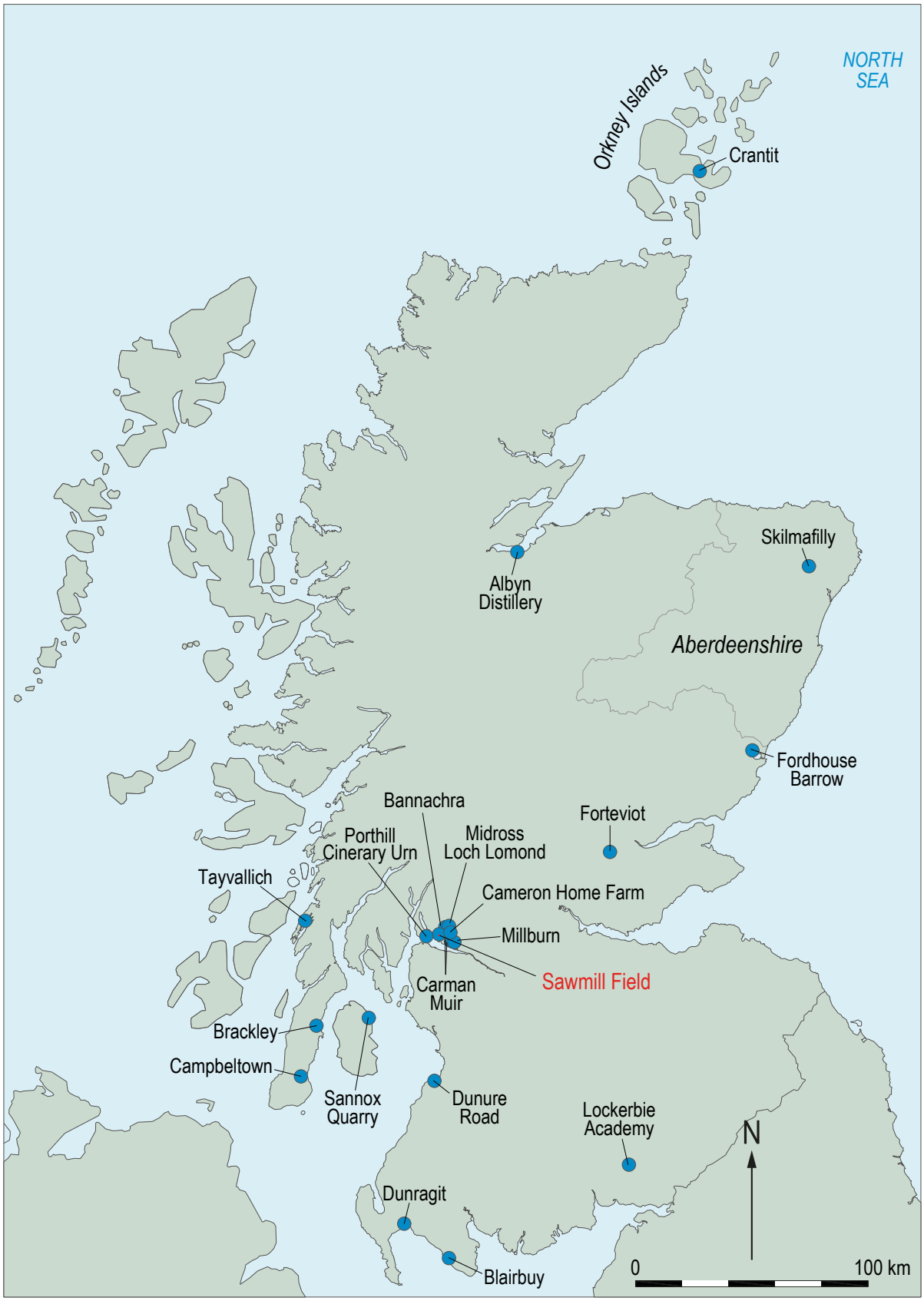

Figure 29: Map of all sites mentioned in the text.

The other two stone-lined cists, Cists 1 and 3, were built at least three centuries later c. 2140 – 1930 cal BC. They were similarly constructed, were orientated N/S or NW/SE and contained multiple cremation deposits comprising the remains of at least two adults and a sub-adult. The remains of a curved facade created by upright slabs to a late Neolithic Clyde cairn may still have been visible when Cists 1 and 3, along with the standing stone, were constructed. It is possible that the stones of the cairn chambers were removed and repurposed for the cists. The enigmatic pit 037 interpreted as a tree-throw during the excavation, could have been the location of a simple chamber with the cairn, positioned as it was behind the centre of the facade (see Henshall 1972, Vol 2, Fig 3). Clyde cairns were often relatively simple constructions, some with curved facades lying in front of single chambers, with up to four compartments, nestled within a cairn of small boulders (Ibid, 32). Brackley in Kintore (ARG28) with its one or two compartmented chamber may have been similar to the cairn remains found at Sawmill Field. It is also interesting as it was reused during the early Bronze Age, presumably for a burial that included the remains of a Food Vessel and jet beads and a flint plano-convex knife, among other finds (*ibid*, 346-348). The discovery of the Food Vessel remains north-east of the cairn could be a further indication of this earlier structure to which these pottery fragments and later Cists 1 and 3 are associated.

By the first half of the second millennium BC the main focus of the funerary complex seems to have been centred around an earlier cairn, possibly with an external kerb. This cairn was disturbed by bioturbation and later agricultural activities, such as field clearance and ploughing, and neither its full extent nor its original form could be defined. However, the proximity of the cists to its facade of stones suggests an association between these two monuments. As noted in ScARF '*many of these circular monument forms were subject to reuse and alteration in later prehistory, utilised as pyres, cremation cemeteries… or transformed into cairns or barrows*' (2022, Neolithic, section 6). It is clear that even though the typology of funerary monuments changed over time, and also peoples representations of different belief systems and/or traditions, the importance of certain locations remained. Although on a larger scale than the Sawmill Field cemetery complex, other major ceremonial complexes across Scotland, such as Dunragit and Forteviot have demonstrated the longevity and importance that certain landscapes had during prehistory (Arabaolaza 2021, 327).

Stratigraphically, the remains of the cairn covered the oldest cist (Cist 2) on site as well as burial pit 037, which was in close proximity to the cist. Although thought to be associated with the cist during the excavation, burial pit 037 contained an upright small decorated Collared Urn and provided a date similar to the cairn remains and other burial pits found on the site. These burial pits, all containing urned cremations, were placed in pairs or in isolation and seemed to radiate out from the area where there was a loss of cairn material. Although the placing of the urn burials to the south-east might be accidental, their alignment towards the rising sun is similar to the entrance alignments of Bronze Age roundhouses, (ScARF 2022, Bronze Age, section 5).

All the human remains recovered from site, were cremated and were either interred in urns, placed as deposits inside stone-lined cists, or along with other grave goods in a burial pit. As in other contemporary sites, cremation was the main funerary treatment in Sawmill Field. The rite of cremation is one of transformation which involves the construction of the pyre, the preparation of the body and associated grave goods, the selection and collection of the cremated remains, their burial and in some instances, as in Sawmill Field, the creation of funerary monuments (Williams 2015). Although there were no pyre sites recorded during the excavation, the presence of possible pyre material or hearth remains was recorded in the upper fill of Cist 2. Even though no pyre goods were recorded, the possible presence of copper-alloy artefacts was evidenced by green staining present on some of the cremated remains in both cists and in four of the burial pits.

Analysis of the cremated remains suggests that the temperature reached on the pyre was high and maintained for an extended period as the bones were fully calcified. The body was placed 'green' or covered with flesh prior to burning as indicated by the texture of the bones, cracks

and warping. In contrast, the pottery vessels containing the cremations were not well fired which indicates that either they were placed on the edge of the cremation pyre or fired on a domestic hearth which did not reach a sufficient high temperature. The lack of botanical remains associated with pyre material within the cremation deposits suggests that they were either cleaned or carefully selected prior to burial. Most of the burials were multiple cremation deposits with two or three individuals, with at least an adult and sub-adult recorded on each assemblage. This is not unusual during the Bronze Age, as multiple burials of an adult and sub-adult have been noted in other sites across Scotland such as Tayvallich, Argyll (Lehane 1986), Lockerbie Academy, Dumfries and Galloway (Kirby 2011) and Skilmafilly, Aberdeenshire (Johnson and Cameron 2012). The presence of multiple individuals could suggest that they were not only buried but also cremated at the same time (McKinley 1997).

No grave goods were recovered from any of the stone-lined cists. However, a small Collared Urn (Vessel 5) was encountered next to a cremation deposit in burial pit 037, and a variety of vessels, most of them funerary vessels, were identified on site. Analysis of the vessels, and in particular the unstratified Food Vessel (Vessel 6), suggests similarities with other local sites such as Millburn, Vale of Leven, as well as other sites further afield such as Dunure Road by Ayr. The different types of vessels and decoration could manifest difference in the age, gender, social status or origin of the human remains that they contained. They are the tangible evidence of the trading and exchange of ideas and influences that occurred during this period. Furthermore, the fragments of Beaker (Vessel 2A) recovered within burial pit 37002 from under the funerary vessel could be also considered as either a grave good or ceremonial deposition. Examples of Beaker fragments as ritual depositions have been noted in numerous funerary sites across Scotland (Hunter 2000). The degraded nature of the sherds as well as their placement underneath the inverted Collared urn (Vessel 1A) containing the cremation indicates that they were possibly a secondary deposition, from a previous funerary rite and reused as part of the later burial. It is unclear what the function of the cremated animal bone artefact found within the cremation deposit contained within this pit was. Its calcined state suggests that it would have been part of the original pyre that was later added to the cremation as grave good. Examples of similar calcined grave goods have been encountered in Scotland since the Neolithic (Noble and Brophy 2017). However, most Bronze Age burials do not contain grave goods (ScARF 2012).

In general, the differences and similarities of the treatment of the dead and their burial within the cemetery complex compared to chronologically similar sites is another example of the diversity present across Scotland, Britain as a whole and further afield during the Bronze Age. Although cremation was the predominant burial rite on site, were variations (with an urn and a cist, an urn without a cist) in how the cremation deposit was disposed or buried between the early cists burials and the later burial pits. This change, demonstrated by the dating evidence, was also noted on other sites such as Dunragit (Bailie 2021). They could represent changes in the beliefs system and/or cultural rites practiced by the community, or they were simply fashionable choices – the reasoning remains unknown.

What is certain is that the people using the site of an earlier funerary monument were drawn to it and they were using it for the same purpose. The recent publication *The Beaker People* has demonstrated small scale mobility within Britain and mainland Europe linked to the 'Beaker package' (Parker Pearson *et al*. 2019, 457). The occurrence of Beaker fragments on this site could demonstrate the presence of incomers or their descendants within this community and/or an adoption of their practices/traditions by the indigenous population. It is possible that the community considered the site special because of its association with their ancestors or people that previously occupied the land, and they reused the site at different periods to reinforce their ownership or connection to their ancestors or the landscape.

Conclusion

The excavation at Sawmill Field revealed early use of the site during the Mesolithic but the Bronze Age funerary complex was the main focus of activities. The longevity of this funerary area from the mid 25th century BC to the middle of the 16th century BC indicates that the collective memory of the site as part of funerary/ritual landscape continued, although intermittently throughout this long period. The quantity and quality of the archaeological remains encountered at Sawmill Field offer a glimpse of the prehistoric landscape, an in particular of the ritual/funerary landscape around present-day Helensburgh. Together with other similar and roughly contemporary local sites, such as Midross beside Loch Lomond, Sawmill Field has provided another example of the funerary rites practiced during the early Bronze Age period.

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