

Excavations at an early medieval cemetery at Stromness, Orkney

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ABSTRACT

In Autumn 2002, AOC Archaeology Group excavated a cemetery at the Bu of Cairston. The site was situated on a headland known as Bu Point, 2km east of Stromness on the Orkney Mainland. The site was centred on NGR: HY 2725 0950. Scottish Water had received planning permission to construct a new waste water treatment plant at the Bu of Cairston. Archaeological investigations were carried out as a condition of this planning consent. A number of pre-cemetery features were identified at the site; these included a Neolithic gully with associated post-holes, a palaeochannel, a buried soil horizon and several rubble spreads. Excavations revealed a cemetery of 13th- to 14th-century date. A total of 109 inhumations, and a further 15 probable graves, were recorded on the site. The dating and archaeological evidence for the cemetery suggests a Christian context. The burials were supine on an east/west alignment with no associated grave goods or markers. Six individuals were buried in cist-like structures and five were buried in wooden coffins. It is thought that the original parish church of Stromness was located at the Bu of Cairston, before the parish church was moved to St Peter's in Outertown in the 17th century. It is probable that the cemetery excavated at Cairston was that associated with the parish church.

INTRODUCTION

In September to October 2002, AOC Archaeology Group undertook an excavation on a headland known as Bu Point, 2km east of Stromness on the Orkney Mainland. Scottish Water had received planning permission to construct a new waste water treatment plant at the Bu of Cairston. A condition on the planning consent was for a programme of archaeological assessment to be implemented to inform a mitigation strategy, given the suspected nature of archaeological remains along the route of a new access road. A programme of archaeological works was therefore commissioned by Tulloch Civil Engineering Limited on behalf of Scottish Water.

The area investigated was located immediately to the south of the farmsteadings of the Bu of Cairston, and situated on a low eroding cliff adjacent to the Bay of Ireland (illus 1). Site centre was at NGR: HY 2725 0950. The excavation area consisted of two 1m wide strips of land either side of the road cutting, and those parts of the base of the cutting in which archaeology was located. The total excavation area was c 350sq m.

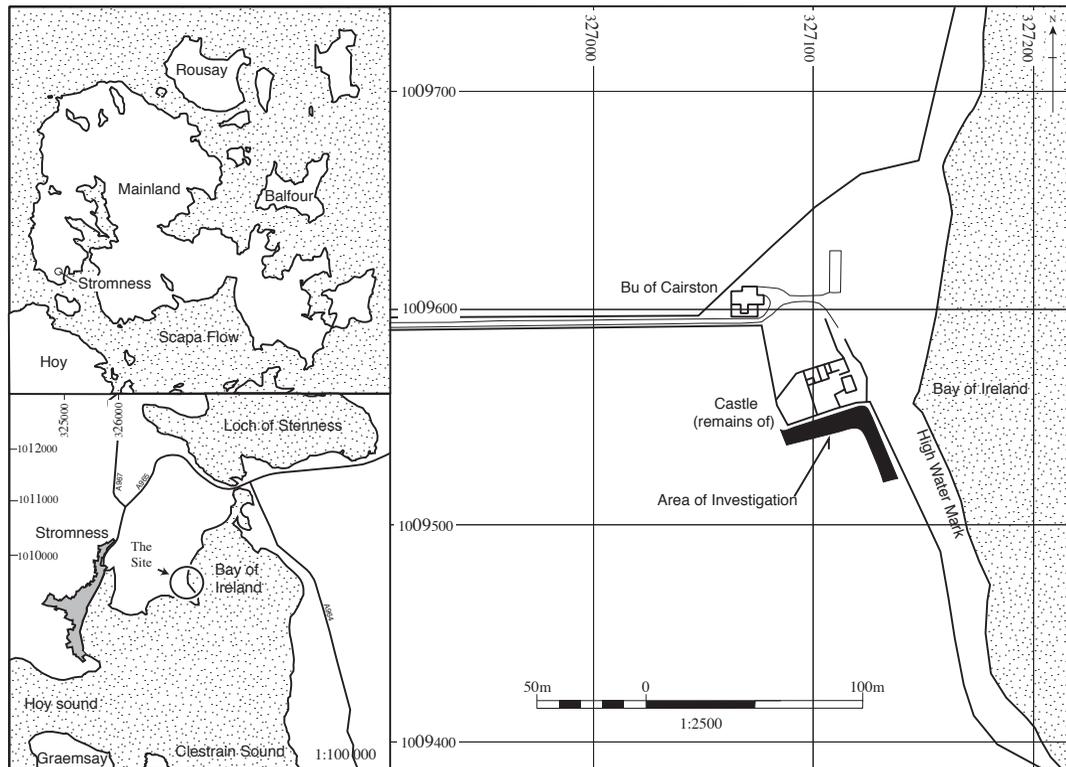
ARCHAEOLOGICAL & HISTORICAL BACKGROUND

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The Bu of Cairston is first mentioned in the *Orkneyinga Saga* in the year AD 1152, when Earl Erlend and Sweyn Asleifson encounter

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ILLUS 1 Site location

Earl Harald off Cairston, referred to as 'Kjarrekstaðir'. The passage describes how Harald, after seeing Erlend approach by sea, retreated to the 'castle' at Cairston and defended himself against a prospective attack. The *Saga* relates that many were wounded on both sides and that Harald would have surrendered had the attack lasted any longer (Taylor 1938, 308). In the midst of this account there is a paragraph which describes Arni Hrafn's son running to the church in Kirkwall, this passage leading to some doubt over the location of the event at Cairston. Munch (1874, iii, 849n) altered the text to read 'Knarston' so that the flight to Kirkwall was credible. However, Clouston and Taylor believe that Arni's flight had become associated with the wrong battle, as there is a similar account of an ambush at Knarston in AD 1154, thus proposing that there were two battles – one at Cairston and

one at Knarston – and that at some point Arni's flight had been associated with the wrong attack (Clouston 1932, 112n; Taylor 1938, 317–18, 398 n9).

The Bu of Cairston was originally Earldom property and is entered in the 1503 Rental as 'of the auld earldom'; in the 1492 Rental it is entered as 'conquest', but this contradiction is explained by Thomson (1996, 68) and there is no reason to doubt that the estate was bordland, and thus part of the Earldom property. The estate was leased to tacksmen, middlemen associated with the Earldom, often by blood ties, and not feued to private individuals until 1587 when William Gordon received it in feu charter from Earl Robert Stewart. The charter was granted 'in consideration of our sovereign lords acts of Parliament made anent the setting of fewis for bigging (building) and beiting (repair) of houses'

(Clouston 1929b, 59). The Gordons continued to hold the estate until about 1774 when it was sold after James Gordon abandoned the estate – and his wife – and moved to America. Non-resident proprietors held the estate until c 1900 when it was broken up and sold as separate farms (Clouston 1929b, 59).

In 1927 Clouston, intrigued by the *Saga* account, investigated ‘the Castle’, an enclosure at the time serving as a piggery and henhouse to the south of the farm buildings, where he claimed to find the remains of a ‘Norse castle’ (Clouston 1929b, 57–68). The enclosure comprised an almost square courtyard measuring 70ft (21.3m) north–south by 68ft 9in (20.9m) east–west over walls on average 3ft 11in (1.1m) wide. In the north-west corner were the upstanding remains of a 9ft (2.7m) diameter circular turret and Clouston (1929b, 59), through excavation, identified a second turret at the south-east corner, c 16ft (4.9m) in diameter built over earlier foundations. Within the enclosure were the much-altered remains of three rooms. In the north-west corner was a room which opened into the turret. Its entrance was in the south-east into a mural lobby with a straight stair leading to the west. A fireplace and a window were in the west wall. Clouston interpreted this chamber as a 12th-century keep which had been later altered by the Gordons who rebuilt the west wall, added the turret and inserted a doorway in the east wall. A second room, linked to the first by means of the doorway in the east wall and using the enclosure wall as its north wall, had a fireplace and two windows in its south wall. Clouston considered it to be of 16th-century date. The third room was adjacent to the first on the south side and was interpreted by Clouston (1929b, 59–63) as ‘early’, with a fireplace, and two recesses added later.

To summarize, Clouston interpreted the site as dating from the 12th century and incorporating the fragmentary remains of a Norse castle comprising an enclosure wall, outer ward (found to the east of the enclosure), keep and south-east tower. The Gordons rebuilt the site in the 16th

century to create a manor house, adding the north-west turret along with the second room and undertaking major alterations to the first and third rooms. The Royal Commission, however, considered the remains at Cairston to all be of ‘late 16th century date’ (RCAHMS 1946, ii, 322 no 918).

The site was resurveyed in 1999. It was in a ruinous and overgrown state and there were no visible features earlier than the 16th century, although the stonework appeared to be of a considerable age and was clearly built in several styles. One style, where large stones were arranged join above join without breaking-bond, could theoretically be of Norse date (Clouston 1929a; Grieve 1999, 75–9). The extant archaeological remains did not confirm the presence of a Norse castle at the site.

The enclosure is only one of several component features of the Bu of Cairston estate, which also includes within its original bounds several attached farms, the tradition of a chapel and burial ground and the remains of a broch. All these features are relevant in understanding the history of the site and its environs.

The name ‘Bu’, ON *bú*, farmstead, estate (Marwick 1952, 240), has a particular meaning in Orkney as a large estate of single occupancy. The term is used in this context in the *Orkneyinga Saga*. Clouston (1927, 41–3) outlined four characteristics of original Earldom ‘bu’ settlements of which he calculated there were 11. The ‘bus’ were large in size, had attached smaller farms, were built close to the shore and had an associated chapel or church. The Bu of Cairston is a typical ‘bu’ and, as such, can be termed a high-status medieval settlement, one of several owned by the Earls (for the extent of the Earldom Estates see Thomson 1987, 127–8, fig 11). Prior to the Norse period, the site was also a focus of high-status settlement as demonstrated by the remains of a broch and associated settlement eroding to the north of the enclosure.

The tradition of a chapel at the Bu of Cairston is first recorded by Clouston (1918, 104). The Ordnance Survey of 1964 records that the chapel

was located in the stackyard, with the burial ground having been in a drystone enclosure to the north (CANMORE). The existence of a chapel and burial ground at the Bu of Cairston is not surprising as large medieval farms often have an associated chapel. However, the status of the chapel at Cairston is of particular relevance. Clouston has argued that the original parish church of Stromness was located at the Bu of Cairston. His argument is based on a group of deeds dating from 1667 to 1673 where it appears that the parish church had been recently transferred to St Peter's in Outertown, with the original parish church having been dedicated to the Holy Cross. Clouston states that the glebe of Stromness was originally at Congesquoy to the north of the Bu of Cairston and, using this along with the evidence for the high-status nature of the Bu of Cairston and his belief of a Norse castle at the site, he proposed that the parish church was originally at Cairston, only later being moved to Outertown to be more convenient for the majority of the population (Clouston 1932, 155–6). The evidence used by Clouston is problematic but the argument is convincing. Nine of the parish churches in Orkney are located at bu farms and there is every reason to suppose that the Bu of Cairston was no exception. This is further proven by the existence of a track between Congesquoy and Cairston, which indicates that they were linked in some way, and the tradition that St Peter's in Outertown replaced the chapel at Cairston (CANMORE).

The Bu of Cairston was a focus for high-status settlement from the Iron Age as proven by the broch remains. Although there is no confirmed archaeological evidence for Norse remains there is little doubt that a high-status settlement once occupied the site. This settlement may have been similar to several others found in Orkney, including Tuquoy in Westray and the Bu in Orphir. Tuquoy consisted of a large lime-plastered hall-house with a tower at one end built close to the shore and immediately adjacent to the parish church, Crosskirk (Owen 1993, 318–39). This form of

settlement is a physical manifestation of the wealth and power held by the elite in the early medieval period at the height of the success of the Earldom and clearly shows the important connections between secular and religious life at this time. Archaeological evidence of a high-status settlement and parish church is also found at the Bu of Orphir where Norse remains were uncovered in the late 1800s adjacent to a 12th-century round church (Johnston 1903). More recent survey and excavation has revealed a horizontal mill and industrial site at Orphir and, although no archaeological remains of the hall have been discovered, there is no doubting that the Bu was a significant earldom estate in the medieval period (Batey & Freeman 1986; Batey & Morris 1992; Batey 1993).

It is probable that any remains of such a structure at the Bu of Cairston were removed in the 16th century when the Gordon manor house was constructed. The Bu of Cairston should be considered one of the most important high-status settlements in Late Norse Orkney and a fundamental part of the infrastructure of the Earldom.

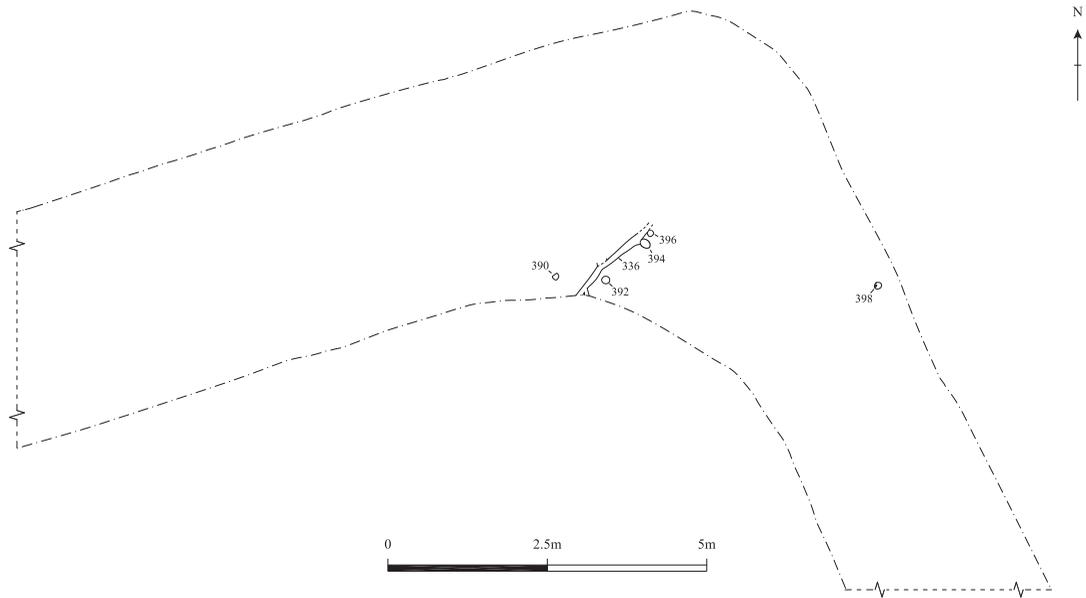
THE ARCHAEOLOGY

NATURAL DEPOSITS

The underlying bedrock at the site was Middle Old Red Sandstone, which occurs in this area as the Stromness Flags. These are described as grey and black thinly bedded, in part laminated, dolomitic siltstones, shales and subordinate thin, very fine-grained sandstones. These often weather to an ochreous colour. These appear to outcrop in the north of the site from beneath an area of drift characterized as medium-coarse yellow sand. These sandy deposits appear to be different to the natural Devensian glacial till ('boulder clay') that is present over most of the site, and may have been marine sands deposited during high-water episodes (Mykura 1976).

C-horizon, natural glacial till (007)

This deposit occurred as a firm-stiff yellow clay (007), containing medium-sized clasts of comminuted grey



ILLUS 2 Phase I: pre-cemetery

and yellow flagstone, derived from the Stromness and Rousay Flags. The depth of the deposit is unknown, but evidently was variable across the site for occasional outcrops of the underlying flagstone (254) to occur.

PHASE I: EARLIER NEOLITHIC PRE-CEMETERY ACTIVITY (ILLUS 2)

A number of features were identified that were sealed by the Phase III soil horizon and cut the natural clay (007). Probably the earliest feature was a 3.3m length of gully (context 336) that existed between the limit of excavation and Feature 334. This was a 0.3m wide feature up to 80mm deep, which curved slightly to the north-east. It appeared to bifurcate at its southern end, where it extended into the limit of excavation. Contiguous with this gully were two post-holes (394 & 396) of a similar depth and up to 0.3m in diameter. All three features contained the same fill (335), a distinctive mid-dark grey silty clay containing moderate amounts of sandstone and occasional birch charcoal fragments. A sample of birch charcoal from context 335 was dated by AMS radiocarbon dating at the Scottish Universities Research & Reactor Centre (Table 1). This mid-

fourth millennium BC date suggests activity at the site during the earlier Neolithic period. In close proximity, though not strictly stratigraphically equivalent, were two further post-holes (390 & 392), both substantially deeper at 0.35m, though of comparable diameters. Both post-holes had packing stones in their bases, and were filled with mid greyish-brown sandy silts (389 & 391). Birch charcoal was recovered from the fill (context 389). One of the packing stones from context 391 may have been a reused quernstone fragment. A deep post-hole (398) in the east of the site also contained packing material and may have been roughly contemporary.

The presence of birch (*Betula* sp) as the sole genus represented in the charcoal retrieved from a gully (context 336) and post-hole (390) is interesting. Birch, as with most other native tree species, is nearly absent in modern Orkney and currently only grows wild at Berriedale Wood on Hoy. Although pollen analysis indicates that Orkney was once covered in dense deciduous woodland consisting of birch, alder, willow, hazel, rowan and aspen, it appears that serious deforestation occurred from c 3000 BC onwards as Neolithic and Bronze Age peoples over-exploited wood resources for fuel and cleared land for grazing. The fact that only birch was recovered from the contexts under discussion here might further

TABLE 1
Radiocarbon dates calibrated using Oxcal v3.8 Bronk Ramsey (2002) with atmospheric data from Stuiver et al (1998)

<i>Lab code</i>	<i>Sample material</i>	<i>Context number</i>	$\delta^{13}\text{C}$ (%)	<i>Years BP</i>	<i>1σ calibrated range</i>	<i>2σ calibrated range</i>
SUERC-1201 (GU-11500)	Human bone	009	-18.0	895 \pm 35	AD 1040–1090 (29.4%) AD 1120–1140 (12.4%) AD 1150–1210 (26.5%)	AD 1030–1220 (95.4%)
SUERC-1202 (GU-11501)	Human bone	107	-19.0	900 \pm 35	AD 1040–1100 (33.1%) AD 1110–1190 (35.1%)	AD 1030–1220 (95.4%)
SUERC-1407 (GU-11499)	Charcoal: birch	335	-25.4	4700 \pm 40	3630–3600 BC (7.8%) 3530–3490 BC (13.5%) 3460–3370 BC (46.9%)	3640–3550 BC (21.1%) 3540–3360 BC (74.3%)

suggest a severely limited local wood resource, the collection of which in this case consisted in fact of a single species.

PHASE II: PALAEOCHANNEL & BURIED SOIL (ILLUS 3)

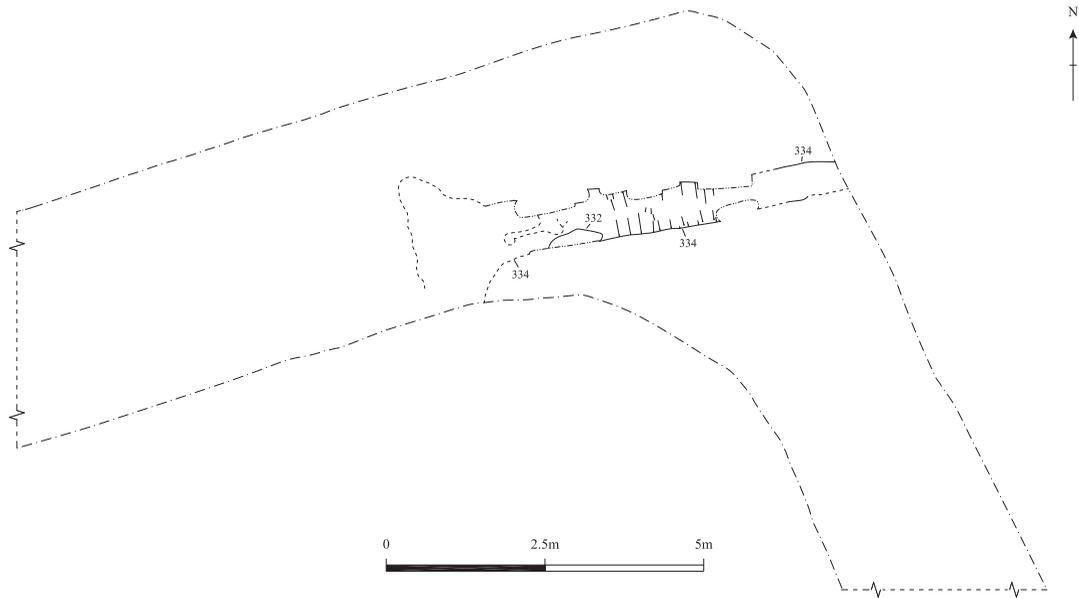
Appearing to cut the gully (context 336) at its northern end and extending for at least 11.5m east–west across the site was a broad gully/channel feature (334). At the eastern visible extent, this feature measured *c*0.95m across and 0.1m deep, increasing to 1.8m wide by a similar depth at the western end. As it extended westwards and became broader the edges of the feature gradually became flatter and merged with the surface of the natural clay. It was also at this western end that what had appeared as the fill of the feature in the east formed a layer over the natural clay and extended even further westwards. This layer (333) was visible in section sealing gully (336). This has been interpreted as a buried soil horizon occurring across a limited area of the site, although the processes behind its formation are not yet understood. The deposit was characterized as a firm, occasionally friable, pinkish–greyish brown fine sandy silt containing moderate quantities of small flagstone fragments and occasional small charcoal fragments. At its deepest, towards the west end of Feature 334, it was 0.23m deep, where it appeared that water action may have scoured out an irregular gully in the base of the feature. A possible honing stone made from a smoothed beach pebble was found within this deposit.

Pit 332 cut through the top of the southern side of the channel and was itself truncated by a later grave (091). The full extent of the pit was not seen, but measured at least 1.8m by 0.6m, but only 70mm deep. The fill was very similar to context 333, and may have also been a natural feature, especially as the sides were quite irregular.

The western extent of context 333 was marked in section by a large flagstone (429) in section, which seemed to be sitting in a slight hollow. To the east of this a thin layer of orange clasts (428) appeared to mark a possible surface flush with the top of this stone, but when the section was cut back this deposit lensed out rapidly to the south and east. It is not known whether the large stone was deliberately placed, and the reddish layer appears to be a naturally formed layer of iron panning within the soil horizon (003) rather than a manmade surface. It may be that water running off eastwards towards the sea was wicked up over the flagstone, and resulting precipitation of iron-rich groundwater resulted in an iron-panned horizon within the subsoil on the eastern side.

PHASE III: 'B' SOIL HORIZON

This layer (003) sealed all the Phase I & II features and deposits, and consisted of a mid-dark greyish–brown silty clay with a 2% fine–medium sand fraction. Inclusions comprised small clasts of reworked clay and flagstone. Whilst no definite unconformity with the topsoil (002) could be identified, it was obvious



ILLUS 3 Phase II: pre-cemetery channel and pit

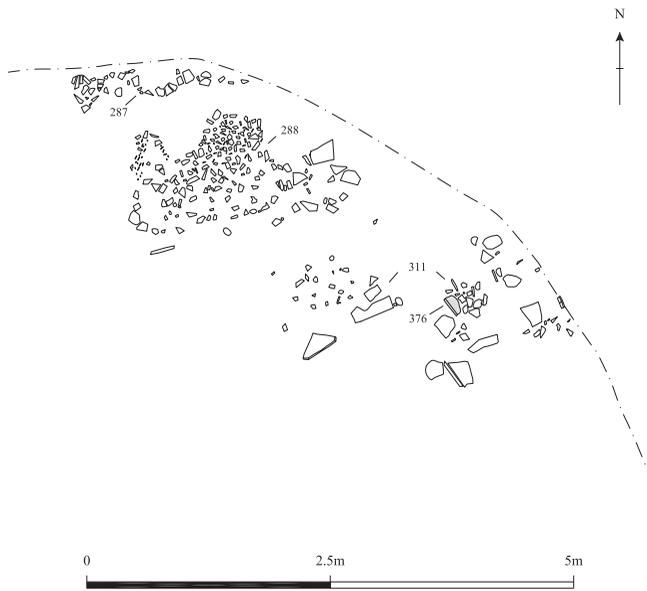
from the stratigraphy that the formation of this layer substantially pre-dated the topsoil, though it did post-date some human activity at the site. It must be assumed that context 003 at some point formed the land surface prior to and contemporary with the use of the site as a burial ground. The single pottery sherd recovered from this deposit indicates a possible medieval date. Some re-working of this horizon has occurred, partly naturally but also through ploughing, which resulted in the loss of the original land surface itself. However, the old ground level must have been similar to the heights of the B-horizon as seen in section during the excavation. Where it was seen in the base of the trench, it was recorded as contexts 151 and 248.

This horizon forms the layer into which the Phase V graves were repeatedly cut and, as such, might be expected to contain a fair amount of disarticulated human bone. Whilst this deposit was removed prior to AOC attendance, some disarticulated bone was noted in section, and had previously been identified during the walkover survey (Robertson 2002). However, there was relatively little bone identified within context 003, suggesting that despite concentrated inter-cutting within the graveyard most of the bodies were more or less intact and cemetery activity had not persisted long enough for total dispersal of interred bodies.

PHASE IV: RUBBLE DEPOSITION (ILLUS 4)

During the walkover survey a layer of flagstone fragments was identified at the western angle of the trench and tentatively identified as a rubble and clay surface, possibly associated with an ecclesiastical structure supposed to exist at the site. Overburden was removed from this part of the trench sides and an area of *c* 25sq m exposed. The previously identified layer of rubble (287) extended up to 0.6m from the face of the section, and was composed of a single layer spread of local flagstone fragments up to 0.25m maximum dimension. The southern edge of this layer appeared to form a roughly straight line, but little evidence of form was available due to the truncation on the north side. This layer did extend further to the west in section, and had a total visible length of *c* 10m. Beneath context 287 was a thin layer of clay and sand (384) up to 25mm thick that was discontinuous below context 287, but did give the impression of being a levelling or make-up layer laid directly onto the underlying soil (003). The top of context 287 was not wholly level, however, and tended to reflect the underlying natural topography, sloping slightly seawards to the east as it did.

Immediately to the south but not contiguous with context 287 was a further rubble spread (288). This was not truncated by the track, and existed over an



ILLUS 4 Phase IV: rubble deposit

area up to 1.9m wide by at least 3.8m east–west. It was almost identical to context 287, with the exception of an area of slightly larger stones at its eastern end. The ‘clean’ patches between these two spreads may be the result of truncation by later graves, of which there may have been at least three in this area. These possible graves were not excavated as they fell outside the area of excavation. A single sherd of transitional medieval/post-medieval pottery was obtained from the top of this deposit and is almost certainly intrusive.

There were further patches of flagstone rubble to the south of this that were generally recorded as context 311. One such vertical flagstone may be a marker associated with Grave 053, as discussed below, that must truncate context 311. The stones in this area were generally more jumbled, and several may have been other stones associated with unidentified and unexcavated graves outside the area of the main trench.

The purpose of these rubble deposits is unknown. They were deposited onto the pre-existing soil horizon (003), possibly with some levelling beneath, and do not appear to be a natural horizon. It seems that they pre-date at least some of the cemetery activity, as evinced by graves cutting through these deposits. Any suggestion that these deposits represent the foundations of even an insubstantial structure(s) seems tenuous, despite the presence to the east of

apparently higher status graves (see below), as might be located in this area with reference to a chapel or church. No other evidence of structural material was seen, although the total area exposed was not great. It is possible that these deposits were used to stabilize wet ground prior to or during the use of the graveyard, or may even originally have been a path or yard surface, that was disturbed by later interments.

PHASE V: CEMETERY (ILLUS 5)

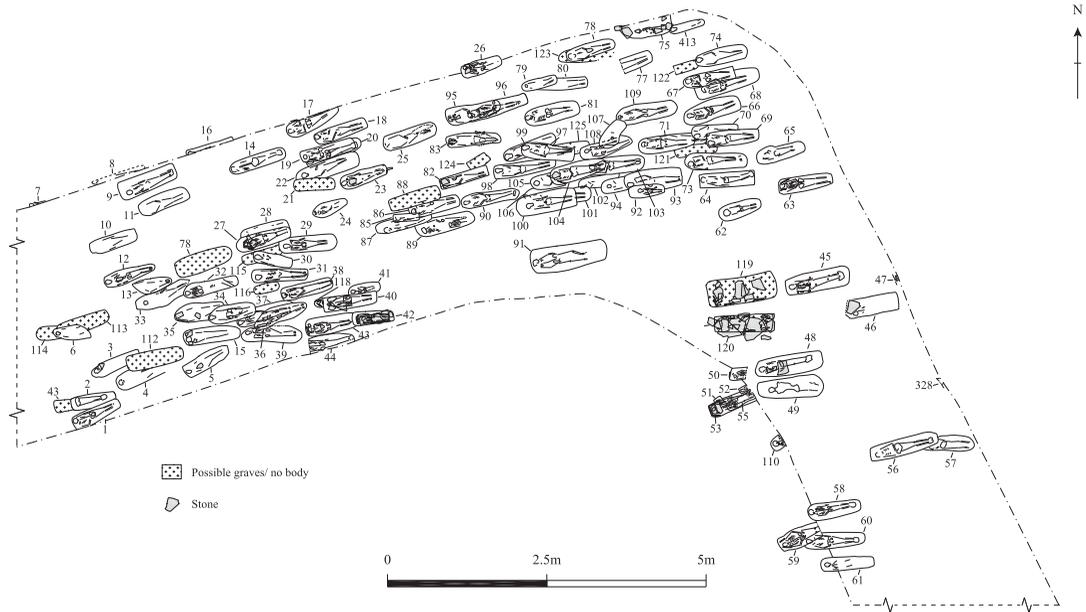
Extent

The extent of the cemetery as defined in the excavation was largely determined by the extent of the modern track-cutting where the human remains were initially revealed. The furthest east–west distance between graves was 26m, with a similar distance of 19m from north to south.

Although there is some suggestion that the density of the graves lessened towards both the west and the south, there is every likelihood that the original extent of the graveyard was further to the north and the east. There is an obvious barrier to the east in the modern shoreline and, although the position of the old shoreline is unknown, it cannot have been too much further to the east. This could imply a further eastward extent of 15–20m for the cemetery. Erosion is less aggressive at the lee side of the headland than at other graveyard sites exposed more fully to the Atlantic weather, such as Warebeth (Stromness Cemetery) on the western side of Stromness (Bell & Dickson 1989). A visual inspection of the Cairston shoreline revealed no human remains in section. This is hardly surprising given that Phase VI deposits comprised the majority of the section, probably in an attempt to inhibit further cliff erosion.

Spatial distribution of burials

With the prominent caveat regarding substantial modern truncation, it is tentatively possible to define three areas of the graveyard between which the spatial distribution of the graves differs slightly. These areas are defined purely on plan-form, and may well be artificial distinctions due to the incomplete nature of the site taphonomic sequence. They will therefore not be discussed in detail.



ILLUS 5 Phase V: cemetery

Area of concentrated interment north & west of palaeochannel

This area must be considered as having been the primary focus for interment within the cemetery, based on the area of excavation, notwithstanding that the cemetery is likely to extend beyond the area of investigation, as discussed above. This swathe of burials extends most of the way across the excavated area from east to west and constitutes the greatest known extent of the cemetery, at c26m. All but 20 of the graves should be considered as lying within this northern area, including those discussed in the following section regarding the relationship between interments and the palaeochannel.

It is likely that the prime concentration of interments would be close to any chapel or church that existed at the site, but in the absence of definitive excavated structural evidence, or evidence for the original total extent of the cemetery, the location of such a structure is unknown. Documentary evidence might imply that this structure lies to the north of the investigation area, but this cannot be defined without investigation of that area.

It does seem that this area is delimited to the south by the presence of the palaeochannel, possibly implying that this feature remained damp or of slightly lower relief than the rest of the area, and was

therefore unsuitable for interring bodies. However, it is noticeable from the stratigraphic sequence that, in the area immediately adjacent and north of the channel, those graves higher up the sequence gradually encroach into that area above the feature, although only by 0.5m or so. This tends to suggest that the cemetery was becoming crowded and that all available space was being used, even that which was perhaps unsuitable.

Physically above the channel

Three graves (062, 063, 091) can be identified that lie wholly above the palaeochannel. These may be a function of the later expansion mooted above and may represent a conscious decision to utilize the area above the channel, which may previously have acted as a boundary, visible or otherwise, to cemetery expansion. None is known to have physical relationships with other graves, a possible function of the area's general unsuitability for use as a cemetery.

South of the channel

South of the palaeochannel lay 20 graves in an area of much less inter-cutting than the northern area. This area may represent an expansion of the cemetery

relatively late in its development and to the south of the palaeochannel which may have formed an earlier boundary to the graveyard. The relatively low concentration of graves and of inter-cutting graves tends to suggest less intense use, possibly because this area was not used for such a long period of time before the cemetery went out of use.

Development

Given the nature of the modern truncation, and the necessity of excavating only part of the graveyard, albeit possibly the central part, it has not been possible to construct an absolute stratigraphic sequence for the development of the graveyard. The lack of secure dating evidence for the graveyard as a whole means that the stratigraphy defined cannot be dated absolutely. It is therefore extremely difficult to interpret developmental trends within the graveyard, either spatially or temporally.

It is self-evident that the graveyard would at a single unspecified time have consisted of one grave, that is, the first person(s) to be buried in the first grave dug. From this point, most graveyards show a pattern of expansion out from the initial grave to the edges of the burial ground, until the optimum level of single graves has been reached. It is at this point that ground begins to be reused, and the truncation of pre-existing graves becomes evident in the stratigraphy. (This is excluding additional interments in kin plots, which may already have occurred, and can cause truncation.) There may also be circumstances where certain areas of a graveyard remain unused, because of surface features or other land-use, until other areas have become relatively 'full', and these new areas then come into use.

It is not possible to ascertain whether these processes occurred within the graveyard at Cairston. It is also not possible to determine whether the initial focus of the burials was near to any chapel that may have been at the site, and on which side of it the graves were first located. There is a general tendency in many graveyards for the bulk of the burials to be situated to the south of the church, at least initially, and it may be that the Cairston chapel, if it ever existed, lay to the north of the current investigation area. One interpretation might be that the first graves were located south of a chapel situated north of the current investigation area, followed by intense reworking of the areas closest to it. Use of the graveyard extended westwards, and eventually southwards also, to the other side of the old southern boundary.

Due to the lack of dating evidence on site, chemical analyses were used to date the cemetery (Table 1). This is covered in detail in the human bone section. In the absence of other dating evidence, results suggest that the cemetery is of 12th- to 14th-century date.

Burial practice

The principal practice identified was that of inhumation, with no cremations identified. A total of 125 burial numbers have been assigned, of which 84% (n=105) relate to inhumation burials and contain usually one body. A further 4% (n=5) relate to unexcavated burials containing bodies. The remaining 12% (n=15) were assigned to truncated and untruncated cuts without bodies but which are interpreted as probable inhumation burials.

Grave shape & size

Apart from the multiple burials (017 & 089), all the burials were contained within a grave cut for a single individual. Most of the graves were roughly rectangular with vertical sides and a flat base, although the ends of each grave were generally slightly curved. The size of the grave varied, roughly according to the size of the body in most cases, or of the coffin or grave furniture, where present.

For adults, the length of the grave-cuts that were not truncated ranged from 0.81m (context 005) to 2.15m (context 048), an average length of 1.72m (males: range 1.56m (context 082) to 2.15m (context 048), average 1.84m; females: range 1.31m (context 021) to 2.08m (context 068), average 1.74m). For sub-adults, the length ranged from 0.82m (context 085) to 2.18m (context 056), average 1.12m.

The width of the grave-cut for adults, again those that were not truncated, ranged from 0.30m (context 005) to 0.68m (context 066), an average of 0.51m (males: range 0.37m (context 082) to 0.65 (context 048), average 0.51m; females: the width ranged from 0.37m (context 067) to 0.66m (context 100), average 0.51m). For sub-adults, the width ranged from 0.30m (context 005) to 0.68m (context 066), average 0.51m.

There were a few variations on the standard 'box-shaped' grave-cut. Most of these were minor differences, primarily in the degree of 'finishing' to the base of the cut. Although the majority had flat bases, a few (010, 015, 031, 056, 068 & 069) appeared to have been excavated with slightly less care, leaving the bases either uneven, or concave with

slightly elevated east and west ends. This latter form may have been deliberate for reasons unknown, but is not thought significant in terms of burial practice. It may be the result of settling into the natural subsoil, as evinced by 'pockets' beneath cist stones in Grave 120.

Several of the graves, such as Graves 006 and 033, could be described best at this level as irregular scoops, although this is likely mainly to be a function of the degree of horizontal truncation. Even if they were poorly finished originally, later modern disturbance has given the impression of substantial irregularity. All these graves were shallow and in the base of the trench, and would still have had to be dug to that depth for the interment of the body, so may have had more regular sides higher up. However, it does appear that not all of the graves defined were originally excavated with all due care, although expediency is often a greater impulse than artisanship.

Grave depth

Because the level of the contemporary ground surface from which the graves were cut is fairly well established, some data can be extrapolated regarding the depth of the graves, despite the modern truncation. Because the topography of the site is regarded as having been fairly level, therefore, it is reasonable to assume that the level of the bases of the graves is an indicator of their original relative depth.

For those burials where the grave depth could be recorded, minimum grave depth was 0.08m and maximum depth was 0.68m, an average of 0.23m. However, as the majority of burials were truncated, these results must be treated with caution. When assessing those individuals who were not truncated, the depth ranged from 0.08 to 0.42m, with an average depth of 0.22m. The graves visible in section indicate that a number of the burials were quite shallow. For those burials where the cut could be recorded, the bases of all the graves lay between 4.56m and 5.98m OD, with the average base height being at 5.23m OD. When the base height is assessed for only those burials not truncated, the range was 4.68–5.82m OD, with an average of 5.15m.

It might have been expected that markedly smaller, and younger, corpses would occupy shallower graves as, for practical reasons, it is harder to dig a small grave as deeply as a large grave. It is distinctly possible therefore that infant burials are under-represented in the sample, as their shallower graves would have been particularly vulnerable to

horizontal truncation. There are several infant graves (051, 052 & 055) occurring high up in section, the bases of which occur at 5.27–5.38m OD, some 0.13–0.24m higher than the adult grave (context 053) which they truncate, and only 0.16–0.27m below the top of the layer (context 003) from which they appear to be cut. However, the base of the adult grave in this case is only 0.4m below the top of this layer and, as most of the other adult graves seen in section are at a similarly high level, it must be assumed that many of the graves were relatively shallow. It seems likely that the 'six feet under' assumption that exists with 19th- and 20th-century cemeteries, particularly in urban environments, does not apply to the Cairston graveyard. Most likely, the graves were often dug deep enough to cover the body and no deeper.

Alignment of burials

All of the burials with a measurable alignment conform to a single major alignment. As is generally practiced in Christian cemeteries, this was on an east/west alignment. The great majority of these lie on an alignment of 75–85°, relative to grid north, although there are a few burials which are orientated further to the north at 60–70°. Two burials (030 & 097) are orientated at an angle greater than 90°, albeit slightly. Some care was obviously taken to preserve this roughly east/west alignment, although there is some slight variation. There is no evidence to suggest that the burials are oriented with reference to anything other than those areas of the horizon where the sun rose and set, with the orientation observed being a function of Orkney's northerly latitude. Any relationship between grave orientation and Feature 334 is most likely to be coincidental, with the channel running towards the shoreline immediately to the east.

Alignment & location of the head

All individuals at the site were buried with their heads located at west of the grave. This was apparent even with those individuals whose heads had been truncated by later graves or were otherwise missing. This would seem to imply Christian burials when considered with the radiocarbon dates obtained, with the heads of the deceased facing the rising sun. It is unusual that none of the individuals were laid out with the head to the east, and is strong corroborative evidence for a degree of care in interment, within a Christian context.

Arrangement of the corpse

The position of the skeleton was assessed for those burials with articulated remains (n=109). For nine burials the position of the body could not be ascertained. This was either because the remains were in such a poor state of preservation or the remains were only identified as an articulated individual during the post-excavation assessment. The remaining burials (n = 100) were positioned supine (on their back), the common practice in Christian cemeteries.

Of these 100 individuals, 69 had the majority of limbs present thus enabling us to record the exact position of the body. The most common position (n=37) was with both the arms and legs extended, followed by flexed arms and extended legs (n=26). Other burial positions include flexed arms and legs (n=1); arms extended and flexed legs (n=2) and arms extended with one flexed and one extended leg (n=3). It was possible to record the position of the head for 39 individuals; of these, 13 were facing upwards, 13 faced east, ten faced south and three faced north.



ILLUS 6 Burial 042

Coffin furniture

Burials were generally found without the presence of coffins or other grave furniture. However, evidence of flagstones used as partial or whole cist-like structures was seen in six graves (040, 042, 048, 075, 119 & 120), as head-boxes in ten graves (003, 015, 027, 035, 043, 053, 059, 063, 082 & 118), with a further possible three (007, 036 & 83).

The best example was in Grave 042, a beautifully constructed stone box enclosing the body of a juvenile skeleton (illus 6). The cist was constructed with four sides closely parallel to the cut and a lid; there was no stone base. The flagstones were of grey, orange and yellow colouration. Three flagstones formed the sides of the cist; one flagstone was located at either end and three as the lid. The flagstone to the rear of the skull had been superficially split to reveal the nature of the flagstone. Single stones located either above the head, chest/head and chest were seen in seven other graves (005, 012, 023, 026, 032, 095 & 104).

It is not known whether the cist-like structures were originally used merely as packing between a coffin and the edge of the grave, or whether the remains represent intended grave furniture. In a region with likely very few wood resources (and those few consequently conserved), it seems unlikely that wood was used as coffin material, and consciously or otherwise, stone may have served as a wood substitute. The hypothesis of stone as grave furniture is strengthened by the presence of definite 'head-boxes' enclosing the skulls of individuals, and the presence of stones across the bodies of individuals which are probably intended to be seen as 'enclosing' the body or 'sealing' the grave.

However, evidence of wooden coffins was seen in five graves (010, 045, 119, 091 & 120). In Grave 010 the presence of a coffin was indicated by an iron fitting. Decayed wood, iron fittings and possible lime packing were identified in Grave 045. A decayed wooden plank was found in Grave 091. Evidence of iron coffin fittings were found within cist-like structures of Graves 119 and 120.

Burial markers

There was little definite evidence for burial markers, apart from a single possible example in the stripped area at the 'elbow' of the track. This comprised a vertical flagstone at the western end of Grave 053 and was part of a configuration of stones forming

a head-box around the skull of the individual. The possible marker projected 0.2m above gravel spread (context 311) through which the grave was cut, but may originally have been higher.

Grave 031 appears to have a 0.13m diameter post-hole cut through the base of the cut just north of the body, but it is uncertain whether this was a pre-existing feature at the time of the grave's inception.

Burial markers could have been erected to avoid disturbance by later burials; locate a particular burial in order to visit it; locate a particular burial in order that future burials be buried nearby (that is, a small plot). The evidence from Grave 053 suggests that three infant burials cut it, but that these burials may well be associated with one another.

The lack of much definite evidence for burial markers is probably as a result of modern truncation, past ploughing activity and an excavation area restricted to the track. It is difficult to prove whether such markers existed elsewhere on site, and it seems unlikely given the degree of inter-cutting evident over most of the site. The few apparently isolated interments in the south of the graveyard may well have been marked, but it is likely that most graves were only marked by an earth mound created after backfilling, which would gradually subside and revegetate.

Multiple inhumations

There were two multiple burials on the site: 017 & 089. Burial 017 contained the remains of an old adult (46+ years) probable male (context 202) and an unexcavated individual (context 200). Burial 089 contained the remains of an adult of unidentifiable sex (context 137) and two neonates (contexts 138 & 152), between the knees and on the right side of the chest, respectively.

Burial goods

In situ No *in situ* burial goods were identified in any of the graves, and this is entirely consistent with Christian burial practices. Given that shroud pins and similar fastenings are often found in Christian graves, there was a surprising lack of such artefacts, a fact unlikely to be wholly attributable to acid soil conditions.

Residual artefacts The only artefacts other than coffin fittings found within graves were apparently

residual and should be interpreted as such. Animal bone was the commonest find, from domestic mammals and fowl, with occasional fish species, and was recovered in small quantities from eight graves (030, 052, 053, 064, 090, 091, 110 & 118). Flint/chert was recovered from two graves (091 & 110) and may be residual midden material. One sherd of medieval earthenware was found in Grave 091.

Mortar was noted in small amounts in the fills of several graves (062, 063, 119 & 120) and may be circumstantial evidence for the presence of a demolished building pre-dating the creation of these graves. Interestingly, all four of these graves occur within 5m of one another and are all isolated interments near the elbow of the trench. This may be a further suggestion that burials here were located with respect to an ecclesiastical building near to this part of the site. The presence of mortar within Graves 119 and 120, neither of which yielded a body, may suggest that these graves were located under or immediately adjacent to a chapel or similar. When this building was demolished and the stone reclaimed, the bodies of these higher status individuals may have been removed, with mortar from demolition material entering the graves at that time. This does not of course explain the presence of mortar in Graves 062 and 063, in which bodies were present, unless the origin of the building material was different, or these graves were later than the demolition.

THE DEAD

Melissa Melikian

A total of 109 articulated individuals were recovered during the excavation. The remains underwent full osteological analysis. The following is a summary of the results; details of the full osteological report are lodged with the archive report.

METHODOLOGY

The human bones were analysed in accordance with recommendations by English Heritage (1991; 2002), Historic Scotland (1997) and the IFA (Brickley & McKinley 2004). Data from the recording forms were logged into an Access 2000 database constructed specifically to maximize skeletal data.

A full inventory of the bones and dentition was created; the disarticulated material was also recorded. The degree of preservation and percentage

completeness of each skeleton was noted. For the sub-adults, individuals' age determination was based on dental eruption (Ubelaker 1989), diaphyseal lengths (Sundick 1978; Scheuer & Black 2000) and epiphyseal fusion (Scheuer & Black 2000). Age determination of the adults was based on the morphology of the pubic symphysis (Brooks & Suchey 1990), changes at the auricular surface (Lovejoy et al 1985) and dental attrition (Brothwell 1981). An age estimation was established using as many methods as were applicable. Individuals were then classed into one of ten age ranges. Biological sex of the adult skeletons was based on the morphology of the skull (Acsadi & Nemeskeri 1970) and the pelvis following Phenice (1969) and Buikstra & Ubelaker (1994). Sex of individuals was based on as many methods as applicable. From this, an overall biological sex was assigned to the individual. Individuals were classed into one of the following categories: 0=undetermined sex; 1=female; 2=probable female; 3=indeterminate; 4=probable male; 5= male.

Metrical data were recorded based on the definitions of Brothwell (1981) and Howells (1973). In this study, height was calculated using the formulae of Trotter (1970) and Trotter & Gleser (1952; 1958). Non-metric traits were recorded following Brothwell (1981), Berry & Berry (1967) and Finnigan (1978). Skeletons were assessed for joint disease, spinal pathology, sites of entheses and dental health. Any pathology was described and diagnosis was based on findings in Aufderheide & Rodriguez-Martin (1998) and Ortner & Putschar (1981).

CHEMICAL ANALYSES

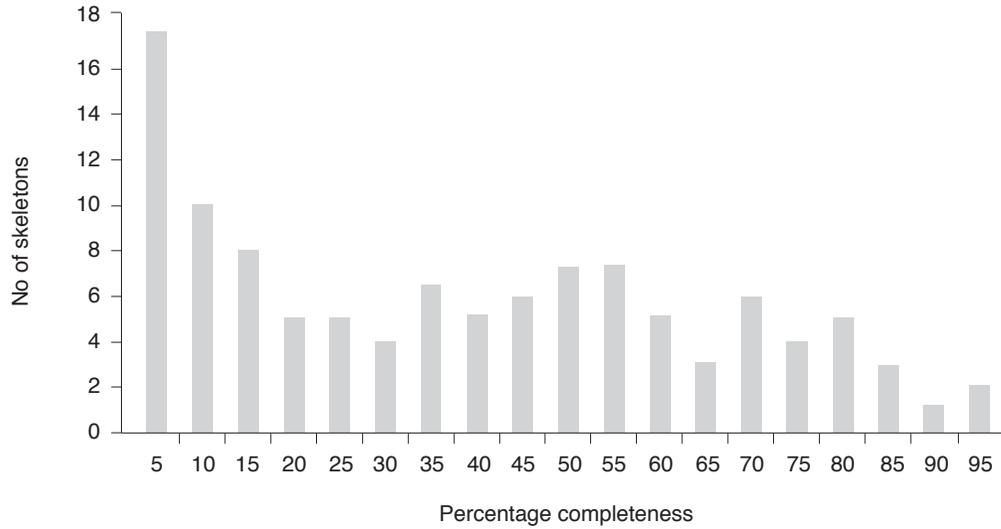
There was a lack of dating evidence on site and it was deemed necessary to carry out radiocarbon dating to establish, at least in part, the date range of the use of the cemetery. The only material which could confidently be defined as primary was articulated human bone, hence the use of minimal amounts of skeletal material in the radiocarbon assay. Two samples of human bone from stratigraphically secure and better-preserved human skeletons (009 & 107) underwent AMS radiocarbon dating at the Scottish Universities Research & Reactor Centre. For the analysis, a 7g sample of rib was used from each individual (Table 1). The calibrated age ranges were determined from the Oxford Radiocarbon Accelerator Unit calibration programme (OxCal 3.8). When calibrated, both of these samples provide a date range of AD 1030–1220 at the 1-sigma level.

Two 3–5g samples of bone from these individuals were also submitted for stable isotope analysis as part of a project looking at diet in Orkney in the first and second millennia AD (Barrett & Richards, in press; also see this reference for details of the methodology). For isotopic data, the sub-sample from context 107 was too poorly preserved for reliable results. For Sample 009, a good carbon to nitrogen ratio was achieved and is likely to be a reliable result: $\delta^{13}\text{C} = -17.80$, $\delta^{15}\text{N} = 15.10$, C:N ratio = 3.30. Thus, assuming that a $\delta^{13}\text{C}$ of $-12 \pm 1\%$ is a 100% marine diet, and $-21 \pm 1\%$ is a 100% terrestrial diet, this individual ate about 36% marine protein. This is rather high for Britain but comparable with other samples from medieval Orkney. The nitrogen value suggests a carnivore, probably fish again.

As well as increasing the data pool for this study, the isotopic data were used as a chronological control for the radiocarbon dating. This process, known as marine reservoir correction, is necessary because there is an offset of approximately 400 years between radiocarbon dates of contemporary terrestrial and marine carbon (for details of the methods employed see Barrett & Richards, in press). If we use the estimated marine carbon to help calibrate the radiocarbon date, the results are AD 1150–1310 (2-sigma). In the absence of other dating evidence, this result would suggest that the cemetery is of 12th- to 14th-century date.

At the request of the Orkney Archaeologist, Julie Gibson, a programme of sampling of the teeth was implemented during the excavation. This was undertaken in order to provide a potential ancient mitochondrial DNA sample from a possibly medieval population. It was hoped that, in the future, the sample could help inform researchers as to the genetic composition of the sample population interred at the Bu of Cairston, and also of Orkney populations prior and subsequent to the life of the cemetery. Recent research has examined the prevalence of Viking/Norse aDNA in the modern Orkney population (Wilson et al 2001).

Where possible, one tooth in 'suitable condition' was removed from each individual. Suitable condition was defined as a near or fully intact tooth that had not obviously been disturbed by human action. Badly degraded teeth or teeth from skulls that had been recently disturbed were not collected. None of the teeth were directly handled, in order to avoid contamination with modern DNA. Each tooth was double-bagged in clean fresh plastic bags, and labelled on the outside in permanent ink with the site code skeleton number.



ILLUS 7 Skeletal completeness

The samples were visually inspected as part of the human bone analysis but were not removed from their bags or otherwise contaminated. A total of 50 teeth were recovered from 50 individuals.

‘adult’, the mortality profile represents a U-shaped curve, with the majority of deaths occurring at both extremes of age. The prevalence of neonate or fetal deaths is 6%.

PRESERVATION & COMPLETENESS

Generally, the skeletons were poorly preserved and incomplete. In many instances the exterior cortical surfaces were badly eroded and the articular facets were missing. For 68 (62%) individuals, the bones were in a poor state of preservation, 36 (33%) were in moderate condition and only five (5%) were in a good state of preservation. The low levels of preservation were due to the acidic soils and to the amount of root activity and modern disturbance on site. Illus 7 shows the percentage completeness of the skeletons; it can be seen that 73 (67%) are 50% complete or under. A total of 17 (16%) are represented by only 5% of the skeletons.

SEX DETERMINATION

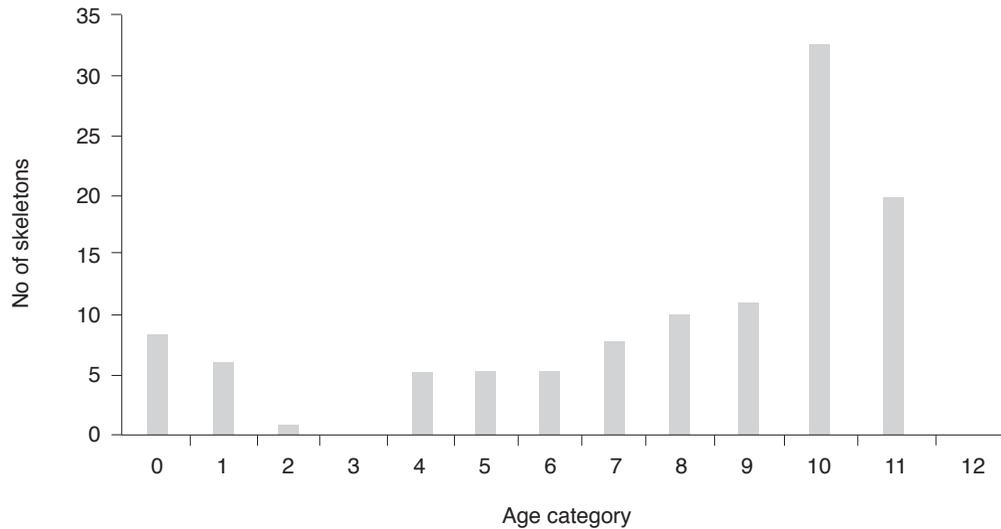
A large number of individuals (n=59) could not be sexed; this equates to 54% of the total sample and corresponds to the low levels of preservation

TABLE 2 Mortality profile

Age category	Age range	Number of individuals
0	No data	8
1	Fetal/neonate	6
2	1–6 months	1
3	7–11 months	0
4	1–5 years	5
5	6–11 years	5
6	12–17 years	5
7	18–25 years	8
8	26–35 years	10
9	36–45 years	11
10	46+ years	32
11	Adult	18
12	Sub-adult	0

AGE DETERMINATION

The sample comprised 79 adults (78.2%) and 22 sub-adults (21%). Eight individuals were in such poor condition it could not be ascertained if they were adult or juvenile (distribution of age at death can be found in Table 2 and illus 8). Excluding age category 11, which is for those individuals classed only as



ILLUS 8 Mortality profile

and high degree of truncation on site (Table 3). The assemblage comprised 24 females or probable females and 21 males or probable males; a male to female ratio of 1:1.1. This ratio is to be expected in any 'normal' population where sex is governed by genetic factors.

DEMOGRAPHY

The pattern of age at death for males and females is relatively similar (Table 4), with the number of deaths increasing in the older age categories. The only difference noted between the sexes was that two males were identified in age category six (12–17 years).

TABLE 3
Sex estimation

Category	Definition	Number of individuals
0	Undetermined sex	59
1	Male	6
2	Probable male	15
3	Indeterminate	5
4	Probable female	15
5	Female	9

STATURE

The number of individuals applicable for stature estimation was limited by the poor preservation and completeness of the sample. In total, it was possible to calculate stature for 12 individuals (Table 5 and illus 9). The mean stature for males was $169.6 \pm 3.94\text{m}$ ($n = 6$) and $158.4 \pm 3.78\text{m}$ ($n = 6$) for females.

DENTAL HEALTH

The study of the dental health of a population reflects oral hygiene and diet. During the analysis a number of dental conditions and pathologies were assessed. A few of these are discussed here.

Calculus

Dental calculus, or 'tartar', consists of mineralized plaque. The study of calculus can reflect the level of dental hygiene in an assemblage. Where applicable, the level of calculus was scored as none, mild, moderate or severe for each tooth (after Brothwell 1981). The level of calculus could be scored for 72 individuals; of these, 22 (30%) had no calculus, 19 (26%) had mild calculus, 16 (22%) had moderate calculus and 15 (21%) had severe calculus. Generally, the younger age categories had none or a lesser degree of calculus. This is to be expected as calculus forms

TABLE 4
Demographic profile of the Stromness skeletons

Sex	Age category												Total	
	0	1	2	3	4	5	6	7	8	9	10	11		12
Male	0	0	0	0	0	0	2	3	3	1	11	1	0	21
Female	0	0	0	0	0	0	0	3	4	5	11	1	0	24
Intermediate	0	0	0	0	0	0	0	1	0	1	3	0	0	5
Undetermined	8	6	1	0	5	5	3	1	3	4	7	16	0	59
Total	8	6	1	0	5	5	5	8	10	11	32	18	0	109

over a period of time. The ‘severe’ group consists largely of the older age categories (9 & 10; see Table 2), particularly age category 10 (66.7%). A total of 18 males and 23 females could be scored for calculus. Overall, a higher proportion of males (94.4%) exhibited calculus than females (82.6%).

Dental abscesses

A dental abscess, a body of pus surrounded by denser tissue, can form in response to a number of stimuli. Periodontal disease, dental caries, severe attrition or trauma can predispose the development of a dental abscess. No dental abscesses were found in the sub-adult sample. For the adults, the presence or absence of dental abscesses could be scored for 791 tooth positions. Evidence of abscesses was detected in 17 tooth positions; a total prevalence of 2.1%. For these 17 sites, 15 (88%) had the tooth present in

the socket and for two (11.8%) the tooth had been lost ante-mortem. The prevalence for the maxillary and mandibular sites was similar, 2.2% and 2.1%, respectively. Generally the most common tooth position was the first and second mandibular molar. The prevalence of dental abscesses increased with age. The prevalence was marginally higher in females (2.4%) than in males (1.5%).

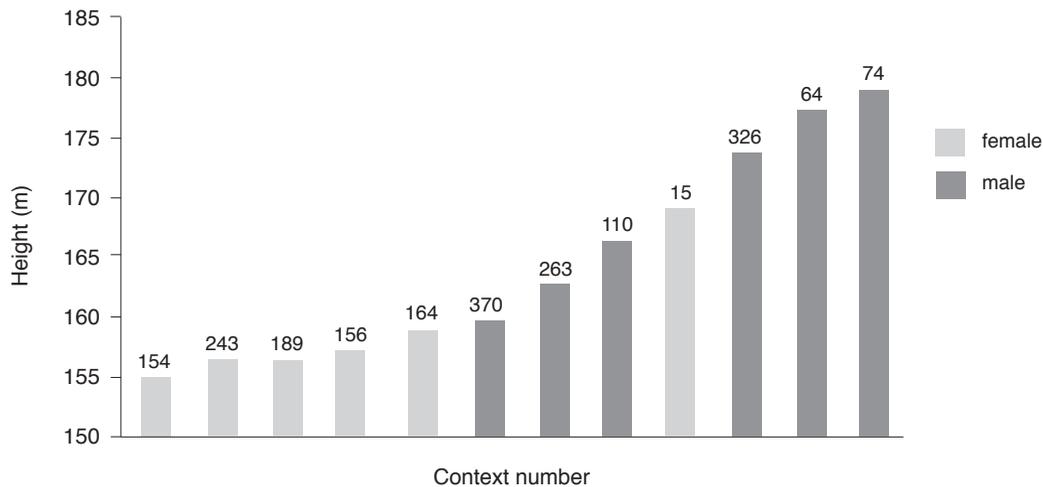
Dental caries

Dental caries is the most common dental disease. It is an infectious disease that can manifest itself as either opaque spots on the enamel or large cavities. Caries is the result of fermentation of food sugars by plaque bacteria and is progressively destructive.

The presence or absence of dental caries was noted for each tooth. If dental caries was identified then the site at which the lesion was initiated was noted. The

TABLE 5
Stature

Context number	Metrics used	Males		Females	
		Stature estimation (m)	Standard error (m)	Stature estimation (m)	Standard error (m)
015	Femoral length	–	–	1.67	±3.72
064	Femoral length	1.76	±3.94	–	–
074	Femoral length	1.79	±3.94	–	–
110	Femoral length	1.65	±3.94	–	–
154	Radial length	–	–	1.54	±4.24
157	Radial length	–	–	1.56	±4.24
164	Femoral length	–	–	1.58	±3.72
189	Radial length	–	–	1.56	±4.24
243	Femoral length	–	–	1.56	±4.24
263	Femoral length	1.62	±3.94	–	–
326	Femoral length	1.74	±3.94	–	–
370	Femoral length	1.59	±3.94	–	–
Mean	–	1.69	±3.94	1.58	±3.78



ILLUS 9 Stature

caries sites were classed into one of the following categories: occlusal, lingual, buccal, mesial, distal, root surface or gross. 'Gross' was used where so much of the crown was lost that the site of initiation was completely unknown (Hillson 1996). Caries was identified in a total of 11 adult individuals (Skeletons 091, 129, 149, 157, 186, 205, 214, 220, 266, 370 & 378). This equates to 10.1% of the total sample and 13.9% of the adult sample. For these individuals, caries was found in 32 teeth, a prevalence of 3.3%. The most common site was the right maxillary second molar (12.5%), followed by the mandibular first (6.8%) and second molar (6.7%). Similar frequencies were seen in the maxillary and mandibular teeth. For the 32 instances of caries, the most common specific site was gross (43.8%), followed by root surface and mesial (15.7% each), occlusal (12.5%), buccal (9.4%) and distal (3.1%). Caries was not present in the youngest adult age category (age 18–25 years, category 7). The prevalence of caries increased with age, and was considerably higher in females (4.7%) than in males (0.8%).

PATHOLOGY

Osteoarthritis

Osteoarthritis (OA) is a progressive joint disease characterized by the loss of joint cartilage and subsequent new bone formations. It is the most common joint disease in archaeological assemblages.

OA is multifactorial in its aetiology; it is related to increasing age, genetic predisposition, obesity, activity/lifestyle and environmental factors (Roberts & Manchester 1995). OA may also be caused by secondary factors such as trauma or disease, for example rickets. It is believed by some that the distribution of joints affected can serve as an indicator of lifestyle and occupation.

Osteoarthritic changes were recorded following the diagnostic criteria of Rogers et al (1987) and Rogers & Waldron (1995). A total of seven individuals (Skeletons 081, 115, 134, 149, 177, 205 & 243) exhibited evidence of OA in the extraspinous skeleton (details of vertebral pathology can be found in the archive report); this equates to 6.4% of the total sample and 8.9% of the adults. A number of these individuals had OA at multiple foci. Skeleton 115, an old adult male, exhibited OA in a total of eight joint surfaces. Skeleton 117, an adult of unidentified sex, had bilateral OA at the knee joints (four joint surfaces). Skeleton 149, an old adult of intermediate sex, had bilateral OA of the acetabulum. A total of 2682 joint surfaces could be assessed for OA; of these, a total of 19 exhibited evidence of OA, a prevalence of 0.7%. OA was more frequent on the right side of the body (0.9%) than the left (0.5%). No indications of joint disease were observed in the joints of the hands and feet. OA only occurred in age categories 10 (age 46+ years) and 11 (adult). This is to be expected as OA is a degenerative disease. The prevalence of OA was higher in females (1.4%) than

in males (0.3%). This may be indicative of the type or level of activity between the sexes or may be due to genetic factors.

Other joint disease

Skeleton 290, an adult of undetermined sex, exhibited pathology consistent with hallux valgus (bunions). Bilateral cyst-like erosions occurred on the medial area of the distal portion of the first metatarsal, adjacent to the articular surface. The term hallux valgus denotes deviation of the big toe toward the fibular border of the foot. In the present day, hallux valgus is a common foot disorder of several aetiologies, which can lead to significant foot pain and deformity. There are genetic factors and certain predisposing abnormalities of foot function. Wearing narrow-toed and high-heeled shoes can greatly accelerate the formation of a bunion.

Trauma

Evidence of trauma was exhibited in several ($n = 4$) individuals. Fractures were seen in two individuals. Skeleton 134, an old adult probable male, displayed a healed fracture at the distal portion of the shaft of the left tibia and fibula. There is a slight malunion of the bones. This is more marked in the fibula where there is some overlap of bone. The shaft of the tibia is enlarged with new bone present and vascular markings. A spur of bone is present on the fibula. This is myositis ossificans traumatica, a lesion usually produced by avulsion of tendinous or muscle attachments to bone. It is commonly associated with fractures. Osteoarthritis was present on the distal articular facet of the first left metatarsal. It is probable this is secondary osteoarthritis caused by the trauma. Skeleton 154, an old adult probable female, displayed a healed fracture to the shaft of the right fibula. The area is enlarged with new bone and vascular markings are present. A spur of bone is present on the medial surface which has formed a new articular facet with the tibia. This pathology is consistent with a healing fracture with myositis ossificans traumatica.

Non-specific traumatic new bone formation was seen in two instances. Traumatic myositis ossificans was seen in Skeleton 370, an old adult male. A spur of bone measuring 22mm was present on the shaft of the left fibula. This has been broken post-mortem. Skeleton 250, an adult of intermediate sex, displayed a lesion on the anterior surface of the right femoral

shaft superior to the femero-patellar surface. The area was raised, oval in shape and measured 28mm by 15mm. The bone was generally smooth with an oval porotic area on the medial side. The lesion appeared to be a layer of periosteal bone. This was likely to be due to a traumatic lesion, caused by an injury such as a muscle tear.

Infectious disease

Skeleton 309, an old adult of undetermined sex, displayed pathology consistent with osteomyelitis. The distal portion of the left femoral shaft was enlarged with irregular disorganized new bone present. A post-mortem break showed the medullary cavity is reduced; the cortical bone was dense and thickened. A circular cavity (cloaca) was present on the posterior surface of the shaft just superior to the lateral condyle. The cloaca was irregular and circular, measuring 12mm superior–inferior by 11mm anterior–posterior. Osteomyelitis is an inflammation of the bone and marrow caused by a pus-producing bacteria. The pus drains to the surface through cloacae. The knee region accounts for 80% of osteomyelitis locations (Aufderheide & Rodriguez-Martin 1998). Osteomyelitis is frequent from the Neolithic onwards (Brothwell 1981) and became more common in the Middle Ages as a result of poor living conditions and diet (Aufderheide & Rodriguez-Martin 1998). In the past, the infection was treatable only by amputation. Individuals can live for some time with the condition but there are several complications which may prove fatal (Waldron 2001). The presence of bony changes shows that the individual had survived an infectious agent for some time.

Neoplastic disease

A few ($n = 3$) neoplastic conditions were identified in the sample. Skeleton 243, an old adult female, had lesions present on the inner table of the skull, on the parietals near the sagittal suture. The area was characterized by depressions and prominent arterial markings. These findings were consistent with meningioma, a soft tissue tumour affecting the meninges. In the present, the average age of affected persons is 45 years and both sexes are equally represented (Aufderheide & Rodriguez-Martin 1998). The prevalence of meningioma in archaeology is difficult to ascertain as the disease manifests itself on the internal surface of the skull, an area often not seen.

Cystic lesions were identified in two individuals. In Skeleton 309, an adult of undetermined sex, a lesion was located on the left acetabular rim. The lesion was regular, clear-cut and smooth, measuring 5mm in diameter. In Skeleton 374, an old adult probable female, the lesion was visible in a post-mortem break of the left femoral head. It appeared oval with smooth walls and measured *c* 15mm diameter.

Circulatory disorders

A total of two circulatory disorders were identified in the sample. Skeleton 005, an adult of undetermined sex, displayed a lesion on the medial epicondyle of the right femur that is consistent with osteochondritis dissecans. The lesion was oval in shape, measuring 12mm by 11mm and *c* 2–3mm deep. The area of the lesion was depressed and displayed irregular, porotic trabecular bone. Osteochondritis dissecans is a benign condition characterized by small areas of necrosis at the epiphyses (Aufderheide & Rodriguez-Martin 1998). Clinical data indicate that the knee is affected in 80% of cases (Roberts & Manchester 1995). The disease is more common in young adults, particularly males, and commonly appears in young athletes, indicating a possible link to repeated trauma (Aufderheide & Rodriguez-Martin 1998).

Scheuermann's disease was observed in Skeleton 074, an old adult male. The third and fourth lumbar vertebrae exhibited destruction of the anterior surface of the vertebral bodies where Schmorl's nodes were present. The onset of the disease usually occurs between 12 and 18 years and some studies have shown preponderance in males (Aufderheide & Rodriguez-Martin 1998). The specific aetiology of the disease is unknown.

Miscellaneous conditions

Periosteal new bone was identified in a number of individuals. Unfortunately, as periosteal bone is generated by a number of factors, the cause of this new bone cannot often be identified. In Skeleton 110, an old adult probable male, periosteal bone was present on the internal table of the frontal bone. The new bone was irregular, nodular and raised by *c* 1mm. This is known as hyperostosis frontalis interna and, in this instance, was the 'plaque-like' form. The condition is of unknown aetiology, although it is more commonly found in post-menopausal females (Ortner & Putschar 1931). In Skeleton 217, a young adult probable female, periosteal bone was present on the

shafts of the left and right tibiae, femora and fibulae. The periosteal bone was particularly concentrated on the distal shaft of the left fibula and tibia and the right tibia. The cortexes of the left and right femora were thickened. Periosteal new bone was seen in Skeleton 237, an old adult male. An area of raised porotic new bone was identified on the medial surface of the proximal shaft of the right tibia just below the articular surface. The lesion was oval-shaped measuring 14mm by 9mm.

In Skeleton 243, an old adult female, four circular lesions were identified on the sagittal plane of the cranial vault (parietals and occipital). One at lambda measured 9mm in diameter, was regular and perforated both the inner and outer tables; the three remaining lesions, visible on the outer table, did not perforate the bone and were circular depressions along the sagittal suture. A diagnosis is difficult to ascertain. It is likely they were the result of either sebaceous cysts or traumatic lesions. It is worth noting this individual also had evidence of meningioma.

Skeleton 370, an old adult male, displayed an area of porotic, irregular bone on the proximal articular facet of the first proximal phalange. The area was 'sunken' and approximately circular. This is likely to be a cortical defect or pseudo erosion.

Bilateral cribra orbitalia was found in Skeletons 285 and 296: Skeleton 285 was a juvenile aged 8.5–12 years at death; Skeleton 296 was aged 6 years. Cribra orbitalia presents itself macroscopically as pitting in the orbital roofs and, in 90% of cases, occurs bilaterally. Cribra orbitalia is relatively common in British populations and is a stress marker that may be associated with anaemia.

CONCLUSION

The assemblage of bones from Stromness is limited by a number of factors. Generally, the bone is in a poor state of preservation and the remains are incomplete. In addition, the cemetery was not excavated in its entirety and a number of burials were left in situ. Burial sites, including those in a Christian cemetery context, are determined by social factors and the proportion of the cemetery excavated may be biased. However, the skeletal material is a valuable addition to the corpus of material from Orkney and expands our knowledge of the area. There is also a potential for future research to be carried out in the form of chemical analyses.

DISCUSSION

PRE-CEMETERY

Important evidence for the presence of Neolithic remains was recovered from the site in the form of a gully and associated post-holes. This type of 'negative feature' evidence is rare in Neolithic Orkney, where structural evidence is generally preserved in the form of 'positive features' such as walls and standing stones, or as deposit accumulations such as shell middens. Radiocarbon assay has suggested a mid-fourth millennium BC date for these features, corresponding to the earlier part of the Orcadian Neolithic. What they represent is uncertain, as the remainder of the gully lies unexcavated. It is possible that a fence line or boundary existed here, a demarcatory feature, although whether this might have been associated with settlement, animal husbandry or agricultural practices remains impossible to define. Evidence of a probable boundary ditch was found at Noltland and this is comparable with the known boundary ditch at Rosinish, Benebcula, Western Isles (Clarke & Sharples 1985). At Noltland, the size of the ditch implies that its function was to mark off the individual field rather than to deter animals from the crops. No indications of a fence were found in the ditch. However, the fill of the ditch contained a number of large stones, as did that at Rosinish, and these may represent the final traces of a seaweed fence (Clarke & Sharples 1985).

The relationship between the palaeochannel and the Neolithic features implies that there was abandonment of the latter, during or after which those features were infilled. The line of the palaeochannel is consistent with drainage downslope towards the sea. Dating of this feature is unknown but it would seem to have occurred not too long after the cessation of the known earlier Neolithic activity and may therefore also be Neolithic or Bronze Age in date. Despite the development of a soil horizon above, there is circumstantial evidence in the layout and development of the cemetery to

suggest that this feature continued to act in a small way as sub-surface drainage in the medieval period.

The formation of quite a thick pre-cemetery soil may have taken thousands of years, and even taking into consideration artificial elevation due to the reworking of the soil horizon during the cemetery phase, is still a substantial deposit. This in itself is corroborative evidence for an earlier rather than later date for the palaeochannel it seals.

Three areas of rubble deposits were recorded deposited onto the pre-cemetery soil, possibly with some levelling deposits directly below them. These seemed to pre-date at least some of the cemetery activity. The function of the rubble spreads is unknown, although they appear to have been deliberately formed rather than by any natural agent. They may have been used to stabilize wet or damp ground, either to prepare for construction or general land improvement, or may even originally have been a path or surface, which was disturbed by later interments. No firm evidence was found for either hypothesis.

CEMETERY

The dating and archaeological evidence for the cemetery suggests a Christian context. The burials, which date to the 13th–14th century, are on an east/west alignment with no associated grave goods. It is unusual for a Christian cemetery not to be associated with an ecclesiastical structure. It is likely, as the cemetery was not excavated in its entirety, that this structure lies outside the limits of the site. Evidence of a possible building in the locality has been identified through rubble spreads and mortar found in grave fills. It is thought that the original parish church of Stromness was located at the Bu of Cairston, before the parish church was moved to St Peter's in Outertown in the 17th century. It is probable the cemetery excavated at Cairston was that associated with the parish church.

CONCLUSION

Despite the fragmentary nature of the archaeological evidence, the excavation of the Cairston site has revealed important evidence of early Neolithic activity, and of the presence of a medieval cemetery of some extent. This has contributed to the expanding corpus of knowledge gained from archaeological investigation of these two important facets of Orkney's heritage. Fundamentally, it has also indicated that the area peripheral to the investigation should be preserved carefully until such time as redevelopment can no longer be avoided. It is to be hoped that any further archaeological examination of this area will satisfactorily corroborate or refute the findings of the current investigation, and will expand still further our knowledge of this headland with respect to human development through the millennia.

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