Excavations at Tywyn y Capel, Trearddur Bay, Anglesey, 1997 and 2002–03

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INTRODUCTION

Location and present description

Tywyn y Capel, or Capel St Ffraid, is the site of a former chapel and cemetery located in the parish of Holyhead (SH 526789) on the west coast of Holy Island, off Anglesey (Fig. 1). The site lies just above high-water mark in the centre of an indented sandy bay now called Trearddur, but formerly also called St Bride’s (or in Welsh St Ffraid’s) Bay, after the dedication of the chapel to St Ffraid (Fig. 2). Prior to excavation erosion had removed all trace of the chapel and much of the cemetery, leaving a segment close to the seashore. The land is low-lying in the immediate vicinity of the mound, although there are rock outcrops. To the east, there is a tidal inlet which stops only some 450m east of the chapel site and which almost cuts Holy Island into two parts. It has been suggested that this inlet was once the estuary of the river Alaw, and that the bay of Trearddur would have contained the mouth of the river, similar to the river Ffraw at Aberffraw (Greenly 1919, 786). On the beach below the mound within the intertidal area are layers of peat with tree stumps and the remains of trees. A sample taken from a similar deposit further round the coast at Llanddwyn was dated by radiocarbon analysis to 6925±90 BP (SRR-5265; Williams 1996, 281).

Before excavation the site was visible as a low sand dune lying just above the high-water mark, and separated from the beach by a promenade (Fig. 3). The mound measured some 40m north–south and 20m east–west. The top lay 4.42m above the adjacent promenade, and 6.05m above the beach. The promenade lies at 4.5m OD, so the top of the mound lay just below 9m OD. The site is crossed from south-west to north-east by a stone boundary wall, which was built in the early years of the twentieth century. This was temporarily removed to allow excavations to proceed, but was subsequently rebuilt. A number of stone slabs, some on edge, were visible within the turf on the mound, and these were interpreted prior to excavation as the remains of long-cist graves.

History of the site

There are very few early references to the site: no mention in medieval times has yet been found, and it is not included in the Taxation of Norwich of 1284 (Lunt 1926), or in the 1291 taxation (Ayscough and Caley 1802), or the Valor Ecclesiasticus of 1535 (Caley and Hunter 1810–34). Several references can be found dating from the mid sixteenth century, however, including John Leland in his Collectiana, compiled before 1550, who records ‘Llan Sant Ffraid’ listed as a chapel under Holyhead, and ‘Porth Llan Sant Ffraid’ (Smith 1906, 131). An Elizathethan survey of 1562 records ‘Saynete Brides, from Barfroo [Aberffraw] 4 miles. A creke for small picardes’ (Robinson 1972, 501). The site is clearly indicated as a chapel on Christopher Saxton’s map of 1578, where it is called ‘Cap. Llanfanfraidd’, and similarly on John Speed’s map of 1610 (Saxton 1578; Speed 1611). Lewis Morris included a view of the site when charting the area in the 1730s; though the view is distant (1 mile off according to Morris) it clearly shows a dramatic mound with a chapel on top. Morris, in giving sailing directions says ‘you will soon know the
place by the ruins of a small chapel on top of a green hill on the water side’.⁴ There is a view of the site dated 1776 by Moses Griffith in Thomas Pennant’s personal copy of his *A Tour in Wales* (edition at National Library of Wales), which shows a high mound, on the top of which are the ruins of a stone building standing almost to eaves height, with an east window, the remains of a south window lighting the sanctuary, and a south door at the west end (Fig. 4). The chapel is shown situated on the east end of...
Fig. 2. Location of the excavations at Tywyn y Capel © Crown copyright: Ordnance Survey. All rights reserved.
the high isolated mound, with a raised track passing to the east between the mound and a tidal inlet. The sides of the mound are depicted as very steep, particularly at the east end, and though it is possible this was accentuated in the drawing. Pennant, who in all likelihood visited the site with Griffiths, offers a description that confirms the view in the drawing (Pennant 1781, 274–5):

Go over Tywyn y Capel, a low sandy common, bounded on one side by rocks, which in high winds the sea breaks over in a most awful and stupendous manner, and are justly dreaded by mariners. In the middle of the common is an artificial mound, on which are the ruins of Capel St. Ffraid. I have no doubt but that, prior to the chapel, it had been the site of a small fort, for I never saw artificial elevations given to any but works of a military kind.

In 1846 the antiquarian W. O. Stanley recorded the dimensions of the chapel as ‘about thirty or thirty five feet by twenty two feet six inches’ (Stanley 1846, 226). The walls were four feet thick, and the foundations extended to a depth of eleven feet into the mound. The mound was 31 feet above the surrounding sward, and 36 feet above the shore. The top was 50 feet in diameter, and the diameter at the base was 250 feet. The graves in the mound were arranged in four or five tiers, and the implication is that these were mostly long-cist graves, although plain burials were also found (Figs 5–6). Approximately one third of the mound had been washed away by 1846, including the west end of the chapel (Stanley 1846, 225–6). By 1868 the chapel had ‘wholly perished’ (Stanley 1868, 398–9).
Erosion of the mound continued, and large numbers of burials were exposed in the following 150 years (Baynes 1921; Baynes 1928; Thomas 1937; Thomas 1938). In 1980 a bronze penannular brooch of eighth- or ninth-century date was found during the strengthening of the sea wall close to the mound (Lewis 1982). However, excavations undertaken east of the mound in 1990 in advance of construction of a house and café failed to expose any graves, though buried soil horizons were noted, indicating former periods of dune stability (Boyle 1991).

**Methodology**

Initial trial excavations were undertaken during a two-week period in September, 1997 in order to assess the archaeological value of the remains of the cemetery (Davidson 1997; Robertson 1998). On the seaward side of the cemetery mound there was a wind-blown gully running up the side, and terminating close to an upright slab which had been interpreted as part of a long-cist grave. A trench 2m wide and 9m long was excavated along the line of the gully. By doing this, it proved possible to stabilise the eroding sand when consolidating the back-filled excavation.

Consolidation works undertaken following the 1997 excavations were unable to prevent continued erosion of the cemetery site, and by 2002 the situation had worsened, particularly on the south-west side of the mound facing the sea, where episodic erosion regularly revealed new burials. It was decided that full excavation of the site was the most appropriate course of action, and this was undertaken during four weeks in July 2002, and eight weeks in July and August 2003.
The layers of vegetation covering the mound, consisting mainly of marram grass and some turf, were removed by hand excavation, followed by exploratory excavations undertaken through the modern wind-blown sand by hand. A buried soil horizon, sloping from the top of the mound down to the east, was found across the site, and once it was clear that the overburden was modern sand and did not contain any archaeology of significance, a machine was brought in to excavate the uppermost layers across the entire mound onto this soil horizon. Excavation then proceeded by hand.

The difficulties of excavating in sand did not allow the preservation of major sections on site, so a method of open area excavation was adopted, that allowed for cumulative sections to be recorded. The site was divided into three areas, with baulks between each. Each section was recorded at heights of
0.5–1m before the baulk was removed. Figure 7 is derived from the section across the southern baulk (shown on Fig. 22), but with the addition of burials which lay to north and south of the baulk to aid interpretation. The instability of the sand, combined with the difficulty of recognising grave cuts in plan, led to the excavation of the site in spits. Each skeleton was excavated as it was reached. This method was altered to take into account the major buried soil horizons, and where possible excavation allowed for the exposure of layers in their entirety before resuming the regular removal of sand in spits. All contexts were numbered sequentially, and skeletons were given their own individual skeleton number, cross-referenced to the grave cut where this was identified.

EXCAVATIONS PHASES

Ten principal phases were identified during excavation of the site. These are summarised from earliest to latest below, and can be best understood by reference to a section through the site (Fig. 7).

1. Wind-blown sand
2. Pre-cemetery buried soil (189)
3. Long-cist burials
4. Sand incursions
5. Non-cist burials
5a. Construction of chapel
6. Erosion of medieval land surface
7. Formation of buried soil (158)
8. Construction of wall (148) around cemetery
9. Formation of buried soil above wall (126)
10. Modern sand incursions.

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Fig. 7. Section through site from south-west to north-east, reconstructed from cumulative sections to show location of burials and principal phases.
Phase 1: wind-blown sand
The full depth of the sand was not established below the burials, though the presence of peat deposits on the beach some 4m lower may give some indication of the depth of the sand here. The long-cist graves had all been dug into this sand layer.

Phase 2: pre-cemetery buried soil
This deposit (context 189) was found over the entire excavation area, and consisted of a thick layer of dark humic sand up to 0.3m thick. It was interpreted as a buried soil, which would have developed during a relatively long period of stability when sand incursions were at a minimum. The layer sloped upwards from east to west rising by 1.5m, and upwards from south to north. There are indications also that the level was falling to the north from a high point towards the north end of the site. This would indicate the presence of a low mound, though no part of the western slope down towards the sea remained to confirm this.

In plan the layer contained regular parallel lines of clean yellow sand within the darker soil (Fig. 8). In section these were visible as wavy intermittent layers of yellow sand within the darker humic soil and were initially interpreted as the result of ploughing. However, further consultation and study led to their interpretation as natural ‘ripples’ within the sand, caused primarily by the action of tidal water and wind on the surface of the soil, and not as the result of ploughing.

Fig. 8. Buried soil 189 with grave mounds in upper right corner, looking west, with grave G214 in the foreground.
Small quantities of animal bone were found within the soil. The animal bone consisted of teeth from cattle (Bos) and pig (Sus), and a fragment of a Bos scapula which showed signs of butchery. Part of a sheep (Ovis) scapula also contained a single straight-edged cut (Coard 2004). The buried soil was analysed for pollen, but its alkaline nature, though ideal for preserving bone, was unsuited to the preservation of pollen. However, the soil did contain significant quantities of charcoal, identified as a mixture of oak, hazel and birch (Denne 2004). All the burials were stratigraphically later than the buried soil.

The soil layer marks a prolonged stable period within the formation of the mound, during which cattle, sheep and pig were being kept on or close to the site, and the charcoal suggests trees of hazel, birch and oak grew close-by.

**Phase 3: sand incursions and long-cist burials**

A series of burials were subsequently dug through the buried soil described above. However, where the evidence survived, it could be clearly seen that the burials were not dug from the buried soil, but through a layer of sand some 0.20m thick that lay above. It would appear, therefore, that sand incursions had buried the earlier land surface before the site was used as a burial ground. The bodies were laid in stone-lined long-cist graves buried some 0.5m to 1m below the surface. Where sufficient evidence survived, the graves were found to be covered by low mounds, surrounded by a ring of upright stones (Fig. 9). The long-cist burials are described further below.

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**Fig. 9.** Grave mounds showing G214 nearest the camera, and G213, G212, G184 along the west edge of the excavation, looking west. Scales 2m.
Phases 4–7: sand incursions, non-cist burials, chapel and subsequent erosion

Following the insertion of the long-cist burials, far greater sand incursions took place. Sand accumulated to a depth of approximately 2m in layers which were differentiated by changes in coarseness of the sand. These are assumed to have been laid down during periods of greater turbulence. The top of this accumulation was marked by a layer of dark humic sand (158) interpreted as a buried turf line marking another period of dune stability. This turf line sloped from a western ridge down to the east away from the sea front, and was interpreted as the landward side of a raised mound, now much more pronounced than the mound in which the long-cist burials had been laid. The buried soil was not continuous over the full area of the mound, but was mainly confined to the southern side. Within the 2m layer of wind-blown sand lay a series of dug non-cist burials. Remains of approximately 100 individuals were found, though many of those in the upper layers were disturbed and incomplete. The burials were spread over an area measuring approximately 30m by 10m, the majority being concentrated in the upper 1.4m layers of sand. It was not possible to identify with certainty the layers from which the graves had been dug. The burials had not been dug through the buried turf line (158) and there were no other clearly identifiable layers marking periods of stability. The few graves which it was possible to record in section were cut from different levels, but were all of a depth of approximately 0.5m. Several burials lay very close to the upper turf line (158), and some (e.g. S511) were partially truncated.

The evidence suggests that the mounds placed over the long-cist burials in Phase 3 were not exposed for any substantial period of time before they were covered with wind-blown sand. This is evidenced by the lack of vegetation growth on top of the mounds, and the survival of the stones surrounding the mounds, including a row of quartz pebbles over grave 214. The tight grouping of the radiocarbon dates from four of the long-cist graves, and a contemporary date from one of the non-cist dug burials (see below), is further evidence for a rapid influx of sand shortly after the long-cist burials had been inserted.

None of the non-cist dug burials lay below the lower buried soil (189). There was no evidence that any of these dug burials had been inserted through the upper buried soil (158). The layer from which these burials had been dug was not, therefore, immediately apparent. However, the presence of partially truncated skeletons immediately under the surface (158) would suggest that erosion had removed the upper surface from which burials were made and that layer (158) developed after this erosion. The depth of the burials would also suggest that they were made whilst the sand was accumulating. Six of the grave cuts were observed in section, and in each case the depth of grave was approximately 0.5m, implying several sequences of burial during sand accumulation.

No surviving evidence for the construction of the chapel was found and it is therefore thought that the medieval layer on which it was built was removed by erosion, and subsequently replaced by the buried soil (158). It was not possible to confirm if the construction of the chapel post-dated the non-cist dug burials, or if it was contemporary with the later of these burials.

Phase 8: construction of the wall (148)

Overlying the buried turf line (158) was a large distinct concentration of boulders and stones (148; Fig. 10). These defined the seaward (eroded) edge of the buried turf line, and also lay lower down the eastward slope. Though no distinct wall-faces were found, the stones at the upper edge were largely horizontal, and formed a tight grouping, whereas those lower down the slope lay at an angle on top of the buried turf and were more widespread. There was no mortar associated with the narrower band of stone at the top, but there were patches of lime mortar associated with the stones lying more randomly. At the north end, though erosion had been greater there, the band of stone turned towards the west, as though starting to curve around the edge of the mound. No similar turn was observable at the south end.
Fig. 10. Stones 148 from Phase 8 forming wall around former chapel, looking north. Scales 2m.

The horizontal stones are interpreted as the remains of a stone wall encircling the former chapel (Fig. 11). A wall in this location is shown on Stanley’s plan of 1846 (Stanley 1846, 228). The other stones are thought either to have slipped from this wall down the slope, or from the former chapel above. Stanley records that the lower walls of the chapel were not mortared, but that the upper stones were (Stanley 1846, 225–6). This would apply particularly to those stones leaning against and upon the narrower band of stone interpreted as a cemetery wall, and those associated with small patches of mortar. This phase, therefore, is thought to contain elements of the collapse of the stone-built chapel. As this is unlikely to have taken place much before 1800 (the Moses Griffith sketch of 1776 shows the walls virtually intact) it might be suggested that the stone wall was constructed late on in the history of the chapel, perhaps during a relatively stable period following a period of erosion. If the interpretation of the buried soil (158) as a relatively late development, following a period of erosion, is correct, then the surface contemporary with the construction of the chapel on top of the mound must also have been eroded away by this time.

Phase 9: formation of buried soil above wall
Overlying the stones of the wall was a dark humic layer (126), similar in character to 158 below (Fig. 12). It lay parallel to 158, sloping in the same direction, and approximately 0.5m above it. The layer had been truncated on the western (seaward) side by erosion, but otherwise lay over the entire site. The erosion on the seaward side had stopped at the approximate line of the stones that are thought to have formed the eastern wall surrounding the chapel. The layer sloped steeply to the east, and continued inland beyond the limits of the excavation. It overlay the stones in Phase 8, and underlay modern wind-blown sand. Few substantial stones and no mortar were recovered from this layer. There was no charcoal within the layer, and no finds were made.
Fig. 11. Plan of stones 148 and possible location of chapel and top of mound.
The layer is interpreted as a buried turf line, marking a period of dune stability. It can be dated later than the stone wall which surrounded the chapel, and, given the lack of stone and mortar, is likely to be later than the destruction of the chapel by erosion. The lack of finds may be partly due to the steepness of the slope, which would have encouraged objects to roll down beyond the limits of the excavation.

**Phase 10: modern sand incursion and later development of the site**

The topmost layer consisted of wind-blown sand covered with marram grass and containing occasional stones. The western face of the mound was actively eroding, so this there was little or no wind-blown sand over this area. On the eastern side of the mound, however, a layer approximately 1.5m thick had developed over the buried turf line (126). This continued sloping down to the east outside the limits of the excavation. The sand, as in the lower deposits, was in layers, with finer sands separated by coarser sands and gravels. This wind-blown sand therefore post-dated the formation of the turf line (126), and had accumulated around the eastern side of the mound, and between the mound and the property to the east. No artefacts were found within the sand.
RADIOCARBON DATING

Nine radiocarbon dates were obtained from material excavated in 2002/03, and two from the 1997 excavations. One was obtained from charcoal in the lower buried soil (159), and ten from skeleton remains, four from the long-cist graves and six from the non-cist burials.

The dates were calibrated using the Calib Radiocarbon Calibration Program (1986–2005, M. Stuiver and P. J. Reimer) and calibration dataset Intcal104.14c (the results are to be used in conjunction with Stuiver and Reimer 1993). The calibrated dates are quoted at 2 sigma.

**Beta-204435**

*Context:* buried soil, context 159  
*Material:* charcoal  
*Radiocarbon age:* 1450±40 BP  
*Calibrated date at 95.4 per cent probability:* AD 547–655  

**Beta-121649**

*Context:* skeleton B10  
*Material:* bone  
*Radiocarbon age:* 1350±90 BP  
*Calibrated date at 95.4 per cent probability:* AD 472–931  

**Beta-194907**

*Context:* skeleton S108  
*Material:* bone  
*Radiocarbon age:* 1290±50 BP  
*Calibrated date at 95.4 per cent probability:* AD 652–867  

**Beta-194908**

*Context:* skeleton S102  
*Material:* bone  
*Radiocarbon age:* 1281±25 BP  
*Calibrated date at 95.4 per cent probability:* AD 670–774  

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*Context:* skeleton S102  
*Material:* bone  
*Radiocarbon age:* 1281±25 BP  
*Calibrated date at 95.4 per cent probability:* AD 670–774  

**Beta-194903**

*Context:* skeleton S51  
*Material:* bone  
*Radiocarbon age:* 1180±50 BP  
*Calibrated date at 95.4 per cent probability:* AD 694–977  

**Beta-194907**

*Context:* skeleton S34  
*Material:* bone  
*Radiocarbon age:* 1156±26 BP  
*Calibrated date at 95.4 per cent probability:* AD 779–969  

**Beta-194909**

*Context:* skeleton S59  
*Material:* bone  
*Radiocarbon age:* 1120±70 BP  
*Calibrated date at 95.4 per cent probability:* AD 711–1030  

**Beta-121648**

*Context:* skeleton S58  
*Material:* bone  
*Radiocarbon age:* 910±70 BP  
*Calibrated date at 95.4 per cent probability:* AD 1016–1259
The grouping is generally tight, and indicates occupation on the buried soil (189) between AD 540–660, followed by the long-cist burials between approximately AD 650–870. The non-cist burials fall between AD 650–1220.

The stratigraphy and dates are generally in agreement, with the exception of skeleton S58 excavated in 1997. This skeleton lies at the base of the wind-blown sand, just above the buried soil (189) so should be one of the earliest burials, yet it is the latest in date. The burial was one of the furthest west, however, and lay close to the probable site of the stone chapel. The walls of the chapel are recorded as going deep into the mound, with a mass of bones around, so perhaps skeleton S58 was buried later, at around the time of the construction of the chapel. Skeleton S59 lay nearly 1m above skeleton S58. The radiocarbon dates at two sigma do just overlap by 30 years, so both could be dated to AD 1000–1030.

However, skeletons S33 and S34 lay adjacent to one another (Fig. 27), and at the time of excavation it was thought, because of the close physical relationship and similarity in alignment, the two were buried at the same time. The dates for these at two sigma are AD 650–890 and AD 781–976. If these two are contemporary, a date within the ninth century AD is indicated, a date range which could also encompass skeleton S59, but not S58.

There is no evidence to date the remaining activity on site. It is argued above that the buried turf layer (158) which seals many of the non-cist burials, was formed after a period of erosion that truncated the upper levels of non-cist burials. The wall (148) in Phase 8 was constructed after this, and masonry and mortar, possibly from the chapel walls, were found overlying the wall. The chapel was in ruins by 1846 and the west end had collapsed. By 1868 the east end had also collapsed. The masonry and mortar from the chapel are most likely to have fallen during the first half of the nineteenth century. There was no corresponding masonry or mortar above the buried turf line (126), so this is unlikely to have formed before the middle of the nineteenth century whilst the chapel was still collapsing.

In summary, the chronological sequence which best fits the evidence (though not conclusive) would see the lower buried soil (189) in existence up to the middle of the seventh century, when sand incursions started, and a series of long-cist burials were dug through it. Sand incursions increased as the seventh century progressed, and simple dug graves were inserted into the accumulating sand from the end of the seventh century to the eleventh century. The chapel surmounting the mound would, on the basis of comparable surviving stone built churches, have been built in the twelfth century at the earliest. The medieval occupation layer was partly eroded in the early modern period, perhaps in the seventeenth and eighteenth centuries, when burials were truncated on the east side of the mound. During a temporary period of stability, marked by the buried turf line 158, a wall (148) was built around the church, but in the late eighteenth and early nineteenth centuries the chapel finally collapsed, and the majority of the cemetery was eroded on the seaward side. The remainder of the medieval occupation layer was eroded at this time. Following relatively minor sand incursions a further extended period of stability ensued, during which the upper buried turf line (126) was established. In more recent times, probably during the twentieth century, sand accumulated over this layer on the east side of the mound, whilst erosion continued on the west side.

THE LONG-CIST BURIALS

Adult long-cist burials (Phase 3)
A total of 24 long-cist graves were excavated, 10 of which contained adult burials and 11 contained sub-adult burials. Three additional juvenile long-cist graves had been partially eroded and were empty and one contained disturbed remains that may have been a secondary insertion. One of the graves (292)
contained remains of two skeletons. One juvenile burial (grave 240) did not contain a cist. The long-cist graves are described individually, followed by a general discussion.

Grave 184 / skeleton S83 (Fig. 13)
Cist and lintel grave. This grave lay close to the northern edge of the long-cist group. The top of the grave was marked by a low mound, approximately 0.02m high and 1.05m wide. Large boulders, which lay on a thin layer of clean wind-blown sand, lined the edge of the mound. The grave had been dug through the wind-blown sand and then through the buried soil (189). The boulders lay along the north side, around the west end and partially along the south side, though not at the east end. Stone-holes did not show within the sand, so it was not possible to determine if boulders had once fully encircled the grave. The grave cut, measuring 2.1m by 0.64m, lay on a slightly different alignment to the mound, though the cut was just covered by the mound. The top of the cist lay 300mm below the buried soil. It consisted of six large slabs laid across and resting on top of the side slabs. Some cracking had occurred to the slabs. The top of the side slabs had been levelled by the insertion of additional smaller stones inserted horizontally into the sand. The grave was slightly narrower at the east end, though this was the result of a thicker side slab on the north side. Four slabs formed the north side and three the south side, with one at the east end. The west end was partially blocked by the large side slabs at that end. Within the cist lay the skeleton of an adult male aged 40–49, fully extended, with some 200mm spare length at the feet end.

Grave 185 / skeleton S81 (Fig. 14)
Cist and lintel grave. This grave lay north of 184, and close to the north edge of the group. Its alignment differed from the remainder of the group, being aligned some 20 degrees more to the north. It is possible that this grave was once also covered by a mound and encircled by a ring of stones, but only one stone at the west end remained to indicate this. Rabbit activity and general erosion had disturbed the area and removed any evidence of the remainder. The grave only became visible when the cut through the old land surface was identified; it measured 1.8m by 0.52m. The cover slabs of the cist lay approximately 0.36m below the top of the old land surface. Though appearing as a mixed jumble, they were carefully laid to exclude sand, and had been laid from east to west, with some overlapping of the slabs. As in grave 184, some stones had been laid horizontally into the sand on top of the side slabs to level and take the support of the upper slabs. Where spaces occurred between the principal upper slabs, smaller slabs had been laid over, though in this instance the skeleton had been fully covered by sand, which nearly filled the cist. Though it cannot be said with certainty that the sand dated from the original burial, this is the more likely case. The cist was as carefully constructed as the others, none of which contained sand, whilst at the west end remnants of organic material were found which looked like parts of the old land surface; this is most likely to have been incorporated during deliberate backfilling. The cist was 1.7m long, by 0.52m wide at the west end and 0.35m wide at the east (foot) end. Three principal slabs formed the north side, and five slabs the south side. The west end had one large slab, and the east end two small slabs. The skeleton lay fully extended with lower arms in-turned so the hands rested within the pelvic area. The grave was occupied by a female aged between 18–30 and approximately 1.58m tall.

Grave 212 / skeleton S108 (Fig. 15)
Cist and lintel grave. A partial ring of boulders encircled a low mound 2.4m by 1.3m. The boulders were continuous along the south side, around the west end and partially along the north side. There were none around the east end and eastern part of the north side. A number of the boulders contained a large proportion of quartz, in particular the stone at the west end. Excavation showed that the grave cut did not lie directly under the mound, but on the south edge of it, and orientated south of an east–west line. The
Fig. 13. Plan and section of cist grave G184.
Fig. 14. Plan and section of cist grave G185.
discontinuity was so great that it would almost argue for a gap in time, where the outline of the original grave was lost. In fact, the evidence suggests that sand was encroaching at a rapid rate, and it is possible that the site of the original grave was lost by an overnight storm. The alternative is a time lapse between the burial and the creation of the mound: there is slight evidence for the establishment of an organic layer on top of the grave following backfilling, but this could result from deliberate placing of turfs on top of the grave, as it is not consistently over the grave, and does not continue outside the grave. Otherwise, the evidence is the same as grave 185, namely a grave cut through windblown sand some 0.15m deep, then through the old land surface. However, this was the shallowest of the graves. The top of the cist lay close to the old land surface; at the east end it was immediately below, though at the west end, as the surface sloped upwards, it was some 0.05m below. The cist cover was of six large slabs, and several smaller stones. The skeleton lay largely free of sand in the cist. The cist was pointed at the west end by two side slabs arranged at angles. The north side contained one very long slab and two shorter ones, whilst the south side contained five shorter slabs, the last one angled in at the east end to a small end slab. The cist was shallower than some of the others, and was a relatively tight fit for the burial. The skeleton was that of a female aged between 55–60 with a displaced fracture on the distal radius and ulna. She was approximately 1.50m tall, and was buried with the head back at an angle and turned to the right. The left arm was placed over the body, and the right arm was straight.

Grave 213 / skeleton S102
Cist and lintel grave. This grave lay on the west edge of the excavations, amongst a number of other graves. Remains of the east end of a mound encircled by boulders survived, but the west end of the mound had been eroded. A ring of boulders was nearly continuous around the east end of the mound, with a total of eight stones. As with other graves, several of the boulders contained quartz inclusions. The boulders defined a low mound of sand that overlay firstly a layer of relatively fine wind-blown sand, secondly a much coarser layer of sand, and thirdly the old land surface (189). The grave had been clearly cut through these three layers. As in grave 212, the grave did not lie under the centre of the mound, but rather under the north edge of the mound, and it is possible that the exact location of the grave was not apparent to those erecting the mound and encircling boulders. Unusually amongst the long-cist graves, a stratigraphic relationship existed between graves 213 and 214, which showed that the grave cut of 214 cut the mound of 213. The top slabs of the cist lay 0.50m below the surface from which the grave was dug, and 0.40m below the top of the old land surface. The top slabs were carefully fitted together to exclude gaps. The slab over the west end was much heavier and thicker than the others. The slabs were laid from west to east. The cist was narrower at the east end, and both ends were formed from single slabs. The north side was of four slabs, and the south side of three long slabs. The skeleton lay fully extended, occupying the entire length of the cist. Survival within the cist, perhaps because of the high quality of the construction of the cist, was good, and included hair survival on the skull. The upper part of the skeleton was dark and discoloured, reflecting, perhaps, slight traces of organic matter. Remains of roots lay over the skeleton. The burial was of a female aged 35–49 and approximately 1.35m in height.

Grave 214 / skeleton S105 (Figs 16–20)
This grave had the best-preserved grave mound, and provided the clearest sequence of grave cutting and mound construction. The mound was marked by large slabs on the north and south sides and an upright slab at the east end. There was no evidence for a comparable slab at the west end. The side slabs lay on the sloping side of the mound, but it is possible they formerly stood upright, as at the east end. The mound, which was more clearly defined with this burial, overlay some 0.15m of wind-blown sand that had buried the old land surface, one of these layers being of coarse sand or grit, with finer sand above
Fig. 15. Plan and section of cist grave G212.
Fig. 16. Plan and section of cist grave G214.
Fig. 17. Longitudinal section of cist grave G214.

Fig. 18. Section through mound of cist grave G 214, looking west. Scale 0.3m.
and below. The mound was of a darker material, perhaps containing organic remains, but there was no evidence for vegetation growth on the mound prior to the sand inundations which covered it. The mound was approximately 0.15m high. Along the top of the mound lay the remains of a row of white quartz pebbles. Three pebbles remained in situ, but four others lay around the base of the mound, suggesting a continuous row along the top of the mound.

The top of the cist lay 0.50m below the surface from which the grave was cut, and some 0.35m below the old land surface. The cist was covered with six large slabs and several smaller stones had been carefully laid to cover the cist entirely. One of the central slabs overlapped the two either side, though it

Fig. 19. View of lintel stones on cist grave G214, looking west. Scale 1m.
appeared that an initial layer had been placed from east to west, then other slabs over the top. The cist sides were made up of four slabs on either side, with an additional thin overlapping slab at the north-east corner, a dominant west slab, and two small east slabs. The cist tapered down to the east end, and also narrowed slightly at the west end, from a maximum width of 0.35m. The length was 1.65m. The cist contained the skeleton of a female aged 22–25 years. She lay fully extended, with arms down the sides, and head turned to the left. A considerable quantity of hair remained on the skull, trained down the right side and over to the sternum. The skeleton was some 1.55m in height.
Grave 215 / skeleton S93
This grave lay on the south edge of the group, and on the west edge of the mound, with remains of two other long-cists to the west, both of which had been badly eroded (graves 286 and 288). This grave contained a dominant upright stone at the west end, and two slabs lying across the grave mid-way down. No evidence survived for other stones marking a mound, and because of the lack of upstanding evidence, no mound was clearly identified during excavation, so the grave only became clearly visible once the cut through the old land surface was revealed. The top of the capstones lay some 0.40m below the old land surface. The top of the cist was less carefully laid than the others, and it would appear that suitable long slabs that spanned the width of the grave could not be found. In order to aid support of the cove slabs, two opposing large slabs had been inserted horizontally into the side of the cist in the centre, and one in the south-west corner. One slab formed the west end of the cist, three slabs down the north side and three slabs along the south side. The side slabs were dug well into the side of the grave, making support of the capstones even more problematic. Because of the poorly fitted capstones, some sand had penetrated into the grave, though not sufficient to cover the skeleton. The burial was of a female aged 60–87. The body had been placed slightly on its right side, with its legs crossed, and left arm over the body.

Grave 251 / skeleton S89
This grave lay on the west edge of the excavation, towards the southern edge of the long-cist grave group. It had been badly eroded, and the west end of the grave damaged. No capstones remained over the grave. The cist consisted of three slabs along the north and south sides, a slab at the east end, possibly a former slab at the west end which had fallen out. Two additional slabs lay immediately outside the south side. They must have been inserted at the time of the construction of the grave, but because of the erosion, the old land surface did not remain to indicate the size of the cut. Because of the loss of the old ground surface in this area, the depth of the grave below the surface is not known with certainty, though it can be estimated at approximately 0.30m. The skeleton had been considerably disturbed, and gave every appearance of having been either moved or reburied, though part of the legs were still articulated. Other bones had also been inserted into the grave at a later date. The primary skeleton was of a male older than 35 years, though some doubt must remain that this was the principal burial of the cist, due to the excessive disturbance.

Grave 269 / skeleton S87
The eroded remains of a long-cist grave lying on the northern edge of the excavated area. The west side of the cist had been heavily disturbed, and as with 251, the old land surface had been eroded so the depth of the grave could not be determined. The east end of the grave contained two side stones on the north and south sides, but no stone at the east end. The remains of two principal and several lesser slabs remained covering the cist. Within were two tibia of an adult over 23 years.

Grave 284 / skeleton S97
This grave lay on the north side of the group of long-cists, between the principal group and grave 269. This area had been severely eroded, and the old land surface no longer existed. The capstones were revealed by excavation, lying some 0.10m below the surface. Three principal slabs were present, one of which had split badly, and several additional slabs lay over the east end. The west end of the grave was missing. Excavation revealed a single slab at the east end, one very long slab along the north side, backed by a secondary slab, and three slabs along the south side, again partly backed by additional slabs. The west end slab, and western side slabs were missing. The burial was a female aged 20–23 years, of which the skull and upper body was missing. The lift arm had been placed across the body, but the right arm and legs were fully extended.
Grave 285 / skeleton S95
This grave lay on the west side of the mound, and had been partly removed by erosion. The cover stones lay close to the surface of the wind-blown sand, and were not covered by the old land surface, which had been removed by erosion. The cist was covered by carefully fitted large slabs, though the western slabs were missing. The cist was contained three side slabs on the south side and one long slab on the north side, with another probable slab on the north side, though this is probably not in its original position. The burial within the cist was of disarticulated bones belonging to a juvenile aged 3–6 years. Whereas this may have been the original occupant of the grave, because the skeleton had been so disturbed it is possible that the bones had been re-buried following erosion from an original grave. They lay high up within the cist, on top of a layer sand, with every appearance of being a secondary burial, though, the capstones, if they had been lifted to insert the burial, were very carefully replaced.

Grave 291 / skeleton S99
This grave lay at the south end of the group of long-cist graves. The ground was very disturbed and eroded above, and no remains of grave markers in the form of a mound or marker stones had survived. Despite the erosion that had taken place here, the long-cist grave remained intact. The capstones lay approximately 0.20m below the old land surface. The cover of the cist was made up of five large slabs, with other smaller stones placed on top to cover the gaps between. The five large slabs were laid from east to west, each one overlapping on the east side. Horizontal slabs had been placed into the side of the grave above the side slabs to help support the cover. The cist was constructed from a single slab at the west end, and two very large slabs down each side. There was no end slab at the east end. The interior dimensions of the grave were approximately 1.45m by 0.28m. The skeleton was that of a female aged over 60 years, approximately 1.60m in height.

Juvenile long-cist graves

Grave 216 / skeleton S84 (Fig. 21)
This grave formed the east end of a line of five juvenile graves that lay on the north side of burials 213 and 214. A single upright slab and one smaller stone lay at the west end of the grave which are thought to be grave markers. The grave had been dug from the same layer as the others, that is, through a layer of windblown sand that overlay the old land surface. Slight evidence remained for the existence of a low mound over the grave. On excavation, the cist was found to consist of a flat slab forming the west end, very rough slabs down the north and south sides, and two small stones partly forming the west end. Two small cover slabs had been placed at the east and west ends, and then one large slab had been laid longitudinally to cover the remainder. Another smaller slab had been placed on top on the north side. The top of the slabs lay approximately 0.30m below the old land surface. Several of the stones were quartz rich, and one in particular, in the north-west corner, was very white. The skeleton was of a child 0–2 months old.

Grave 223 / skeleton S91 (Fig. 21)
This juvenile grave lay between the adult long-cists 212 and 184. No markers existed for the grave, and it only became visible when the cut through the old land surface was revealed. The capstone lay immediately below the old land surface, and consisted of three slabs, a single centre one that had been placed across, and then two that overlapped the centre had been placed at each end. The side slabs were not very deep, and the body lay with its head in the south-east corner, but fully extended, though with both legs slightly bent. The slabs were roughly arranged along the sides, but with a definite slab at the west end, and a slightly narrower east end. The grave contained a juvenile aged less than 6 months.
Grave 224 / skeleton S96
This grave formed one of a line of five juvenile graves that lay on the north side of burials 213 and 214. No grave markers were found, and no mound was identified during excavation. The top of the cist lay approximately 0.30m below the old land surface. Dark humic sand within the bottom of the fill of the grave is best interpreted as the turf layer being used as back-fill material at the bottom of the grave. Excavation revealed two cover slabs, the east one poorly preserved and partly collapsed, whilst the west one was in good condition. There were two slabs down each side, and one at the west end, though none at the east end. The grave contained a juvenile aged less than 6 months.

Grave 225 / skeleton S86
This grave formed the west end of a line of five juvenile graves that lay on the north side of burials 213 and 214. It lay on the eroding west face, and was visible only as a cut through the old land surface. The
top of the cover slabs had originally lain approximately 0.20m below the buried soil; however, the upper stones, of which there were four slabs, had given way in the centre. All the cover lintels had therefore collapsed into the centre of the cist. Resting on the cover slabs had been a small quartz pebble. Removal of the cover slabs revealed a relatively wide cist, slightly tapering towards the east end. There was a single slab across the west end, two down either side, but none at the east end. The burial was of a juvenile aged between 0–6 months. The skeleton was fragmentary, but had been placed slightly on its right side, with legs partially flexed.

**Grave 227 (no skeletal remains)**
The remains of a small cist were revealed on the west edge of the excavated area. The cist had been damaged by erosion, and only the east end remained. Erosion had also removed the old land surface from above the grave, but measuring from the level immediately east, the top of the cover slabs lay approximately 0.30m below the top of the old land surface. Two cover slabs remained at the east end of the grave. Upon removal, these revealed the east end of the cist, consisting of two slabs on the north side, one slab on the south side, and one slab across the east end. It was not possible to measure the total length of the grave, though a length of 0.80m remained. The width of the cist at the east end was 0.25m.

**Grave 240 / skeleton S90**
This grave formed one of a line of five juvenile graves that lay on the north side of burials 213 and 214. The grave cut showed clearly in plan where it cut through the buried soil, though the sandy fill was difficult to distinguish from the surrounding sand, and the base was only identified when small bones were located. The grave had a small headstone which was set quite shallowly within the thin layers above the buried soil, though not within it. The grave was some 0.35m deep, and with no cist. The burial was of a neo-natal juvenile aged 32–34 weeks.

**Grave 279 / skeleton S92**
This grave formed one of a line of five juvenile graves that lay on the north side of burials 213 and 214. There was no above ground marker for the grave, but there remained slight evidence of a raised mound over the grave. The grave was, however, only fully identified when the cut through the buried soil was revealed. Excavation revealed a deep grave approximately 0.35m deep to the top of the capstone from the top of the buried soil, so it would originally have been some 0.40m deep. The grave fill was fairly even, with evidence for more organic material towards the base of the fill, best interpreted as part of the buried soil that formed part of the excavated grave. The cist cover consisted of two principal slabs, one of which had partly shattered, neatly covering the grave, and partly supported on two small horizontal slabs that had been buried into the side of the grave above the side slabs. Removal of the cover revealed a neatly designed cist of stone slabs, approximately 0.57m by 0.20m across, slightly bowed out in the centre and tapering to two end slabs. Inside lay an additional side slab at the east end of the south side. The burial lay fully extended, though with the legs slightly to one side to go around the additional side slab. The burial was of a juvenile approximately 0.54m tall, aged 6±3 months.

**Grave 286 / skeleton S100**
This was an eroded long-cist grave on the west edge of the mound, north of, and alongside grave 288. Only the east end remained, the remainder having been removed by erosion. The remaining part consisted of a fragmentary cover slab, lying on one east slab, and a single slab on the north and south sides. The top of the cist lay approximately 0.50m below the old land surface. The disturbed remains of a juvenile aged 0–6 months lay within the cist, with two ribs and skull fragments from an adult.
Grave 288 (no skeletal remains)
The very fragmentary remains of a cist burial lay on the west edge of the eroding mound. The east end slab and one long side slab on the north side remained. No skeletal remains were found within the cist.

Grave 292 / skeletons B10 and B11
The eroded remains of a long-cist, first excavated in 1997, when the skeletal remains were removed. The west end of the cist had been eroded, but there was an eastern end slab, two large slabs on the north side, and one smaller slab on the south, with the remains of another fallen slab alongside. Several of the stones contained high quantities of quartz. The grave was unusual in apparently having the remains of two juvenile primary burials, one aged 6–7 years and the other 2–4 years. Remains of three other individuals were found higher in the grave, but these were not articulated, and were consequently interpreted as re-burial of eroded bones in modern times, and not subsequent internments in the same grave.

Grave 339 / skeleton S109
Fragmentary remains of a long-cist on the west edge of the mound contained lower limbs of S109 only. Too little remained to allow any analysis of features. A quartz pebble lay alongside the burial.

Grave 350 / skeleton SB2
A small long-cist excavated in 1997, approximately 0.6m long. It lay close under the buried soil. The cist was formed from two small slabs on each side, two end stones, and five small cover slabs. Inside were the well-preserved remains of an infant aged between birth and 6 months. Extensive plaques of woven new bone present at the distal end of the left ulna and radius, and to a lesser extent on other bones, are consistent with an infection which was active at the time of death (Robertson 1998, 8).

SUMMARY OF LONG-CIST BURIALS
The 24 long-cist burials were located on the west edge of the excavation area, and occupied an area of only some 6m wide from west to east (Fig. 22). Though there was a particular cluster of graves in the centre of the mound, there were also outliers to north and south, so the cemetery occupied a total length of some 30m from north to south. A number of the graves had been disturbed by erosion on the front of the mound. Seven adult graves and eight sub-adult graves survived in complete condition. Nine partially surviving long-cists, all eroded at the west edge of the mound, were excavated. Seven of these contained partial skeletons in situ, whilst two contained no skeletal remains. At least two of the partially eroded graves contained jumbled remains of bones which were later insertions. It was common for eroded bones to be reburied, and it is thought this is the case here.

Since the excavated graves form the surviving remains of a much larger cemetery, little information can be derived from the spatial distribution of the small sample remaining. However, it is certainly of interest that five of the juvenile graves form a distinct line amongst the adult graves, and these may represent a family group.

The grave mounds
The remains of six mounds survived, the purpose of which was to act as above ground grave markers (Figs 9, 22). These were all above adult graves, and although minor differences existed, and none survived fully preserved, in each case the marker consisted of a mound of sand approximately 0.15m high over the grave, surrounded by a ring of upright stones around the perimeter of the mound. The top of the stones would
Fig. 22. Plan of cist grave locations.
have been of similar height to the top of the mound, and they were not deeply buried. The best preserved
was grave 214, which also contained a row of quartz pebbles along the top of the mound. Several of the
surrounding boulders also contained quantities of quartz inclusions. In two cases there was a disparity
between the alignment of the mound and the alignment of the grave. This might have been because the
exact location of the grave cut had been lost by wind-blown sand covering the grave. If this was the case,
then a time gap between the burial and the construction of the mound is possible, though sand can be
transported by a strong wind very quickly, and a single night could be sufficient to obscure the grave.
Two of the smaller graves of sub-adults were marked by small upright stones at the west end (G216
and G240). Slight evidence for a raised mound was also present above G216 and G279.

The graves
As has been noted, where the evidence was recoverable the long-cist graves had been dug through a
covering of 150–200mm of wind-blown sand which overlay the buried soil (189). All the graves had been
cut through the soil, and where grave mounds did not survive, or had not existed, the graves only became
visible as cuts through this surface. The cists were buried at slightly different depths, though the upper
surface of the cover slabs usually lay between 400–500mm below the surface. Grave 212 was less, at only
some 200mm below. The depth of the cist and lintels was usually 250–300mm, so the base of an adult
gave was typically 700–800mm below the surface. The depths of the sub-adult graves varied more, and
were typically much shallower; grave 223, for example, lay immediately below layer 189, though grave
216 was 300mm below it. One of the juvenile graves (240) contained no cist.

The cists
All the examples were of cist and lintel form, with no basal slabs. The body was laid directly on the sand.
The stone was of local granite, which has a tendency to split into uneven slabs. Many of the stones had
high levels of quartz within them. The sides were between 200–300mm high. The actual act of placing
the slabs, given their weight and the instability of the sand, can never have been easy. Some indication of
the method of building the grave can be gained where side stones overlap one another. Grave 251, for
example, was constructed by placing the central north slab, and overlapping the two either side. In the
case of grave 279, the west end stone appears to have been inserted first, then the north side from west
to east, the east stone, then the south side from east to west. Where the top of the sides was uneven, small
horizontal slabs were pushed into the sand above the upright slabs to level up the sides and help support
the cover stones.

Lintels varied in size and detail. Some appeared carefully laid, and made to fit. Larger slabs were laid
first, and small slabs then covered up the holes remaining, though, in the case of grave 215, the holes
between the lower cover slabs had been blocked by additional large slabs placed over. Supporting slabs
had been inserted horizontally into the sand to support the cover slabs. Again, where the cover stones
overlap it is possible to see an approximate order of construction. The evidence suggests the western
stone, over the head, and often the eastern stone also, was laid early on the sequence, and these were
carefully chosen to fit the space required. The central stones were laid after the end stones, and often in
a more haphazard fashion, as some were not wide enough to fit across. In the case of grave 215, the slabs
were laid from west to east, with more careful arrangement of the cover at the west end than the
remainder. In grave 214 the western cover-stone was again carefully chosen to fit the space, but on this
occasion overlapped the slab to the east. The eastern slab had also been carefully put in place before the
central slabs, which were placed more haphazardly.

The cists were usually empty of sand, so that the skeleton was clearly visible when the capstones were
lifted. Only one cist, grave 185, was filled with sand. There was no apparent reason why sand should have
filled this cist and not the others. Some of the cover slabs had cracked, but this would not have been sufficient to allow sand inside, and this burial may, therefore, have been covered in sand prior to construction of the cist cover.

The cists of juveniles were similar in construction, though considerably smaller. Occasionally it was possible for a single stone to be used as a lintel.

The burials
Eight adult skeletons survived to allow the body position to be identified. The bodies were laid in the cists fully extended and supine. The lower arms were placed in a number of positions, with no particular trait dominating. Three burials (S81, S83 and S99) had arms in-turned from the elbow so the hands rested in the centre of the pelvis. Only one (S102) had arms fully extended, though in this case the hands were resting slightly under the pelvis. S105 had the right hand located just underneath the pelvis, and the left hand resting on top of the pelvis. The right hand of S97 was also resting under the pelvis, though here the left arm crossed over the waist, but this might have been the result of later disturbance, as the cist was partly damaged. S108 was similar with the right arm extended, and the left arm across the body but angled down to the lower pelvis. S93, a woman aged 60–87, was placed towards her right side, with legs crossed and left arm over the body. The relatively close spacing of the feet and the tightness of the arms against the body in three of the cases suggests the bodies were wrapped in shrouds prior to burial, though others, for example S93, could not have been tightly wrapped (O’Brien 2003). The cists were usually of an appropriate size for the burial, though in grave 184 there was some 200mm spare at the east end.

Hair survived on two of the cist burials (S102 and S108). It was considerably less on S102, a female aged 35–49, where the head had been partially buried by the sand, but in the case of S108, a female aged 55–60, a long length of hair lay resting on the sand around the right side of the head and shoulder (Fig. 23). An initial physical examination was undertaken at Bradford University, which concluded survival was probably the result of burial in a cist which resulted in an air void, and perhaps the presence of salts in the sand might have retarded aggressive microbial activity (Wilson et al. 2004). Raman spectroscopy was used to examine crystals found at the interface between the hair and the skeletal neck vertebrae. These were found to be a mixture of newberyite and haematite, associated with decomposition products of the hair and bone (Edwards et al., 2005). Strontium isotope and trace element analysis was undertaken on a sample of teeth, but the results have not yet been finalized (Matchett et al., 2005).

The juvenile burials are less easy than the adult to burials to classify, as the bone preservation was generally poorer. In grave 292, however, a cist originally excavated in 1997, there were two layers of burial. The upper layer contained the unarticulated remains of three individuals, and these were interpreted as reburials of eroded bones in modern times. The lower layer, however, contained the articulated lower body remains of two sub-adult skeletons, one aged 6–7 years and the other 2–4 years. This was the only instance of more than one skeleton in a single grave. G240 was the grave of a neonate (aged 32–34 weeks) buried without a stone cist, but in a simple dug grave approximately 0.35m deep, with a small upright stone marker on the surface.

Age and sex distribution
There were 21 long-cist graves with identifiable remains, of which ten were adult and twelve sub-adult (one grave with two burials). The 10 adult graves contained 7 females, 2 males and one unknown (the lower legs only remained). Two of the females were aged over 60, and one was aged 55–60. One was aged 39–45, and the remaining three were younger than 30. There was no recognizable difference in the style of burials of the different age groups, nor were the graves of the two males, one aged 40–49, and the other
over 35, differentiated in any identifiable way. The juvenile burials varied in age from one fetal, seven neonate (0–12 months), 3 infant (1–5 years), and one child (6–12 years). Of interest is the lack of individuals aged between 12–18, an indication, perhaps, that having made it through the yearly years of childhood, the general health of the population was relatively strong. This is indicated also by the presence of three women aged c. 60 years, which is indicative of a healthy population.

**Orientation**

All the long-cist graves were orientated on an east–west axis with the head to the west. The actual alignment of the adult graves varied from just north of north-east (grave 215 at 38° 98') to slightly north of due east (grave 185 at 79° 98'). In terms of sunrise, this would place the majority of burials aligned on the arc of horizon where the sun rises between the spring and autumn equinoxes, a pattern typical of early medieval burials in north-west Wales (Longley 2002).
Finds associated with long-cist graves
The only finds made within any of the long-cist graves were pebbles, usually of quartz, though occasionally black. Pebbles lay throughout the layers of sand, and in many circumstances it was difficult to ascertain if they were purposefully placed or simply there as part of the back-filled sand. However, a carefully placed row of quartz pebbles along the top of the mound which covered grave 214 could only have been placed there deliberately. Three quartz pebbles were found in situ, and four along the base of the mound which are thought to have rolled down from the top. A quartz pebble was found alongside grave 339, but the cist was badly disturbed, and it may not be an original deposit. Grave 213 contained a small quartz pebble close to the right shoulder. The significance of quartz is discussed further below.

NON-CIST BURIALS
Unlike the long-cist burials, which were confined to a single layer, the non-cist, or simple dug burials, were on several layers within a deposit of sand measuring 1.5–2m thick. The graves of four burials were identified in section, and in each case the depth was close to 0.5m. This would suggest that the burials were being made regularly and during a prolonged period of sand incursions when the mound was growing. The radiocarbon dates suggest this period lay between the seventh and twelfth centuries AD, though the relatively small sample of skeletons dated mean caution must be used to extrapolate periods of burial, and it is, perhaps, too easy to assume that use of the site was continuous.

Burial type
The remains of 103 burials were recovered, of which 51 were considered to be complete undisturbed burials (Fig. 24). Many of the skeletons were, however, in a relatively fragile state, resulting in loss of some bone, in particular from the cranium and ribs. This accounts for the difference in complete numbers between the evidence derived from excavation and that given following the specialist report. Of the 52 burials which were incomplete, the majority had been affected by the on-going erosion on the seaward side of the mound, whilst a lesser number had been disturbed during a period of erosion on the landward side of the mound (see above) and had been subsequently re-buried by wind-blown sand.

The usual form of burial was an extended inhumation in a simple dug grave. Although there was little evidence for grave markers there was surprisingly little intercutting of graves, implying a knowledge of the location of former graves. One instance of intercutting occurred where three burials (S50, S61, S511) all lay immediately adjacent. One infant burial, S29, was partially surrounded by stones on the south and west side.

Although the identification of the grave and grave cut was rarely possible, the layout of the skeletons implied they were single extended inhumations. The only exception was S18 and S19 where a female aged 16–20 years was holding a fetal child on her chest and cradling it with one arm.

Burial position was usually fully extended, with hands crossed over the pelvis. Forty-seven burials were sufficiently well preserved to be able to analyze the arm positions (Table 1) employing the methodology used at Poundbury and Llandough (Holbrook and Thomas 2005, 18; Woodward 1993, 222).

The commonest trait was with both arms bent onto the pelvis, or one arm bent on to the pelvis and the other straight (Figs 25–26). Very few had arms raised back onto the chest or head. In two instances (S43 and S49) the arms were crossed at the wrists at waist level. Both were adult females, and one (S43) had legs crossed at the ankles. In the majority of cases the legs were fully extended, though other exceptions did occur, and it was noted that those with unusual leg positions often also had unusual arm positions. S52, an adult female, lay on her back with left arm crossed over the lower waist to rest on the right arm,
Fig. 24. Location of non-cist burials.
the left leg crossed over the right at thigh level and then passed under the right leg. In the case of S25, an adult male, the legs were crossed at the ankles (right over left), and the right arm was bent to the left side of the pelvis (Fig. 26).

Four other instances occurred where the legs were not fully extended. Burial S48 was a female aged 20–25. The body lay on its back with the two legs drawn up so the knees were vertical, and the arms were doubled back at the elbow so the hands rested close to the chin. S51, a male aged 30–49, was similar in that the knees were drawn up, but the arms the left arm was straight alongside the body, and the right crossing over the pelvis (Fig. 28). S511, an adult female, lay on its left side with knees partially drawn up, the left arm doubled back so the left hand rested under the chin, and the right arm at right-angles so the right hand lay on the left elbow. S04, a juvenile of 7–9 years, was also buried on the left side, with legs slightly drawn up.

Age and sex distributions (Fig. 24)
Details of age and sex distribution are detailed more fully in Appendix 1. Of the 103 non-cist burials, four could not be aged. Of the remaining 99, 42 were younger than 18, and 57 were older than 18. Of the sub-adults, two were fetal burials, nine were neonate (0–12 months), 15 were infant (1–5 years), 1 was a child (6–12 years), and 8 were sub-adults (13–18 years). The age of death is, on average, younger for the dug burials than the cist burials, perhaps showing a slight decline in health or living standards. Where sex could be determined within the adult burials, 14 were male and 16 were female. There was no particular spatial distribution of adult male and female graves, although there were areas where juvenile burials were dominant. This was particularly noticeable on the west edge towards the south side, where there was a cluster of six child burials, three (S42, S44 and S45) at an upper level, and three (S71, S72, S74) at a lower level.

Orientation
Identifying the correct orientation was not always a simple process, either because of later disturbance or because the burial was not supine, and this is particularly true of the upper burials. Nonetheless, all were on a general east–west axis with the head to the west, and all were orientated north of due east, which is usual for burials of this period. No obvious local features appeared to be influential in determining orientation, though the excavated burials lie on the very east side of a larger cemetery, and determining factors may have existed elsewhere.

Finds associated with non-cist dug burials
As with the long-cist burials, the only finds associated with the non-cist dug burials were pebbles of quartz or other stone. These were relatively few, though larger quantities were found within the sand, and
Fig. 25. Examples of typical non-cist burials.
Fig. 26. Examples of non-cist burials laid out in less typical arrangements.
might have been purposefully placed within the backfill of the grave. Three quartz pebbles, one on the forehead, one by the right elbow, and another in a disturbed part of the grave were found associated with S115, and a large black oval pebble lay by the head of S117.

**DISCUSSION**

In addition to Tywyn y Capel four extended inhumation cemeteries have been excavated under modern excavation conditions on Anglesey, two on Holy Island within approximately 2 kilometres of Tywyn y Capel at Ty Mawr and Parc Cybi (Cuttler *et al.* forthcoming), and two on Anglesey at Afryn and Capel Eithin (Hedges forthcoming; White and Smith 1999). A review of cemetery studies within Wales has recently been published (Longley 2009) and the following discussion therefore focuses on the local context and those features which are unique to Tywyn y Capel.

**Location**

Tywyn y Capel is located on the west coast of Holy Island within a range of sand dunes fronting a sandy bay which may be the site of a pre-glacial river mouth (see above). The date of the first accumulation of sand is not known with certainty, but it overlies peaty deposits with remnants of trees that are thought to date from around the eighth century BC. Certainly by the seventh century AD a low turf-covered mound
Fig. 28. Skeleton S51, looking west.
of sand lay a short distance from the sea. If there was any focal point here, either a raised feature to encourage wind blown sand to gather, or a prehistoric feature to attract burial, all evidence has now been lost. There is a strong correlation between prehistoric sites and early medieval cemeteries and Anglesey is no exception (Williams 2006, 181–5; Longley 2009). The Ty Mawr cemetery lies alongside a Bronze Age ring-ditch; burials at Porth Darfarch were cut into prehistoric burial mounds and the Capel Eithin cemetery lay alongside prehistoric burials and a probable Bronze Age barrow (Stanley 1876; White and Smith 1999). The ninth-century Pillar of Eliseg was erected on a mound which contained an earlier burial in a stone cist, though whether of prehistoric or early medieval date it is now difficult to discern (Nash Williams 1950, no. 182). The Catstane, Kirkliston (Midlothian), a fifth-century inscribed stone, is shown in a drawing by Lhuyd as forming a part of a circle of large stones surrounding a low mound, which was in turn respected by a series of long-cist graves; a larger cemetery of long-cists laid in regular rows lay to the east (Edwards 2007, 185; Cowie 1978). The Catstane mound may have covered a special grave, in which case it might have been comparable to the grave mounds at Tywyn y Capel, but here again the evidence is now difficult to interpret. The point to be made, however, is that the location of the early medieval cemetery on a site with prehistoric origins would not be unexpected at Tywyn y Capel, but any evidence was lost through erosion during the nineteenth century.

The grave mounds
The survival of the mounds and stone surrounds above the long-cist burials is unusual and not readily paralleled at other sites. The evidence from Tywyn y Capel suggests that all the excavated adult long-cist graves had an oval mound above the grave, which was encircled with upright or placed stones. The mounds were low, and can be explained by the excess sand displaced by the insertion of the cist grave, but their subsequent embellishment shows a deliberate action designed to clearly mark the graves on the surface. The survival of the mounds and surrounding stones must be attributed to the rapid accumulation of windblown sand around the graves soon after their creation. There is no clear evidence for the establishment of vegetation over the grave mounds following their construction. Organic horizons do exist, but these are best explained by the incorporation of the existing buried soil within the backfill of the grave. Similarly, the survival of the quartz pebbles along the top of grave 214 argues for rapid burial by sand.

A partial explanation of the lack of surface remains from other sites is that the surface from which the graves were dug has since been truncated or eroded by agricultural or natural processes. Certainly at three sites on Anglesey, Ty Mawr, Parc Cybi and Capel Eithin, the upper layers were generally eroded, and similarly at Bangor and Llandegai (Longley 1995; Longley 2001). However, slight remains of a small cairn were found over two of the graves at Ty Mawr (graves 075 and 214), though here the cairn seems to have taken the place of lintels covering the grave. At Capel Maelog, Powys, two of the graves were ‘defined on the surface by edge-set stones enclosing an area covered by a thin scattering of quartz pebbles’ (Britnell 1990, 54). The parallel use of quartz is discussed further below, but the point to be made here is that only two of the graves, one considered to be a ‘significant grave’, were clearly defined on the surface. At Cannington (Somerset) only one grave was found to be clearly marked by a mound (FT26). In this instance it is again a single significant grave which was marked by stone slabs laid flat and edged with vertical slabs. A vertical post may have stood at the east end, and a stone decorated with incised lines and circular motif was found close by. The grave lay approximately 0.5m below the slabs (Rahtz, Hirst and Wright 2000, 51–6).

Long-cist graves
The long-cist graves at Tywyn y Capel were, wherever it could be tested, stratigraphically earlier than the non-cist burials, and dated from c. AD 650–800. No certain comparable dates are available from other
Anglesey sites, though where evidence is forthcoming, it does tend to reinforce the view that extended inhumations in stone-lined cists are of this approximate date. It was argued that one of the graves at Capel Eithin was of sixth- or seventh-century in date (White and Smith 1999, 144), and some of the graves at Arfryn pre-date the seventh century AD (Hedges forthcoming). The radiocarbon dates at Tywyn y Capel suggest no significant break in time between the long-cist burials and the non-cist burials.

Burial in Ireland in this period changes from early slab-lined cists in isolated small cemeteries of the fourth and fifth centuries to lintel graves often with no basal slabs in larger cemeteries dated to the seventh and eighth centuries (O’Brien 2003, 66–7). The long-cist graves at Tywyn y Capel fit into the later type, whereas the small cemeteries at Ty Mawr and Parc Cybi which lie relatively close-by, though undated, more closely resemble the earlier type.

The excavated adult long-cist graves at Tywyn y Capel were all similar, with no basal slabs, but full side and lintel slabs, whereas at Ty Mawr complete cists, including basal slabs, were the dominant type (Cuttler et al. forthcoming). Two lintel graves are also known from Capel Eithin, though there was a large presence at this site of partial cists. At both Ty Mawr and Capel Eithin, and at other comparable cemeteries, stone-lined graves are intermingled with timber-lined graves, the latter sometimes having supporting stones around the timber sides. Examples of timber-lined graves were not found at Tywyn y Capel.

As noted at other cist cemetery sites (Proudfoot 1996, 403), greater care appears to have been paid to the construction of the cist at the west end than at the east. All but one of the adult cists had a slab at the west end, whereas several did not have a specific east end, but rather the sides were angled in. The western lintel appeared carefully chosen to fit the required space, whereas other slabs were laid in a more haphazard manner.

The body position of each of the cist burials is discussed above. However, the small number of surviving graves makes identification of any meaningful patterns very difficult, and the lack of skeletal evidence from other cist graves within Wales does not allow comparison with other Welsh sites. The double burial in cist 292 is difficult to parallel elsewhere, and though the cist had been disturbed in later times and only the lower limbs remained, there was little doubt that the remains were fully articulated and in situ, and the lack of disturbance of either burial suggests they were interred together. In an example at Hallow Hill, St Andrews (Fife), two cist graves contained burials in sequential deposits, one above the other, but there were no examples of simultaneous burial (Proudfoot 1996, 400).

The later cemetery
The non-cist burials date from the eighth to the twelfth century. Sand incursions separated the burial mounds of the long-cist burials from the later burials, but these sand incursions appear, from the stratigraphic record, to have been rapid, and the changeover from long-cist to non-cist burial appears to have taken place relative quickly with no significant chronological gap.

Use of quartz
Quartz stones were the only contemporary finds with both long-cist and non-cist burials. Quartz stones are regularly found associated with prehistoric and historic burials (Rees 1935). At Porth Dafarch a ‘heap of round white quartz pebbles of the size of paving stones formed a sort of cairn’ above a prehistoric cist (Stanley 1876, 139). Where quartz pebbles and outcrops occur naturally it is difficult to know if they are present in burials by chance or purpose. However, there is little doubt that the row of quartz pebbles over cist grave 215 was a deliberate act. There was little other evidence for quartz pebbles within cist graves, though many of the stones forming the cists contained quartz, and so did those marking the top of the graves. At Llandough, Vale of Glamorgan, a high proportion of graves were found to contain either quartz
or other pebbles (Holbrook and Thomas 2005, 37), and at Capel Maelog at least one pre-church grave was marked with 24 quartz pebbles (Britnell 1990, 36). Although their use does not appear in official church guidance, two ecclesiastical references to white stones have been identified by Hill which implies their significance in a Christian context (Hill 1997, 472). Their use within the burial rite occurs sufficiently frequently for it to be identified as a regular and significant part of that rite. However, whilst its continued role can in part be attributed to tradition, the original intention is now difficult to identify.

The status of Tywyn y Capel
Christianity was introduced into Wales during the later Roman period, and whilst archaeological evidence for this is very slight, there is little doubt that by the sixth century a part, and probably a large part, of the population of the formative kingdom of Gwynedd thought of itself as Christian. Archaeological knowledge of this period is largely derived from the evidence provided by cemeteries, many of which have relatively short periods of use. These are best interpreted as ancestral or familial cemeteries, in use, perhaps, to the seventh or eighth centuries before burial was regularised in church cemeteries. Though burials of the fifth and sixth centuries were not necessarily Christian, and this certainly seems to be the case in Ireland (O’Brien 2003), there is little evidence for the continuation of paganism into the seventh century, and it is generally assumed that the population was Christian by the start of that century. This would place the earliest Tywyn y Capel burials in a Christian context, and though there are no archaeological traits which would necessarily confirm this, the burial of individuals in a supine position with head to the west and with no grave goods does not contradict it. During the eighth and ninth centuries the ancestral burial grounds were being exchanged for burial in regularised church cemeteries, though the extent to which this occurred prior to the twelfth century is unknown (Pryce 1992, 45). The continued use of the cemetery at Tywyn y Capel through this period and beyond would therefore suggest recognition by ecclesiastical authorities of its status as a Christian cemetery. The authority in this instance is most likely to have been the clas church of Holyhead, a site with perhaps monastic origins, which became responsible for pastoral care throughout a third of Anglesey. The history of Holyhead church has been summarised elsewhere, but certainly there is evidence for it being a significant place of Christian worship from at least the sixth century, and its wealth and status are confirmed by a Viking raid on the church in 963 (Davidson 2009).

It is perhaps inevitable, given that Holyhead is the closest convenient harbour to Dublin, that there are Irish associations with Tywyn y Capel. The dedication to St Ffraid is discussed further below, but is one of many later dedications to the fifth-century St Bridget. In 1980 part of a penannular brooch was found close to the cemetery during strengthening of the promenade. The brooch is considered to be of Irish origin, and it has been suggested that its presence denotes Viking activity in the region (Lewis 1982; Redknap 1995, 65). There is no evidence for pagan Viking burial in the immediate area, though a possible example was found on the east coast of Anglesey, close to a Viking settlement (Redknap 2000, 96). However, the adoption of Christianity by the Vikings occurred during the ninth and tenth centuries, and it is perhaps significant in this context that initial results from strontium levels within two of the skeletons from Tywyn y Capel may suggest a childhood spent in Norway, whilst another suggests Iceland (Matchett et al. 2005). It has been argued that Anglesey became a power-base for Viking raiders and settlers during this time (Davies 1990, 56–60), and the brooch and strontium evidence indicate close contact with the Hiberno-Norse population of Dublin.

The chapel and dedication
We know that a chapel was erected on top of the cemetery, and though the date of construction is not known, it is unlikely to be before the twelfth century given the complete lack of masonry churches in
north-west Wales prior to that century. The chapel was dedicated to St Ffraid, and it is generally assumed, though not confirmed, that the same dedication applied to the earlier cemetery. The earliest evidence we have for the dedication to St Ffraid is in Leland’s *Collectanea*, a list dating from the first half of the sixteenth century, which records ‘Llan Sant Fraid’ under the church of ‘Kaer Kybi’ (Smith 1906, 131). The prefix *sant* in front of the saint’s name indicates a none-native saint, in this case Brigit of Kildare. Churches and chapels dedicated to Brigit have the widest distribution of any Celtic saint, and can be found throughout western Britain (Bowen 1973). There is not sufficient evidence to confirm continued use of the cemetery into the Middle Ages. The chapel at Tywyn y Capel is generally associated in eighteenth century and later literature with four other chapels on Holy Island, all under the parish church of St Cybi, namely Capel Llochwydd, Capel Gwyngeneu, Capel Gorlas and Capel Llan y Gwyddel (Price 1782). None, with the exception of the nave of Capel Llan y Gwyddel in the cemetery next to Caer Gybi church, have survived. This latter chapel falls more readily into the category of the *capeli y bedd* (‘grave chapels’), though by tradition it commemorates the grave of Sirigi and not Cybi. The origins of the other chapels are now difficult to discern, and lie largely outside the scope of this report, though it is of interest that a significant distribution of medieval chapels, some associated with earlier cemeteries, has been recorded around St David’s, Pembrokeshire. These, by late medieval times, had become part of a pilgrimage route, and were a significant source of income for the cathedral (James 1993, 105–10). The extent to which this can be applied to the chapels on Holy Island is not known, but certainly there is a surviving tradition of pilgrimage around the sites which has recently been re-established. A new cross was erected on the site of Tywyn y Capel in 2000 to commemorate the site of the cemetery and chapel, and to remind visitors of its long history.

APPENDIX I: THE HUMAN SKELETAL REMAINS
By Rachel Adlam and Michael Wysocki

INTRODUCTION

Skeletal remains of 122 individuals were recovered during the excavations. 103 burials were from simple non-cist graves, dug in sand. Stratigraphically beneath these were stone long-cists from which nineteen skeletons were recovered. The two groups of burials are each presented here as discrete assemblages. The majority of the skeletons were analysed using modified recording forms developed for the Physicians for Human Rights (PHR) excavations of multiple inhumations. Information recorded included a skeletal inventory, minimum number of individuals present (MNI), sex and age estimations, pathology and trauma, post-mortem damage, and dental details. The forms, which were designed to enable recording of either adult or juvenile remains using the same template, have been deposited with the skeletal archive.

Metric analyses were generally not undertaken, due to the vastly fragmentary nature of the remains. The exceptions to this were in particular cases where abnormal pathology required a more thorough documentation, or where, preservation and condition permitting, metric analysis would aid sex assessment or age estimation.

Preservation and condition of remains
The state of the remains (both series) was documented in two ways. *Preservation* refers to the percentage of a total human skeleton that was present, using the following definitions: ‘good’ = 70–100 per cent present; ‘moderate’ = 40–69 per cent present; ‘poor’ = 0–39 per cent present. *Condition* of the remains
was defined in the following ways: ‘good’ = bones mostly whole, joint surfaces and bone margins showing little or no erosion or other post mortem damage; ‘moderate’ = some fragmentation, some marginal erosion, small areas of trabecular bone visible; ‘poor’ = widespread fragmentation, severe erosion and post mortem damage, much trabecular bone visible or lost.

Sex assessment and age estimation
Sex assessment was based on pelvic and cranial morphology, using criteria from Bass (1995), Buikstra and Ubelaker (1994) and Brickley and McKinley (2004); varying degrees of certainty were classified in the following way: ‘male’, ‘probable male’, ‘indeterminate’ (indet.), ‘probable female’, ‘female’.
Age at death of adults was estimated using a number of methods. These included pelvic morphology (Buikstra and Ubelaker 1994), epiphyseal fusion and diaphyseal length (data from Scheuer and Black 2000) and dental development and attrition (data presented in Hillson 1996).

Ancestry
It was not possible to undertake osteological assessment of ancestry due to the poor state of the remains.

Trauma and pathology
Skeletal pathology and trauma were classified according to type and location following diagnostic criteria presented by Auferheide and Rodriguez-Martin (1998) and Ortner (2003). Unfortunately, erosion of bone surfaces was widespread: in many cases it proved very difficult to make any assessment of trauma or pathology; fragmentation of the bones merely compounded this difficulty. Consequently it should be noted that recorded pathology is in fact limited to observable pathology and is not believed to be a true representation of the actual state of health of the populations from which these remains are derived. Illnesses such as tuberculosis and osteoporosis or even age and activity related degenerative changes seem to be very under-diagnosed. The normal skeletal evidence for the presence of such conditions, or, indeed, for their absence, was simply unobservable.

Data concerning ante-mortem tooth loss, caries, calculus, and enamel hypoplasia are less compromised although teeth have been lost post-mortem and some, labelled ‘root only’, showed no crown due to very severe wear. Also recorded were any incidences of gum disease or root abscess.

THE LONG-CIST BURIALS

In total, 19 individuals were recovered from the long-cist burials: 10 adults (two males, seven females, one adult of indeterminate sex), two infants, six neonates and one late-term foetus. The cist burials were generally well-preserved, with only three skeletons (87, 89 and 100) showing consistently poor preservation and condition. The age and sex distribution of individuals is given in Table 2.

Of the adults, individuals were fairly evenly spread across the entire adult age span. Almost half of the cist-burials were neonates or infants. No juveniles between the ages of 6–18 were present. It should be remembered, however, that the recovered cist burials represent only a small and spatially constrained fraction of the original cist cemetery. Likewise, the apparent bias towards females is also likely to be an artefact of chance survival. It is, nonetheless, notable that the cist burials included the most aged individuals in the entire skeletal archive from the site: two females (skeletons 93 and 99) both possibly over c. 60–65 years.
Table 2: Age and sex determination of the long-cist burials

<table>
<thead>
<tr>
<th>Age category</th>
<th>No. of individuals</th>
<th>Sex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fetal (&lt;0)</td>
<td>1</td>
<td>n/a</td>
</tr>
<tr>
<td>Neonate (0–12 months)</td>
<td>6</td>
<td>n/a</td>
</tr>
<tr>
<td>Infant (1–5 years)</td>
<td>2</td>
<td>n/a</td>
</tr>
<tr>
<td>Child (6–12 years)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Adolescent (13–18 years)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Total sub-adult (&lt;18)</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Young adult (19–24 years)</td>
<td>4</td>
<td>3 female; 1 indet.</td>
</tr>
<tr>
<td>Adult (25–45 years)</td>
<td>3</td>
<td>2 female; 1 male</td>
</tr>
<tr>
<td>Mature adult (45–65 years)</td>
<td>1</td>
<td>1 male</td>
</tr>
<tr>
<td>Elderly adult (&gt;66 years)</td>
<td>2</td>
<td>2 female</td>
</tr>
<tr>
<td>Total adult (&gt;18)</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

**Trauma and pathology**
A summary of observed pathology and trauma is given in Table 3. No skeletal pathologies or traumatic injuries were observed in the immature material. Generally, most of the observed conditions were degenerative and age-related.

The majority of adults (70 per cent), both males and females, exhibited spinal and/or joint osteophytes, a common and often trivial development of bony growths generally associated with advancing age and wear and tear (the three individuals free of this condition were all in the younger adult category). The two males displayed more widespread age and wear and tear related pathologies, both exhibiting localised compression of vertebral bodies (Schmorl’s nodes) with associated spinal curvature, possibly a consequence of load carrying activities. Osteoarthritis and degenerative joint changes were evident in one of the aged females (S93).

Two individuals displayed evidence of traumatic injury. Female S102 had a healed displaced fracture to the right distal ulna, while female S108 exhibited an unusual range of features associated with dislocation at the left wrist.

Table 3: Pathology/trauma type and location of the long-cist burials

<table>
<thead>
<tr>
<th>Pathology type</th>
<th>Cranial</th>
<th>Axial</th>
<th>Pectoral</th>
<th>Pelvic</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developmental</td>
<td>–</td>
<td>1 (6.7%)</td>
<td>–</td>
<td>–</td>
<td>1 (6.7%)</td>
</tr>
<tr>
<td>Infectious</td>
<td>–</td>
<td>–</td>
<td>1 (6.7%)</td>
<td>–</td>
<td>1 (6.7%)</td>
</tr>
<tr>
<td>Metabolic</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Neoplastic</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Degenerative</td>
<td>–</td>
<td>5 (33.3%)</td>
<td>2 (13.3%)</td>
<td>2 (13.3%)</td>
<td>9 (60.0%)</td>
</tr>
<tr>
<td>Fracture</td>
<td>–</td>
<td>–</td>
<td>2 (13.3%)</td>
<td>–</td>
<td>2 (13.3%)</td>
</tr>
<tr>
<td>Dislocation</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Other</td>
<td>–</td>
<td>2 (13.3%)</td>
<td>–</td>
<td>–</td>
<td>2 (13.3%)</td>
</tr>
<tr>
<td>Total</td>
<td>–</td>
<td>8 (53.3%)</td>
<td>5 (33.3%)</td>
<td>2 (13.3%)</td>
<td>15</td>
</tr>
</tbody>
</table>
Skeleton 108
Skeleton 108 was that of a female over the age of 55. In addition to spinal osteophytes indicating age related degenerative joint disease, and a mandibular abscess, this woman showed a well-healed fracture of the left distal radius (Fig. 29). This bone was displaced by means of a medial rotation (Fig. 29). The limb was significantly shorter than the right arm (Table 4).

Fig. 29. **Top left:** skeleton S108, anterior distal radius (remodelling of the medial margin – arrow shows healed fracture line). **Top right:** skeleton S108, distal forearms. **Middle:** skeleton S35, (a) right femur, (b) left femur, (c) anterior pelvis (arrow showing pseudoarthrosis). **Bottom left:** left ribs showing rugose muscle attachments. **Bottom right:** radial heads showing right side enlargement and cleft.
Table 4: Skeleton 108, diaphyseal maximum length (upper limb)

<table>
<thead>
<tr>
<th>Bone</th>
<th>Left (mm)</th>
<th>Right (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humerus</td>
<td>281</td>
<td>297</td>
</tr>
<tr>
<td>Radius</td>
<td>205</td>
<td>223</td>
</tr>
<tr>
<td>Ulna</td>
<td>226</td>
<td>237</td>
</tr>
</tbody>
</table>

Although it is normal to find asymmetry of length in paired limb bones, the magnitude of length difference here suggests that the fracture occurred during growth, i.e., while the individual was still a sub-adult. A fracture occurring during adult life showing no longitudinal displacement is unlikely to cause such significant shortening of the limb. However, Knüsel (2000) notes that reduced activity (for example, from a severe dislocation and fracture) also affects the dimensions of articular surfaces if the individual is juvenile. Articular surface dimensions in this instance exhibit minimal asymmetry. It is therefore concluded that the dislocation and fracture took place relatively shortly before fusion of the distal radial epiphysis, which normally occurs between approximately 17–23 years (Scheuer and Black 2000).

A dislocation of this kind would have resulted in loss of articulation of the thumb joint at the wrist, severely limiting the use of the hand. Articulation across the wrist itself would be compromised, potentially inflicting nerve and tendon damage too. This, in conjunction with severe pain, could effectively immobilise the wrist completely. This immobilisation would certainly persist until significant healing had taken place and movement might not have ever been fully recovered. The new position of the bone would have limited any movement that was recovered. The atrophy of the entire limb would seem to indicate a chronic (i.e. long-term) loss of movement. The rotation of the bone also affected the proximal articulation of the radius at the elbow. The entire bone had rotated and this would have caused muscular and soft tissue damage at the elbow in addition to the wrist. This would compound the loss of mobility in the limb.

**Dental and oral health**

Results of the dental analysis in the cist burials are presented in Table 5. Figures in brackets show percentage incidence of dental pathology when related to number of teeth with crowns present (teeth worn to the root only were unable to be scored for caries or calculus).

The vast majority of the observed pathology in adult teeth was that of tooth wear, indicated by dentine exposure. Calculus was present in around one third of the teeth examined, while caries appeared in under 7 per cent of the sample. Very few of the teeth examined from the juvenile burials were erupted, those that were all came from skeleton 109 and all showed presence of calculus.

**Discussion of long-cist burials**

The small size and incomplete nature of the cist-buried skeletal population means that only limited inferences can be drawn about child mortality, male and female life expectancy and general quality of life of these individuals. The absence of children and adolescents, the relatively high proportion of infant burials and the low proportion of adult males could all be artefacts of preservation and similar caveats apply to the frequency of observed pathologies. Taking what evidence there is at face value, one might want to speculate that the health and quality of life of these people was not poor, with 60 per cent of adults attaining ages over 35 years. Relatively high infant mortality rates suggested by this sample are to be expected, though are often archaeologically invisible (Guy et al. 1997; Chamberlain 2006). It is curious, however, that there are no burials of children or adolescents. This is unlikely to reflect the
Table 5: Tooth assessment of the long-cist burials

<table>
<thead>
<tr>
<th></th>
<th>Adult burials (&gt;18 years, n=10)</th>
<th>Juvenile burials (&lt;18 years, n=9)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total teeth assessed</td>
<td>73</td>
<td>83</td>
<td>156</td>
</tr>
<tr>
<td>Unerupted teeth</td>
<td>2</td>
<td>74</td>
<td>76</td>
</tr>
<tr>
<td>Root only present</td>
<td>13</td>
<td>-</td>
<td>13</td>
</tr>
<tr>
<td>Crowns present</td>
<td>58</td>
<td>9</td>
<td>67</td>
</tr>
<tr>
<td>Caries</td>
<td>4 (6.9%)</td>
<td>-</td>
<td>4 (5.9%)</td>
</tr>
<tr>
<td>Calculus</td>
<td>18 (31.0%)</td>
<td>9 (100%)</td>
<td>27 (40.2%)</td>
</tr>
<tr>
<td>Wear (dentine exposure)</td>
<td>50 (86.2%)</td>
<td>-</td>
<td>50 (74.6%)</td>
</tr>
<tr>
<td>Abscess</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Enamel hypoplasia</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

situation had the entire cist cemetery been available, but taken at face value could suggest that once individuals had survived beyond the age of weaning, their chances of reaching adulthood were good. Such a view is possibly supported to a limited extent by the absence of enamel hypoplasia in the available adult dentition, indicating childhoods free of critical illness or profound metabolic stress in those adults.

Less than 7 per cent caries is a relatively low rate if one assumes that this population were agriculturists with a high carbohydrate intake, which generally results in caries frequencies of over 7 per cent. However, there is also a clear correlation between high occlusal attrition rates and low caries prevalence (Larsen 1997, 65–7), so no inferences from the dental evidence about diet can be drawn, apart from the observation that it was likely to have had a coarse and gritty component.

NON-CIST BURIALS

In total, 103 individuals were recovered from the later interments.

Preservation and condition
The later interments showed slight polarisation in terms of preservation; generally skeletons were either well preserved or very poorly preserved with less than one fifth appearing in a moderate state. The condition of these skeletons encompassed a more even spread, with approximately one third of the total number of skeletons in each category (Table 6).

Age estimation
The age distribution of individuals is given in Table 7. Some individuals were removed from the demographic analysis as they were recorded as merely ‘adult’ (n=20) or ‘sub-adult’ (n=7) and could not

Table 6: Preservation and condition of the non-cist burials

<table>
<thead>
<tr>
<th></th>
<th>Good (%)</th>
<th>Moderate (%)</th>
<th>Poor (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preservation</td>
<td>36 (35.0%)</td>
<td>18 (17.5%)</td>
<td>49 (47.6%)</td>
</tr>
<tr>
<td>Condition</td>
<td>32 (31.1%)</td>
<td>41 (39.8%)</td>
<td>30 (29.1%)</td>
</tr>
</tbody>
</table>
Table 7: Age determination of non-cist burials

<table>
<thead>
<tr>
<th>Age category</th>
<th>No. of individuals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-adult</td>
<td></td>
</tr>
<tr>
<td>Fetal (&lt;0)</td>
<td>2</td>
</tr>
<tr>
<td>Neonate (0–12 months)</td>
<td>9</td>
</tr>
<tr>
<td>Infant (1–5 years)</td>
<td>15</td>
</tr>
<tr>
<td>Child (6–12 years)</td>
<td>1</td>
</tr>
<tr>
<td>Sub-adult (13–18 years)</td>
<td>8</td>
</tr>
<tr>
<td>Total including non-specific records</td>
<td>42</td>
</tr>
<tr>
<td>Adult</td>
<td></td>
</tr>
<tr>
<td>Young adult (19–24 years)</td>
<td>9</td>
</tr>
<tr>
<td>Adult (25–45 years)</td>
<td>20</td>
</tr>
<tr>
<td>Mature adult (45–65 years)</td>
<td>8</td>
</tr>
<tr>
<td>Elderly adult (&gt;66 years)</td>
<td>–</td>
</tr>
<tr>
<td>Total including non-specific records</td>
<td>57</td>
</tr>
</tbody>
</table>

be assigned a specific age range. Four individuals particularly poorly preserved were classified as ‘age unknown’.

Over 60 per cent of the juvenile burials were under 5 years or age. Two juvenile skeletons were assessed to be fatal; however it is unknown whether the individuals had been delivered as premature births or died in utero. The majority of the adult skeletons were in the age range 25–45 years (35 per cent) with almost equal numbers (approximately 15 per cent) of individuals in the age categories either side of this range. No adults were present in the ‘elderly’ category.

Sex determination

Results of sex determination analyses are presented in Table 8. The high proportion of indeterminate cases is due in part to the presence of many sub adults, on whom accurate sex estimation cannot be attempted (Mays and Cox 2000). In this study, any individual below the age of c. 18 years was considered to be sub adult, which accounts for 40 per cent of the individuals in the later burials. Of the adults in these burials (n=62), 32 per cent were unable to be assigned a sex. This is predominantly due to the fragmentary nature of the remains. However, three adults in good condition remained unassigned; in all these cases only the bones of the lower limb were present, thus rendering any assessment of cranial or pelvic morphology impossible.

Trauma and pathology

Of the 103 burials, 64 (62.1 per cent) showed no evidence of pathology or trauma. Table 9 summarises the results of the pathology and trauma assessment in the later burials. Almost half of the observed pathology related to the axial skeleton; almost equal numbers of these instances were either developmental or degenerative in origin.

There was a small amount of trauma: a displaced fracture of the left clavicle of a probable male (S77) and a healed mid-shaft fracture of the left ulna in female S60. Similar fractures of the ulna are often termed ‘parry fractures’ and typically occur when the arms are raised in front of the chest/face to ward
Table 8: Sex determination of non-cist burials

<table>
<thead>
<tr>
<th></th>
<th>Adult</th>
<th>Juvenile</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>14</td>
<td>–</td>
<td>14</td>
</tr>
<tr>
<td>Probable male</td>
<td>7</td>
<td>–</td>
<td>7</td>
</tr>
<tr>
<td>Indeterminate</td>
<td>20</td>
<td>41</td>
<td>61</td>
</tr>
<tr>
<td>Probable female</td>
<td>5</td>
<td>–</td>
<td>5</td>
</tr>
<tr>
<td>Female</td>
<td>16</td>
<td>–</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>41</td>
<td>103</td>
</tr>
</tbody>
</table>

Table 9: Pathology/trauma type and location of non-cist burials

<table>
<thead>
<tr>
<th>Pathology type</th>
<th>Cranial</th>
<th>Axial</th>
<th>Pectoral</th>
<th>Pelvic</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developmental</td>
<td>2 (2.5%)</td>
<td>10 (12.5%)</td>
<td>–</td>
<td>–</td>
<td>12</td>
</tr>
<tr>
<td>Infectious</td>
<td>4 (5%)</td>
<td>1 (1.2%)</td>
<td>–</td>
<td>9 (11.2%)</td>
<td>14</td>
</tr>
<tr>
<td>Metabolic</td>
<td>8 (10%)</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>8</td>
</tr>
<tr>
<td>Neoplastic</td>
<td>3 (3.8%)</td>
<td>2 (2.5%)</td>
<td>1 (1.2%)</td>
<td>2 (2.5%)</td>
<td>8</td>
</tr>
<tr>
<td>Degenerative</td>
<td>–</td>
<td>11 (13.8%)</td>
<td>5 (6.2%)</td>
<td>5 (6.2%)</td>
<td>21</td>
</tr>
<tr>
<td>Fracture</td>
<td>–</td>
<td>1 (1.2%)</td>
<td>2 (2.5%)</td>
<td>1 (1.2%)</td>
<td>4</td>
</tr>
<tr>
<td>Dislocation</td>
<td>–</td>
<td>–</td>
<td>1 (1.2%)</td>
<td>1 (1.2%)</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>1 (1.2%)</td>
<td>7 (8.8%)</td>
<td>–</td>
<td>3 (3.8%)</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>32</td>
<td>9</td>
<td>21</td>
<td>80</td>
</tr>
</tbody>
</table>

off blows. However, in the absence of any other evidence of interpersonal violence in this or other individuals the injury could just as well be from a fall or other accident.

Seven individuals exhibit porosity of the superior orbital surface, diagnosed as *cribra orbitalia*. This condition has frequently been associated with iron deficiency anemia (Auferhide and Rodriguez Martin 1998), though debate still persists regarding the root cause (Walper *et al*. 2004). Three cases were in subadults.

Six individuals, both males and females, displayed periostitis in the lower limbs. Such inflammatory reactions are frequently seen in archaeological/agricultural populations and are commonly associated with knocks to the shins or lower legs and resulting soft tissue injuries (Roberts and Manchester 1995).

Developmental anomalies included sagittal craniosynostosis (S50) and unusually thickened cranial diploë (S508). Infectious processes noted in the cranial region include sinusitis (S56). Three individuals, all females (S20, S52, S53) displayed metopic sutures. This is not pathology, rather, it is a discrete trait which expresses itself as a persistence of the frontal suture into adulthood. Various studies have claimed that metopism is hereditary and may therefore be used to establish kinship in skeletal remains (Hauser and De Stefano 1989; Slavec 2004). Such a conclusion here can only be tentative and should be treated with caution unless confirmed by molecular analysis (DNA). Skeleton S20 is sadly also notable as a probable death in childbirth: 38-week foetal remains were recovered from the pelvic area.
**Skeleton 35**

This skeleton was in good condition and showed good preservation. The individual was male and between the ages of 15–25. The right femur showed a malformed femoral head and a pseudoarthrosis had formed on the right ilium, which showed no acetabulum (Fig. 32). Traumatic dislocation of the hip usually results in remodelling of an existing acetabulum; however, in this case the acetabulum is almost entirely absent and severely malformed, which is indicative of congenital hip dislocation (Aufderheide and Rodriguez-Martin, 1998, 26).

This type of abnormality would have severe implications on the individual’s posture and mobility. Skeletal evidence for these is clear. In addition to shortening of the right lower limb (Table 10), the young adult male showed a scoliotic spine. There was curvature to the right in the lower thoracic and lumbar vertebrae, as expected from the limb shortening and tilted pelvis (not shown). A compensatory curvature to the left was present in the cervical vertebrae, believed to be a consequence of the individual trying to counteract the lower curvature and remain relatively upright. Additional evidence for this counteraction is seen in the ribs, where muscle attachments on the inferoposterior left ribs are much more robust than those of the right (Fig. 33). This may also indicate substantial effort in retaining a relatively upright posture.

One last point of interest in this skeleton was the difference in upper limb size and rugosity (Table 10). The radial head on the right side measured 4mm greater in diameter than that of the left (Fig. 34). In addition this radial head showed a deep cleft in its proximal surface, indicating substantial pressure on the joint surfaces. Together, this skeletal evidence for much greater use of the right arm may indicate use of a crutch or other aid to mobility. This is supported in recent literature by the knowledge that an increase in load on a bone will cause a hypertrophic response (see, for examples, Knüsel 2000).

**Dental and oral health**

Results of dental assessment in the later burials are presented in Table 11. Figures in brackets show percentage incidence of dental pathology when related to number of teeth with crowns present (teeth worn to the root only were unable to be scored for caries or calculus).

**Discussion of non-cist burials**

The ratio of juvenile to adult remains within both phases of burial is shown in Table 12. It can be seen that there is little difference, indicating no obvious change in childhood mortality rates between social groupings that may have differed in status.

When considering adult mortality in isolation, however, differences appear to be evident in life expectancy. In the long-cist burials, 30 per cent of the adult deaths fall into the 25–45 age group, and 30

<table>
<thead>
<tr>
<th>Bone</th>
<th>Left (mm)</th>
<th>Right (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humerus</td>
<td>313</td>
<td>320</td>
</tr>
<tr>
<td>Radius</td>
<td>247</td>
<td>251</td>
</tr>
<tr>
<td>Ulna</td>
<td>265</td>
<td>270</td>
</tr>
<tr>
<td>Femur</td>
<td>423</td>
<td>411</td>
</tr>
<tr>
<td>Tibia</td>
<td>340</td>
<td>341</td>
</tr>
<tr>
<td>Fibula</td>
<td>not examined</td>
<td>not examined</td>
</tr>
<tr>
<td>Clavicle</td>
<td>150</td>
<td>145</td>
</tr>
</tbody>
</table>
Table 11: Tooth assessment of non-cist burials

<table>
<thead>
<tr>
<th></th>
<th>Adult burials</th>
<th>Juvenile burials</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&gt;18 years, n=30</td>
<td>&lt;18 years, n=16</td>
<td></td>
</tr>
<tr>
<td>Total teeth assessed</td>
<td>633</td>
<td>271</td>
<td>904</td>
</tr>
<tr>
<td>Unerupted teeth</td>
<td>8</td>
<td>76</td>
<td>84</td>
</tr>
<tr>
<td>Root only present</td>
<td>38</td>
<td>–</td>
<td>38</td>
</tr>
<tr>
<td>Crown present</td>
<td>587</td>
<td>195</td>
<td>782</td>
</tr>
<tr>
<td>Caries</td>
<td>27 (4.6%)</td>
<td>–</td>
<td>27 (3.4%)</td>
</tr>
<tr>
<td>Calculus</td>
<td>189 (32.1%)</td>
<td>–</td>
<td>189 (24.2%)</td>
</tr>
<tr>
<td>Wear (dentine exposure)</td>
<td>351 (59.8%)</td>
<td>23 (11.8%)</td>
<td>374 (47.8%)</td>
</tr>
<tr>
<td>Abscess</td>
<td>15 (2.6%)</td>
<td>–</td>
<td>15 (1.9%)</td>
</tr>
<tr>
<td>Enamel hypoplasia</td>
<td>5 (0.9%)</td>
<td>13 (6.6%)</td>
<td>18 (2.3%)</td>
</tr>
</tbody>
</table>

Table 12: Ratio of juvenile to adult remains of long-cist and non-cist burials

<table>
<thead>
<tr>
<th></th>
<th>long-cist burials (%)</th>
<th>non-cist burials (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-adult skeletons</td>
<td>47.3%</td>
<td>42.4%</td>
</tr>
<tr>
<td>Adult skeletons</td>
<td>52.6%</td>
<td>57.6%</td>
</tr>
</tbody>
</table>

per cent in the 46+ age group. These figures contrast with over 54 per cent of adult deaths in the 25–45 age group age in the non-cist burials, and 21 per cent in the 46+ age group. This difference would seem to show an increased lifespan in the adults buried in cist graves. However, as noted earlier the size of the cist burial sample is too small to be representative. By the same token, comparisons of frequency and type of pathologies between the two populations are equally spurious. While there are hints or suggestions that the people in the cist burials enjoyed a less stressful and healthier lifestyle than the individuals in the later burials, the cist burial sample is too small to be representative of the population. It is unfortunate and frustrating that so much potentially revealing evidence about these people has been lost to the elements.

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NOTES

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2. School of Forensic and Investigative Sciences, University of Central Lancashire.
3. School of Forensic and Investigative Sciences, University of Central Lancashire.
4. Anglesey Record Office, WM/1905/1, 22.

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