Archaeological Excavation Report,
Mackney
Co, Galway

Ringfort with Killeen Burials

Volume 1

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Summary

The site excavated at Mackney E2444 comprised a ringfort and souterrain with extensive evidence for early medieval occupation, including the remains of a central round house, another six possible structures and small-scale metalworking (Plate 1). The ringfort was also occupied during the later medieval period, a possible structure dating to this phase of occupation was identified. In the post-medieval period the site was used as an unconsecrated burial ground and for ridge and furrow cultivation. Charcoal from the site yielded radiocarbon dates that spanned the 8th to the 17th centuries.

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1 Introduction

This report presents the results of an eight-month excavation of a large, denuded and partly destroyed ringfort in the townland of Mackney, Ballinasloe, Co. Galway. The excavation was undertaken by Eachtra Archaeological Projects for Galway County Council and the National Roads Authority and forms part of a wider archaeological excavation programme undertaken by Eachtra within approximately 15 km of the proposed N6 motorway (Contract 4) (Figures 1-3).

The excavation at Mackney ringfort uncovered a long sequence of settlement and occupation activity and later reuse as a place of burial and cultivation. Eight samples were sent for radiocarbon dating and returned dates between the 8th and 17th century.

The large ditch was nearly exactly circular in plan, enclosing an area with an internal diameter of 55.64 m, including the footprint of the bank (Figure 4-5). The ditch was approximately 5 – 6 m wide and ranged in depth from 1.75 m – 3.1 m. One half of a well-preserved Henry III silver penny and a socketed arrowhead were recovered from the upper fills of the ditch. The entrance to the ringfort was located in the ENE sector of the enclosing ditch. The entrance was defined by a 6.6 m wide causeway running between two rounded, steep-sided ditch termini. A series of structural elements were revealed on the inside edge of this causeway. A metalworking area was identified to the north of the entrance, inside the remains of a portion of inner bank revetment wall. A number of bowl furnaces were found within this area.

A range of internal features survived within the ringfort. These cut the underlying sandy gravel subsoil and included the remains of two possible circular houses, a lean-to structure and a possible rectangular structure. A beautifully constructed, partly robbed and in-filled souterrain was also discovered. It consisted of two chambers, a connecting drop creep and a set of entrance steps. A series of later medieval fire pits/hearths and associated structures were also revealed.

The ringfort was later re-used as a burial place: 143 individual skeletons, primarily of infants under the age of six years, were excavated within the ringfort. The burials were concentrated in the south-western arc of the ringfort ditch.
2 Site Location, Topography and Soils

The site was located in the townland of Mackney at NGR 183745, 229417, 5 km north-east of Aughrim and 1.5 km south-west of Ballinasloe. It was situated between chainage 51300 and 51380 and was identified as AR37 in the EIA for the scheme (RPS-MCOS and Ryan Hanley WSP 2004). The site was situated on a level platform on the side of a low hill which rises gently to the north. It lies within the former demesne of Mackney House and had a large beech tree planted within its north-western quadrant. A low damp hollow was found to the north-east of the enclosure: this may have been a source of water for the ringfort’s inhabitants. Immediately east of the enclosure a level area of ground is evident which would seem suitable for cultivation. The courtyard, stables and walled garden associated with Mackney House lie just to the west of the enclosure. A farm trackway leading from the courtyard to the field to the east of the enclosure ran across the southern half of the site.

Ballinasloe was probably an assembly place of the Uí Maíne in the early medieval period. The ringfort at Mackney is located on the outskirts of present day Ballinasloe and has a wide prospect across the surrounding country side and especially across the valley of the Suck.

3 Background to the Development

The excavation was undertaken by Eachtra Archaeological Projects for Galway County Council and the National Roads Authority and forms part of a wider archaeological excavation programme undertaken by Eachtra within approximately 15 km of the proposed N6 Galway to Ballinasloe dual carriageway scheme (Contract 4 Figures 1-3).
4 Previous Archaeological Work

The site was not recorded in the RMP for Co. Galway or in the published archaeological inventory for the county. It was discovered during field walking for the EIA for the N6 Galway to Ballinasloe road scheme. The cultural heritage element of the EIA, compiled by Arch Consultancy, described the site as ‘a well preserved univallate ringfort with an earthen bank and a slight fosse’ (RPS-MCOS & Ryan Hanley 2004).

A geophysical survey of the field containing the ringfort was undertaken as part of a large scale geophysical survey across the length of the entire scheme (Roseveare and Roseveare 2004). Due to the presence of a large tree at the interior of the monument and a temporary wire fence running north-east to south-west, a relatively large portion of the ringfort was not geophysically surveyed. The geophysical survey results suggested that there were strong anomalies from cultivation furrows running roughly north to south across the field. The upstanding enclosure did not produce a geophysical signature.

Test excavations at and adjacent to the site of the enclosure at Mackney were undertaken by Jones (2004) in July 2004 (Archaeological Licence Number 04E0866). Three trenches were opened and complex stratigraphy was noted within the substantial V-shaped enclosing ditch.

An eight-week Phase 1 test excavation assessment of the enclosure was undertaken by Eachtra Archaeological Projects for Galway County Council and the National Roads Authority in December 2005. The excavation formed part of a wider archaeological assessment by Eachtra of approximately 15 km of the proposed N6 motorway (Contract 4).

The assessment confirmed the presence of cultivation features within the interior of the enclosure, as noted in the geophysical report. A number of archaeological features were revealed below this cultivation level suggesting that internal features associated with the enclosure had survived. In addition an infant burial was discovered immediately below the topsoil within the enclosure. Two possible entrance features were also identified and investigated. Two sections were excavated across the line of the enclosing ditch. These sections confirmed the presence of the substantial ditch and also revealed the presence of at least three burials within the ditch fills.
5 Archaeological and Historical Background

The local history of the area around Ballinasloe is well documented thanks in large part to the work of local historian Patrick Egan, whose detailed history of Ballinasloe parish was published in 1960. Much of the information presented below is based on his work.

5.1 Early Christian Landscape Around Ballinasloe and Aughrim

The modern catholic parish of Ballinasloe reflects a combination of two medieval parishes - Kilcloony and Creagh, which were situated either side of the river Suck. Kilcloony is located on the western side of the Suck and is located within Co. Galway and the barony of Clonmacowen. Creagh is located on the east side of the river Suck and is located within Co. Roscommon and the barony of Moycarn. The parishes of Aughrim and Kilconell did not join together until the 14th century and form part of the barony of Kilconell.

The townland of Kellysgrove and that part of Mackney townland now within the parish of Clontuskert may have at one time been located in the parish of Kilcloony. An early draft of the Books of Survey and Distribution identify both townlands as being in the parish of Kilcloony. Egan (1960, 13) states that the Ballinure River south of Kellysgrove may well have been the earlier parish boundary.

The river Suck creates a natural boundary and territorial dividing line and consequently the ford across the river at Ballinasloe has always assumed a strategic importance. The Slíghe Mór, the great east to west highway crosses the river at this point and passes along the hill of Dunlo towards Kilconell and onwards to Clarinbridge (Geissel 2006). The Slíghe Mór has been identified as running partly along the natural Eiscir Riáda which became one of the great natural boundary lines of ancient Ireland dividing the country into two great divisions Leath Chúinn and Leath Mhóga. The roads from Roscommon and Leinster converge on Creagh while those from Portumna, Tuam and Galway combine on the west bank of the Suck in Kilcloony.

According to Geissel (2006) the dates to the early medieval period and was primarily used by students moving between the great ecclesiastical centres along its route, such as Clonmacnoise and Clonard and the seaports of Dublin and Galway. A large esker runs north-west from Clontuskert Abbey and may well have linked the abbey with the great Slighe Mór.

5.2 Ecclesiastical Activity

St Grellan is associated with the establishment of Christianity in the area around Ballinasloe. It is recorded that St Grellan became the patron of the parish of Kilcloony and of the Uí Maine of Connacht. St Grellan founded a church at Kilcloony which is possibly located at the site of a later ruin on the west side of the town (RMP GA074:058A). According to the Life of
St Grellan the saint was intimately associated with the Úi Máine and helped the tribe overcome local adversaries in their establishment of a large territory in Connacht (O’Donovan 1843). St Grellan’s staff became a treasured relic amongst the Úi Máine and was used as a battle standard. St Grellan’s church in Kilcloony appears to have led an independent existence until the 12th century and may have been supported directly by the Úi Máine. St Grellan’s well (087:212) in Kilcloony is located in the townland of Tobergreullin to the south-west of the church.

Teampaill Raoileann (GA074:011C) is located in Creagh parish on the east bank of the river Suck and to the north-west of Ballinasloe. The townland name is Ashford and the earlier name for this townland was Tuaimsrutha. The church was founded by Raoiriú, later known as Raoilíu and finally as Raoillinn. Raoillinn was associated with the Cineal Dobhta who ruled a territory in Co. Roscommon bordering the Shannon above Lough Ree. The church was yielded to the monastery of Clonmacnoise in the sixth century by Cairbre Crom, chief of the Úi Máine (Egan 1960, 12).

In the parish of Aughrim St Commedan established a community of monks in the sixth century and the church at Kilcommadan (GA087:126) became one of the seven chief Coarbships of the Úi Máine.

In east Galway the two primary movers in the monastic world were the abbots of Clonmacnoise and Clonfert. Clonmacnoise exerted a great influence on the area around Ballinasloe. A registry of Clonmacnoise refers to Cairbre Crom chief of the Úi Maine bestowing on St Kieran of Clonmacnoise 17 townlands and three houses. Some of the townlands bestowed have been identified by Egan (1960, 12-3) as being located within the parishes of Creagh and Kilcloony. According to the Book of Lecan the connection between Clonmacnoise and the tribal leaders of the area around Ballinasloe was based on the fact that Clonmacnoise and the abbot had the right of burial for the Úi Máine and tribute needed to be paid for this honour.

Just to the south of Kilclooney parish, located close to the banks of the river Suck is the 12th-century Augustinian Priory of Clontuskert (GA088:001). This foundation had an earlier incarnation as a monastic centre founded by St Beataín in the eighth century. Beataín’s successors were ranked in the 12th century as one of the seven chief Comharbaí of the Úi Máine. The relationship between the eighth-century foundation and the surrounding territory cannot be fully determined, however, in light of the fact that after the synod of Kells in 1152 the monastery appears as the rector of the whole parish of Kilclooney some earlier relationship can be inferred (Egan 1960, 14).

Other possible early institutions in the area include Teampóilín in the townland of Pollboy, which survives as the ruins of a medieval church (GA088:020). It was thought by Egan (1960, 25-6) to have an early incarnation however Gwynn and Haddcock (1970, 368) have thrown some doubt on this assertion. Egan (1960, 25-6) also refers to evidence for a church in the townland of Dunlo in the ninth and tenth centuries (GA087:083). A number of adult burials associated with a bronze harp peg and pin and a bone spindle whorl, uncovered dur-
ing the building of St Joseph’s terrace, point to the existence of a Christian burial ground and an associated church.

Prior to the 12th century re-organisation of the church, its property in the area of Kilcloony-Creagh was extensive due to the patronage of the Uí Maine chiefs. The relationships and political affiliations that connected the three early ecclesiastical institutions of Clonmacnoise, Kilcloony and Clontuskert cannot be fully ascertained.

5.3 Secular Activity

This ecclesiastical activity would necessarily reflect a high level of secular activity within the same area. The greatest identifiable indicator of this secular activity is the number of ringforts and enclosures located within the territory administered to by the ecclesiastical foundations.

Ringforts are the classic early medieval (c. AD 500 to 1100) settlement type, and are among the most common archaeological monuments in the country. Stout (1997, 81) has shown that south-east Galway is located in an area of high ringfort density.

Ringforts consist of circular areas, defined by banks and external ditches, and excavation often reveals the remains of dwelling houses and outbuildings for extended families. According to Stout (1997, 20) ringforts were not built to repel prolonged sieges, or designed to annex territories and populations but rather as a defence against lightning raids for cattle and slaves. A full ringfort in the townland of Mackney (E2444), approximately one half of another (E2442) and an enclosure (E2054) both in the townland of Loughbown have been excavated by Eachtra during the course of the present archaeological excavation programme. Six other sites including cashels and remnant ringforts have been investigated elsewhere on the scheme. The results from these excavations should yield valuable information on the early medieval society occupying these ringforts and enclosures.

Souterrains are underground structures, which can be either simple or complex in form, ranging from a short length of undifferentiated passage/chamber to a labyrinthine arrangement of passages and chambers. Clinton (2001, 59-61) suggests that while the majority of souterrains were primarily built as refuges they would also have served as ad hoc storage facilities. Alcock et al. (1999) contend that souterrains were not isolated monuments, though they often survive as such today, rather they originally formed part of complex habitations as is testified by their frequent association with ringforts and early ecclesiastical settlements. In the north Galway area 88% of souterrains were associated with ringforts, ecclesiastical settlements or unclassified enclosures and earthworks (Alcock et al. 1999). Most writers such as Warner (1979, 128) suggest dates for souterrains ranging from 500 – 1200. Clinton (2001, 95) argues that they enjoyed a floruit in the period between c. 750 and c. 1250.

There are two recorded souterrains (GA087:016B and GA087:087:111D) associated with ringforts located in the townlands of Grange and Caher and both of the ringforts excavated during the course of Eachtra’s archaeological excavation programme on this scheme have revealed hitherto unrecorded souterrains.
5.4 Tribes and Mythology

The origins of the tribes and people who made up this thriving early medieval community are prehistoric and so by definition it is difficult to attribute tribal names and families to distinct areas. St Grellan is purported to have intervened between the Uí Maíne, of Lagenian descent and the earlier inhabitants around Kilcloony when he came to Magh Seincheineoil or the ‘the plain of the ancient kin’. The Uí Maíne established an exceedingly powerful petty kingdom, however, they remained tributary to the line of Cruchain – latterly the O’Connors - the Goedelic kings who dominated Connacht from Early Christian times until the coming of the Normans. The chief family of the Uí Maíne, the O’Kellys, established themselves as direct occupiers of the land around Ballinasloe during the medieval period and the Goiedel Kings of Connacht also reappear in the area during the 12th century when the O’Connors bridged the river Suck in 1120 and built a castle at Dun Leodha, in Ballinasloe.

According to the mythologies one group of people located on the banks of the river Suck who were in occupation before the, Uí Maíne survived there until the 12th century. These were the Cattraige who are said to have descended like the Uí Maíne from the Lagenians. The Cattraige however were reduced to servitude and were concentrated on the river Suck in the parishes of Kilcloony and Creagh. They maintained a separate existence as a subject people at least until the time of the Norman invasion.

5.5 Medieval Period

The ecclesiastical parishes of Kilcloony and Creagh owe their origins to the 12th century Church reform movement that was initiated with the Synod of Raith Breasail in 1111. Both parishes lie on the eastern boundary of the diocese of Clonfert. After the reforms of the 12th century four churches were retained: Kilcloony and Teampólíln in Kilcloony, and Creagh and Teamplerellan in Creagh.

The first community of monks to arrive in Aughrim were the canons regular of St Augustin. They built a priory at Aughrim in the late 12th century, which was dedicated to St Catherine (Mac Lochlainn 1980). Clontuskert Priory was also founded by Augustinian canons and dedicated to St Mary some time after 1140. There is the tradition of a togher running between Teampólílnn and Clontuskert Abbey to the south. A togher (088:014) was uncovered to the north of Clontuskert Abbey during Land Commission operations in 1946 (Prendergast 1946). It ran from north to south for at least 1.5 km and consisted of a double row of parallel oak logs in a bed of brushwood on a layer of gravel. These were joined at each end by vertical pointed hazel stakes. Clontuskert came under the direct control of the O’Kelly family in the 15th century and became a prime example of the abuse of lay patronage. After the dissolution of the monasteries in 1551 the priory and its lands were taken over by the de Burgos, the earls of Clanricard.
Turlough O’Connor built a castle (GA088:028) close to the fording point on the river Suck in 1124. This castle was not built of mortared stone as it was burned in 1131. A small urban settlement developed around the castle and a bridge (GA088:047) which was built in 1130. The townland of Dunlo derives its name from ‘Dunleodha’, the fort of Leodha. This fort may have been a ringfort located on the western bank of river Suck, however, Holland (1996) suggests that the O’Connors may have constructed a pre-Norman motte. There is a strong local tradition that the present Roman Catholic church occupies the site of Dun Leodha.

Richard de Burgo succeeded in the 13th century in having the O’Connor lands in Connacht declared to him by the Crown which amounted to 25 cantreds in the area of Roscommon, Sligo and Galway. This left the O’Connors with five cantreds including Omany within which lay the parishes of Kilcloony and Creagh.

The Normans built a castle in Ballinasloe in 1245, on the eastern bank of the river Suck. It became the centre of a Norman manor which, along with a manor at Aughrim, was granted to Sir Richard de Rupella in 1253. The castle standing at Ballinasloe today – overlooking the bridge where the existing N6 is carried over the Suck by a fine masonry bridge - was built by the O’Kelly sept in the 14th century and probably replaced the earlier Norman castle. Irish law and custom prevailed in the area around Aughrim and Ballinasloe from the mid 14th century until the end of the 16th century, with members of the O’Kelly family the direct occupiers of the land in the area during this period. However, the Reformation signalled tremendous change in the area. Land and property belonging to the monasteries and the Church were confiscated and re-granted to Protestants and others who recognised the English monarch as head of the Church. The upheavals of the time are evident in the records for occupancy of Ballinasloe castle towards the end of the 16th century. In 1572 the castle was held by the Earl of Clannicard, one of the Clannicard Burkes, who successfully transformed from Anglo-Norman lords to English-style lords (Mulloy 1996, 213). Soon after it was taken over by the Crown and in 1579 it was made the residence of the English governor of Connacht Sir Anthony Brabazon (Egan 1960, 40, 69-70).

Not all land was transferred from the Gaelic lords: in 1578 Sean na Maighe O’Kelly accepted land granted to him at Clanmacowen under the surrender and regrant scheme (Egan 1960, 39). However, Feardorch O’Kelly of Aughrim was less successful and he was forced to seek a lease from the Earl of Ormond for land his family had occupied for several hundred years (Egan 1960, 40). In general, by the middle of the 17th century, the Old Irish families like the O’Kellys, while still retaining some vestiges of their old privileges, were suffering declining fortunes (Mulloy 1996, 213).

In October 1641 an insurrection broke out and heralded the beginning of a war that was to last 11 years. It was fought by a loose amalgamation of the old Irish lordships and what became known as the Old English. In Galway the Earl of Clannicard, though Catholic and Royalist, refused to join forces with the confederation and had such an influence that the rebellion in Connacht in general lacked coherency. By 1653, however, the country was
devastated by Cromwell’s army and the ensuing confiscations and transplantations resulted in a great change of landownership. The Act of Settlement (1662) and the Act of Explanation (1665), passed under the Restoration monarchy, generally reconfirmed the adjustments made in landownership after the original Cromwellian settlements. The O’Kelys, who were the main landowners in the area prior to the settlements, were the big losers. They were later forced to sell much of the land they retained in the parishes of Kilcloony and Creagh (Egan 1960, 90-1).

While the misfortunes of the O’Kelly family were linked to the upheavals of the 17th century, there were winners as well as losers. In Ballinasloe and the surrounding countryside, the Trench family were winners. The post-medieval history of the area is inextricably linked with this family of French Huguenots who settled at Garbally in 1631 after arriving from Northumberland in England (Lodge 1838, 98). Frederick Trench purchased Garbally castle and lands, on the western outskirts of Ballinalsoe, from a Colonel Carey Dillon.

Trench ownership of Garbally castle was confirmed by patent from Charles II (Egan 1960, 107). The estate was added to by his son, also Frederick Trench, in 1678 and the acquired land amounted to the whole parish of Kilcloony and a large area in the parish of Clontuskert (Egan 1960, 133). The acquisition of this land would have been at the expense of the descendants of Sean na Maighe O’Kelly.

In 1691 Ballinasloe and Aughrim took centre stage during a battle for the crown of England. The battle of Aughrim was fought between Jacobite and Williamite forces on 30th June 1691 and it was the bloodiest battle ever fought on Irish soil with up to 7000 soldiers killed. It was bloody and it was decisive: after the battle the city of Galway surrendered without a fight and the Jacobite’s main army in Limerick surrendered shortly afterwards.

As Protestants and Hugenots the Trenches supported the Williamites during the Battle of Aughrim. Family memoirs record that a map of the Jacobite position at Aughrim was given to the Williamite General Ginkel and that the house at Garbally was thrown open to King William’s army and was used as a field hospital (Clancarty 1874). The Rev John Trench, a brother of Frederick, was active on the Williamite side and it is said that he contributed the heel of his boot in the effort to raise the gun that was to kill the Jacobite General St Ruth (Egan 1960, 108).

The third Fredrick Trench succeeded his father in 1704 (Egan 1960, 133) and he became one of the most powerful men in Co. Galway. He acted as High Sheriff of the county from 1703 and became one of the Knights of the Shire, and therefore the acting Member of Parliament for the area. He also added to his estate: in theory the Act of Settlement after the Cromwellian confiscations set aside the barony of Clonmacowen for transplanters from Carlow, Waterford and Limerick. In reality one major grant was made to William Spenser whose son Nathaniel sold his interest to the third Frederick Trench in 1716 (Egan 1960, 94).

The third Fredrick Trench was succeeded by his son, Richard Trench, in 1752. Richard had already sat in Parliament for the borough of Banagher. Through Richard’s marriage to Francis Power the Trench family acquired all the Power estates in the baronies of Leitrim,
Dunkellin and Loughrea as well as the Keating estates in Kilkenny, Carlow and Dublin. This brought them ancient titles to Norman and Irish nobility (Egan 1960, 133-4). Richard Trench was succeeded by his son William Le Poer Trench in 1770 who, after his son (another Richard Trench) voted for the Union in 1800, became a Viscount in 1801 and the Earl of Clancarry in 1803 (Egan 1953). His numerous offspring included Richard, the 2nd Earl of Clancarry, who pursued a diplomatic career; Power, who became the last Church of Ireland Archbishop of Tuam; William Rear Admiral of the Royal Navy and the Venerable Charles le Poer Trench, who was Archdeacon of Ardagh.

In the early part of the 19th century the Trench family commissioned the English architect, Thomas Cundy I, to rebuild Garbally House, the family seat, after an older house on the site was burned down in 1798. Cundy first exhibited at the Royal Academy in 1795 and became a successful country house architect from c. 1807 (Placzek 1982, 482). In conjunction with the rebuilding of Garbally the cartographic evidence suggests that the Trench family also built Mackney House at the end of the 18th century (Kelly 2004). Mackney House and grounds also underwent a period of extensive development during the early 17th century. Lewis in his Topographical Dictionary of 1837 references the estate of Mackney as one of the principal houses in Ballinasloe and it is listed as the residence of Charles le Poer Trench who was brother to Richard, Earl of Clancarry, and acted as his agent.

The responsibilities of estate ownership involved fostering agricultural and industrial modernisation, to improve conditions for the people who lived and worked on the estate as well as to increase revenues from the estate. Ballinasloe was developed largely under the auspices of the Trench family. For example, sometime around 1750 Frederick Trench was advertising and giving active encouragement for the development of a linen or woollen industry. Plots were offered along with accommodation and additional farming land (Egan 1960, 134-5). The Trench family also encouraged the Ballinasloe fair as a profitable business. This annual October livestock fair, which is reputedly the largest such fair in Europe and had a national reputation even in the 19th century, created a large amount of prosperity in the town (Egan 1960, 136).

5.6 Children’s Burial Grounds

The custom of setting aside a separate burial place for children is an ancient one and was practised by the Greeks and Romans (Ó Súilleabháin 1939). In Ireland these burial places are thought to be more recent and are usually dated to the second millennium AD (Alcock et al 1999). The general view is that these burial grounds were used as final resting places for unbaptised children; however, they were also used for other groups seen as being in some way outside of normal society such as strangers, suicides and famine victims. According to Crombie (1985) 420 children’s burial grounds exist in Co. Galway and in the north of the county 53% were associated with ringforts and enclosures (Alcock et al. 1999). A large number of children’s burial grounds have been identified in the area around Ballinalsoe and Aughrim.
Burial grounds have been recorded in association with an enclosure in the townland of Ur-raghry, with ringforts in Loughbown, Garbally Demesne and Grange and with church or ecclesiastical sites in Templepark, Kilcommadan, Kellysgrove and Pollboy. A large children’s burial ground was identified and excavated within the ditch and the interior of the ringfort at Mackney (E2444).
6 Excavation Methodology

A 1.5 m wide north/south baulk was established across the centre of the site. Two smaller 0.5 m wide baulks were established running from the centre of the site to the east and the west respectively. This arrangement effectively divided the site into four quadrants: north-east, south-east, south-west and north-west. These four quadrants were then used as separate excavation units for recording purposes.

The sod and topsoil across the site was removed manually. Across the majority of the ringfort interior an underlying cultivation level was encountered, represented by remnant spade-dug ditches. The interface between this level and the topsoil was cleaned using a combination of shovels and trowels. Where the cultivation level was not apparent (to the north of the interior) the topsoil was removed and the underlying interface was again shovel and trowel cleaned.

Fourteen 4 – 6 m wide sections were excavated across the enclosing ditch (Figures 5-6). Due to the depth of the ditch, particularly to the south and west of the site, where it was greater than 3 m deep, the excavated sections were stepped in accordance with health and safety regulations.

All archaeological features revealed after cleaning were fully excavated by hand and recorded using the single-context recording system with plans and sections being produced at a scale of 1:20 or 1:10 as appropriate.

A complete photographic record was maintained throughout the excavation. These photos were supplemented by specialist aerial photographs taken after the final excavation stage.

The environmental sampling strategy was devised by Mary Dillon (Eachtra Archaeological Project’s environmental specialist) at the outset of the excavation. Sampling targeted features with large amounts of charred material. Features containing metallurgical waste were also fully sampled for analysis.
6 Results of Excavation

Detailed results from this site are available in the stratigraphic index (Appendix 1) and the stratigraphic matrix (Appendix 2). The archaeological features excavated at the site were divided into sub-groups (stratigraphically connected contexts, generally derived from a defined and stratigraphically independent archaeological action or sequence of actions) and groups (related sub-groups). These are minutely described in the groups and sub-groups text (Appendix 3). The following report presents a description of the archaeological activity at Mackney ringfort at sub-group level. The description of results generally follows the phases of activity identified at the site, with Phase 1 representing pre-ringfort activity, Phase 2 construction and early medieval use of the ringfort, Phase 3 later medieval occupation of the ringfort and Phase 4 post-medieval and alter use of the site. The phasing is analysed in detail in the discussion section of this report. Other detailed records of artefacts and specialist material retrieved from the site are found in the finds register (Appendix 4), specialist reports (Appendices 5-11 and 17) and artefact catalogues (Appendices 12-16).

6.1 Natural Deposits

The natural subsoil across the area of excavation was a compact mid greenish-grey pebbly sand containing frequent amounts of undifferentiated pebbles and stones (Sub-group 1001). An overlying orange natural deposit was recorded in places outside the ringfort ditch and in a continuous band along the line of the ringfort bank. It also spread into the ringfort interior beyond the line of the bank (as defined by the inner edge of the ringfort ditch) and the revetment wall to the north of the entrance. This natural orange subsoil was apparently preserved below the remnants of the ringfort bank; in the interior of the ringfort it was removed, possibly by later cultivation or perhaps as a result of deliberate scarping to create a well-drained occupation surface on the underlying grey pebbly sand.

A buried ground surface (Sub-group 1004), or sod layer, was also identified around the circumference of the ringfort. It was a firm light brown sandy silt with very occasional fine pebble inclusions and some faunal remains. It was cut by the ditch during construction of the ringfort, but was preserved beneath the ringfort bank. Similar buried sods were discovered at ringforts such as Lisnagun (O’Sullivan et al. 1998) and Dromthacker (Cleary 1998).

6.2 Possible Pre-Bank Features – Phase 1

A number of archaeological features (Group 2) lay either underneath the in situ bank remains (Sub-group 4001) or the buried sod layer (Sub-group 1004) and therefore pre-date the construction of the bank. A fire-pit (Sub-group 2006), located to the north of the site, was
interpreted as a pre-bank feature despite that fact that the pit was found directly below the topsoil; it was clearly in a location that was originally below the bank.

Three linear features (Sub-group 2001) ran from north to south and were located to the north of the site. They underlay the remains of the bank. These generally had steep sides and flat bases and their northern and southern extents had rounded corners. An oval pit (Sub-group 2002) located between two of these linear features was also excavated. A small pit (Sub-group 2005) was located under the revetment wall in the north-eastern quadrant of the ringfort.

A small circular fire-pit and associated stake-hole (Sub-group 2003) and a small post-hole and an associated linear trench (Sub-group 2004) were located under the buried sod under the footprint of the original bank prior to any slippage to the south-east of the enclosure. A fragment of hazel charcoal taken from the fire-pit, which truncated the top of the stake-hole, yielded a date of cal AD 728 – 949 (UB-7374). Charcoal derived from yew was also recovered from the fire-pit. This is unusual within the charcoal assemblage from the site. Insect holes identified in the charcoal suggest it was derived from old wood and it is tentatively suggested that the yew charcoal was derived from an artefact, as yew is a very hard wood that is usually used for making objects rather than for fuel.

6.3 Enclosing Ditch – Phase 2

The enclosing ditch (Group 3) was large and generally V-shaped in profile (Plates 2 & 3, Figure 5). It was cut around the highest point of a naturally occurring glacial ridge which runs roughly east to west. The ditch was nearly exactly circular in plan with a diameter, measured from the inside edge of the ditch, of 55.64 m. It enclosed an area of 2432 sq. m, which included the area occupied by the enclosing bank. The circumference of the ditch measured 180.5 m. It was interrupted by a 6.6 m wide causeway running between two rounded and steep sided ditch termini. The entrance causeway was located in the east-north-eastern part of the ringfort. The ditch was approximately 5 – 6 m wide and ranged in depth from 1.75 – 3.1 m. It was deepest to the south-east, south, south-west and west and shallowest to the north. The level at the base of the ditch ranged from 54.63 m OD to the north-west to 52.08 m OD to the north-east. The ditch was constructed during Phase 2 of occupation at the site, but some of the backfilled deposits clearly related to later phases.

The ditch was cut into the subsoil and the underlying natural sand and gravel (Group 1). A significant number of large, naturally occurring stones protruded from the sides of the ditch. Along the southern sector of the ditch the sides were splayed wider at the top forming a partially stepped profile, especially along the outside edge. The lower half of the ditch sides were steeper and sharper than the upper ditch sides.

The ditch was cut around the highest point of a naturally occurring glacial ridge which runs roughly east to west. The ground outside the ringfort ditch, to the south and west, is relatively flat; however it falls away sharply to the north and east. This accounts for the rela-
tive shallowness of the ditch in this sector as the natural fall of the ground offered a natural
defensive advantage.

During the excavation, 14 ditch sections (Areas 1 – 14) of varying widths were excavated
across the line of the enclosing ditch (Figures 5-6). (One of these sections, Area 13, was not
recorded due to root disturbance from the large tree in the north-west quadrant of the site.)
The excavated sections revealed a series of complex deposits representing the construction,
use, erosion, re-use and deliberate backfilling of the large ditch.

A series of deposits at the very base of the ditch were probably derived from the natural
silting up of the base of the ditch from both the inside and outside edges and the erosion
of the ditch sides from weathering (Sub-groups 3003, 3006 & 3007). Exceptional levels of
silting were recognised in Area 12 in the south-eastern arc of the ditch. The only evidence
for a re-cut in the entire ditch was also identified (Sub-group 3002) in this area, perhaps a
response to the large accumulation of silt. A series of charcoal-rich silty clays were noted in
the north-eastern sector of the ditch (Sub-group 3004). The charcoal flecks may be derived
from metalworking activities (Group 14) located inside the bank in the north-eastern quad-
rant of the interior. Two possible hearths were also identified at these lower levels in the ditch
stratigraphy (Sub-groups 3005 & 3008).

A series of ditch fills (Sub-group 3009) consisting of medium to large sub-rounded stones
were evident overlying the lower ditch silts at the centre of the ditch. These were found
around the entire circumferences of the ditch apart from in Area 1. The stone deposits were
probably the remains of a collapsed rough-coursed outer bank revetment wall. This was,
similar to the remains of the inner bank revetment wall (Sub-group 4004) revealed in the
north-east quadrant (see below).

Overlying the collapsed revetment wall there was another series of deposits that probably
resulted from episodic erosion and collapse of bank material (Sub-group 3010 and Sub-group
3013), as well as natural silting (Sub-group 3011). Evidence for localised deliberate dumping
(Sub-group 3012) into the ditch was also recognised in Areas 5 and 14. This was found in
between the erosion and collapse deposits and the natural silting layers.

A thick deposit of brown silty clays and sandy silts (Sub-group 3014) was recognised at
similar levels around the full circumference of the enclosing ditch. The depth of these depos-
its (some were over 1 m deep) suggests natural silting of the ringfort ditch over a considerable
period of time. Later burials were cut into the soft ditch deposits (See 7.18 Burials). The burial
horizon was located predominantly in the south-western arc of the ditch, had a maximum
depth of 0.6 m and was encountered approximately 1.2 m below the surface level of the ditch
prior to excavation.

Overlying the main silt deposits in Areas 7 and 9, at the south of the ringfort, deposits
reflecting further bank erosion or possible levelling were revealed (Sub-group 3016). A series
of deposits which may represent an old undisturbed ground surface (Sub-group 3017) and
which extended across the full width of the ditch were recognised to the north-west, north
and north-east of the enclosing ditch.
A deliberate, continuous and substantial deposit of medium to large stones (Sub-group 3018), with an average depth of 1 m, was excavated across the full width of the ditch to the west, south and east. The stone was locally derived glacial material and represented a deliberate backfilling of the ditch. The stone layer corresponds with the areas of ditch used for the burials and directly overlay the silt deposits (Sub-group 3014) containing the burials.

A number of deposits (Sub-group 3019) identified in the south-eastern half of the enclosing ditch appear to be derived from the deliberate levelling of the inner enclosing bank (Group 4). They were located along the inside edge of the ditch and the angle of deposition suggests they were pushed into the ditch from this inner edge. Other deposits (Sub-group 3020) identified at this upper level also represent the deliberate backfilling of the ringfort ditch. The deposits contained slag, furnace bottoms, iron fragments and faunal remains mixed with modern ceramics and glass, suggesting that some of the material used to back fill the ditch was derived from the interior of the ringfort.

6.4 Enclosing Bank – Phase 2

6.4.1 Earthen bank

Although a ringfort bank was identified during fieldwalking for the EIS, this bank was not substantial. There was evidence to indicate that the bank was deliberately levelled in the past, and that at least two phases of cultivation had eroded and denuded the earth and stone bank. Where the bank did survive it was composed of layered dumps of stone and compacted sand and gravel. Four sections were cut across the line of the bank (Group 4). In two of these sections a buried sod layer (Sub-group 1004) was identified, which was cut by the digging of the ditch (See 7.1 Natural Deposits).

Definite in situ bank deposits of compact silty sand and stone (Sub-group 4001) were identified in the sections cut across the line of the bank to the north-east and south-west. Partial remains or layers of bank deposits were also excavated in plan to the north-west of the site. In the excavated sections definite tip-lines were identified which seemed to indicate that they were mostly derived from up-cast soils originating from the excavation of the ringfort ditch. Two deposits (Sub-group 4002) identified in the south-western bank section appear to have been deposited from the interior and may derive from the construction of the souterrain (Group 19).

A range of deposits (Sub-group 4003) were identified which appear to abut or straddle the in situ bank deposits. These may be the result of natural deposition against the inside of the bank after the abandonment of the ringfort. Some are also likely to be derived from original bank material which has either been deliberately levelled and spread around the interior of the enclosure, or has naturally slipped and degraded.
6.4.2 Revetment wall

An inner revetment wall was recorded in the north-east quadrant of the site (Figure 5). The wall extended northwards from the entrance causeway (Group 5) for 18 m and it curved in a manner that mirrored the ringfort ditch. It survived to a maximum of two courses of large faced stones approximately 0.4 m in length and 0.25 m in height. The stones defined a bank area 3.4 m in width. There was no bonding between the stone work and the wall was of fairly crude construction. Three wide gaps in the wall may be a result of truncation by later agricultural furrows.

The revetment wall was placed on the inside edge of the bank in order to prevent slippage into the interior. While this wall was only discovered in the north-east of the ringfort interior, there may have been a complete revetment for the interior of the bank that has not survived due to disturbance by agricultural activities. The wall itself appears to overlay one of the bank deposits (C.1113) and therefore was either constructed immediately after the bank material was dumped or after the full construction of the bank. Again due to the levelling of the bank this was difficult to determine.

6.4.3 Possible bracing

Three shallow linear trenches (Sub-group 2001) were excavated to the north of the site. These ran at right angles to the line of the bank and did not extend beyond the line of the bank into the interior. The features have been interpreted as being pre-bank in origin but may be related to the construction of the bank. They are possibly the remains of some form of cross bracing used to stabilise the bank material.

6.5 Entrance Features – Phase 2

Stout observes that ‘A ringfort’s entrance usually consisted of an undug causeway across the fosse leading to a gap in the banks protected by a gate’ (Stout 1997, 18) and for once the usual becomes the actual because this is the exact morphological layout of the entrance at Mackney ringfort.

The entrance consisted of a 6.6 m wide causeway running between two rounded and steep-sided ditch termini (Figures 5 & 7). The entrance causeway is located to the east-north-east of the monument. A number of large pits and post-holes (Group 5) were identified slightly to the north of the entrance causeway and at a point which would have been midway across the width of the bank. Two phases of activity were identified, which may represent repair or re-design of the original entrance structure or later re-use of the entrance area for a separate gate or structure.

Three large sub-rectangular pits and a post-hole were identified as representing the original gate or gate-house (Sub-group 5001). All three pits were large and sub-rectangular running north to south. Two of the pits ran alongside each other while the third was located
to the north. A circular post-hole 0.5 m wide was identified in the base of the south-eastern pit and all three pits are likely to have been foundation pits dug to contain substantial load-bearing posts, consistent with a defensive gate or gate-house.

A row of four large post-holes (Sub-group 5002) were identified running north to south between the line of the enclosing bank and in line with the entrance causeway. The row of post-holes ran in the same direction as the three large pits that were probably from a gate or gate-house (see above). Two of the post-holes cut one of these pits and therefore the post-holes were later features. The post-holes may have supplemented the earlier gate or gate-house to form a more elaborate entrance feature. They may also point to a repair of the gate after a period of use or may represent a full redesign of the entrance. It is also possible that the post-holes may be associated with a later re-use of the ringfort.

A large (4 m x 3.5 m), irregular, triangular-shaped pit (Sub-group 5003) was excavated just inside the possible gate features. It was aligned with the entrance causeway. The location of this pit inside the possible gate-house suggests an association with the entrance. However, due to the irregular shape of the pit and the fact that it is not truncated by, or does not truncate any other features around the entrance it is difficult to determine its function or period of use. Two pits and a post-hole (Sub-group 5005) were identified just to the west of the large irregular pit and due to their location are also likely to be related to the entrance features.

### 6.6 Internal Structures – Phase 2

#### 6.6.1 Central circular house (Structure A)

A circular house structure (Group 6, Structure A) was revealed just off centre within the ringfort interior (Figure 8, Plate 4). It was located in the south-east quadrant and was badly truncated by the two later phases of cultivation (Group 20 and 24). A construction trench (Sub-group 6001), which was on average 0.40 m wide and 0.20 m deep, defined a roughly circular area 5.4 m in diameter with an internal space of 22.9 sq. m.

The foundation trench was concave in profile and had steep and smooth sides to the north, east and south and was less prominent and more truncated to the west. On examination of the field-drawn plans the trench seemed to be divided into eight straight sections which together appeared to form a circular shape. This suggests that wooden foundation planks were used to support the side walls of the structure. Two distinct fills of brown silty sand were seen to fill the trench for the majority of it circumference however two separate orange brown fills were identified in the eastern side of the trench. These may be a result of in situ rotting of the foundation plank along that section.

Four tightly spaced post-holes were located in the northern section of the foundation trench and there were five tightly spaced post-holes opposite them, in the southern section of the trench (Sub-group 6003). These posts probably formed part of the wall of the structure,
supplemented by wooden planks or wattling. It is also likely that they acted as load-bearing roof supports.

Three post-holes (Sub-group 6002) were found in a 1.13 m gap in the circular trench, along its north-eastern side. Two post-holes (C.389) and (C.391) were identified to the south of the gap and one (C.387) to the north. The posts may have supported a door and could also have acted as supports for the side walls and roof.

Two pits and six post-holes (Sub-group 6004) were identified within the interior space of the structure. The two large pits were possible later features that were un-related to the structure. The post-holes included a double post-hole and a large triple post-hole. No definitive pattern or shape can be defined by the internal pits and post-holes. They may have been used to divide the internal space, provide support for the roof or to form internal features such as storage or bedding areas. There was no evidence for the presence of an internal hearth in this structure. It is possible that evidence for a hearth may have been truncated by the cultivation features or by the two larger and later internal pits.

A single external pit (Sub-group 6005) located 1 m to the north-west of the entrance may be related to the structure.

6.6.2 Lean-to structure (Structure B)

A possible lean-to structure (Group 7) was identified just inside the line of the enclosing bank and to the south of the ringfort entrance (Figure 9). The structure was defined by two curvilinear foundation trenches. The line of the northern trench was possibly extended by two pits and a post-hole. These combined to form a semi-circular ground plan (Sub-group 7001). This was built into, or up against, the eastern bank of the ringfort, forming a ‘lean-to’ structure. The structure measured 3.8 m east to west and 8.4 m north to south and had an internal space of 46.32 sq. m. A gap between the foundation trenches formed a 1 m wide entranceway which faced westwards. The foundation trenches of this structure were quite shallow, varying from 0.12 to 0.22 m in depth and were badly truncated by later cultivation levels.

An internal sub-circular hearth (Sub-group 7002) measuring just over 1 m in diameter was identified in the south-east corner of the structure (Plate 5). There was evidence for in situ burning. A small stake-hole was located just to the north-west of the hearth.

Three distinct internal sandy layers (Sub-group 7003) were identified and may represent the degraded remnants of a deliberately created surface or series of surfaces. Two internal pits appear to cut these layers and may be connected with the occupation of the structure. An internal post-hole was identified below one of the possible surfaces, which suggests it may have been part of the structure before the accumulation of the surface layers within the lean-to, however, it may also pre-date the structure (Sub-group 7004). Three external pits (Sub-group 7004) formed a curving line which ran from just to the north of the lean-to entrance. It is possible that these pits represented the remnants of some form of structure which screened the entrance to the lean-to from the main entrance to the ringfort.
6.6.3 **Partial circular house (Structure C)**

The partial remains of a possible circular structure (Group 9) were located to the south of Structure A (Group 6) (Figure 5). A 1.54 m long curvilinear trench represents the possible remnants of the foundation trench of a circular structure (Sub-group 9001). The trench was quite narrow and shallow and it was truncated by ridge-and-furrow cultivation. A number of later burials probably also disturbed the possible remains of the foundation trench. It is estimated that the building would have been approximately 4.48 m in diameter, creating an internal space of approximately 15.76 sq. m.

Two pits and three post-holes located within the extrapolated interior space of the circular structure have been interpreted as internal features similar to Structure A (Sub-group 9002). Four pits were located just on or outside the projected line of the foundation trench and were possibly associated with the structure (Sub-group 9003). One of the external pits contained some slag, similar to one of the fills from the internal features. This suggests a link between the internal and external features in this structure. It is possible that both the internal and external pits are related with a later phase of activity.

6.6.4 **Possible rectangular structure (Structure D)**

A number of structural features (Group 10) found in the south-east quadrant, to the south of the Structures A and B (Figure 5). These were excavated and interpreted as the possible remains of a rectangular structure. A total of 18 post-holes and pits were identified, some of which suggest large structural elements, which may represent the remains of a building (Sub-group 10001). While a definite structure could not be seen in the arrangement of the post-holes, a general linear alignment running from north-west to south-east can be distinguished. A perpendicular alignment may also exist to the southern end of this north-west to south-east linear arrangement.

6.6.5 **Post-hole arc (Structure E)**

A series of post-holes located to the north of the souterrain in the north-west quadrant of the ringfort appear to represent a small structure, open to the north, with a central post (Group 12) (Figure 5). A pit containing burnt refuse material located to the north of the structure may have been related to it (Sub-group 1202). The six post-holes did not indicate a large structure (Sub-group 1201). One of the post-holes was clearly truncated by later furrows. It seems likely that the possible structure relates to the main phase of occupation within the ringfort. It is possible that the structure may have been used for storage or perhaps pens for livestock. There is little evidence for industrial or domestic activity recovered from the north-western sector of the site. The absence of packing deposits within most of the features may indicate that posts were removed rather than being left *in situ*. 
6.6.6  **L-shaped post-hole concentration (Structure F)**

Five small post-holes (Group 13) were excavated just north of the souterrain (Figure 5). Collectively, the post-holes formed an L-shape in plan, with the long axis running east to west. Within two of the post-holes it was possible to discern the original profile of the posts themselves, this being evident from the interface between the packing material and the uppermost fill. The post-holes were possibly related to the main phase of activity within the ringfort. One of the possible potato clamps (Group 20) located in this area of the ringfort clearly truncates two of the post-holes indicating that they pre-date the cultivation system. The potato clamps may well have obscured further post-holes within the area. The full extent of the structure represented by the five remaining post-holes is therefore unclear. The proximity of the post-holes the souterrain (Group 19) suggests that they may relate to its construction or use.

6.6.7  **Post-hole concentration (Structure G)**

An extremely dense concentration of post-holes and pits was recorded in a 10 sq. m area in the north-east quadrant of the ringfort (Group 8) (Figure 10). No pattern or significant stratigraphic information could be ascertained during the excavation or post-excavation process and therefore no definitive building/structure plans could be identified.

Two very large possible post-holes were excavated just to the west of the main concentration (Sub-group 8001). The steep sides as well as their surviving depths suggested that these represented significant structural elements such as load-bearing posts. A chert scraper (E2244:593:1) was recovered from one of the post-hole fills.

A group of 26 post-holes was excavated to the west of the two larger examples. The post-holes differed greatly in length, width and depth, and the *in situ* remains of packing material was observed in eleven of them. Examples of double and triple post-pits were identified and one post-pit contained five post-holes (Sub-group 8002).

A series of nine irregular to sub-circular pits (Sub-group 8003) with concave profiles were excavated in the same area as the 26 post-holes. The pits varied in size but had a similar shape. The function of these pits remains unclear; however, their proximity to the structural features already noted suggests that all features are related to one another. A further two large irregular pits, with an associated smaller pit, and three post-holes were located on the northern edge of this area of activity (Sub-group 8004).

The concentration of pits and post-holes appears to represent the remains of a building or a series of small structures. Very little stratigraphic information was retrieved so it was impossible to identify any distinct phases of activity or evidence for adaptation or rebuilding.

6.7  **Refuse Pits – Phase 2**

A large pit and a series of smaller surrounding pits (Group 17) were located 5 m to the north of Structure A and to the south of Structure G (Figure 5). These were interpreted as refuse...
pits. The large pit (Sub-group 1701) was circular in shape, measuring 1.75 m in length, 1.75 m in width and 1.3 m in depth (Plate 6). Faunal remains, small quantities of slag and a chunk of natural flint were recovered from the fills of the pit. The feature has been interpreted as a large refuse pit but it is possible that it may have acted as a cistern. The pit could have been lined with wood or water-proof material and used for water storage. Its depth and central location close to both occupation and industrial features would have been ideal for the storage of water, which would have been necessary for both domestic and semi-industrial processes. A series of smaller pits (Sub-group 1702), which seem to share a similar size and shape, were excavated to the north of the large pit. These pits have also been interpreted as refuse pits.

6.8 Souterrain – Phase 2

The souterrain was located in the south-west quadrant of the ringfort (Group 19). It was constructed in a roughly L-shaped trench (Figures 5, 11-12). The longer, north to south section of the trench measured 14.3 m in length and was 1.9 m deep. The cut was 4 m wide to the south and narrowed to 3.4 m to the north. The east to west part of the trench was 9.1 m long, 3.6 m wide and was 1.9 m deep. The sides of the cut were steep and sharp. This souterrain was constructed during Phase 2 occupation of the ringfort, but was backfilled with deposits from later phases.

The souterrain consisted of two chambers, a connecting drop creep and a set of steep entrance steps giving access from the ground surface to the outer end of the east/west chamber (Plate 7). The walls of the souterrain were constructed using the dry-stone technique. The walls were composed of weathered limestone boulders set in eight very rough and uneven courses. The lowest course was composed of larger more substantial stones. The walls were one stone wide and were built up against the sides of the foundation trench. The space between the wall stones and the cut was filled with packing material consisting soil and smaller stones. The end walls of both chambers were slightly rounded and connected seamlessly with the side walls. The stones had average dimensions of 0.4 m x 0.2 m. The inner face of the walls was covered in a white calcite deposit which formed in the damp interior of the souterrain.

The main chamber (Chamber 1) was aligned north to south (Plate 8). The internal dimensions of the chamber were 7.6 m x 1.6 m. The full height of the walls ranged from 1.4 – 1.6 m. The northern end of the side walls and the northern end wall survived to only one or two courses. The western wall had one large area of collapse but the overall integrity of the wall survived. The collapse may have been caused by burrowing as the space between the cut and the wall was filled with small loose stones and packing material. This chamber falls into Clinton’s ‘oblong’ category (Clinton 2001, 117) as its long axis is more than three times its short axis.

At Mackney the dimensions of the chamber were increased both in terms of width and height by the use of a corbelled lintelled roof structure. The souterrain roof survived across the southern end of Chamber 1. It was roofed using a hybrid structure that combined lintels
with corbelling. Flat slabs laid on the side walls overhung the interior of the souterrain by c. 0.3 m and were kept in place by counter balancing boulders resting on their outer ends. The flat corbel stones in turn supported the true lintel stones which spanned the remaining space to complete the roof structure. The five *in situ* central lintels were composed of large thick limestone slabs. The lintels measured on average 1.60 m x 1 m x 0.18 m. The height at the centre of the chamber was up to 2 m and it had a consistent width of 1.6 m. Oblong chambers achieve a maximum amount of floor space.

The roof was covered by a strongly cemented layer of light greenish/grey pebbly sand with small stone inclusions. This cement-like mixture was c. 0.5 m deep. It sealed the souterrain and acted as a water-proofing layer and stabilising agent. The mixture did not percolate down between the voids and cavities that were present between the chamber walls and the steep sides of the souterrain cut. The floors of both chambers were composed of a similar, strongly cemented, light greyish/yellow sand with occasional fine and coarse pebbles and very small stone inclusions.

A blocked-up lintelled alcove was identified in the western wall of Chamber 1. The alcove was located 0.7 m from the south-west corner of the chamber. It was 0.7 m wide, 0.9 m long and 0.8 m high. Two covering lintels rested on the north and south side walls. The walls were built of limestone blocks and were five courses high. The steep-sided souterrain cut formed the back wall of the alcove, so that it was not faced with stone but with bare gravel subsoils. The alcove was deliberately blocked up (Sub-group 1904). The alcove space was filled by a deposit of sandy silt and a loosely compacted sand. A stone wall matching and in line with the western chamber wall was then built across the face of the alcove.

Clinton has assigned three categories of alcove based on the height, width and depth of the feature: cupboard, cubby hole and recess (2001, 140-2). Alcoves are rare, with only 3% of recorded souterrains displaying such a feature. The Mackney alcove should be classified as a recess under Clinton’s classification. A recess would have the capacity to serve as a storage area or as an additional occupation area. A recurring feature of these recesses, which is also seen in the example from Mackney, is the absence of formal stone-work at the back of the feature. At Mackney the recess was conceived as an integral part of the structure from the outset, as the gap between the western interior wall face and the back of the souterrain cut was kept sufficiently large to accommodate the recess, which also had two covering lintel stones. The overall effect of the gap between the cut and the wall face was that the east/west chamber appeared to be constructed off-centre to the original construction cut.

Four fills located in Chamber 1 were possibly associated with the primary use of the souterrain (Sub-group 1902). The strongly cemented, light greyish/yellow sand chamber floor was covered to a depth of 0.08 m by a light yellowish brown clay with occasional pebbles and charcoal flecks. A dark brown sandy silt was identified above the floor deposit at the base of the alcove. Two fills of loose grey silty sand were identified above the lower deposits next to the northern end-wall of Chamber 1. The fills were possibly deposited as a result of the use of the connecting ramp between Chamber 1 and the drop-creep.
Two fills located against the base stones of the northern wall of Chamber 1 next to the
creep should possibly be interpreted as evidence for primary collapse (Sub-group 1903). Both
of them were firmly compacted mid and dark brown sandy clay with occasional pebbles and
small stone inclusions. The fills also contained occasional charcoal and animal bone frag-
ments. These fills were covered by a dark brown silty clay which spread across the base of the
entire north to south chamber. This context contained a clay pipe and six corroded metal
objects. It seemed to have built up after the initial collapse but prior to the blocking up of
the alcove.

The second chamber (Chamber 2) was aligned east to west. It was 7.4 m x 1.6 m wide
to the west. The walls were 1.6 m high and were constructed in similar fashion to the north
to south chamber. The chamber narrowed gradually to the east and was less than 1 m wide
at the top of the entrance steps. This chamber is best recognised as an unrestricted passage
(Clinton 2001, 107), though its dimensions place it at the very upper end of the scale and it
could also be described as unrestricted passage/chamber. The relatively unrestricted access
would also have lent itself to storage.

Five steep steps were constructed at the eastern end of the chamber. The three lowest
steps were built using three square limestone blocks for each step while the two upper steps
used two blocks for each step. The individual steps were narrow and steep, averaging 0.2 m
in depth and 0.2 m in width. The steps were set into a yellowy cemented sand material which
appeared to act as a form of mortar securing the individual stones in place. The bottom step
was also set into this material and was thus raised off the chamber floor by 0.05 m. The steps
comprised a flight of five very steep steps. These would have allowed for a narrow, easily con-
cealed opening.

Chamber 2 was linked to the slightly larger Chamber 1 by means of a drop-creep or trap-
door (Plate 9). Towards the western end of the southern wall of Chamber 2 a large lintel stone
covered an entrance into a small creepway. The entrance below the lintel was 1 m in height
and the creep itself was 1.7 m long and 0.84 m wide. The back wall of the creepway was 0.6
m high. Due to collapse and deliberate destruction the exact method of access between the
two chambers remains unclear. It falls into Clinton's western group of 'Class A elevated trap-
doors'. The western group of trapdoor features involved connecting passages and chambers
on the same level and so required the insertion of a height differentiation and hence the term
elevated trapdoor. The Class A design comprises all trap doors which had to be sealed from
the inside which would suggest that defence was uppermost in the minds of the builders.
This is in contrast to the dominant north-eastern group of trapdoor designs, which had to be
sealed from without (Clinton 2001, 123-7). The term 'drop-creep' was used at Mackney as
this was precisely what was required of someone entering the main chamber from the east/west
passage.

A solid sloping surface composed of compact yellow sand ran between the top of the back
wall of the drop-creep and the northern wall of the Chamber 1. This surface formed a con-
necting ramp between the drop-creep or trapdoor and the main chamber. It was not possible
during the excavation to determine the exact relationship and the structural configuration
of the entrance to the main chamber from the drop creep as this area had been robbed of
structural stones and was also the site of collapse and backfilling.

Four separate fills were identified within the Chamber 2 and the drop creep (Sub-group
1905). The two lower fills were grey-brown sandy clays and contained bedded limestone slab
fragments. These fragments were possibly derived from the lintels that would have originally
covered the chamber. It is likely then that these fills were contemporary with a phase of activ
ity that saw the lintels removed from this chamber. A dark brown silty clay covered the two
lower deposits and the side walls of the chamber. This deposit was visible on the surface after
the removal of the topsoil as a thin band surrounding the main upper stone fill. The stone fill
consisted of small to medium sized sub-rounded stones with a brown sandy clay matrix and
was up to 0.6 m in depth. Animal bone and charcoal were retrieved from all four fills of the
east to west chamber.

Chamber 1 contained two main fills (Sub-group 1906). These were stratigraphically later
than the four fills of Chamber 2. The lower fill was a light grey stony sand with occasional
medium sized sub-rounded stones. A small metal fragment, a metal pin and animal bone
were all recovered from the fill. The main fill of the chamber was a deposit of small to me-
dium sized sub-rounded stone with a brown silty clay matrix and had a depth of c. 1 m.
Animal bone was also recovered from this fill. This fill may correspond to a stone fill found
in the ringfort ditch. The ditch was deliberately filled with large quantities of loose stone and
the collapsed souterrain may have been backfilled at the same time.

The three upper fills of the souterrain covered the latest collapse of the remaining souter-
rain structure (Sub-group 1907). The fills were isolated in an area measuring 3.6 m east/west
and 2.8 m north/south. A brownish, black, sandy clay with a depth of c. 1 m was identified.
The fill contained pebble and small stone inclusions and also contained large volumes of
window glass fragments, corroded metal, and an interesting collection of glass bottles and
ceramic pots. This fill was overlain by a layer of decayed concrete with a white render on one
side, which was in turn overlain by a thin layer of blue gravel. These final fills contains finds
contemporary with occupation of nearby Mackney House and it probably consists of waste
deposited during or after the demolition of the big house.

6.9 Metalworking Features – Phase 2

In the lee of the bank to the north of the entrance a series of bowl furnaces / fire-pits, refuse
pits and post-holes (Group 14) were excavated and recorded (Figure 5 & 13). Slag, furnace
bottoms and heat-shattered stones were associated with these features which suggests that
they were associated with metalworking processes.

A trefoil shaped double bowl furnace and associated pit (Sub-group 1401) revealed evi-
dence for re-use. The remains of the bowl furnaces were roughly circular measuring 0.4 m
to 0.5 m in diameter and were between 0.2 m and 0.25 m deep (Plate 10). The primary fills
contained two furnace bottoms, slag, predominantly oak charcoal and fire-affected stone. A radiocarbon date of cal AD 775-965 (UB-7371) was obtained from hazel/alder charcoal taken from these primary fills. A large angular stone contained within the associated pit may have acted as some sort of ‘striking platform’ for metal working activities, however, no slag residue was observed on this stone. Two later furnace re-cuts were identified and their fills contained oak charcoal, a furnace bottom and slag material. Some plant remains including cereal and grass grains and hazel nut shells were also recovered from the fills.

A slightly larger sub-circular fire pit or possible bowl-furnace with steep sides and a flat bottom was located just to the north of the double bowl-furnace and contained burnt material, fire-affected stone and dark brown/black silty clay. The possible fire-pit or bowl-furnace was cut by a similar pit with a similar fill which, however, lacked the quantity of burnt material and fire-affected stone found in the primary pit. The later pit may have been a waste pit or some other related feature associated with the possible furnace.

A shallow rectangular pit (Sub-group 1402) (0.9 m x 0.29 m x 0.13 m) with a flat base and steep sides was located 0.3 m to the south of the double bowl-furnaces described above. The fill of the pit contained quantities of slag and mostly oak charcoal as well as an angular stone that fitted into the north-east end of the pit. A radiocarbon date of cal AD 988-1153 (UB-7376) was obtained from alder charcoal from the fill of the pit. Slag material was attached to the stone and its close proximity to the bowl furnaces may indicate that the stone was used as a striking platform possibly as part of the smithing process.

Six pits (Sub-group 1403) were located within a 5 m radius of the bowl-furnaces described above. The pits varied widely in length, width and depth but were all concave in profile. Large quantities of oak charcoal were recovered from the fills along with two furnace bottoms, slag material and faunal remains. Two small convex end scrapers (E2444:827:1 and E2444:854:1), a stone wedge (E2444:911:1) and an iron nail head (E2444:935:1) were also recovered from the fills. These pits probably represent general dumping areas or rubbish pits with a close connection to the metalworking industry within the ringfort.

Eleven post-holes (Sub-group 1404) lie in close proximity to the bowl-furnaces and metalworking features described above. The post-holes varied greatly in length, width and depth. The post-holes varied from square to oval in shape and had either flat or concave bases. The sides were generally vertical or steep. Packing material was present in eight of the post-holes and slag material was recovered from some of the fills along with some faunal remains. A small amount of charcoal was also identified as well as some cereal and weed seeds. One of the post-holes was closely associated with two stake-holes and it appears from the angle of the cuts that the stakes were used to reinforce the main post. Another was truncated by a later post-hole, which possibly represents a replacement of the post. This later post was in turn cut by a later pit. These post-holes probably relate to a building (Structure H) associated with the metalworking activity, however, no discernable pattern could be observed.

Six post-holes and five pits (Sub-group 1405) were generally located to the north-west of what appears to be the main focus of the metalworking area. While these features may pos-
possibly have a relationship to the metalworking area and may represent evidence of a secondary building (Structure I) associated with a related metalworking process; there was no definite evidence to suggest this.

6.10 L-shaped Linear Features – Phase 2

Five linear trenches (Group 18) with a distinctive sharp curve to one end were spread across the interior of the ringfort (Figure 5). Although very similar in shape, these features all had different locations and orientations. The trenches varied in length from 2.4 to 4.6 m, varied in width from 0.4 to 1.05 m and varied in depth from 0.12 to 0.21 m. One metal object was recovered from the fills and faunal remains were also noted. Two of the five were truncated by the north to south running furrows which indicates that they pre-date the early cultivation level. Due to their similar size and shape these features probably had a similar purpose. A possible explanation may be that they are various drainage gullies for different features or structures within the ringfort interior.

6.11 Late Medieval Features – Phase 3

6.11.1 Hearths and fire-pits

Four large hearths/fire-pits (Sub-groups 1501, 1502, 1503 and 1504) and a series of associated pits and post-holes (Sub-group 1505 and 1506) were excavated inside the line of the enclosing bank in the south-eastern quadrant of the ringfort interior (Figure 5). All four pits/hearths had evidence for *in situ* burning. Charcoal remains from all four pits were dominated by oak which is rarely found in domestic fires and hearths and is most commonly found from industrial contexts. There were also large amounts of cereal grains noted in the samples taken from all four features. This would indicate the features were used for corn drying and that the quantities of cereals recovered suggested repeated use. The presence of small legumes in all the samples indicated a later date for the use of these features and this was confirmed by the radiocarbon dates obtained from the charcoal associated with three of the features. The three dates ranged from cal AD 1323 – 1442 to cal AD 1443 – 1631 (UB-7368, UB-7369 and UB-7370) indicating use between the 14th and the 17th centuries. The four corn drying hearths and were therefore not associated with the primary phase of ringfort occupation but with a later use of the ringfort site in the later medieval period.

6.11.2 Possible structure to the south of the souterrain (Structure J)

A possible structure (Group 11) was tentatively identified to the south-east of the souterrain by the presence of post-holes a hearth and associated pits (Figure 5). Six post-holes (Sub-group 1101) were excavated all of which were circular in shape with steep or vertical sides. Five of the six post-holes had remnants of a stony packing material. Some faunal remains,
slag, mixed charcoal, cereal remains and hazelnut shell fragments were recovered from the fills of three of the post-holes. The mixed charcoal assemblage and the hazelnut fragment from the post-hole fills may indicate a domestic origin. The post-holes possibly represent the remains of a building that was located to the south of the souterrain. While the packing material found in most of these post-holes suggests a solid construction, a ground plan for the building cannot be established as there is no discernable pattern in the location of these features. Five sub-rectangular to oval shaped pits (Sub-group 1103) were also excavated and may have been used as refuse pits or also possibly mark the remains of internal features associated with the possible structure.

A hearth as well as a closely associated post-hole and double post-pit (Sub-group 1102) were located to the east of Structure J (Sub-group 1101). A rich charcoal assemblage and large quantities of plant remains were recovered form the hearth. The plant remains indicate that cereals were either dried by the hearth or were used as fuel. An individual post-hole was located just to the west of the hearth deposits and may suggest that a pot holder was once used in connection with the hearth. The double post-pit, located 0.2 m to the north of the hearth, may represent a small construction that was closely related to it, possibly a wind break. A radiocarbon date obtained from hazel/alder charcoal derived from the hearth yielded a date of cal AD 1449-1634 (UB-7375), indicating the hearth and possible associated structure are associated with later medieval use of the ringfort.

6.11.3 Hearth and associated features to north of the ringfort interior

A large hearth and a number of related pits and post-holes (Group 16) were located inside the line of the enclosing bank to the north of the ringfort interior (Figure 5). This group of features was located to the north of the large post-hole concentration (Group 8) and to the north-west of the metalworking features (Group 14).

A hearth, a post-hole and three pits (Sub-group 1601) combined to form the central focus of activity. The post-hole may have been the remains of a pot hanger used in connection with cooking over the hearth. One of the pits has been interpreted as an ash pit and was probably used as a dumping area for the burnt materials from the hearth, while a large central pit was probably the original base for the hearth and its associated features. Two pits located just to the west of the hearth represent two phases of a large probable refuse pit, connected with the hearth. The fills and layers from these features contained large amounts of predominantly oak charcoal. Plant remains were also frequent. A radiocarbon date obtained from alder charcoal derived from one the fills of the hearth yielded a date of cal AD 1446-1632 (UB-7373) indicating the hearth and possible associated structure are associated with later medieval use of the ringfort.

Two post-holes and a stake-hole (Sub-group 1602) surrounded the hearth and were possibly associated with a structure such as wind break. Three pits (Sub-group 1603) also surrounded the hearth and may have been related to it or to the possible surrounding structure.
A group of three small post-holes to the north of the main focus of activity and a pit (Sub-group 1604) lying to the north-east may also have a possible association with the hearth or possible structure. A pit (C.871) containing waste material and slag cut the hearth and, while this pit was stratigraphically linked to the hearth, it was a later feature and therefore was not connected to its use.

6.12 Later Occupation – Phase 4

6.12.1 Quarries

Three semi-circular cuts (Group 21) were identified around the circumference of the enclosure. The largest (Sub-group 2103) was located just to the south of the entrance causeway and the other two (Sub-groups 2101 & 2102) smaller examples were both located to the north. All three were cut into the inside edge of the ringfort ditch and partially through the ditch fills. The cuts ranged in size from 4 m to 10 m in diameter and all three were flat bottomed. It would appear that the cuts represented small quarries used to harvest the underlying sand and gravel. The quarries appeared to be relatively late as they were cut through the upper fills of the ditch which have been interpreted as being early nineteenth century in date. Their similar sizes and shape indicate that these three quarry pits were probably relatively contemporary with one another.

Within all three of the quarry pits there was evidence of natural slippages and accumulation suggesting that once the material had been quarried from the pits they had been left open and exposed for a lengthy period of time. The later fills all appeared to represent purposeful dumps of material used to re-fill the quarry hollow. Furnace bottoms, metal and post-medieval glass and ceramic were recovered from these later deposits along with a socketed arrowhead (E2444:18:2). The later and deliberate back filling of these three pits suggests that this was done for a specific purpose. A possible explanation may be the levelling of the area in order to establish the east to west cultivation furrows.

6.12.2 North to south furrows and potato clamps

The earliest cultivation features (Group 20) within the ringfort interior were the north to south furrows (Sub-group 2001) and a series of associated oval pits (Sub-group 2002) which have been interpreted as potato clamps (Figure 5). The north to south furrow pattern was only revealed once the cultivation level between the later east to west furrows was reduced to the interface with the underlying natural subsoil. The north to south pattern was not as consistent or regular as the east to west pattern. The furrows varied in width from 0.45 m – 0.6 m and the interval between furrows varied from 1 m – 0.3 m. They were filled with a dark grey silt with frequent pebbles, which contained some faunal remains. The furrows represented a period of cultivation that overlies and truncates the interior features of the ringfort but under-
lies the later, east to west, cultivation furrows. These furrows represent a period of use in the
area after the ringfort had been abandoned. The furrows appear to be bounded by the line of
the ringfort bank and, unlike the east to west furrows, do not traverse the line of the bank.

Five shallow pits shared a similar north to south orientation. Four of the pits were situated
directly to the north of the souterrain while the fifth was located to the west. The pits ranged
from 1.5 m to 3.25 m in length, 1.1 m to 1.58 m in width and 0.11 m to 0.43 m in depth,
and were oval to sub-rectangular in plan. The pits contained single fills which contained
occasional charcoal flecks and some faunal remains. It seems likely that the features were
contemporary with the north to south aligned cultivation system, as the furrows appeared
to terminate to the north of these features and then reappear to the south on the same align-
ment. The shape and size of the pits suggest that they may be shallow potato storage pits or
potato clamps.

6.12.3 Features post-dating the north to south furrows
A series of features (Group 23) within the interior of the ringfort clearly post-date the north/
south aligned cultivation system. The features included five pits, two linear trenches and a
post-hole. Oak charcoal was recovered from one of the fills of the pits along with some slag
material.

6.12.4 East to west furrows
A series of parallel ridge and furrows were revealed directly below the sod and topsoil across
the interior of the ringfort (Group 24) (Figure 5). They are aligned approximately east to
west. The furrows were between 0.35 m and 0.40 m wide and were 0.2 m deep. They were
filled with topsoil and stones (0.10 m – 0.25 m in length). The ridges were between 1.7 m
and 1.8 m wide and rose in height towards the centre where there was as little as 0.1 m of sod
and topsoil covering the stony/gravel cultivation surface. After cleaning and being exposed to
rain the ridge and furrow pattern was very obvious, as the topsoil fill remained in the furrows
along with occasional large stones. The east to west ridge and furrow pattern was discernible
across the majority of the site, with the exception of the northern portion of the north-east
and north-west quadrants. These furrows represented a period of cultivation that took place
after the north to south furrows had gone out of use. The cultivation level was created as a
result of the process of ridge and furrow construction across the ringfort interior. This phase
of cultivation may have had some relationship to the development of Mackney House at the
turn of the 18th century.

6.12.5 Large Pit
A large north/south orientated pit (Group 22) was located at the northern extent of the ring-
fort. The pit was circular in plan and had a varying profile, with a concave base. The function
of this pit is unclear. Deposits within the feature appear to be the result of deliberate backfilling. Post-medieval pottery recovered from the pit confirms the late date assigned to it.

6.12.6 Miscellaneous features

Due to the lack of information that could be gathered from 18 features (Group 25) located across the interior of the ringfort and also due to their isolated locations they could not be grouped with any of the other features on site. The 18 features included six pits and two linear trenches from the north-west quadrant, two pits, a post-hole and stake-hole from the south-west quadrant and two pits, two post-holes, a linear feature and a fire-pit from the south-east quadrant. It is unclear as to whether the majority of these features formed naturally or have an archaeological origin. The shallow irregular nature of some of the cuts and the lack of faunal remains or anthropogenic material within the feature fills suggested the possibility that some of them they may have been formed through natural processes.

6.13 Burials –Phase 4

The ringfort was reused as a space for primarily infant burials (Figure 5). A total of 143 individual skeletons were recovered from Mackney, as well as a quantity of disarticulated/associated bones. Only 17 of these burials were located in clusters, in the southern third of the ringfort. The remainder were all excavated from a continuous thick deposit of brown silty clays and sandy silts (Sub-group 3014) within the enclosing ditch. The majority of these burials were located in a 15 m stretch of the ditch located in the south-west sector. There were some dispersed outliers to the east and west. This burial horizon had a maximum depth of 0.6 m and was encountered approximately 1.2 m below the surface level of the ditch prior to excavation.

A continuous and substantial deposit of medium to large stones (Sub-group 3018) with an average depth of 1 m was excavated across the full width of the ditch from the north-west, through the southern half to the east. The stone was locally derived glacial material and represented a deliberate backfilling of the ditch. The stone layer corresponded directly with the areas of ditch used for the burials including the more dispersed areas and directly overlay them. The preservation levels of the skeletal remains varied considerably. Burial cuts and fills were not always distinguishable during excavation.

The human remains were examined by Linda Lynch (Appendix 5). Most burials at Mackney were basically supine and extended, with some minor deviations such as slightly flexed legs. Most of the burials (96.5%) were under the age of 6 years at the time of death, and 33.6% of the 116 infants were full-term at the time of death. A number of probable miscarriages were also buried here, the youngest being an individual just 24 foetal weeks. The burial of a pair of pre-mature infants (Skeletons 48 and 49) together appears to represent the deliber-
ate interment of twins in a single grave (Plate 11). Just three adults were recovered: a young adult female, a young adult male, and a middle adult male.

With the full-term foetuses, 55.6% were larger than the average expected size, and this is likely to have led to complications at birth. None were undersized. Despite a natural high infant mortality and diseases in the past, it is possible that not all the individuals here died ‘naturally’, as some of these may have been unwanted pregnancies and may have been the victims of infanticide.

However, the predominant factor with many of the observable older infants and juveniles was that there were undersized for their age-at-death (37.3% or 19/51 observable infants >0 mths and juveniles), which is likely to be linked to poor health status and subsequent stunted growth.

There was one individual from the site that stands out from all others and that is Skeleton 4 (8-10 years) (Plate 12). The individual had significant dental problems, had a well-healed rib fracture, and received a fracture to the cranial vault soon before death. Subsequently this individual was buried in this unconsecrated burial ground, but far from the main concentration of burials (literally on the opposite side of the site) and in an extremely unusual burial position. The left arm was flexed at 180° so that left hand overlay the left shoulder. The right forearm extended 45° out from body with the forearm drawn right up so the head rested on right hand. The left upper leg extended out from body at 90°, with the lower leg drawn back in and the left foot rested just inferior to the pelvis. The right leg was completely flexed up over the abdomen and chest area, and the right knee rested on the right chest and the foot overlay the right hip. The combination of apparent ill-health, an old healed fracture, a skull fracture received close to the time of death, the interment far distant from other burials in the site (even within an un-consecrated burial ground), and the extremely unusual burial position, all suggest that this individual may have severely suffered in life at the hands of others.

In a number of instances shroud pins and/or coffin nails were recovered from burials. The presence of either or both provides instant tangible evidence that some individuals were buried with respect and reverence, despite the location in unconsecrated ground. However, the absence of either shroud pins or coffin nails from a burial does not immediately indicate a clandestine disposal of an unwanted infant corpse. The presence of green staining was present on the remains of a number of skeletons from Mackney. This staining is indicative of the presence of copper alloy, presumably related to shroud pins in particular. A total of 53 individuals had this staining. However, of those 53 individuals shroud pins were only recovered from 34 of them. In addition, shroud pins were recovered from 13 other individuals, but no copper-alloy staining was present on the skeletal remains. It is possible that at least 66 individuals at Mackney were buried in shrouds that were secured with pins. In addition other shrouds or winding sheets may have been used where a pin was not required to secure it. At least 34 in situ burials had evidence of a coffin, particularly through the finding of coffin nails. Twenty-two of these had also either shroud pins (three), copper-alloy staining (seven), or both (12).
The osteologist (Linda Lynch) believes that the burials from Mackney ringfort are unique for a number of reasons. There is a very high rate of young individuals in this population sample. Just 2.1% of the skeletal samples were adults. The usual layout of most cemeteries – particularly a site with at least 143 inhumations – is for the burials to be confined and contained by an enclosing boundary. However, in this instance, the vast majority of the burials that were recovered were confined to a specific area of the ditch. Although the indications are that the burials date to the Christian period, they do not conform to the traditional practice of Christian inhumation. While all were more or less supine (lying on the back) and extended, the orientations vary. Many were indeed laid in the Christian orientation of west/east with the head to the west. However, the plan of the burials indicates that the graves were actually orientated along the ditch in a primarily clockwise direction with the head to ‘12 noon’. Mackney ringfort was utilised as a specialised place of burial, outside of the typical consecrated Christian burial ground. The burial ground at Mackney is very probably similar both in its population and use of an abandoned monument to many kileen burial grounds except that many of them would overlie an earlier and more conventional burial phase.

6.14 Specialist Analysis

6.14.1 Slag

The slag from Mackney was examined by Therese Kearns (Appendix 6). A total of 43 kg of ironworking slag, the majority of which had been dumped in various pits and deposits throughout the metalworking area (Group 14) were examined to determine which ironworking technologies were represented.

There are three morphologically distinct groups of slag. The first is composed of pieces that are roughly sub-circular to circular in plan and plano-convex in shape with relatively homogeneous interiors and a band of metallic iron accumulated towards the base. It is possible that these are a collection of furnace bottoms which are the result of smelting in a non-slag tapping furnace. The second morphologically distinctive slags were all sub-circular in plan and plano-convex or convex-convex in section. Several had slight depressions on their upper surfaces and in section were heterogeneous, with layers containing slag, hammerscale, clay, charcoal and droplets of metallic iron. Macroscopically these examples all had the characteristics of smithing hearth bottoms. The third group consisted of small, randomly-shaped lumps of slags, none of which has distinctive morphologies, which makes it difficult to assign them to a specific ironworking process. Some of this material may have been fragments of smithing hearth bottoms and/or furnace bottoms, either broken over time or deliberately broken to retrieve any trapped metal.

Small amounts of soil related to the slag samples were tested with a magnet and were shown to contain both spheroidal and flake hammerscale. This material was indicative of smithing. A total of 33 furnace fragments were also recorded and these may have been the
remains of superstructures which originally belonged to the excavated furnaces. If this is the case, then it is likely that they were originally low shaft furnaces which were dismantled after each smelting cycle to clean out the slag (furnace bottom) accumulated in the base.

6.14.2 Plant remains

The plant remains were examined by Mary Dillon (Appendix 7). Oat grains (43%) dominated the assemblage followed by wheat (23%) and barley (14%). A large amount of legumes and oat-type grasses were present. Knotgrass seeds, hazelnut shells, and nipplewort seeds were also well represented. Only a few grains of rye were present. Most of the plant remains came from samples from hearth contexts.

During the 8th to 12th century phase at Mackney, wheat was probably much less common than oat or barley. In the 14th to 17th century phase of occupation wheat replaces barley as the second most common grain. Based on the results from Mackney, if we assume that these charred grains give an accurate reflection of the most important crops used at the site, then it is probably quite likely that oats and barley, and then in the latter phase oats and wheat, were of equal importance. The significant number of large legumes present indicated that these may have been an important protein source for the inhabitants of Mackney ringfort in the latter phase of occupation. Hazelnuts were evidently also a common food, particularly in the earlier phase.

6.14.3 Charcoal

The charcoal from Mackney was analysed by Mary Dillon (Appendix 8). The assemblage was dominated by oak (62% / 70%) (Figures are given as a percentage of the fragment count and of the total weight count) followed by hazel (8% / 9%), ash (7% / 4%), Pomoideae (6% / 4%), and Prunus (4% / 4%). Other wood types identified in small amounts were hazel/alder, willow/poplar, alder, holly, birch, spindle, yew and elder.

The percentage totals varied based on the proposed date ranges of the sampled material. Three samples from the pre-bank features produced 49% oak charcoal, 41% yew and small amounts of hazel/alder, alder and willow/poplar. The high percentage of yew may be indicative of structural wood or artefacts. A total of 47 samples from the primary ringfort occupation phase produced 53% oak charcoal, 16% ash, 9% hazel, 5% hazel/alder, 5% alder, 5% willow/poplar, 4% Pomoideae, 1% Prunus, 1% birch and less than 1% of diffuse porous, holly, spindle and yew. Compared to the later medieval occupation there is a larger variation in wood types and oak is not as dominant. A total of 38 samples from the later medieval features produced 79% oak charcoal, 1% ash, 8% hazel, 3% hazel/alder, 1% alder, 3% willow/poplar, 4% Pomoideae, 2% Prunus, and less than 1% of birch and elder.

The results of the charcoal analysis from Mackney ringfort gives us information on both the palaeo-woodland environment of the area around Mackney during the medieval period and the use of such woodlands. Oak was represented most frequently in the assemblage. Oak
was deliberately gathered for industrial firings and is over-represented because of this i.e. the trees around Mackney were unlikely to have been two-thirds oak. Presence in the charcoal assemblage does not necessarily indicate abundance in the local landscape. Oak woodlands would have been an important resource and because the Mackney settlement had access to such resources it could well indicate that a position of high rank was held.

One third of the assemblage was made up by eleven wood types, but trees such as hazel and ash, which are common in nearby pollen diagrams (Parkes and Mitchell 2000; Hall 2006; Molloy et al. forthcoming) are not significant in the charcoal record. Certain trees such as alder and birch were certainly available but were scarcely used, perhaps because they were growing in boggy, inaccessible ground, or they may have been deliberately avoided for cultural reasons.

6.14.4 Animal bone

A total of 6686 bones were recovered during the excavations and half of these were identified to species level. Most of the animal bone came from the fills of the large enclosing ditch and contexts comprising the backfilling of the souterrain. Analysis showed that domestic animals, cattle and sheep in particular, formed the major part of the assemblage.

The majority of the cattle bones belonged to small domestic beasts of relatively low stature. The main peak of slaughter seems to have been in the second and third years. Animals over four years of age represent females being kept for dairying and breeding and males perhaps for traction.

Sheep were second in importance to cattle. The indications are that most sheep were kept up to two years of age, at which stage they were slaughtered for their meat. Only four goat bones were identified suggesting that these animals were not common at Mackney.

Pigs were less numerous than cattle and sheep although their remains are consistently represented across the site. Deaths in the pig population were largely of young animals, which would have been killed for meat at 1-2 years.

The presence of bones of horses, dogs, cats and wild birds at the site shows that these species were also exploited, but they were not important aspects of the economy or the diet. Overall there was an almost complete reliance on the three major livestock animals (cattle, sheep and pigs) for meat complemented occasionally by horseflesh, venison, hare and wild fowl. The relative proportions of the major livestock species are similar to results from other Atlantic coast sites (McCormick and Murray 2007) and the general impression gained is that local environmental factors played a major part in animal husbandry practices in the region.

6.14.5 Finds

The complete list of the finds from Mackney ringfort is presented in the finds register (Appendix 4), with catalogues of finds presented in Appendices 12 – 17.
The earliest finds from the site were lithics (Figure 14), in particular five possible small convex end scrapers (E2444:510:15, E2444:593:1, E2444:827:1, E2444:854:1 and E2444:1160:2). These are usually associated with the Bronze Age (Woodman et al. 2006). This may suggest that some of the pre-ringfort activity identified at Mackney was Bronze Age. The remaining lithics from the site were not chronologically diagnostic (Plate 13).

Medieval find types include an iron socketed, bodkin-bladed arrowhead (E2444:302:1, Figure 15, Plate 14), a type that usually dates from the 10th to the 13th centuries (Carroll and Quinn 2003). An Anglo-Norman silver coin (E2444:1:1) dated to the 13th century (1247 – 72), from the reign of Henry III. A second silver coin (E2444:78/89:13) found at the site was probably a groat from the reign of Henry VIII, possibly struck in Bristol in 1546 (Plates 15 & 16).

Post-medieval finds were plentiful at Makney, many of them retrieved from waste dumped in the souterrain during the occupation of nearby Mackney house. There was evidence that a certain amount of luxury goods were used at the house. The finds included empty pots of toiletries (cold cream and tooth paste) and a bone tooth brush handle, which appear to have been manufactured from the 17th century onwards, although the majority recovered from excavations date to the 18th – 20th centuries (Hurley 2003, 333-334). Several pots that originally held anchovy paste, for toast and biscuits, were also discovered, evidently brought over from London (Plate 17), and there were also several ceramic salt caps (Plate 18). A ceramic door knob, perhaps from one of the doors in Mackney House, was also found (Plate 19). A musket ball (Plate 20) indicated that activity at the site was not all luxury and domesticity, and the numerous other post-medieval finds from Mackney included pieces of textiles and shroud pins (Plate 21) associated with the burials were found and these were post-medieval types (see Appendix 14).

Finds of unknown date included an iron knife (E2444:157:1), probably medieval in date (Plate 22) and a bone toggle (E2444:112:6, Figure 16).

6.14.6 Textile

The textiles from Mackney were examined by Elizabeth Heckett (Appendix 17). The textiles were all from 21 of the infant burials. They were preserved by partial mineralisation because of their proximity to thin metal pins. Pieces of good quality linen were found with eight of the burials and linen fibres and threads were found with a further seven burials. A deteriorated type of cloth was present in all the finds: the material was coarse and dense in appearance, perhaps from wool, but it was not possible to definitely identify the fibre. It is possible that a substance such as bitumen was added to these coarse fibres. All of the textiles were used as shrouds or winding sheets.
6.14.7 Radiocarbon dates

Radiocarbon from Mackney were carried out by the 14 Chrono Centre in Queen’s University Belfast (see Appendix 10). The resultant dates suggested occupation ranging from the 8th to the 17th centuries.

The earliest date at Mackney was 730 – 950 cal AD (UB - 7374), which came from the fill of a fire pit, identified as a possible pre-bank feature. This date closely overlapped with one other early medieval date from the site: 780 – 965 cal AD (UB – 7371), obtained from metalworking features. A third early medieval date, 990 – 1150 cal AD (UB – 7376), came from the fill of another metalworking feature.

A late medieval date, 1260 – 1385 cal AD (UB – 7372), came from the fill of an isolated post-hole in the northern part of the ringfort. Another late medieval date, 1325 – 1440 cal AD (UB-7368), came from the fill of a hearth/fire-pit, probably used for corn drying and associated with a late phase of occupation at the ringfort (Phase 3). Other dates of later medieval occupation came from nearby fire-pits that were also probably used as corn dryers, e.g. dates of 1410 – 1450 cal AD (UB – 7369) and 1445 – 1630 cal AD (UB – 7370). Although the date range of these features is quite wide, from the 14th to the 17th centuries, these dates almost overlap in the fifteenth century, perhaps the most likely phase of use of the corn-dryers.

A final two late medieval dates were obtained from a layer that overlay a domestic hearth, 1445 – 1525 cal AD (UB – 7373), and the fill of a domestic hearth found in close proximity to Structure J, 1450 – 1635 cal AD (UB – 7375). All of the later medieval dates were found in association with features that produced large quantities of plant remains, possibly indicating that the site was used for crop processing or re-distribution in the later medieval period.
7 Discussion

7.1 Phasing

Mackney ringfort has had a long history of use and re-use and, while it is difficult to render the story of the ringfort in exact chronological order, some definite points in time can be established around which a narrative can be constructed. This chronology is based on morphological comparisons between features, stratigraphic relationships, radiocarbon dating and cartographic analysis. The absence of datable finds from secure contexts means that the artefacts are unsuitable for establishing site chronology.

7.1.1 Phase 1: pre-ringfort activity

The earliest trace of activity on the site of the ringfort at Mackney was recognised below *in situ* bank deposits and below the remains of a buried sod layer that survived beneath the line of the bank. One of these features, a fire pit, yielded charcoal that produced a radiocarbon date of cal AD 728 – 949 (UB-7374). These pre-bank features may reflect activity unrelated to the construction of the ringfort or may be connected with activity related to its construction. The radiocarbon date indicates a time before which there was no ringfort on the site. This date range places Mackney ringfort in the later half of the established ringfort construction chronology produced by Stout, which suggests that two-thirds of sites have the midpoint of their date range falling between AD 600 and 900 (Stout 1997, 24).

7.1.2 Phase 2: primary ringfort occupation

The construction of the enclosing ditch and bank, and the related internal features, took place sometime during the 8th and 10th centuries. The dating of a large proportion of the ringfort features to this primary phase of ringfort activity has been done largely on the basis of morphological similarities with features from other excavated ringforts. Due to a lack of stratigraphic relationships between the internal features the spatial relationship of features to each other was also considered. The entrance causeway (and associated features), the central circular house (Structure A), the partial circular house (Structure C), the lean-to (Structure B), the refuse pits and the souterrain have all been attributed to the primary phase of ringfort activity on this basis. The identification of other features with this primary phase, such as the post-hole concentration (Structure G), the possible rectangular structure (Structure D), the post-hole arc (Structure E), the L-shaped post-hole concentration (Structure F) and the L-shaped linear features is less clear cut and some may possibly belong to the later occupation phases.

The discovery of metalworking features and their location in the lee of the bank to the north of the entrance has striking similarities with other excavated ringforts. A radiocarbon date obtained from charcoal associated with one of the bowl furnaces dates the activity to
cal AD 775-965 (UB-7371). This date range links the metalworking activity to the primary phase of ringfort activity. A second radiocarbon date obtained from charcoal from a related feature gave a date range of cal AD 988 – 1153 (UB-7376). This second date produced a minimum date range for this period of activity as a whole and indicates that metalworking was carried out at the site over a long period of time. The excavated bowl furnaces showed evidence for three phases of re-use. One of the post-holes associated with one of the possible buildings (Structure H) associated with the metalworking revealed traces of being repaired.

Evidence for a period of prolonged activity is visible in other areas as well. For example, the entrance to the ringfort appears to have been repaired or re-designed over time and early features were identified below the possible occupation surface remnants inside the lean-to, Structure B.

### 7.1.3 Phase 3: later medieval activity

A series of large fire-pits/hearths and associated pits (Group 15) were located just inside the line of the bank in the south-east quadrant of the ringfort. Three of the features were radiocarbon dated by charcoal from their fills to between cal AD 1323 and 1631 (UB-7368, UB-7369 and UB-7370). This series of features is not associated with the primary phase of ringfort occupation but with a use of the ringfort in the later medieval period. A hearth associated with structural post-holes and pits (Structure J) located close to the line of the bank in the south-western quadrant of the ringfort yielded a radiocarbon date of cal AD 1449 – 1634 (UB-7375). Charcoal from a hearth located just inside the line of the bank to the north of the ringfort interior produced a date of cal AD 1446 – 1632 (UB-7373), which is strikingly similar to two of the other radiocarbon dated hearths. Artefacts from this period included a socketed arrowhead (E2444:18:2) and two silver coins: one (E244:78/89:13) dating from the reign of Henry III and the other (E2444:1:1) from the reign of Henry VIII. The radiocarbon dates, and later medieval finds are evidence for substantial occupation activity within the ringfort in the later medieval period.

### 7.1.4 Phase 4: post-medieval and later, burials and cultivation

Post-medieval use of the site included cultivation and use as a burial ground. The area was part of the estate of nearby Mackney House, which was built by the Trench family at the turn of the 18th century, and the ringfort lies in close proximity to the courtyard and walled garden of the house.

Possibly the earliest phase of post-medieval activity was represented by a group of furrows, aligned north to south. These appeared to respect the layout of the ringfort and did not traverse the remains of the enclosing bank. An Irish halfpenny (E2444:0:7) dating to 1805 was recovered from these furrows. Four of the infant burials located in the southern half of the ringfort interior cut the north to south furrows, indicating that the furrows were earlier than some of the burials.
Use of the site as an unconsecrated burial ground occurred within a specific sector of the silted up ringfort ditch. There is no indication of when the burials began but they probably happened over an extended period of time, hinted at by the fact that some of the burials were cut through each other and the burials were found at different levels within the burial horizon. The burial horizon was subsequently deliberately covered by a thick layer of locally derived glacial stone. This covered the area of burials and suggests that whoever instigated the introduction this stone deposit appears to have been aware of the burials and the dumping of the stone may have been a deliberate attempt to discourage the use of the ditch as an informal burial ground.

Similar stone was used to backfill the souterrain and large stones from the souterrain were quarried or robbed. The northern lintel stones of the north/south chamber of the souterrain and the lintel stones which covered the east/west chamber were deliberately removed. These stones would have represented good building material and would have been a valuable commodity. It is possible that robbing and backfilling of the souterrain and part of the ringfort ditch was associated with the original construction of Mackney House. The backfilling of the souterrain and the covering of the area of burials with stone may have all been associated with preparation of the site as part of a new landed estate.

However, despite the introduction of layers of stone, the ringfort continued in use as a place of infant burial. This continuation of burials may have initiated the levelling of the bank, which was pushed into the ditch. The Mackney estate underwent significant re-development in the early 19th century (Kelly 2004). It may well be that the backfilling of the ditch at Mackney ringfort was linked to this re-development. The field immediately to the east of the newly developed stable and courtyard may have been levelled and burial discouraged in order that cultivation could take place. The furrows aligned east to west may date to this period of cultivation. These were more regular and standard than the earlier furrows which were aligned north to south.

Mackney ringfort is not represented on the first edition Ordnance Survey map of the area, which dates to 1837. It is likely that a ringfort of such size would have been represented on the first edition map if it had been upstanding at the time of the survey. Therefore, the ditch was probably in-filled and the bank was levelled at some time prior to the survey for the first edition map.

Rubbish and waste from occupation of Mackney House was deposited in the souterrain after one of the remaining lintel stones from the roof of the north to south chamber of the souterrain collapsed, creating a hollow. This was filled with large volumes of window glass fragments, corroded metal, and an interesting collection of glass bottles and ceramic pots. The finds probably dated from either the late occupation of Mackney House or from the time of its destruction.

The three semi-circular quarries used to harvest sand and gravel from what remained of the ringfort bank are all features backfilled with mixed material containing some modern
fragments. The quarries themselves may be date from a slightly older phase of late nineteenth century activity. A number of internal pits are also possibly of more modern origin.

7.2 Morphology of the Ringfort

The single most distinctive morphological characteristic of the excavated ringfort at Mackney is the depth of the enclosing ditch. It was up to 3.1 m deep and 5-6 m wide. This suggests a defensive purpose for the ditch, although ostentation cannot be ruled out. Had the bank survived, the ditch and bank would have combined to present a massive defence for the settlement. The only published ringfort excavations with anyway comparable ditch depths are Lisdoon in Co. Fermanagh (Brannon 1982), Lissue in Co. Antrim (Bersu 1947) and Carrowkeel (Zajac 2004), all of which had enclosing ditches with depths of up to 2.2 m.

The internal diameter of Mackney ringfort at 55.64 m is well above the mean diameter for ringforts as a whole which, according to Stout, is 30 m (1997, 14). It is also larger than the measurement deduced from the Crith Gabhlach for the size of a Kings ringfort which is given at 42.56 m (Warner 1988). The ringfort conforms to the standard eastern entrance orientation observed by G. Stout (1984, 26) however its north-eastern inclination is slightly less conformist, with the majority of entrances having a slight south-eastern bias. The single ditch and bank which form the enclosure is also standard, as 80% of ringforts are univallate.

There is evidence at Mackney that the inner and possible outer revetment wall may have been added as an afterthought in order to contain the massive bank. The classic example of a bank constructed with an inner and outer revetment wall is Garryduff 1 (O’Kelly 1962) where the revetment was integral to the construction of the bank. At Rathgureen (Comber 2001) in Co. Galway the revetment wall also seems to have been integral to the construction. The partial inner revetment wall revealed at Mackney has more in common with an example from Lisnagun (O’Sullivan et al 1998) where, in the eastern and southern sectors, the inner face of the bank was revetted by a low drystone wall. Both Lisnagun and Mackney, however, were both subject to later cultivation which disturbed the surviving features greatly and it may be that the partial nature of the revetment walls was due to this disturbance.

The remains of a gate or possible gate-tower at the entrance to the ringfort were revealed during the excavation. These features narrowed the entrance to the ringfort and resembled the layout of the entrance at Garryduff 1 (O’Kelly 1962). The gate at Mackney was apparently large and elaborate and may well have supported a gate tower similar to examples postulated for Garryduff 1 and Ballycatten (O’Riordain & Hartnett 1943).
7.3 Structures

A total of ten structures or possible structures were assigned to the main early medieval phase of ringfort occupation. The remains of a central circular house (Structure A) and a lean to (Structure B) are definite structural features and there were partial remains of a secondary smaller circular building (Structure C) and a rectangular structure (Structure D). A large concentration of post-holes (Structure G) to the north of the site represent some form of structure or structures and post-holes associated with metalworking features (Structures H and I), although no definite shape or pattern could be ascertained have also been attributed to the early medieval phase of ringfort occupation.

Two less definite structural elements were identified in the north-western quadrant of the ringfort. An arc of shallow post-holes with an associated central post-hole (Structure E) have been interpreted as a small structure associated with storage or for penning animals and an L-shape group of five post-holes (Structure F) also served some structural purpose although later potato clamps and furrows have disturbed the evidence.

The remains of another possible building (Structure J) were found to the south-east of the souterrain but this has been assigned to the later medieval period.

The central circular house at Mackney, Structure A, had a diameter of 5.4 m. This matches the average size of the circular wicker houses from Deer Park Farms (Lynn 1994). Its isolated location at the centre of the ringfort interior is also a standard well-attested phenomenon (ibid.). From the house, it was possible to look out, to the north-east, and to see the approach to the ringfort through the entrance. The placement of house and entrance therefore appears to be largely based on the direction of the prevailing wind and a deep-rooted psychological desire to be able to observe the entrance to one’s domain.

The fabric of Structure A was apparently largely made up of wattle panels inserted into the foundation trench, an interpretation based on observation of eight regular flat-sided lengths of the trench. There was no evidence for stabilising posts in the form of regular post-holes at either end of the panels. There were tightly-spaced groups of post-holes in the northern and southern sides of the house. The evidence implies mixed construction techniques which allowed for load bearing posts to support the roof structure to be incorporated into the walls of the structure. A number of internal post-holes and pits survived but definite patterns outlining bedding areas or other internal divisions could not be deduced.

It is usual to find evidence for a second roundhouse, especially in larger ringforts, as was the case at Dromore Co. Antrim (Collins 1968). The partial evidence for a similar secondary round house were also uncovered at Mackney (Structure C). However, these remains were disturbed and very little can be deduced about this structure. Neither of the two circular structures at Mackney produced evidence for a hearth.

Rectangular house structures have been identified within ringfort interiors and largely as a result of Chris Lynn’s (1994) pioneering work these are now generally accepted along with souterrains as representing a later stage in ringfort development. It has been suggested that
roundhouses were an obsolete form by the 10th century (Lynn 1994). If this is the case then the circular houses at Mackney can be placed at the very end of this sequence in view of the late date proposed above for the construction of the ringfort. Rectangular houses are also generally located closer to the enclosing element than the earlier circular structures. The remains of a possible rectangular structure have been identified at Mackney (Structure D). The evidence was limited to two perpendicular rows of substantial structural post-holes. Lynn (1994) identified only six rectangular houses constructed with spaced post-holes and in this respect the possible structure form Mackney is slightly unusual.

A working and living space such as a ringfort would have necessitated numerous building such as sheds, stores, outbuildings and workshops. At Mackney traces of ancillary structures were identified. Definite traces of a lean–to structure (Structure B) with an internal hearth were identified against the line of the bank to the south of the entrance. Well known examples of structures abutting banks come from excavations at Seacash (Lynn 1978) and Rathbeg (Warhurst 1969). At Lisnagun (O’Sullivan et al 1998) evidence for a range of ancillary structures located at either side of the entrance were identified. Structure B at Mackney fits neatly within this group. The structure had an entrance, a gap in the slot trench, facing Structure A.

The large concentration of post-holes to the north of the ringfort (Structure G) did not reveal any pattern however the large numbers of structural features in a clearly defined area are suggestive of a structure or a group of structures an indeterminate pattern may attest to rebuilding and renewing over time.

7.4 Other Internal Features

Along with the structural remains a number of other internal features were also identified with the primary ringfort occupation. A series of isolated but centrally placed pits located just 5 m to the north of the central circular house have been interpreted as refuse pits. The large central pit with a depth of 1.3 m could also have acted as a cistern used to store water both for domestic and semi-industrial purposes. There was no evidence of the necessary waterproof lining, however, a water-storage feature would have been a necessity in such a large active settlement space. A number of large pits from Killickaweeneey (Walsh 2005) have been similarly interpreted.

7.5 Metalworking

A total of 42 kg of slag found at Mackney is representative of small scale ironworking industry when compared to sites such as Lisleagh, Co. Cork where c. 800 kg (Monk 1988) were recovered or Johnstown, Co. Meath (Clarke 2002) where 2,000 kg of slag were recovered. The 86 kg of slag recovered from a site at Killickaweeneey, Co. Kildare (Walsh 2005) provide a more comparable level of activity. The metalworking was carried out during the early me-
dieval period. The double furnace feature has been dated to cal AD 775-965 (UB-7371) and appears to be the earliest of the furnaces as it is truncated and overlain by later furnaces. It is likely that after each smelting cycle the furnace had to be dismantled to retrieve the bloom and therefore a new furnace was built for each smelt, one on top of another. A rectangular pit has been interpreted as a smithing hearth with an anvil-stone *in situ*. Charcoal from the fill of the hearth was radiocarbon dated to cal. AD 988-1153. Early medieval metalworking furnaces were also found at the early ecclesiastical site at Reask, Co. Kerry (Fanning 1981) and at the ringfort at Marlinstown, Co. Westmeath (Keeley 1991).

Iron is produced from minerals containing sufficient iron to make the process economically viable. The most common ores found in Ireland are haematites, limonites and pyrites (Scott 1991). In antiquity, an important source was bog ore (iron hydroxide), which is formed by the precipitation of iron compounds in lakes and bogs. Bog ores are porous and relatively easy to reduce. Mackney is situated on the boundary of the boggy ground which runs south from Ballinasloe along the bank of the river Suck and it is likely on the basis of proximity and availability, that the ore used in the iron-working was derived from these bogs.

The metalworking area was defined by the remains of two furnace structures which may have been low shaft furnaces used for smelting. An associated pit with an *in situ* angular stone may have been used for primary bloom smithing. Another rectangular pit has been interpreted as a smithing hearth which also had an *in situ* anvil stone. A large stone with slag attached to its upper surface is thought to have been used as an anvil. Recognised stone anvils are quite rare and the only other example from a ringfort excavation was identified at Rathgureen, Co. Galway (Comber 2002).

This evidence, together with the assemblage of smithing hearth bottoms, indicates that smithing was carried out at Mackney in the early medieval period. The series of furnace cuts, together with furnace fragments and slag cakes in the shape of ‘furnace bottoms’, also suggest that smelting was carried out on a small scale.

A structure, identified as a series of post-holes in the vicinity of the double furnace and annexe, may have served as a shelter for the metalworking activities. Eight post-holes had evidence for packing material and one appeared to have been stabilised by two smaller stakes. There was also some evidence for the renewal of the posts. The evidence then points to a substantial building (Structure H), not just wind-breaks, associated with the metalworking activities which may have been repaired and used for a prolonged time period. Evidence for structures associated with the metalworking industry are rare and the recently excavated site at Kilickaweeney (Walsh 2005) is exceptional in that a small rectangular structure was identified with the metalworking area and was identified as perhaps being a shelter for the smith.

An 8th century document - ‘Blaí ord indeóin’ (The Exemption of the Hammer and Anvil) - suggests that it was not only humans who were in danger of injury as it also quantifies the amount of compensation to be paid, should an animal sustain an injury. This, according to Scott, indicates that the forge was out in the open and boundary-less or simply covered by
a flimsy structure (Scott 1984, 59-61). This matches the picture described for the potential secondary smithing area where there are no post-holes associated with the feature.

### 7.6 Spatial Organisation

At Mackney some attempt can be made to describe the internal organisation of the ringfort. There is evidence that metalworking was accommodated within the enclosure as well as the normal domestic necessities of shelter and food production. The standard view of the ringfort economy as one largely based around dairying has gained acceptance and credibility since the publication of McCormick’s (1995) hypothesis that an agricultural revolution based around the introduction of dairying was the catalyst behind the development and proliferation of the ringfort as a settlement model. The implication of this model is that cows and their management play a role in the function of the ringfort space.

Metalworking would have required high temperature furnaces and hearths which were presumably fire-hazards. The metalworking area was isolated in the lee of the ringfort bank, to the north of the entrance. This position would also have allowed the prevailing wind to discharge the associated noxious fumes. It is interesting to note that the positioning of the metalworking area to the north of the entrance and in the lee of the bank mirrors the layout at Garranes (O’Riordain 1942) in Co. Cork. Due to the prevailing wind in Ireland this positioning of a smokey semi-industrial activity in this quarter of a circular enclosure would be a logical arrangement.

The roundhouse (Structure A) stands isolated and just south-east of centre within the interior at Mackney. The house entrance is aligned with the ringfort entrance and the entrance to the lean-to (Structure B). The secondary circular house (Structure C) is located to the south. It seems likely, therefore, that this area to the south-west of the interior was a domestic space. A possible cistern, centrally placed within the ringfort, would have been ideally located to cater for all the needs of the ringfort inhabitants whether agricultural domestic or semi-industrial.

Only one structure (Structure E) associated with primary ringfort occupation is located in the north-western part of the ringfort. This has been interpreted as a shelter or animal pen. Perhaps this area of the ringfort was dedicated to the management of livestock.

The souterrain occupies the south-western quadrant of the ringfort interior. The souterrain would have acted as a place of refuge but also for storage. Perhaps the rectangular structure (Structure F) shared the function of storage as it was located nearby.

### 7.7 Souterrain

Alcock et al. (1999) contend that souterrains were not isolated monuments, though they often survive as such today. Rather they originally formed part of complex habitations as is testified by their frequent association with ringforts and early ecclesiastical settlements. In the north
Galway area 88% of souterrains are associated with ringforts, ecclesiastical settlements or unclassified enclosures and earthworks (ibid). In south Galway this pattern is repeated with only 13% of the identified souterrains being associated with unenclosed settlements (Clinton 2001, 45). The souterrain at Mackney is clearly associated with a ringfort.

However, it is not clear whether the souterrain at Mackney was constructed at the same time as the initial construction of the ringfort. It is possible that a number of in situ bank deposits located in the south-west quadrant may have originated from the construction of the souterrain. The material appears to be re-deposited boulder clay and was located on the inside edge of the bank. The recorded tip lines would not be inconsistent with having being dumped from the interior of the ringfort. This suggests that the souterrain was built in conjunction with the enclosing bank and not at a later secondary phase of occupation.

The souterrain contains a number of interesting structural features that have been recognised elsewhere and have been categorised and discussed by Clinton (2001). Mackney is a well-developed example of a souterrain with an oblong chamber. Most souterrains of this kind are found in the Galway /north-west Clare / south Mayo area (Clinton 2001, 121-2). The main chamber at Mackney fits well into this distribution pattern and is a large and very well constructed example of an oblong chamber. The trap door of this souterrain also conforms to known souterrain designs from the west of Ireland.

A souterrain discovered in 1982 in Carnmore, Co. Galway, and described by Buckley and O’Brien (1985), displays a number of striking similarities to Mackney souterrain including the presence of a connecting ramp. At Carnmore a ‘drop hole creep’ and a ramp connected chambers 2 and 3. The ramp was 1.5 m long 0.9 m high and appears to consist of natural boulder clay left uncut during the construction of the souterrain. The segmented isometric view of the souterrain provided by Buckley & O’Brien (1985) also shows that the ramp connects the low northern wall of chamber 2 with the ‘drop hole creep’ opening. At Carnmore the side walls of the chamber continue either side of the ramp and the upper end of the northern wall is completed above and to the north of the ‘drop hole creep’ opening. A similar arrangement would provide the most logical layout for the remaining structural features at Mackney where the side walls either side of the ramp, the roof and the upper half of the northern wall of the north/south chamber have been robbed and the space subsequently backfilled. A similar arrangement of drop-hole creep and ramp was identified in souterrain 1 in Millockstown, Co, Louth (Manning 1986).

The souterrain at Carnmore was L-shaped and used large key or spall stones projecting from the chamber walls to support the large roofing lintels. This roofing arrangement is paralleled at Mackney where the large supporting lintels of the upstanding roof section also projected from the side walls of the Chamber. At Mackney these supporting lintels are held in place by large counter balance boulders and the roof as a whole was covered in a thick layer of cement like material. This material covered the entire area between both sides of the souterrain cut and was up to 0.5 m deep along the western side. This material may have acted as both a stabilising agent and a waterproof layer protecting the integrity of the chamber be-
low. According to Clinton’s classification the souterrain at Carnmore belonged to a different sub-class of the western elevated trap door group than the Mackney example. This is due to the fact that the flow of entry was in an opposite direction, which meant that the drop creep could only be sealed from the outside, rendering it a non-defensive feature.

The occurrence of schools of souterrain building may be detected in the limited distribution of certain structural aspects. The western elevated trapdoor feature is one such distinctive feature and the souterrain at Mackney is a fine example of a developed and distinct western form. If the Mackney souterrain is included on the distribution map of the type A trapdoor features, a distinct east to west linear distribution can be seen. One possible explanation for this distribution pattern is that it reflects a correlation with the Slíghe Mór and that this early medieval highway facilitated the flow of new souterrain designs and construction methods. According to Geissel (2006) the Slighe Mor was primarily used by students moving between the great ecclesiastical centres along its route, such as Clonmacnoise and Clonard, and the seaports of Dublin and Galway. The area around Ballinasloe, as well as being linked into the Slíghe Mór, also had a very well developed early ecclesiastical infrastructure with at least four distinct early medieval foundations in the area, all of which had strong links with Clonmacnoise.

The link between souterrains and early church sites has been demonstrated and Clinton (2001, 210) even suggests that the idea of souterrain construction emanated from clerics returning from sojourns abroad and introducing ideas seen on their travels in either Cornwall or Armorica. A diffusionist model for the origins of souterrains based on the transmission of ideas by clerics may ultimately not have a solid basis when independent ideas based on localised defensive imperatives may be more appropriate. However, the diffusion of individual design elements along an established contemporary route may have a credible basis.
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9 Figures

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Figure 3: The route of the new N6 Galway to Ballinasloe road (Contract 4) overlaid on the RMP map.
Orange subsoil that underlay collapsed bank material

Pre bank features (Group 2)

Miscellaneous features (Group 18)

Features post dating N/S furrows (Group 23)

LEGEND

SK4
SK32

[1028]
[1195]

Quarry (group 21)

Area 8 NW facing section
Area 7 E facing section
Area 9 W facing section
Area 12 W facing section
Area 12 E facing section
Area 4 SW facing section
Area 3 W facing section
Area 2 SE facing section
Area 1 SE facing section

Tree root disturbance

L-shaped linear features (Group 18)

Subgroup 2003

Hearths and fire pits (Group 15)

Possible structure to south of souterrain (Group 11)

Hearths and associated features to NE of ringfort interior (Group 16)

N/S furrows and potato clamps (Group 20)

E/W furrows (Group 24)

Larg Pit (Group 22)

Burials (Group 30)

Central Baulk

SK54
SK115
SK22
SK59
SK113
DSK19
SK8
SK45
SK48 + SK49

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Orange subsoil that underlay collapsed bank material

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Archaeological Excavation Report,
Mackney
Co, Galway

Ringfort with Killeen Burials

Volume 2

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Appendix 1: Stratigraphic Index

Please see attached CD for Stratigraphic Index.
Appendix 2: Matrix

Please see attached CD for Matrix.
Appendix 3: Groups and sub-groups text

Group 1 Natural deposits

This group describes the natural geological deposits identified across the excavated area.

Sub-group 1001: Natural gravels

List of Contexts; C.186, 172, 922, 514.

Description

This sub-group describes the natural underlying stony gravel found in the excavated area. It was a compact mid greenish grey pebbly sand containing frequent amounts of undifferentiated pebbles and stones.

Sub-group 1002: Interface deposits

List of Contexts; C.1055, 806, 201.

Description

This layer represents the interface between the natural gravels and the natural sub-soil. The deposit was a firm dark orangish brown sandy silt.

Sub-group 1003: Natural sub-soil

List of Contexts; C.794, 985, 743, 758, 202.

Description

This sub-group describes the natural sub-soil which was a firm mid orange clayey silt.

Sub-group 1004: Buried ground surface

List of Contexts; C.757, 800, 205.

Description

This sub-group represents a buried ground surface, or sod layer, that was overlain by bank deposits during the construction of the ringfort. It was a firm light greyish brown sandy silt with very occasional fine pebbles inclusions but was mostly stone-free. Some faunal remains were recovered from these deposits.
Group 2 Pre-bank features

This group describes the features that lay underneath the in situ bank remains or the buried sod layer and therefore pre-date the construction of the bank. A fire-pit located to the north of the site has also been included. The pit was found below the topsoil however its location would have originally been below the bank.

Sub-group 2001: Three linear trenches
List of Contexts; (1153), 1148, (1154), 1147, (1137), 1138.

Description
This sub-group is comprised of three north/south linear trenches that were located to the north of the site and underlay the remains of the ringfort bank. These trenches had, in general, steep sides and flat bases and their northern and southern extents had rounded corners. The trenches contained silty sandy fills (1148), (1147) and (1138) all of which had a significant volume of stone and pebble inclusions.

Sub-group 2002: Oval pit
List of Contexts; (1152), 1149.

Description
This sub-group is composed of a single oval pit located between the two linear trenches from sub-group 2001. The pits (1152) long axis lies north/south and it was oval in shape. The profile of the pit was regular and it had gently sloping sides and a concave base. Its fill (1149) was similar in composition to those within sub-group 2001 however it had a much lower density of stone inclusions.

Sub-group 2003: Fire-pit and stake-hole
List of Contexts; (596), 589, 595, 585, (598), 597

Description
This sub-group compromised of a fire-pit and an associated stake-hole located underneath the buried sod material to the south-east of the ringfort. Fire-pit (596) measured 0.67 m in length, 0.58 m in width and 0.16 m in depth. It was circular in shape with gentle sides and a tapered rounded point in profile. Its primary deposit was a mid pinkish red clayey sand (589) which contained charcoal and pieces of quartz. The secondary deposit was a dark greyish black charcoal spread (595) while the final fill was a mid greyish brown silty sand which contained charcoal inclusions. The fire pit (596) truncated the top of stake-hole (598) which
measured 0.2 m in length, 0.15 m in width and 0.2 m in depth. It was sub-rectangular in shape with vertical sides and tapered blunt point in profile. It was filled by a mid greyish brown silty clay (597) which had quartz inclusions. A layer of buried sod material (757) overlay both of these features. A sample from spread (C.595) was rich in charcoal, including oak (62 fragments), hazel/alder (13 fragments) and yew (28 fragments). Insect holes were present in the yew fragments. A sample from C.585 was also rich in charcoal, including oak (13 fragments), alder (3 fragments) and yew (34 fragments). Fire pit fill (C.589) had a small amount of charcoal, including oak (2 fragments), willow/poplar (1 fragment) and yew (2 fragments). Fire pit fill (C.589) had no cereal remains but had 1 large legume fragment and 1 small legume fragment, and weed seeds of the knotgrass family (1 fragment), wild radish (3 fragments), nipplewort (4 fragments) and small grass seeds (3 fragments). The presence of yew in these contexts is unusual, it was not commonly found in other samples from the site, and may represent worked wood instead of e.g. firewood. The insect holes are likely to be evidence that the wood may have been exposed for some time before being burnt.

**Sub-group 2004: Post-hole and small linear trench**

List of Contexts; (901), 1336, (913), 1335, (899), 898.

**Description**

This sub-group represents a post-hole and a small linear trench located underneath the buried sod layer to the south-east of the ringfort interior.

Post-hole (913) measured 0.4 m in length, 0.3 m in width and 0.23 m in depth. It was sub-circular in shape with moderately steep sides and a concave profile. It was filled by a mid brown clayey silt (898) and had a packing material (1335) of small to medium stones. Linear feature (901) measured 1 m in length, 0.15 m in width and 0.03 m in depth. It was sub-rectangular in shape with moderate or gentle sides and a concave profile. It was filled by a light greyish brown silty clay (1336). Both of these features were overlaid by a layer of buried sod (757).

**Sub-group 2005: Small pit under revetment wall**

List of Contexts; (1086), 1085.

**Description**

This sub-group represents a small pit that lay under the inner revetment wall (953) to the north east of the ringfort interior. Pit (1086) measured 0.48 m in length, 0.22 m in width and 0.07 m in depth. It was irregular in shape with moderate to steep sides and a flat base. It was filled by a light grey silty sand (1085) which contained occasional flecks of charcoal. A sample from fill (C.1085) contained oak (8 fragments).
Sub-group 2006: Hearth

List of Contexts: (1173), (1172), (1145), (1168), (1146), (1158), (1157), (1156), (1163), (1159).

Description

A shallow north/south aligned sub-circular pit (1173) with moderate to steep sides and measuring 1.47 x 0.68 x 0.20 m is the earliest feature within this group. The base of the pit was irregular in plan and concave in profile. The pit contained a dark grey brown clayey silt (1172) with a moderate volume of sub-rounded stone inclusions. The north eastern extent of the pit appeared to have been truncated by (1145). Pit (1145) was irregular in plan with vertical sides at its northern and southern extents, however the sides became shallower and concave to the east and west. The base of the pit was oval in plan and concave in profile. The pit contained five fills: (1168), (1146), (1158), (1157), and (1156). All the fills were silt clays varying from black to orangish brown in colour. Fills (1157) and (1146) both contained occasional sub-angular stone inclusions while fill (1156) contained occasional sub-angular pebble inclusions. Vitrified material was recovered from both (1157) and (1146), and heat affected stone and possible shell fragments were also recovered from fill (1146). At the eastern extent of pit (1145) a small post-hole (1163) had been cut into fill (1146). The post-hole contained a single fill of black clayey silt (1159) which was later sealed by fill (1157). A sample from pit fill (C.1156) contained a small amount of cereals, including oat (1 fragment) and wheat (1 fragment).

Group Interpretation

All the features within the group apart from sub-group 2006 lay close to the interior edge of the ringfort ditch under deposits considered to be in situ remains of the enclosing bank or a layer of buried sod interpreted at pre-dating the ringfort construction. Their stratigraphic position implies that they either predate the ringfort or are associated with its construction. No anthropogenic material was recovered to aid in the interpretation of the group. The location and orientation of the three linear trenches within sub-group 2001 imply that they may be associated with the construction of the ringfort bank perhaps acting as cross braces to support loose bank material. The fire-pit and stake-hole described in sub-group 2003, the post-hole and small linear trench described in sub-group 2004 and the small pit described in sub-group 2005 also represent a phase of pre-bank activity. It is also possible that these features were related to the construction of the ringfort.

The date of sub-group 2006 is uncertain however it appears that it does not relate to the main phase of ringfort occupation. The sub-group is located in an area which during the use of the ringfort would have been overlain by the enclosing bank. No deposits associated with the bank had been preserved in this area, however it is clear that it had once been present as excavation of the ringfort ditch in the northern sector of the site produced deposits caused by
bank collapse. It can therefore be concluded that the group either predates the main ringfort construction or post dates the final levelling of the bank.

The deposits comprising the hearth (1145), clearly indicated in situ burning which was further supported by the presence of vitrified material and heat affected stone within them. The post hole (1163) seems to indicate a superstructure associated with the use of the hearth; however it is clear that this had gone out of use before the deposition of (1157). The lack of charcoal lenses within (1145) suggests that the hearth had been deliberately cleared on at least one occasion. It is possible that the earlier pit (1173) relates to similar activity occurring in the area previous to hearth (1145). The charcoal recovered from within (1173) may be derived from the clearing of a hearth pre-dating the final cut of (1145). It is unclear as to whether this group relates to industrial or domestic activity.

**Group 3 Enclosing ditch**

During the excavation 14 ditch sections (Areas 1 – 14) of varying widths were excavated across the line of the enclosing ditch. One of these sections Area 13 was not recorded due to root disturbance from the large tree in the north-west quadrant.

**Sub-group 3001: Original ditch cut**

List of Contexts; C.(17), (25), (39), (62), (77), (83), (88), (90), (106), (180), (768), (1194), (259).

**Description**

The enclosing ditch was large and generally V-shaped in profile. The ditch is nearly exactly circular in plan with a diameter, measured from the inside edge of the ditch, of 55.64 m. The ditch encloses an area of 2432 m², which includes the area occupied by the enclosing bank. The ditch measures 180.5 m in length along its centre and is interrupted by a 6.6 m wide causeway running between two rounded and steep sided ditch termini. The entrance causeway is located to the ENE of the monument. The ditch was approximately 5 – 6 m wide and ranged in depth from 1.75 – 3.1 m. It was deepest to the south-east, south, south-west and west and shallowest to the north. The level at the base of the ditch ranged from 54.63 m OD to the north-west to 52.08 m OD to the north-east. The low point in the ditch to the north east corresponds with a water formed silt deposit (sub-group 3004) primarily located in this area.

The ditch was cut into the sod, topsoil, subsoil and the underlying natural sand and gravel. The ditch sides had significant numbers of large naturally occurring stone protruding into the ditch space. Along the southern sector of the ditch the sides are spleighed wider at the top forming a partially stepped profile especially along the outside edge. The lower half of the ditch sides were steeper and sharper. Only one partial re-cut was identified and this was in the southern deeper section of the ditch.
Interpretation

The ditch was cut around the highest point of a naturally occurring glacial ridge which runs roughly east/west. The ground outside the ringfort ditch to the south-east, south and west is relatively flat, however it falls away sharply to the north and north-east. This accounts for the relative shallowness of the ditch in this sector as the natural fall of the ground offered a natural defensive advantage. The sheer size and scale of the enclosing ditch points to a largely defensive function. Ostentation and symbolism cannot be ruled out, however the pragmatic approach taken with regard to the depth of the ditch points to a utilitarianly defensive nature.

Sub-group 3002: Primary silting and re-cut in area 12

List of Contexts; C.(976), 784, 776, 773, 772, 774, 786, 785, 775

Description

The deposits listed above are all brown sandy clays with occasional pebble and small and large stone inclusions. They were located in the base of the ditch in Area 12, which was located in the south-east arc of the ring fort ditch. The fills were cut (976) at a later date to from a ditch with a tapered point.

Interpretation

The fills formed during the primary silting of the ditch and these were re-cut at a later date to reform the original shape of the ditch. The silting was unusually deep at this point along the ditch and necessitated a secondary phase of ditch cutting. The reason for the exceptional silting is unclear but may have something to do with the industrial/domestic processes been undertaken inside the ringfort bank at this point along the enclosing ditch. Water may have been necessary for some process and this section of the ditch may have been used as a drain leading to the silting up of the ditch.

Sub-group 3003: Primary collapse/erosion of the ditch sides

List of Contexts; C.28, 34, 48,45, 46, 71, 61,60,59, 100, 124, 123, 122, 121, 128, 130, 138, 162, 240, 241, 237, 229, 242, 238.

Description

The ditch fills listed above are generally grey silty sands with some orange/brown silty clays. They all have moderate amounts of pebbles and small stone inclusions, and are relatively thin layers at the base of the ditch. They were encountered at the base of the ditch in all the excavated sections apart from Area 12 which had a re-cut through a number of primary silting
deposits 3002. Fill (46) contained a single fragment of animal bone. Ditch fill (C.28) had a small to moderate amount of charcoal present, including oak (7 fragments), ash (1 fragment), hazel (4 fragments) and willow/poplar (3 fragments).

Interpretation
This group of ditch fills has been interpreted as representing primary collapse and erosion of the ditch sides which occurred shortly after the construction of the ditch. The silt and clay elements within some of the deposits reflect the composition of the upper levels of the ditch sides. The excavated sections in Areas 8 and 11 in particular showed strong evidence of this ditch side collapse. The charcoal within the ditch fills was very mixed, this may indicate that it was domestic in origin.

Sub-group 3004: Silty clay at the base of the ditch
List of Contexts; C.16, 31, 75, 104, 257

Description
The ditch fills listed above are all grey silty clays with occasional pebble and stone inclusions. Charcoal flecking was frequently noted. The fills averaged c. 0.15 m in depth and were deposited towards the base of the ditch. The silty clay deposits are confined to the north eastern excavated sections apart from fill (104) in Area 7. Fill (257) and (75) contained faunal remains. Ditch fill (31) had charcoal present, including oak (21 fragments), hazel/alder (10 fragments), and alder (6 fragments). Ditch fill (16) also contained charcoal with a wide variety of wood types present, including oak (21 fragments), ash (1 fragment), hazel (4 fragments), alder (5 fragments), pomoideae (1 fragments), Prunus (4 fragments), yew (2 fragments) and spindle (1 fragment). Ditch fill (16) had a small amount of cereals, including oat (3 fragments) and indeterminate (3 fragments). Ditch fill (31) had a small amount of cereals present, including barley (4 fragments), wheat (1 fragment), indeterminate (3 fragments) and hazel nutshell fragments (2 fragments).

Interpretation
This group of ditch fills formed through natural silting up of the base of the ditch in waterlogged conditions. The charcoal inclusions may be derived from the metal working activities located inside the bank in the north-east quadrant.

Sub-group 3005: Hearth and associated pit in area 8
List of Contexts; C.1203, 1201, 1199, 1200, 1198, (1210), 1275, 1202
Description

A hearth and pit were excavated in Area 8. A thin deposit of reddish orange clay sub-circular in plan and measuring 0.56 x 0.60 m (1201) underlay a deposit of charcoal (1199) which was in turn covered by a deposit of grey ash (1200). A small pit (1210) was identified close to the hearth which contained black sandy silt (1275) and a grey ash deposit. A sample from hearth spread (1201) had a small amount of charcoal, including ash (2 fragments) and pomoideae (1 fragment).

A sample from spread 1198, which is above the hearth, had a moderate charcoal presence including oak (8 fragments), alder (8 fragments), willow/poplar (8 fragments) and pomoideae (1 fragment). A sample from the pit fill (1203) contained a small amount of plant remains. Cereals included oat (1 fragment), wheat (1 fragment) and indeterminate (1 fragment). A large legume fragment was also present. A sample from the spread (1198) had a large cereal assemblage, including oat (31 fragments), wheat (52 fragments) and indeterminate (5 fragments). Legumes (6 large fragments) and (12 small fragments) and hazel nutshell fragments (46 fragments) were also present.

Interpretation

The features have been identified as a hearth and an associated ash refuse pit. The hearth is located relatively early in the stratigraphic sequence of the ditch fills and was in use prior to the stone collapse possibly associated with the outer bank revetment wall.

Sub-group 3006: Bank erosion pre lower stone deposit

List of Contexts; C.33, 57, 1177, 92, 1273

Description

The ditch fills listed above are primarily brown silty clays with pebbles and moderate small to medium stone inclusions. They are 0.10 – 0.40 m deep and are located towards the base and on the inside edge of the ditch sides. The fills pre-date a level of stone collapse recognised in all the excavated ditch sections. Fill (92) contained some faunal remains.

Interpretation

The fills are most likely derived from erosion of the enclosing bank which pre-dates the possible collapse of the outer, bank revetment wall.

Sub-group 3007: Slips and erosion from exterior pre lower stone deposit

List of Contexts; C.44, 102, 103, 233, 89, 209, 1176, 1175
**Description**

The ditch fills listed above range from brown silty sands and silty clays to grey sands. All of which contained occasional to moderate pebble and stone inclusions. The deposits range in depth from 0.12 – 0.40 m and are located towards the base and along the outside edge of the ditch. The deposits pre-date a level of stone collapse recognised in all the excavated ditch sections.

**Interpretation**

The fills are most likely derived from the erosion and slippage of material derived from the outside edge of the ditch and pre-date the possible collapse of the outer, bank revetment wall.

**Sub-group 3008: Possible hearth Area 8**

List of Contexts; C. 84, 85

**Description**

A deposit of black silt with a large volume of charcoal was identified during the excavation of Area 8. The deposit was 0.03 m deep and sub circular in shape measuring 0.77 x 0.70 m. A dark greyish brown silt covered the lower sub-circular spread. A sample from the hearth spread (85) had a large concentration of oak charcoal (50 fragments).

**Interpretation**

The feature has been interpreted as a hearth and is located stratigraphically later then the previous hearth 3005 excavated in Area 8. The hearth was in use however prior to the build up of the main silt deposits 3014 in the centre of the ditch. Oak is more commonly used as a fuel during metal processing, however no iron slag was present in this hearth. It is possible that oak was being used as a domestic fuel in this hearth, this exhibits access to plentiful supplies of oak, which in turn implies a degree of wealth as oak is a valuable resource.

**Sub-group 3009: Lower stone deposit – possible outer bank revetment wall**

List of Contexts; C.1295, 1298, 42, 74, 58, 105, 118, 131, 161, 239, 1281.

**Description**

The ditch fills listed above consist of deposits of medium to large sub-rounded stones with a grey to brown clayey silt or sandy silt matrix. The deposits ranged in depth from 0.3 – 1.2 m and were located at the centre of the ditch around its full circumference. Fill (131) contained some faunal remains. This lower stone deposit was not recognised in Area 1.
**Interpretation**
The lower stone deposit is possibly derived from the collapse of the outer bank revetment wall into the base of the ditch.

**Sub-group 3010: Erosion and collapse of bank post dating lower stone deposit**
List of Contexts; C.14, 15, 72, 99, 98, 120, 132

**Description**
The ditch fills listed above are grey to brown mixtures of sand silt and clay with moderate pebbles and occasional small rounded stones. They range in depth from 0.06 – 0.62 m. Fill (132) contained a quantity of shell. The deposits were located along the inner edge of the ditch.

**Interpretation**
The deposits appear to reflect episodic erosion and collapse of bank material after the collapse of the outer bank revetment wall.

**Sub-group 3011: Silt deposits pre-dating 3012 in area 5 and 14**
List of Contexts; C.68, 1284, 1182, 1162

**Description**
The fills listed above are yellowish to orangish brown silty sands with occasional to moderate amounts of pebble inclusions. The fills range in depth from 0.23 – 0.28 m and are located in the centre of the ditch in the northern sector of the ringfort ditch.

**Interpretation**
The fills are very similar to the main phase of ditch silting represented by 3014 however they are startigraphically earlier than a localised and deliberate phase of deposition represented by 3012.

**Sub-group 3012: Deliberate deposition containing domestic material in Area 5 and 14**
List of Contexts; C.69, 1181

**Description**
The deposits listed above are softly compacted dark brown silts with frequent pebble and small stone inclusions. The fills range in depth from 0.32 – 0.52 m and are located in the
northern sector of the ringfort ditch in Areas 5 and 14. Faunal remains were recovered from fill (69).

**Interpretation**
The loosely compacted dark brown fills are the result of localised deliberate dumping along this section of the ditch.

**Sub-group 3013: Erosion/collapse of bank material post-dating sub-group 2012 in Area 5 and 14**
List of Contexts; C.66, 70, 73, 76, 1178

**Description**
The deposits listed above are greenish grey to brown silty sands with moderate amounts of pebble inclusions. They range in depth from 0.04 – 0.56 m and are located in the northern sector of the ringfort ditch in Areas 5 and 14. Faunal remains were recovered from fill (1178).

**Interpretation**
The deposits are likely to have resulted from localised erosion or collapse of the bank or ditch sides prior to the build up of the main ditch silt deposits 3014.

**Sub-group 3014: Main ditch silt deposits - burial layers**

**Description**
The deposits listed above are predominantly brown silty clays and sandy silts and were excavated at similar levels around the full circumference of the enclosing ditch. They contained moderate amounts of pebbles and medium to large stone inclusions. The deposits ranged in depth from 0.1 to 1.04 m in depth but averaged c. 0.35 m in depth. The following fills contained faunal remains; (13, 24, 30, 40, 65, 56, 76, 97, 101, 117, 119, 155, 160, 230, 771, 254). Charcoal flecks were noted in fills (255) and (117) and slag was noted in fill (13), from Area 2, which was located in the north-east sector of the ditch and in close proximity to the metal working area in the ringfort interior. One fragment of medieval pottery was recovered from fill (230), in Area 11. In the southern half of the site these fills were used as a burial layer into which 116 mostly infant/juvenile inhumations were deposited. A sample from the ditch fill (117) contained a lot of charcoal, including oak (26 fragments), ash (22 fragments), hazel (38
fragments), alder (2 fragments), willow/poplar (6 fragments) and pomoideae (2 fragments). A sample from the ditch fill (1248) was rich in pomoideae charcoal (30 fragments). Another sample from ditch fill (255) had one cereal grain (bread wheat).

**Interpretation**

The deposits formed due to the natural silting up of the ringfort ditch. The depth of the fills suggests that this took place over a considerable time period. The medieval pottery from fill (230) may reflect a date for the build up of these deposits throughout the medieval period. The charcoal and plant remains recovered indicate that the fills contain general domestic waste.

**Sub-group 3015: Bands of stone underlying old ground surface in area 10**

List of Contexts; C.154, 1278

**Description**

The two deposits listed above are dark greyish brown silts with frequent pebble inclusions. They had an average depth of 0.08 m and were located on the inside and outside edge of the ditch in Area 10.

**Interpretation**

The fills represent localised slips along the ditch sides in the western sector of the ditch prior to the formation of the possible old ground surface 3017.

Sub-group 3016: Bank erosion/possible levelling pre-dating main stone deposit

List of Contexts; C.93, 94, 136, 140, 141

**Description**

The deposits listed above range from grey to mid brown silty sands and silts with occasional to frequent pebble and stone inclusions. The fills range in depth from 0.05 – 0.26 m and are located on the inside edge of the ditch in Areas 7 and 9 to the south of the ringfort.

**Interpretation**

The fills represent erosion or possible deliberate back filling of the bank in the southern sector of the ringfort ditch prior to the deliberate backfilling of this sector of the ditch with the large stone deposit represented by sub group 3018.
Sub-group 3017: Possible old ground surface
List of Contexts; C.11, 27, 64, 53, 153

Description
The above deposits consist of mid brown silty clays with very occasional pebble and stone inclusions. They range in depth from 0.10 – 0.36 m and were found across the full width of the ditch. These fills were excavated to the north-west, north and north-east of the enclosing ditch.

Interpretation
The deposits appear to represent a possible old ground surface which developed above the silt deposits to the north of the site. It represents a period when the ditch stabilised and remained at a constant level.

Sub-group 3018: Main stone deposit
List of Contexts; C.27, 137, 82, 114, 152, 179, 769

Description
The above deposits consisted of sub-rounded to sub-angular medium to large stone fills with a grey/brown silty matrix. The fills range in depth from 0.18 – 1.48 m and have an approximate average depth of 1 m. These fills represent a continuous stone deposit located within the west, south-west, south and south-east sections of the excavated enclosing ditch. Fills (27), (82), and (179) contained faunal remains. Fill (179) contained two fragments of corroded iron material.

Interpretation
This stone layer represents a period of deliberate filling of the ditch. The stone is locally derived glacial material. The stone fills correspond with the areas of the ditch used for infant and juvenile burial and in places directly overly these burials. It is probable that the stone was used to seal this burial layer and to discourage the use of the ditch for further burials.

Sub-group 3019: Deposits derived from deliberate bank levelling
List of Contexts; C.52, 1271, 51, 50, 80, 81, 113, 142, 144, 145, 151, 216, 217, 218, 793, 781,

Description
The deposits listed above are all orangish/yellowish/greenish/greyish brown silty clays and silty sands. They range in depth from 0.03 – 0.30 m and they are all located along the inside
edge of the ditch in the south eastern half of the enclosing ditch. The fills have moderate amounts of pebble inclusions. Faunal remains were recovered from fill (80).

**Interpretation**

These deposits possibly derived from upstanding sections of the bank which were backfilled into the ditch after the large stone deposit 3018 was thrown into the southern half of the ditch. This deliberate levelling of the ringfort bank possibly corresponds with the utilisation of the ringfort interior for cultivation purposes after the construction of Mackney House and the associated stable and court yard.

**Sub-group 3020: Backfilling of the upper levels of the ditch**


**Description**

The deposits listed above consist mostly of brown sandy silts or silty clays. They contain moderate to occasional amounts of pebbles and small rounded stones and range in depth from 0.05 – 0.80 m. Faunal remains were recovered from the following fills; (10, 26, 63, 49, 146, 219, 251, 253 and 258). Slag was recovered from fill (248), ceramic and iron fragments were recovered from fill (146), a furnace bottom was recovered from fill (251) and ceramic and glass fragments were recovered from fill (219). A sample from the charcoal assemblage from ditch fill (1155) was dominated by oak (25 fragments), with ash (1 fragment), hazel (4 fragments) and pomoideae (5 fragments) also present. The oak examined had very slow growth rate, this can indicate that it was grown in a forest. The sample also had a large plant remains assemblage. Cereals consisted of oat (134 fragments), barley (129 fragments), wheat (4 fragments) and indeterminate (43 fragments). Weed seeds consisted of knotgrass family (3 fragments), blackbind weed (1 fragment), wild radish (2 fragments), orache (1 fragment), nipplewort (5 fragments) and grasses (11 fragments).

**Interpretation**

These deposits represent the final backfilling and levelling of the ringfort ditch. They may have been associated with the rise of Mackney Estate at the turn of the nineteenth century and the transformation of the ringfort into an area used for cultivation due to its proximity to the courtyard and stables associated with Mackney House. Iron Slag was recovered from other layers in the ditch, but not in ditch fill (1155). Charcoal and plant remains indicate general waste from occupation.
Sub-group 3021: Cut and fill at the surface of the ditch in Area 8

List of Contexts; C.(1274), 110

Description
The cut and fill listed above represent a small feature cut into the uppermost ditch fills in Area 8. The cut (1274) was 1.74 m wide and 0.37 m deep with a pointed base. The fill (110) was a compact mid brown clay with frequent sub angular stone inclusions.

Interpretation
Possibly a field drain which cut across the upper fill of the ringfort ditch.

Group 4 Bank

This group describes the deposits associated with the construction of the interior defensive bank of the ringfort. Four sections were cut across the line of the bank. In two of these sections a buried sod layer was identified which was cut by the digging of the ditch. Very little of the actual bank material remained around the circumference of the site. Where it did survive it was composed of layered dumps of stone and compacted sand and gravel.

Sub-group 4001: In situ bank deposits

List of Contexts; C. 208, 1073, 1058, 1059, 1060, 1113, 1119, 736, 844, 1057, 1134, 630.

Description
This sub-group describes the deposits of bank material that were identified in-situ. They were in general of a silty sand composition, however, they varied greatly in their colours and stone inclusions. Definite tip-lines were evident in some of the four excavated sections.

Stony deposits (1057) and (1134) were located behind the revetment wall, described in sub-group 4004 and deposit (630) was located in the south western quadrant overlying the natural sub-soil. Charcoal was recovered from (736), animal bone was recovered from (1119) and an iron nail and two pieces of ceramic were recovered from deposit (630). A sample from the bank deposit (736) had a small amount of charcoal present, 5 oak fragments. There were two artefacts from this sub-group: one blade (E2444:1113:3) and one flake (E2444:1113:4) were recovered from bank deposit (1113). Both of these artefacts are Bronze Age in date.

Interpretation
These deposits were placed along the interior of the ringfort ditch during the construction of a defensive bank. The tip-lines noted in some of the four sections through the bank indicate that most of this material probably originated from up-cast soils originating from the excava-
tion of the ringfort ditch. The stony deposits were probably purposefully used as a primary core within the bank.

**Sub-group 400: Deposits possibly tipped from interior of ringfort**
List of Contexts: C. 206, 207.

**Description**
This sub-group describes bank deposits located in the south western quadrant that were unique due to the fact that their deposition indicates that they were possibly tipped from the interior of the ringfort. Animal bone was recovered from deposit (206).

**Interpretation**
These deposits were possibly tipped from the interior of the ringfort with material that may have come from the construction of the Souterrain.

**Sub-group 4003: Deposits lying against bank possibly derived from bank material**
List of Contexts: C. 244, 178, 1087, 554, 590, 472, 1116.

**Description**
This sub-group describes a range of deposits varying in colour from mid yellowish orange to dark brown and varying in composition from silty clays to a sandy silts. Two stony deposits (472) and (1116) have also been included. The deposits appear to abut definite *in situ* bank deposits and straddle the original line of the bank. Two flints, two iron nails and three pieces of ceramic were recovered from deposit (178). An iron artefact and some animal bone were identified in deposit (1116) and eight pieces of flint were recovered from deposit (472). Among the lithics recovered from deposit (472), two of the lithics (E2444:472:2 & c3) were classified as mere natural chunk, while a third piece is flintdebitage.

**Interpretation**
While the deposits may be the result of natural deposition against the inside of the bank after the abandonment of the ringfort they are more likely to be derived from have from original bank material which has either been deliberately levelled towards the interior or has naturally slipped and degraded. Deposits (472) and (1116) mirror the in-situ stony deposits described in sub-group 4001.
Sub-group 4004: Revetment wall and associated layer

List of Contexts; C.953, 1127.

Description

The revetment wall (953) was located in the north-east quadrant of the ringfort interior. It measured 18 m in length and 0.3 m in width and curved parallel to the ringfort ditch. It survived to a maximum of two courses but only to a height of 0.25 m. It was of dry stone construction and ran northward from the northern side of the entrance causeway. Deposit (1127) which was associated with the revetment wall measured 3.38 m in length, 0.65 m in width and 0.08 m in depth. It was a mid-greenish grey silty sand which also contained some faunal remains.

Interpretation

The revetment wall was placed on the inside edge of bank in order to create stability for the defensive bank. While this wall was only discovered in the north-east of the ringfort interior, there may have been a complete revetment for the interior of the bank that has not survived due to disturbance by agricultural activities. The wall itself appears to overlay the bank deposit (1113) and therefore was either constructed immediately after the bank material was dumped or after the full construction of the bank. Again due to the levelling of the bank this is difficult to determine.

Layer (1127) lay against the revetment wall and therefore was deposited after the construction of the wall however its function is difficult to determine.

Group 5 Entrance features

This group describes the features found in close proximity to the entrance of the ring fort to the east of the site.

Sub-group 5001: Possible entrance gate

List of Contexts; C.1020, 1054, 1071, 1070, 1076, (1084), 980, (1006), 981, (982), (1021)

Description

The three pits listed above were located on the inside edge of the causeway of the ringfort ditch to the east of the site. Pits (1084), (1006) and (982), varied in length from 1.82 to 2.34 m, varied in width from 0.65 to 1.15 m and varied in depth from 0.47 to 0.8 m. They were a sub-rectangular/linear shape in plan, concave or irregular in profile and had a north/south long axis. The sides of these pits were either steep or vertical. Pits (1006) and (982) were filled
by a mid to dark brown silty sand, while the fills of pit (1084) differed in colour from yellowish brown to dark brown and had a silty sand or sandy silt composition. Faunal remains were recovered from fills (1020), (1054), (1070), (1076) and (980). Charcoal was recovered from fills (1020) (1054), (980) and (981). Furnace bottoms were discovered within fills (981) and (1054).

Post-hole (1021) had been cut into the bottom of pit (982) and measured 0.5 m in diameter and 0.17 m in depth. It was circular in shape with gently sloping sides and a concave base in profile. It was filled by (981), the same deposit which filled pit (982). Pit (1084) has been truncated by post-holes (1030) and (1072) from sub-group 5002. A sample from the fill (1020) contained a small to moderate amount of oak charcoal (10 fragments) and a small amount of cereals, including oat (1 fragment), wheat (1 fragment) and indeterminate (2 fragments). Fill (981) had a small amount of charcoal, including oak (2 fragments) and pomoideae (2 fragments). Fill (1076) also had a small amount of charcoal, including oak (3 fragments) and Prunus (1 fragment) Fill (1070) was rich in oak charcoal (36 fragments).

Interpretation

The pits (1084), (1006) and (982) were probably post-hole trenches used to support the construction of a gate erected at the entrance of the ring fort. Post-hole (1021) was created by driving a post into the bottom of pit (982) and supports the theory that these long and relatively narrow pits may have been the original cuts for post-hole trenches across the entrance. The samples were dominated by oak charcoal but no metal slag was found in or was associated with the samples. This is an indication of the widespread use of oak on site

Sub-group 5002: Later possible entrance gate

List of Contexts; C. 978, 1008, (1030), (1072), (1077), 991, (1007)

Description

The four post-holes listed above were located on the inside edge of the entrance causeway across the ring fort ditch to the east of the site. The four post-holes (1030), (1072), (1077) and (1007), varied in length from 0.49 to 1.0 m, varied in width from 0.31 to 0.76 m and varied in depth from 0.24 to 0.56 m. They are all oval or circular in plan with a concave profile. All four post-holes had steep or vertical sides. The general alignment of the post-holes was north/south. The fills of the post-holes were composed either of sand or silty sand and were mid brown in colour with the exception of (928). Layer (928) was the fill of post-holes (1072) and (1077). It was an orangish brown sandy silt layer which overlaid all of the features in Group 5. Faunal remains and charcoal were recovered from fills (978), (1008) and (991). Slag material and fired stones was recovered from fill (978). Post-holes (1030) and (1072) truncated the earlier pit cut (1084) from sub-group 5001. Samples from fills (1008, 978 and 991) had moderate
amounts of oak charcoal, 14, 19 and 16 fragments respectively. A retouched limestone chunk was recovered from fill (978), find number 978:1.

**Interpretation**

These four post-holes probably represent a later phase of construction, or possibly reconstruction, of the gate to the entrance of the ring fort. This is supported by their general alignment from north to south across the entrance gap and the relative similarities of their size and shape. As two of the four post-holes, (1030) and (1072), truncated a pit related to the earlier period of possible gate construction, we can speculate that these post-holes were not contemporary with those features but instead represent a later phase of construction at the entrance. Charcoal from these samples was exclusively oak.

**Sub-group 5003: Irregular entrance feature – separate from gateway construction**

List of Contexts; C.1093, 1094, (1095)

**Description**

An irregular pit (1095) measured 4.0 m in length and 3.5 m in width, with a depth of 0.55 m. It was irregular in shape with sharp steep sides on the north, west and south but with a gentle and imperceptible break of slope on the east side. This pit was located on the inside of the possible gate feature and is aligned with the ditch causeway. The primary fill of this pit was a mid orange sandy clay (1094), similar in colour and composition to that of the natural sub-soil (794). The secondary fill was a dark brown silty sand (1093). Faunal remains, fossils and slag material were recovered from this fill. The pit was overlaid by layer (928).

**Interpretation**

The location of this feature inside the possible gateway structure suggests a significant feature strongly associated with the entrance. However, due to the irregular shape of the pit (1095) and the fact that it is not truncated by, or does not truncate any other features around the entrance it is difficult to determine the features function or period of use.

**Sub-group 5004: Layer across entrance features**

List of Contexts; C.928

**Description**

Layer (928) was a mid orangish brown silty sand. It had moderate small and medium stone inclusions and occasional large stone inclusions. Faunal remains and slag material were re-
covered from this layer. This layer overlaid all of the features in sub-groups 5001, 5002 and 5003.

**Interpretation**
This layer was probably a natural accumulation of soil in this area and not a purposeful deposit. It may have only accumulated in this one location due to the fact that it was a low point between the bank. It post-dates all of the entrance features described in sub-groups 5001, 5002 and 5003.

**Sub-group 5005: Isolated features adjacent to the entrance**
List of Contexts; C. 1045, (1046), 986, (987), 894, (897),

**Description**
This sub-group describes one post-hole and two pits located adjacent to the entrance of the ringfort. Post-hole (1046) and pit (987) were located approximately 1 to 2 m south of pit (1095). Pit (897) was located 1.6 m west of pit (1095). Post-hole (1046) measured 0.23 m in length, 0.22 m in width and 0.12 m in depth. It was circular in shape with vertical or steep sides and with a flat base. It was filled by a light brown medium sand (1045). Pit (987) measured 0.78 m in length, 0.62 m in width and 0.17 m in depth. It was sub-circular in shape with a flat base. It was filled by a mid orangish brown sandy silt (986). Pit (897) measured 1.12 m in length, 1.04 m in width and 0.12 m in depth. It was circular in shape with gentle or moderate sides and a concave profile. It was filled by a mid brown silty sand (894). Inclusions of roots were observed within this deposit.

**Interpretation**
The features described above are scattered generally in the vicinity of the entrance of the ringfort. The lack of information that has been recovered from these features as well as their sporadic locations has meant that they could not be connected to each other or any other of the features in the entrance area.

**Group 6 Circular house**
This group describes a house structure and the associated features located just to the south and east of the centre of the ringfort interior.

**Sub-group 6001: Trench cut and fills**
List of Contexts: C.(310), 311, 323, 374, 326.
Description
A construction trench 0.40 m wide and 0.20 m deep defined a roughly circular area with a diameter of 5.4 m. The trench had a wide gap to the north-east. The trench was concave in profile and had steep and smooth sides to the north, east and south and gentle smooth sides to the to the west. The trench was divided into eight straight sections which together appeared to form a circular shape. The upper fill (311) was a mid greyish brown slightly silty sand with occasional small stones. Two pieces of chert and some animal bone were recovered from this fill. The lower fill (323) was a greyish brown loose slightly silty sand. Two separate trench fills were identified in the eastern side of the hexagonal shaped trench. The upper fill (326) was a dark orangish brown slightly silty sand with a loose compaction and the lower fill (374) was a compact light mid orangish brown slightly silty sand. Both fills contained occasional small stone and pebble inclusions. Two samples were analysed from trench fill (323). Neither contained much charcoal; only oak (2 fragments), ash (2 fragments), willow/poplar (1 fragment) and diffuse porous (1 fragment). The only find recovered from fill (311) is a flint flake (311:1).

Interpretation
The trench was used as a foundation cut for a roughly circular structure. The hexagonal shape of the foundation trench suggests that wooden foundation planks were used to support the side walls of the structure. The distinct orange fills of the eastern side of the hexagonal may be a result of in situ rotting of the foundation plank along that section.

Sub-group 6002: Entrance post-holes

Description
Three post-holes defined a gap in the circular trench along its north eastern side. Two post-holes (389) and (391) were identified to the south of the gap and one (387) to the north.

Post-hole (387) measured 0.37 m in length, 0.30 m in width and 0.14 m in depth. It was circular in shape, concave in profile, with sides varying from gentle to vertical in gradient. It was filled by (388) a mid brownish grey silty sand with a loose compaction. Post-hole (389) measured 0.43 m in length, 0.27 m in width and 0.27 m in depth. It was irregular in shape with sides varying from moderate to vertical in gradient and it had a flat base. It was filled by (390) a mid brownish grey silty sand with a loose compaction. Post-hole (391) measured 0.27 m in length, 0.23 m in width and 0.28 m in depth. It was square in shape and concave in profile, with vertical sides to the east and steep sides to the west. It was filled by mid brownish grey silty sand with a loose compaction (392).
Interpretation

The three post-holes define the entrance to the circular structure. The posts may have supported a door and could also have acted as supports for the side walls and roof.

Sub-group 6003: Opposing post-holes within the foundation trench

List of Contexts: C.(355), 356, (351), 352. (324), 325, (353), 354, (359), 360, (357), 358, (335), 336, (343), 344, (332) and 333.

Description

Two opposing groups of post-holes were identified within the circular/hexagonal shaped foundation trench. Four tightly spaced post-holes were located in the northern section of the trench and these were opposed by five tightly spaced post-holes in the southern section of the trench. The northern post-holes (355), (351), (324) and (353) measured approximately 0.33 m in length, 0.19 m in width and 0.30 m in depth. They were oval in shape and concave in profile, with sides varying from moderate to vertical in gradient. They were filled by (356), (352), (325) and (354) compact mid greyish brown slightly silty sands with occasional medium pebble and stone inclusions. One heat affected stone was recovered from fill (325). Three of the southern post-holes (335), (343), (332) measured approximately 0.30 m in length, 0.25 m in width and 0.24 m in depth. They were sub-circular in shape and concave in profile, with sides varying from moderate to vertical in gradient. They were filled by (333), (344) and (336) compact mid greyish brown slightly silty sands with occasional medium pebble and stone inclusions. Post-hole (359) measured 0.26 m in length, 0.22 m in width and 0.19 m in depth. It was irregular in shape and concave in profile, with sides varying from steep to vertical in gradient. The post-hole was filled by (360) a compact mid greyish brown slightly silty sand with occasional medium pebble and stone inclusions. The largest post-hole (357) measured 0.44 m in length, 0.33 m in width and 0.24 m in depth. It was oval in shape and concave in profile, with sides varying from steep to vertical in gradient. It was filled by (358) a compact mid brownish grey slightly silty pebbly sand with small stone inclusions. The fill (333) had very few plant remains, only one wheat grain and two indeterminate cereals.

Interpretation

The opposing post-hole groups represent substantial structural elements of the house. The hexagonal shape of the foundation trench suggest that wooden foundation planks were utilised in the construction of the side walls. This configuration may have been interrupted to the north and south by a line of posts which not only formed the walls of the house but also supported some form of roof structure.
Sub-group 6004: Interior features


Description

Two pits and six post-holes were identified within the interior space of the house structure. The pits were located in north eastern part of house interior. Pit (463) measured 0.30 m in length, 0.20 m in width and 0.12 m in depth. It was oval in shape with sides varying from gentle to vertical in gradient and it had a flat base. It was filled by (466) a reddish brown silty clay with medium pebble and stone inclusions. Two pieces of chipped stones were recovered from this deposit. Pit (463) was cut by a larger pit (176) which was excavated prior to the identification of the circular foundation trench (310). Pit (176) was filled by (174) a light yellowish brown clay. Pit (531) measured 0.27 m in length, 0.24 m in width and 0.15 m in depth. It was sub-rectangular in shape with vertical and irregular sides and a flat base. It was filled by (532) a dark brown silty clay with moderate pebble and occasional medium stone inclusions. Two post-holes (586) and (537) were located on the western side of the interior close to the foundation trench (310). Post-hole (586) measured 0.44 m in length, 0.33 m in width and 0.24 m in depth. It was oval in shape and concave in profile, with vertical sides. It was filled by dark greyish brown silty sand (587). Post-hole (537) measured 0.30 m in length, 0.18 m in width and 0.27 m in depth. It was irregular in shape and tapered blunt point in profile. Post-hole was filled by mid greyish brown silty sand with pebble inclusions (544). Both post holes contained stone packing material (588) and (1331).

Two larger post-holes were located towards the centre of the interior space. Post-hole (574) measured 0.46 m in length, 0.42 m in width and 0.25 m in depth. It was square in shape and concave in profile, with steep sides. It was filled by mid brown silty clay with frequent fine to medium pebble and occasional medium stone inclusions (587). Post-hole (543) measured 0.41 m in length, 0.39 m in width and 0.30 m in depth. It was circular in shape with vertical sides and a flat base. It was filled by dark brown silty clay with moderate medium pebble and stone inclusions (545). Both post holes also contained stone packing material (567) and (1328).

A double post-hole (573) was located in the south east corner of the interior space close to the foundation trench (310). It measured 0.46 m in length, 0.42 m in width and 0.26 m in depth. It was oval in shape and concave in profile, with sides varying from steep to vertical in gradient. Two post pipes (1327) and (1326) were defined by a stone packing material (464). The two post pipes were filled by three separate fills (479), (475) and (467) all of which were composed of stony silty sands.

A large triple post-hole (608) was located 0.60 m inside the southern edge of the foundation trench (310). The post-hole measured 0.85 m in length, 0.52 m in width and 0.28 m in...
depth. It was irregular in plan and concave in profile, with sides varying from steep to vertical in gradient. Three post pipes were defined by a stony packing material (1322) and were filled by (591) and (584) both of which were composed of silty sand.

Interpretation

No definitive pattern or shape can be defined by the internal pits and post-holes. The area has however been severely truncated by the later cultivation features rendering the surviving pattern incomplete. The pits and post-holes may have been used; to divide the internal space, provide support for a roof or formed internal features such as storage or bedding areas. There is no evidence for the presence of an internal hearth. It may have been truncated by the cultivation features or by the two larger and later internal pits.

Sub-group 6005: Exterior feature

List of Contexts; C.286, (287).

Description

Pit (287) was located approximately 1 m to the north-west of the entrance to the circular house as described in sub-group 6002. It measured 0.98 m in length, 0.65 m in width and 0.17 m in depth. It was irregular in shape with gentle to steep sides and had a tapered rounded point in profile. It was filled by a mid orangish brown silty sand (286).

Interpretation

This pit was probably associated with the circular house due to its close proximity to the entrance features described in sub-group 6002. However, as no finds were recovered from the fill of this pit it is difficult to determine either its exact date or function.

Group 7 Lean-to structure

This group describes the features associated with the lean-to structure located just inside the line of the enclosing bank and to the south of the ringfort entrance.

Sub-group 7001: Structural features

List of Contexts; C.288, (303), 289. (315), 1140, (1141), 1009, (1010), 1011, (1012).

Description

This sub-group describes two shallow curvilinear trenches, two pits and a post-hole which represent the remains of a structure located just to the south of the ringfort entrance.
The curvilinear trench (303) measured 3.48 m in length, 0.78 m in width and 0.12 m in depth. The trench curves from the north-east to the south and had gentle or moderate sides and was concave in profile. It was filled by a dark brown sandy silt (288). The curvilinear feature (315) measured 5.5 m in length, 0.78 m in width and 0.22 m in depth. It is linear in shape curving from to the east, with gentle or moderate sides and a concave profile. It was filled by a dark brown sandy silt (289) which contained faunal remains, slag material and charcoal. Pits (1012) and (1141) varied from 0.6 m to 0.67 in length, 0.24 m to 0.31 m in width and 0.1 m to 0.24 m in depth. Both pits were oval in shape with concave profiles with sides varying from gentle to vertical in gradient. Pit (1012) was filled by a mid orangish brown silty sand (1011) while pit (1144) was filled by a dark brownish black silty sand (1140). Slag material was recovered from fill (1140).

Post-hole (1010) measured 0.4 m in length, 0.2 m in width and 0.13 m in depth. It was sub-circular in shape, concave in profile, with sides varying from gentle to steep in gradient. It was filled by a mid orangish brown silty sand (1009).

Interpretation

The features in this sub-group represent the structural elements of a lean-to structure. This structure is defined by the curvilinear trenches (303) and (315) which acted as foundation trenches while pits (1012) and (1144) and post-hole (1010) represent the continuation of trench (303) to the north. The lean-to was a semi-circular structure built into, or up against, the eastern bank of the ringfort. The structure was 3.8 m east/west and 8.4 m north/south with an internal space of 46.32 m$^2$. A gap between the foundation trenches formed a 1 m wide entranceway which faced westwards. The foundation trenches of this structure are quite shallow, varying from 0.12 to 0.22 m in depth. This possibly suggests a small structure, however, the trenches may have been truncated by later agricultural practices.

Sub-group 7002: Central hearth and associated features

List of Contexts; C. 290, 331, (334), 327, 328, (347), 329, (368).

Description

This sub-group describes a hearth located in the centre of the lean-to structure, a hollow that overlies this hearth and an associated stake-hole located 0.1 m to the north-west.

Hearth (347) measured 1.14 m in length, 1.29 m in width and 0.3 m in depth. It was sub-circular in shape and concave in profile with sides varying from gentle to steep in gradient. The primary fill of this hearth was a mid orange silty clay (328) which contained charcoal fragments. The secondary fill of this hearth was a weakly cemented light white silty clay (327). A small hollow (334) measured 0.23 m in length, 0.23 m in width and 0.08 m in depth. It was circular in shape with moderate sides and a concave profile. The primary fill was a dark brown clayey silt (331). The secondary fill was also a dark brown clayey silt (290) but
with moderate amounts of charcoal contained in the deposit. Stake-hole (368) measured 0.15 m in length, 0.15 m in width and 0.07 m in depth. It was sub-circular in shape, with gentle sides and a concave profile. It was filled by a dark brown sandy silt (329) which contained charcoal flecks. A sample from hearth (290) contained a lot of charcoal. Oak dominated (26 fragments) followed by hazel with insect holes (8 fragments) and pomoideae (4 fragments). It also contained cereals including oat (12 fragments), barley (4 fragments), bread wheat (5 fragments) and indeterminate (2 fragments), it contained hazelnut shell fragments (2 fragments), knotgrass family (1 fragment) and large legumes (2 fragments). A sample from fill (328) contained large pieces of oak charcoal (6 fragments) and oats (50), barley (14), wheat (24) and indeterminates (5). It also contained legumes and weeds seeds. Fill (331) had few plant remains, only an indeterminate cereal and a hazelnut shell fragment.

**Interpretation**

The hearth is a central domestic hearth within the lean-to structure. The primary deposit of orange clay indicates the burning area (328) with a secondary deposit of waste ash material overlaying it (327). The associated stake-hole (368) in close proximity may suggest that a pot hanger was once used in connection with this hearth. Oak wood was the most common wood type used in this domestic hearth. The large amounts of plant remains indicate the cereals were either dried by the hearth, where they became charred, or that the cereals were used as fuel.

**Sub-group 7003: Possible interior occupation surfaces and two associated pits**

List of Contexts; C.382, 395, 397, 292, (330), 291, (337).

**Description**

This sub-group describes three contemporary occupation surfaces located to the north of the interior space within the lean-to structure and two pits which have truncated these surfaces. Layer (382) was a light greyish brown sand measuring 2.1 m in length, 1.6 m in width and 0.12 m in depth. Layer (395) was a light orangish brown sand measuring 1.37 m in length, 0.93 m in width and 0.21 m in depth. Layer (397) was a light yellowish brown sand measuring 1.22 m in length, 0.49 m in width and 0.28 m in depth. Pit (330) measured 1.29 m in length, 0.58 m in width and 0.1 m in depth. It was circular in shape with moderate sides and a concave profile. It was filled by a dark brown sandy silt (292). A retouched lithic was recovered from this fill.

Pit (337) measured 0.56 m in length, 0.49 m in width and 0.18 m in depth. It was sub-circular in shape with a concave profile and sides varying from gentle to steep in gradient. It was filled by a dark brown sandy silt (291). Both of these pits truncated the layers (382) and (395). A sample from fill (291) had a small amount of charcoal present, including oak (6 fragments), ash (4 fragments) and hazel (1 fragment) and cereal remains, including barley (1) and
indeterminate (1 fragment). Fill (395) contained cereals consisting of 1 indeterminate and 1 grass seed.

**Interpretation**

The three layers (382), (395) and (397) represent the remnants of one, or possibly several, occupation surfaces within the lean-to structure. Pits (330) and (337) truncated these layers and therefore must have been later features, however, they may also have been contemporary with the occupation of the lean-to structure. The retouched lithic tool within the fill of pit (330) suggests occupation of the structure during the use of the pit.

**Sub-group 7004: Isolated features associated with the lean-to structure.**

List of Contexts; C.413, (417), 294, (295), 507, 515, (519), 1143, (1144).

**Description**

This sub-group represents a post-hole and three pits which have a close association with the lean-to structure. Pit (295) was located 1 m to the west of curvilinear feature (303). Pits (519) and (1144) were located approximately 3 to 4 m north-west of the lean-to structure. Post-hole (417) was located underneath the remnant occupation layer (382). Post-hole (417) measured 0.25 m in length, 0.21 m in width and 0.11 m in depth. It was sub-circular in plan, had either moderate or steep sides and was concave in profile. It was filled by a dark greyish brown silty sand (413).

Pit (295) measured 0.36 m in length, 0.26 m in width and 0.17 m in depth. It was sub-circular in shape, with vertical sides and a tapered blunt point in profile. It was filled by a light brown sandy clay (294). One small unidentified metal object was recovered from this fill. Pit (519) measured 0.66 m in length, 0.54 m in width and 0.36 m in depth. It was circular in shape with steep or vertical sides and a flat base. Its primary fill was a mid brown silty sand (515), while the secondary fill was a dark brown silty sand (507). Faunal remains were found within fill (507). Pit (1144) measured 0.7 m in length, 0.6 m in width and 0.28 m in depth. It was sub-circular in shape, with moderate or steep sides and concave in profile. Pit (1144) was filled by a dark greyish brown silty sand (1143) which contained charcoal flecks. Fill (1143) contained a single grass seed.

**Interpretation**

Pits (519), (1144) and (295) were features all located in the area outside the lean-to structure. The proximity of these features to the lean-to structure suggest they could be related to its use.
Post-hole (417) was located within the lean-to structure. It may have been part of the structure before the accumulation of an occupation layer within the lean-to, however, it may also have pre-dated this structure.

**Group 8 Post-hole concentration to the north of the ringfort interior**

This group describes the elements of the possible structure/structures located to the north of the interior of the ring fort.

**Sub-group 8001: Large post-holes**

List of Contexts; C.683, (708), 593, 631, 613, 626, (654).

**Description**

The two post-holes listed above were located to the north of the ring fort interior. They were situated approximately 1 m west of the structural features described in sub-group 8002. Post-hole (708) was 0.5 m in length, 0.5 m in width and 0.4 m in depth. It was sub-circular in shape, concave in profile with moderate or vertical sides. The fill of this post-hole was a mid orangish brown sandy clay (683). 0.1 m to the east lay post-hole (654) which measured 0.95 m in length, 0.9 m in width and 0.65 m in depth. It was circular in shape with a concave profile and steep sides. The fills of post-hole (654) varied in colour from light orangish yellow to dark brownish grey and were either silty clay or sandy clay in composition. Two flints were recovered from fills (593) and (626). One small Bronze Age convex end scraper (E2444:593:1) was recovered from fill (593).

**Interpretation**

These features represent two substantial post-holes relating to a possible structure located in the vicinity. The steep sides of these features as well as their depths tend to suggest that these features represent significant structural elements such as load bearing posts for a building. Other post-holes surrounding these features, as represented in sub-group 8002, may be closely associated.

**Sub-group 8002: Post-holes**

### Description

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The 26 post-holes listed above were located to the north of the ring fort and within a 3.5 m radius of each other. They were situated in close proximity to the pits in sub-group 8003. The post-holes differed greatly in length, width and depth as seen in the above table. Their shapes varied from irregular to circular while their bases varied from flat to tapered and the sides of these post-holes varied from gentle to vertical. The fills of these post-holes were dark brown to mid brownish grey in colour and were predominantly silty sands. There were no finds recovered from the fills of any of these post-holes, however, packing material was observed in 11 of them. 19 of the post-holes were covered by layer (528), an orangish brown silty clay measuring 7.36 m in length, 6.38 m in width and 0.1 m in depth. Post-holes (636) and (657) were truncated by a large pit (622), described in sub-group 8004.

Post pit (691) was an irregular double post-hole pit containing post-holes (674) and (1291). This pit measured 0.6 m in length, 0.47 m in width and 0.27 m in depth and had a flat base. Post-hole (674) was irregular in shape with a flat base while post-hole (1291) was also irregular in shape but had a tapered rounded point in profile. Both of these post-holes had packing material (1290) and were filled by a mid brownish grey silty sand (679).

Post pit (721) was an irregular triple post-hole pit containing post-holes (707), (1292) and (1293). This post pit measured 0.85 m in length, 0.35 m in width and 0.25 m in depth. Post-hole (707) was circular in shape while post-hole (1292) was sub-circular, however they both had a tapered rounded point in profile. Post-hole (1293) was irregular in shape and concave in profile. The three post-holes were aligned in a linear formation, orientated north-west/south-east. All three of these post-holes had packing material (1294) and were filled by a dark brownish grey silty sand (712).

Post pit (619) was an irregular pit containing post-holes (1285), (1286), (1287), (1288) and (1289). This pit measured 1.44 m in length, 0.76 m in width and 0.32 m in depth, and had a tapered rounded point in profile. Post-holes (1286), (1287), (1288) and (1289) were contemporary with each other and in general were circular or sub-circular in shape and had

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Table 1: - Post-hole dimensions – Sub-group 8002
a tapered rounded point in profile. They were aligned in an almost rectangular formation running from the north-east to the south-west. Post-holes (1286) and (1287) were filled by a mid brown silty sand (614), while post-holes (1288) and (1289) were filled by a mid greyish brown sandy silt (632). They all had the same packing material surrounding them, a light brown silty sand fill (618). Post-hole (1285) was a later feature, packed by fill (614) and filled by a mid brownish orange silty sand (606). Post-hole (1285) was circular in shape and had a tapered rounded point in profile. Post-hole fill (602) had a small amount of charcoal present, including oak (1 fragment), willow/poplar (2 fragments) and Pomoideae (1 fragment) and the post-hole fill (624) contained 1 indeterminate cereal.

**Interpretation**

This group of post-holes along with the large post-holes from sub-group 8001 represent the remains of a structure or series of structures in this area of the ringfort however no definite discernible pattern could be recognised. The sheer volume of post-holes within a 5 m by 5 m area possibly indicates that either a single large structure, or possibly a number of smaller structures, were present in the area. The location of the domestic hearth from Group 15 to the north of these post-holes may be associated with this structure.

**Sub-group 8003: Pits associated with the post-hole concentration**


**Description**

The pits listed above were located towards the north of the ringfort and within a 2 m radius of each other. They were also situated in close proximity to the post-holes described in sub-group 8002. The pits varied greatly in length width and depth. Lengths varied from 0.24 m to 1.21, widths varied from 0.23 m to 0.60 m and depths varied from 0.06 m to 0.48 m. However, the pits were all either irregular or sub-circular in shape and were all concave in profile. The fills of these pits were generally all orange brown in colour and their composition varied from sandy clay to silty sand.

**Interpretation**

These pits are probably associated with the possible structure represented by the post-holes described in sub-group 8002. While the pits vary in size, their similar shape and general proximity ties them together with each other as well as with the post-holes from sub-group 8002. The pits show a level of activity in the area, however, the lack of finds within their fills makes it very difficult to ascertain their use and possible relationships.
Sub-group 8004: Large irregular pits and post-holes associated with the post-hole concentration.

List of Contexts; C.594, (604), 605, 621, (622), 571, (670), 671, (672), 693, (694), 658, (727).

Description
The two pits and four post-holes listed above were located to the north of the post-holes and pits from sub-groups 8002 and 8003. Pit (622) was 1.62 m in length, 0.97 m in width and 0.19 m in depth. It was sub-rectangular in shape with a flat base. Its sides varied in gradient from gentle to vertical. This pit was filled by a mid brownish orange silty sand (605), and a dark brown silty sand (621). Fills (605) and (621) appeared to be the packing material surrounding a sub-circular post-hole (604), which measured 0.39 m in length, 0.37 m in width and 0.17 m in depth. Post-hole (604) had moderate or steep sides and a concave profile. The fill of this post-hole (594) was a mid greyish white silty sand. Pit (727) was 1.87 m in length, 1.15 m in width and 0.42 m in depth. It was sub-circular in shape with a flat base and moderate or steep sides. It was filled by a mid orange silty sand (658), which appeared to have some buried sod within the deposit. Pit (727) was truncated by post-holes (670) and (694) and pit (672). Post-hole (670) measured 0.47 m in length, 0.35 m in width and 0.22 m in depth. It was oval in shape and had a concave profile. Its sides varied from gentle to steep. It was filled by a dark brown silty sand (571). Post-hole (694) measured 0.17 m in length, 0.15 m in width and 0.09 m in depth. The post-hole was circular in shape with steep sides and a concave profile. The fill of the post-hole was a mid brown silty sand (693). Pit (672) measured 0.82 m in length, 0.52 m in width and 0.1 m in depth. The pit was sub-circular in shape with gentle or moderate sides and a flat base. It was filled by a dark brown silty sand (671) with some animal bone inclusions.

Interpretation
These large pits and post-holes that truncate them may possibly represent post pits and therefore show more structural elements in this area. However, this is primarily based on their proximity to the pits and post-holes represented in sub-groups 8002 and 8003. The irregularity of the pits as well as the lack of evidence from within their fills makes it difficult to determine the function of these features.

Group 9 Partial circular house
This group describes the features associated with a possible structure located to the south of the circular house described in Group 6 and south-east of the souterrain described in Group 18.
Sub-group 9001: Structural feature

List of Contexts; C.465, (476).

Description

This sub-group describes a curvilinear trench (476) located to the south of the ringfort interior. It measured 1.54 m in length, 0.35 m in width and 0.21 m in depth. It curved from the north to the west, had steep or vertical sides and was concave in profile. It was filled by a mid brown silty sand (465). A sample from fill (465) had a small charcoal assemblage, with only 5 fragments of oak and 3 fragments of hazel occurring.

Interpretation

This sub-group represents what remains of a foundation trench of a circular structure similar to the house described in Group 6. This was defined by the curvilinear trench (476). While only a 2 m arc of the foundation trench (476) survived it is estimated that the building would have been approximately 4.48 m in diameter, creating an internal space of approximately of 15.76 m². The foundation trench itself is quite narrow and shallow however it has been truncated by later agricultural practises. The building was probably a circular domestic house, very similar to the house described in Group 6.

Sub-group 9002: Internal features


Description

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<th>Dimensions (length, width, depth in metres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P/H (264)</td>
<td>SE Quadrant – 100E 80N</td>
<td>0.27 x 0.27 x 0.23</td>
</tr>
<tr>
<td>P/H (298)</td>
<td>SE Quadrant – 100E 80N</td>
<td>0.33 x 0.25 x 0.2</td>
</tr>
<tr>
<td>P/H (267)</td>
<td>SE Quadrant – 100E 80N</td>
<td>0.29 x 0.29 x 0.3</td>
</tr>
<tr>
<td>Pit (280)</td>
<td>SE Quadrant – 100E 80N</td>
<td>0.29 x 0.29 x 0.25</td>
</tr>
<tr>
<td>Pit (403)</td>
<td>SE Quadrant – 100E 80N</td>
<td>0.46 x 0.36 x 0.105</td>
</tr>
</tbody>
</table>

Table 2: - Pit dimensions for sub-group 9002
This sub-group describes two pits and three post-holes that were located within the possible structure as described in sub-group 9001. Pit (280) was sub-circular in shape with moderate or vertical sides and was concave in profile. It was filled by a dark brown sandy silt (279). Pit (403) was sub-circular with moderate sides and a concave profile. It was filled by a dark reddish brown silty sand (400) which included small amounts of slag material. Post-hole (264) was circular in shape with vertical sides and a concave profile. It was filled by three deposits which varied from light grey to dark brown in colour and from silty clay to clayey silt in composition. Post-hole (298) was circular in shape with vertical sides and a concave profile. It was filled by two deposits which varied from orange to greenish black in colour and were predominantly silty clay in composition. Post-hole (267) was a circular pit with moderate to vertical sides and a concave profile. It was filled by three deposits which varied from dark brown to light grey in colour and were all a silty clay composition. All three of these post-hole had packing stones within their fills. A sample from pit fill (279) had one sample (two bags) with very only two oak charcoal fragments. One of the fragments had insect holes, meaning that it was old dead wood when it was burnt. There was also slag noted in the sample. This sample also contained a single grain of wheat.

Interpretation
This sub-group represents the internal features of the possible circular house described in sub-group 9001. The two pits were probably contemporary with the structure itself and therefore represent the occupation of this building. However, due to the limited amount of finds recovered from the fills of these pits it is difficult to determine their function and date. A small amount of slag material was recovered from one pit suggesting industrial practises. The three post-holes were possibly structural elements for the building. While no pattern can be seen in the locations of these post-holes they may have acted as structural supports for the roof of the structure or were possibly used to divide the internal area of the house.

Sub-group 9003: External features


Description
This sub-group describes four pits that were located immediately outside the possible structure as described in sub-group 9001. Pit (457) measured 0.19 m in length, 0.15 m in width and 0.12 m in depth. It was sub-circular in shape with steep or vertical sides and was concave in profile. It was filled by a dark brown silty clay (456). Pit (451) measured 0.17 m in length, 0.09 m in width and 0.19 m in depth. It was circular in shape, concave in profile and had vertical sides. Its primary fill was a dark brown sandy clay (450) and its secondary fill was a dark brown silty clay (447). Pit (304) measured 0.4 m in length, 0.2 m in width and 0.09 m in depth. It was sub-rectangular in shape with moderate to vertical sides and concave in
profile. Its primary fill was a mid yellowish brown silty clay (306) and its secondary fill was a dark brown silty clay (305).

Pit (473) measured 0.67 m in length, 0.63 m in width and 0.25 m in depth. It was sub-circular in shape with steep to vertical sides and had a concave profile. It was filled by a dark brown sandy clay (459). This fill included a moderate amount of pebbles and small stones. A reasonable quantity of slag material and faunal remains were also recovered from this fill.

**Interpretation**

The features from this sub-group represent a series of pits just outside the projected line of the structure described in sub-group 9001. While pit (473) did contain slag material, similar to one of the internal features from sub-group 9002, there is little information to suggest that the pits in this sub-group were contemporary with the building. Based on their size and steep sides, pits (451) and (457) may in fact be post-holes and may have formed part of the foundation trench (described in sub-group 9001) for the structure or possibly formed some sort of annex to the main structure.

**Group 10 Possible rectangular house**

This group represents a collection of structural features located south-east of the lean-to structure described in Group 7 and north of the hearths/fire-pits described in group 14.

**Sub-group 10001: Possible rectangular structure**


**Description**

<table>
<thead>
<tr>
<th>Context no.</th>
<th>Area/ Grid</th>
<th>Type</th>
<th>Dimensions (length, width, depth in metres)</th>
</tr>
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<tr>
<td>(546)</td>
<td>SE Quadrant - 110E 90N</td>
<td>Post-hole cut</td>
<td>0.3 x 0.28 x 0.18</td>
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<tr>
<td>(533)</td>
<td>SE Quadrant - 110E 90N</td>
<td>Post-hole cut</td>
<td>0.25 x 0.18 x 0.14</td>
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<tr>
<td>(548)</td>
<td>SE Quadrant - 110E 90N</td>
<td>Post pit cut</td>
<td>0.75 x 0.47 x 0.27</td>
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<tr>
<td>Context. no.</td>
<td>Area/ Grid</td>
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<td>Dimensions (length, width, depth in metres)</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------</td>
<td>-----------------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>(575)</td>
<td>SE Quadrant - 115E 90N</td>
<td>Post-hole cut</td>
<td>0.2 x 0.15 x 0.18</td>
</tr>
<tr>
<td>(580)</td>
<td>SE Quadrant - 115E 90N</td>
<td>Post pit cut</td>
<td>0.74 x 0.33 x 0.18</td>
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<tr>
<td>(322)</td>
<td>SE Quadrant - 110E 90N</td>
<td>Possible double post-hole cut</td>
<td>1 x 0.45 x 0.43</td>
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<tr>
<td>(365)</td>
<td>SE Quadrant - 115E 90N</td>
<td>Possible double post-hole cut</td>
<td>0.62 x 0.46 x 0.48</td>
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<tr>
<td>(346)</td>
<td>SE Quadrant - 110E 90N</td>
<td>Possible large post-hole</td>
<td>0.27 x 0.27 x 0.18</td>
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<tr>
<td>(449)</td>
<td>SE Quadrant - 110E 90N</td>
<td>Possible large post-hole</td>
<td>0.5 x 0.4 x 0.1</td>
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<td>(468)</td>
<td>SE Quadrant - 110E 90N</td>
<td>Possible post-hole</td>
<td>0.32 x 0.3 x 0.1</td>
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<tr>
<td>(522)</td>
<td>SE Quadrant - 110E 90N</td>
<td>Post-hole cut</td>
<td>1.05 x 0.6 x 0.4</td>
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<tr>
<td>(559)</td>
<td>SE Quadrant - 110E 90N</td>
<td>Post-hole cut</td>
<td>0.95 x 0.8 x 0.25</td>
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<td>(640)</td>
<td>SE Quadrant - 110E 85N</td>
<td>Post-hole cut</td>
<td>0.77 x 0.56 x 0.22</td>
</tr>
<tr>
<td>(445)</td>
<td>SE Quadrant - 110E 85N</td>
<td>Post-hole cut</td>
<td>0.3 x 0.12 x 0.08</td>
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<tr>
<td>(367)</td>
<td>SE Quadrant - 110E 85N</td>
<td>Possible post-hole</td>
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<tr>
<td>(348)</td>
<td>SE Quadrant - 110E 90N</td>
<td>Possible post-hole</td>
<td>0.5 x 0.5 x 0.3</td>
</tr>
<tr>
<td>(441)</td>
<td>SE Quadrant - 110E 90N</td>
<td>Pit cut</td>
<td>1.5 x 0.9 x 0.11</td>
</tr>
<tr>
<td>(398)</td>
<td>SE Quadrant – 110E 90N</td>
<td>Pit cut</td>
<td>0.38 x 0.27 x 0.3</td>
</tr>
</tbody>
</table>

Table 3: - Dimensions – Group 23.

Post-pit (548) was an oval double post-hole pit with a tapered rounded point in profile containing post-holes (533) and (546). Post-hole (533) was sub-circular in shape while post-hole (546) was circular. Both post-holes had a tapered rounded point in profile. The fills of
both post-holes were a yellowish brown silty sand. The fill of the post pit, which provided packing material for both post-holes was a light greenish brown silty sand (555).

Post-pit (580) was a sub-rectangular single post-hole pit with a tapered rounded point in profile containing post-hole (575). Post-hole (575) was a circular post-hole with vertical sides and a tapered rounded point in profile. It was filled by a light yellowish brown silty sand (1333). The fill of the post pit, which provided a packing material for this post-hole was a mid brown silty sand (572).

Post-holes (522), (559) and (640) were all oval or sub-circular in shape with moderate or steep sides and a concave profile. Faunal remains were recovered from fill (505). All three also contained a mid greenish brown silty sand packing material, (518), (558) and (647) respectively.

Possible double post-holes (322) and (365) were both sub-rectangular in shape with either moderate or steep sides. Post-hole (322) had a tapered rounded point in profile while (365) was concave in profile. The fills of these two features varied from a silty clay to sand and varied in colour from mid grey to mid orangish brown.

Possible post-holes (346), (348), (367), (449) and (468) were all circular or sub-circular in shape. They all had generally moderate or steep sides and either a concave or a flat base. Their fills were generally all a sandy clay with the colour varying from a light yellowish brown to a dark greyish brown.

Pits (441) and (398) were located in close proximity to the structural features above and therefore may have shared a relationship with them. Pit (441) measured 1.5 m in length, 0.9 m in width and 0.11 m in depth. It was sub-circular in shape with gentle or moderately steep sides and a concave base. It was filled by a greyish brown sandy clay (399). Pit (398) measured 0.38 m in length, 0.27 m in width and 0.3 m in depth. It was oval in shape with gentle to moderately steep sides and was concave in profile. It was filled by a dark brown sandy clay (377). A sample from the post-hole (367) had a small cereal assemblage, with only 1 bread wheat and 4 indeterminate. One piece of flint debitage (E2444:488:1) was recovered from fill (488).

Interpretation

The features in this group represent a large collection of structural elements which could represent the remains of a possible building. Some of the post-holes and post pits described above are large structural features indicating a substantial building. While a definite structure could not be seen in the arrangement of the post-holes, a general linear alignment running from south-east to north-west can be distinguished. A perpendicular alignment may also exist to the southern end of this north-west/south-east linear. The hearth (385) from Group 14 may be connected to this structure. While we can determine that the post-holes described above represented some sort of structure there is not enough evidence to identify the shape or use of the building.
Group 11 Possible structure to the south of the souterrain

This group describes a series of features associated with a possible structure located just to the south of the souterrain.

Sub-group 1101: Structural features


Description

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<tr>
<th>Context. no.</th>
<th>Area/ Grid</th>
<th>Dimensions (length, width , depth in metres)</th>
</tr>
</thead>
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<td>(633)</td>
<td>SW Quadrant - 90E 85N</td>
<td>0.96 x 0.66 x 0.32</td>
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<tr>
<td>(719)</td>
<td>SW Quadrant - 90E 85N</td>
<td>0.48 x 0.48 x 0.21</td>
</tr>
<tr>
<td>(741)</td>
<td>SW Quadrant - 90E 85N</td>
<td>0.35 x 0.20 x 0.25</td>
</tr>
<tr>
<td>(661)</td>
<td>SW Quadrant - 95E 80N</td>
<td>0.51 x 0.44 x 0.33</td>
</tr>
<tr>
<td>(685)</td>
<td>SW Quadrant - 95E 80N</td>
<td>0.60 x 0.34 x 0.24</td>
</tr>
</tbody>
</table>

Table 4: - Post-hole dimensions - sub-group 1101

This sub-group describes six post-holes which all lie in close proximity to the southern end of the Souterrain. In general the post-holes were circular in shape with steep or vertical sides and had a concave profile. The fills of these post-holes varied from a mid brown to dark black in colour and from a silty sand to a sandy clay in composition. Five of the six post-holes had a greenish grey stony silt packing material. Charcoal, slag material and a piece of metal were recovered from fill (565) and faunal remains were recovered from fill (662). A sample from the fill (667) had a small amount of charcoal present, including oak (2 fragments) and pomoideae (2 fragments). There was also a small amount of plant remains, including bread wheat (1 fragment), hazelnut shell (1 fragment) and grass seed (1 fragment). Fill (565) had a moderate amount of charcoal, consisting of oak (2 fragments), hazel (4 fragments), hazel/ alder (2 fragments), willow/ poplar (7 fragments), pomoideae (1 fragment) and Prunus (7 fragments). This fill also had a small amount of cereal remains, including oat and barley and hazelnut shell
fragments (5 fragments). Fill (662) also had a moderate assemblage – oak (1 fragment), hazel (some twig) (8 fragments), willow/poplar (1 fragment) and pomoideae (4 fragments).

**Interpretation**

This collection of structural features possibly represents the remains of a building that was located to the south of the Souterrain. While the packing material found in most of these post-holes suggests a solid construction, an alignment for the building cannot be established as there is no discernable pattern in the location of these features. The charcoal and faunal remains recovered from the fills of these post-holes suggest that the hearth described in sub-group 1102 probably related to the use of this structure. Hazelnut shell fragments are commonly charred as a result of being thrown into an open fire, presumably after the nut is extracted. This, and the mixed charcoal assemblage, indicate a domestic hearth origin.

**Sub-group 1102: Hearth and associated post-hole and double post pit**

List of Contexts; C. 714, (1307), 713, (728), 668, 692, 1305, (1304), 725, (740), 715, (735).

**Description**

This sub-group describes a hearth as well as a closely associated post-hole and double post pit located to the east of the structural features described in sub-group 1101. Deposit (692) measured 1.27 m in length, 1 m in width and 0.09 m in depth. It was a dark brown sandy silt and contained moderate amounts of small and medium stones. This deposit and the stone inclusions provided the base for a hearth. It was overlain by a deposit (668), representing the area of burning, which measured 0.71 m in length, 0.9 in width and 0.04 m in depth. It was a light orangish brown silty sand with charcoal inclusions. Post-hole (728) measured 0.25 m in length, 0.25 m in width and 0.24 m in depth. It was circular in shape with vertical sides and tapered point in profile. It was filled by a dark brown clayey silt (714) and had a mid yellow sandy silt packing material (713). Post pit (735) measured 0.97 m in length, 0.38 m in width and 0.18 m in depth. It was sub-rectangular in shape with moderately steep sides and tapered rounded point in profile. It contained two post-holes (740) and (1304). Post-hole (740) measured 0.18 m in length, 0.17 in width and 0.13 m in depth. It was filled by a mid brown silty sand (725). Post-hole (1304) measured 0.13 m in length, 0.12 m in width and 0.14 m in depth. It was also filled by a mid brown silty sand (1305). Both post-holes were circular in shape with steep sides and a tapered rounded point in profile. Post pit (735) was filled by a mid brownish yellow silty sand (715) which was also acted as a packing material for both of the post-holes. A sample from a spread (668) contained a lot of charcoal, including oak (58 fragments) and hazel/alder (8 fragments). There were also a lot of plant remains, the cereals included oat (113), barley (10), bread wheat (12) and indeterminate (7), the legumes included 2 large seeds and there were 7 seeds of grasses. The sample from the deposit (692) contained cereal remains, including oat (5), barley (3) and indeterminate cereal grains (4).
Interpretation
This sub-group represents a domestic hearth and associated post-hole as well as a possible small structure, all in close proximity to the possible building described in sub-group 1101. Deposit (692) probably represented the base for the primary domestic hearth for the possible structure, while deposit (668) was the area of burning that occurred while the hearth was in use. Post-hole (728) lay in close proximity to these deposits and may suggest that a pot holder was once used in connection with this hearth. The double post pit (735) located 0.2 m to the north of the hearth may represent a small construction that was closely related to it, possibly a wind break. Oak wood was the most common wood type used in this domestic hearth. The large amounts of plant remains indicate the cereals were either dried by the hearth, where they became charred, or that the accidentally charred cereals were used as fuel.

Sub-group 1103: Associated refuse pits
List of Contexts; C.566, (603), 695, (716), 686, 706, (687), 732, (731), 745.

Description
This sub-group represents five pits that were located in close proximity to the structure and hearth as described in sub-groups 1101 and 1102. The pits varied from 0.74 to 2.4 m in length, 0.45 to 1.3 m in width and 0.14 to 0.46 m in depth. They were sub-rectangular to oval in shape with moderate to vertical sides and all had a concave profile. They were filled by deposits that were generally mid brown in colour and varied from sandy silt to silty clay in composition. Faunal remains and charcoal were recovered from fill (686) and (732) while faunal remains were recovered from fill (706). A sample from (687) contained a small amount of plant remains, including indeterminate cereals (2), grasses (1) and a hazel nutshell fragment (1)

Interpretation
This group of pits possibly represents refuse pits or internal features associated with the structure and hearth described in sub-groups 1101 and 1102. The faunal remains and charcoal recovered from the fills of these pits links them to the hearth described in sub-group 1102. They may have been used as refuse pits or they may have been internal features.

Group 12 Post-hole arc
This group describes an arc of post-holes located in the north-west quadrant of the ringfort interior. A central post-hole and a burnt refuse pit are also possibly associated.
**Sub-group 1201: Post-hole arc**

List of Contexts: C.(1032), 1031, (961), 959, (974), 1315, (972), 973, (1019), 1017, (984), 983, (1039), 1038.

**Description**

Sub-group 1201 is composed of six features, likely from their profile and plan to have originally held posts. Five of the features, (974), (961), (984), (1039) and (1032) formed an arc open to the north, while (1019) was situated in the centre of the area delimited by the arc. The group is situated approximately 4 m to the north of the east/west chamber of the souterrain. The post-hole dimensions ranged from 0.70 to 0.38 m in length, 0.62 to 0.32 m in width and 0.34 to 0.15 m in depth. The post-holes were sub-rounded in plan apart from one, (984), which was more elongated than the other features in the group suggesting that it may have originally held two posts. The sides of the post-holes were generally moderate to steep in profile and had concave bases. A compact mid brownish green sand with frequent stone inclusions clearly derived from the surrounding natural gravels acted as a packing material (1315) in post-hole (974). The interface between (1315) and the uppermost fill provided estimated dimensions for the post itself of 0.38 x 0.35 x 0.23 m. The other post-holes within this group each contained a single fill of mid brown sandy silt which contained moderate volumes of pebble and larger stone inclusions. Fills (1038) and (973) both contained a small volume of faunal remains. The post-hole fill (1017) contained a single barley grain.

**Interpretation**

Post-hole (1039) within the group was clearly truncated by the north/south aligned cultivation system, although currently without direct evidence, it would seem likely that the group relates to the main phase of occupation within the Ringfort. The group seems to represent a small structure open to the north with a central post-hole (1019). The post-holes do not indicate a large structure; the evidence from (974) suggests posts that were less than 2 m in height. No anthropogenic material was recovered from within the area to give any indication of function. It is possible that the structure may relate to storage or penning as little evidence of industrial or domestic activity was recovered from the north western sector of the site. The absence of packing deposits within most of the features may indicate that posts were removed rather than being left in situ, the packing collapsing with the removal of the post and combining with topsoil to form a single fill.

**Sub-group 1202: Burnt refuse pit**

List of Contexts: C.(1083), 1080, 1082.
Description

Sub-group 1202 consists of a single pit and its associated fills located within the northwestern extent of the interior of the Ring Fort. The pit was circular in plan with moderate sides and a concave base and measured 1.20 x 1.05 x 0.40 m. Two fills were identified within the pit. The lower fill (1080) consisted of a 0.05m thick layer of scorched natural sand that covered the whole base of the feature and contained occasional flecks of charcoal. The upper fill (1082), was approximately 0.35 m in depth and contained frequent large stone inclusions; many of which were heat affected, frequent charcoal flecks and occasional burnt faunal remains. A sample from the pit fill (1080) contained a lot of charcoal, including oak (75 fragments), hazel (2 fragments) and Pomoideae (2 fragments). The oak fragments examined had very dense growth rings, indicative of a slow growth rate. It was also rich in plant remains, including oat (49), barley (1), wheat (27) and indeterminate cereal grains (6). Additionally, a straw culm node (1 fragment), weed seeds including orache (1), plantain (3), cleavers (1) and nipplewort (2), as well as legumes (15 large and 47 small) and a grass seed were recovered.

Interpretation

The feature has been interpreted as a refuse pit for burnt material rather than a hearth. Although a significant volume of charcoal was recovered from within the feature there were no obvious lenses of burning, the charcoal being distributed evenly throughout the deposit. This coupled with the burnt stone inclusions and burnt faunal remains indicate that the fill most likely originated from a domestic cooking fire within the ringfort.

Group 13 L-shaped post-hole concentration

This sub-group represented the remains of a possible structure. It was disturbed by later activity.

Sub-group 1301: L-shaped post-hole concentration

List of Contexts: (1037), 1312, (1035), 1036, (1051), 1313, (1050), 1049, (1064), 1314, (1063), 1062, (962), 968, 969, 975, (960), 977, 979.

Description

Sub-group 1301 is comprised of a concentration of small post-holes immediately to the north of the east/west chamber of the souterrain. Collectively the post-holes formed roughly an L-shape in plan, the longest axis running east/west. The pits (1037), (1051), (1064), (962), (960) that originally held the posts ranged from 0.59 to 0.30 m in length, 0.58 to 0.30 m in width and 0.36 to 0.145 m in depth and were sub-circular in plan and had varying profiles. Within two of the post-holes it was possible to discern the original profile of the posts themselves, this
being evident from the interface between the packing material and the uppermost fill. The two post profiles are represented by (1050) which measured 0.28 x 0.22 x 0.34 m, and (1063), which measured 0.20 x 0.17 x 0.24 m. Both profiles had steep convex sides and concave bases. Posts were packed in place with sub-angular to sub-rounded stone. The Packing material also contained a small volume of greyish green sand matrix; both sand matrix and packing stones were derived from the surrounding natural gravels. The uppermost fills (1036), (1049), (1062), (969), (975), (977), (979) of the 7 post-holes were composed of mainly mid brown silty sand. It was not possible to determine whether the posts had been purposely removed or had been left to decay in situ. A sample from the post-hole fill (977) contained oak charcoal (7 fragments, all of which indicated a slow growth rate)

**Interpretation**

The post-holes possibly relate to the main phase of activity within the ringfort. The pit (948) clearly truncates post-holes (962) and (960) indicating that subgroup 1301 pre-dates the north/south aligned cultivation system. The interpretation of subgroup 1301 is limited by the presence of the later potato clamps, as these features may well have obscured further post-holes within the area. The full extent of the structure that Group 13 represents is therefore unclear. It is unlikely that Group 13 related to industrial or domestic activity, as little evidence of this was recovered from the north western sector of the site. However the group’s proximity to the east/west chamber of the souterrain suggests that the post-holes may relate to the construction or use of this feature.

**Group 14 Metalworking area**

This group describes the metal working activity and related features located in the north-east quadrant of the ringfort interior.

**Sub-group 1401: Bowl furnaces / fire pits and reuses**


**Description**

Bowl furnace (937), (950) and annexe (956) varied in length from 0.4 to 0.55 m, varied in width from 0.39 to 0.45 m and in depth from 0.2 to 0.25 m. These features were located in the interior of the ring fort, slightly north of the entrance. These features were oval or circular in shape with a flat or concave base. The primary fills of (937) and (950) were orange or orangish red silty sands (936) and (949). Fire affected stone was recovered from fill (949). Annexe (956) contained a large angular stone. Ash deposits (932) and (942) were a dark grey silty sand and overlaid (936) and (949) respectively. Fire affected stone was recovered from
both fills. Slag material and a furnace bottom were also recovered from fill (942). Layer (915) was a dark brown clayey sand which overlay deposits (932) and (942) from the double bowl furnace and filled annexe (956). Slag and fired stone was recovered from this layer. Above these features lay two later furnace recuts. The primary recut (910), measured 0.46 m in length, 0.41 m in width and 0.17 m in depth, was circular in shape with a concave profile and was filled by (907). The secondary recut (902) measured 0.57 m in length, 0.42 m in width and 0.12 m in depth, was sub-circular in shape with a concave profile and was filled by (893). The fills of these pits varied from an orangish black to dark black silty sand. Charcoal and slag material was recovered from fill (907) of the primary recut. Charcoal, fired stone, slag material and a furnace bottom were recovered from fill (893) of the secondary recut.

The fire pit (801) was 0.72 m in length, 0.60 m in width and 0.27 m in depth. It was circular in shape with a flat base and vertical or steep sides. The fill (799) was a dark brown silty clay that contained a large quantity of burnt material and charcoal flecking. Pit (801) was later truncated by pit (829), which measured 0.6 m in length, 0.55 m in width and 0.27 m in depth. This pit was circular in shape with a flat profile and vertical or steep sides. The fill (837) was a dark brown silty clay, which contained one fire affected stone. These pits were located 1.6 m to the north of bowl furnaces (937) and (950). A sample from the layer (915) contained a small amount of charcoal, consisting of oak (3 fragments), hazel (2 fragments) and Pomoideae (5 fragments) and indeterminate cereals (2). A sample from the furnace fill (936) also had a small amount of charcoal, including oak (3 fragments), hazel/alder (3 fragments) and diffuse porous (twig wood) (1 fragment). Fill (907) contained a lot of oak charcoal (20 fragments) and one hazelnut shell fragment. Metal slag was also present in the sample examined. A sample from the fill (893) contained oak (19 fragments) and ash (6 fragments) and it contained a small amount of plant remains, including indeterminate cereal (2) and grass seed (1). Metal slag was also present in the sample examined.

**Interpretation**

Features (937) and (950) were probably a double bowl furnace while feature (956) was an annexe to one furnace with a possible metalworking purpose. This can be surmised from the abundance of charcoal and fired stones from the fills of these pits as well as the two furnace bottoms that were recovered. The large angular stone contained within cut (956) may have been some sort of ‘striking platform’ for metal working activities, however, no slag residue was observed on this stone. The later features (902) and (910) appear to have been two separate phases of later furnaces cut into the double bowl furnace (937) and (950) and annexe (956). The use of these features as furnaces can be seen by their dark charcoal rich fills as well as the fact that slag material was recovered from both. A furnace bottom was also recovered from the fill (893) from within (902). Feature (801) was possibly a fire pit/bowl furnace of some type. This is supported by the burnt material recovered from fill (799) as well as its proximity to, and similarity in size and shape to that of the bowl furnaces (937) and (950). The pit (829)
may have been a recut of this feature, however, the small amount of burnt material present in the fill and the inclusion of only one fire affected stone suggests that it was possibly an addition to the fire pit rather than a replacement of it. Pit (829) may have been a waste pit or perhaps some other as aspect of the metal working process related to the possible furnace (801). Layer (907) contained exclusively oak, fill (893) contained mostly oak with some ash, both samples contained metal slag within the samples. Therefore, the charcoal in these samples is likely to be related to iron production.

Sub-group 1402: Metalworking feature

List of Contexts; C.808, (809).

Description

The pit listed above was located approximately 0.3 m to the south of the double bowl furnace (937) and (950). The pit (809) was rectangular in shape, measuring 0.9 m in length by 0.29 m in width, with a depth of 0.13 m. This pit was aligned north-east to south-west and had a flat base with fairly steep sides. The fill (808) was a brownish black sandy silt and contained a fair quantity of slag material as well as an angular stone that fitted into the north east end of the pit (809). Slag material was attached to this stone in situ. A sample from pit fill (808) contained a small amount of charcoal, including oak (6 fragments), alder (twig) (1 fragment) and diffuse porous (2 fragments).

Interpretation

The rectangular pit (809) is possibly a metalworking feature. The close proximity of (809) to the furnaces described in sub-group 1401, as well as the high quantity of slag material found within the fill (808), suggests the use of this feature in the metalworking process possibly smithing. The large angular stone has possibly been placed in the cut (809) to be used as a ‘striking platform’, which is indicated by the remaining slag material found on the stones surface.

Sub-group 1403: Dumping areas/rubbish pits related to metalworking


Description

The pits listed above were located within a 5 m radius of the bowl furnaces as described in sub-group 1401. The pits varied widely in length, width and depth. Lengths varied from 0.31 to 1.22 m, widths from 0.29 to 0.75 m and depths from 0.07 to 0.29 m. The pits varied from oval to sub-rectangular in shape and were all concave in profile. The sides varied from gentle to vertical in gradient. The fills themselves ranged from mid brown to dark black in colour.
with charcoal recovered from the fills of all of the pits. The composition of the fills varied from clayey silt to sandy clay, with the majority of fills being composed of a silty sand. Slag material was recovered from fills (900) and (935). Faunal remains were recovered from fills (854) and (827). Slag material and faunal remains were recovered from within fills (892) and (911). Flints were found in fill (827) and (854), one iron nail was recovered from fill (935) and two furnace bottoms were found in fill (892). Fills (827, 900 and 892) contained oak charcoal (22, 23 and 46 fragments respectively). Fill (892) also contained holly (1 fragment), spindle (4 fragments) and contained a single indeterminate cereal grain. Two small convex end scrapers were recovered from pit fill (827) (find number 827:1) and pit fill (854) (find number 854:1). What was probably a stone wedge (find number 911:1), slightly polished and triangular in shape (measuring 147.8 x 110.5 x 60.08 mm.), was found in pit fill (911), and a iron nail head (find number 935:1) in pit fill (935). In both cases they are the only artefacts from those contexts.

**Interpretation**

These pits possibly represent general dumping areas or rubbish pits with a close connection to the metalworking industry within the ringfort. They are located in close proximity to the metal working furnaces, as described in sub-group 1401. Slag material and/or charcoal has been recovered from the fills of all of the pits. An iron nail and two furnace bottoms were also recovered. The post-hole (836) from sub-group 1404 may have been used as a refuse pit connected to the metal working activities. The secondary fill of the post-hole contained possible burnt material. This may indicate that the post located here was earlier than the metalworking activity and was used as a dumping area after it had gone out of use. Metal slag material was recovered from all of the pits, therefore the charcoal was related to iron production.

**Sub-group 1404: Post-holes associated with the metalworking area**

List of Contexts; C.924, (927), 930, (931), 914, (916), 917, (918), 857, (856), 845, (846), 1301, (853), 963, (964), 992, (615), 1105, (1104), 965, (966), 1107, (1106), 905, (919), (920), (906), 940, (939), 957, (958), 1022, 1023, (1024), 1040, (1041), 1302, (1044), 925, (926), 1303, (938), 831, 830, (836).

**Description**

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(853) | NE Quadrant - 115E 110N | 0.28 x 0.24 x 0.13
(1104) | NE Quadrant -120E 110N | 0.44 x 0.25 x 0.34
(1106) | NE Quadrant - 120E 110N | 0.25 x 0.24 x 0.34
(939) | NE Quadrant - 120E 105N | 0.75 x 0.45 x 0.58
(958) | NE Quadrant - 120E 105N | 0.5 x 0.3 x 0.35
(1024) | NE Quadrant - 120E 110N | 0.38 x 0.27 x 0.17
(1044) | NE Quadrant - 120E 110N | 0.24 x 0.19 x 0.17
(938) | NE Quadrant - 120E 105N | 0.27 x 0.19 x 0.28
(836) | NE Quadrant – 110E 115N | 0.31 x 0.30 x 0.29

Table * - Post-hole dimensions – Sub-group 1404

The eleven post-holes listed above all lie in close proximity to the bowl furnaces described in sub-group 1401 and the metalworking feature in sub-group 1402. The post-holes varied greatly in length, width and depth as seen in the above table. These post-holes varied from square to oval in shape and had either a flat or concave bases. The sides were generally vertical or steep. The fills of the post-holes varied from yellowish brown to dark brown in colour and silty sand to silty clay in composition. Packing material was present in eight of the post-holes within this sub-group. Slag material was recovered from fills (924) and (917). Post-hole (939) had a close association with stake-holes (919) and (920) with all three features sharing a fill, (905). All three were sub-circular in shape and concave in profile with either steep or vertical sides. Fill (905) was a yellowish brown sandy silt with faunal remains recovered from within it. Post-hole (1106) was sub-circular in shape with a flat base and vertical sides. This post-hole was truncated by later post-hole (1104). Post-hole (1104) was oval in shape with a flat profile and vertical sides. Post-hole (1104) was in turn truncated by a later pit (964), sub-circular in shape with a concave base. Faunal remains and slag material were recovered from its fill (963). An oval pit (856) also lay in close proximity to the metal working features in sub-groups 1401 and 1402, and measured 0.56 m in length, 0.4 m in width and 0.22 in depth. Post-hole (836)
was circular in shape with vertical or steep sides and a concave profile. Its primary fill (830) was a mid black sandy silt, while its secondary fill (831), was a mid brown orange silty sand. Burnt material was observed within the fill (831). A sample from pit (856) contained just a small amount of charcoal; oak (1 fragment), ash (1 fragment) and pomoidae (1 fragment) and cereals including oat (5) and wheat (2), also weed seeds including knotgrass family (1) and nipplewort (1). A sample from the pit (615) contained a single hazel nutshell fragment (1).

**Interpretation**

These post-holes probably relate to a structure associated with the metalworking activity, however, no discernable pattern could be observed. The post-holes lie in close proximity to each other and to the metal working features and slag material has been recovered from the fills. Post-hole (939) and stake-holes (919) and (920) appear to be structurally connected with the possibility that the stakes were used to reinforce the post, seen in the angle of cuts (919) and (920) (see plate *). The truncation of post-hole (1106) by (1104) probably represents a renewing of this post. The truncation of (1104) by pit (964) probably represents the addition of a later feature after the post had gone out of use. Slag material was recovered from the fill (963) of the pit (964) which may have been a structural element. Pit (856) may have had a structural use also, given its proximity to the other post-holes and metalworking features and its similar size and shape. Post-hole (836) is located approximately 9 m from the bowl furnaces and may have pre-dated the metal working activity. The burnt material recovered from its secondary fill (831) relates it to the possible dumping of metal working waste (see sub-group 1403).

**Sub-group 1405: Isolated features to the north and west of the metalworking area**


**Description**

This sub-group describes six post-holes and five pits located, in general, to the north-west of the metalworking area. Pits (833), (849) and (852) and post-holes (834) and (841) were located approximately 7 m west of fire pit (801). Post-holes (807) and (823) lay approximately 6.5 m to the west of fire pit (801). Pit (805) and post-hole (812) were located 1.5 m to the west of fire pit (801). Pit (796) was located 1.8 m to the north east of pit (805) and post-hole (812). Pit (839) was located approximately 2 m north west of the fire pit (801). Post-hole (849) measured 0.41 m in length, 0.37 m in width and 0.32 m in depth. It was circular in shape and concave in profile. The post-hole had packing material within it (1297) and was filled by a mid orangish brown silty clay (820). Fill (820) also filled pit (833) and post-hole (834). Pit
(833) measured 0.81 m in length, 0.53 m in width and 0.20 m in depth. It was sub-circular in shape with moderately steep sides and a concave profile. Pit (833) truncated the earlier post-hole (834). Post-hole (834) measured 0.12 m in length, 0.11 m in width and 0.21 m in depth. It was circular in shape with vertical sides and had a tapered rounded point in profile. Post-hole (841) measured 0.12 m in length, 0.10 m in width and 0.10 m in depth. It was sub-circular in shape with moderate or steep sides and a concave profile. It was filled by a mid brown silty sand (840). A large pit (852) measured 1.13 m in length, 0.47 m in width and 0.23 m in depth. It was sub-rectangular in shape with moderate or steep sides and a concave profile. Its primary fill was a light yellowish brown silty sand (867) while the secondary fill was a mid orangish brown silty sand (851). Post-hole (807) measured 0.9 m in length, 0.7 m in width and 0.28 m in depth. It was sub-circular in shape, had steep or moderate sides and was concave in profile. Post-hole (807) had packing material within it, (1300), and was filled by a mid orangish brown sandy silt (802). Post-hole (823) measured 0.35 m in length, 0.3 m in width and 0.15 m in depth. It was sub-rectangular in shape with moderate or steep sides and a concave profile. It was filled by a dark greenish greyish brown sandy silt (824). Pit (805) measured 0.4 m in length, 0.22 m in width and 0.08 m in depth. It was sub-circular to oval in shape with moderate sides and a concave profile. It was filled by a mid brown silty sand (804), containing occasional large stones. Post-hole (812) measured 0.13 m in length, 0.10 m in width and 0.09 m in depth. It was sub-circular in shape, had gentle or moderate sides and was concave in profile. Post-hole (812) had packing material within it, (1296), and was filled by a mid orange silty sand (810). Pit (796) measured 0.74 m in length, 0.32 m in width and 0.32 m in depth. Pit (796) was sub-circular in shape, had gentle or moderate sides and was concave in profile. It was filled by a mid greyish brown silty sand (795). Pit (839) measured 0.55 m in length, 0.35 m in width and 0.15 m in depth. It was oval in shape with gentle to steep sides and was concave in profile. It was filled with a dark orangish brown clayey sand (838).

**Interpretation**

The features above are all generally located north-west of the metalworking activity. While these features may possibly have a relationship to the metalworking area, there was no definite evidence to suggest this.

**Group 15 Hearths/fire-pits**

This group describes the hearths and fire pits and associated features located to the south-east of the lean-to structure described in Group 7 and south of the possible rectangular structure circular described in group 10.
Sub-group 1501: Fire-pit


Description

This sub-group describes a fire-pit and an associated pit located south-east of the lean-to structure described in group 8. Fire-pit (314) measured 2.14 m in length, 1.66 m in width and 0.53 m in depth. It was oval in shape, with moderate or steep sides and was concave in profile. Its primary fill was a light orangish brown sandy clay (313) and its secondary fill was a light greyish white silt (316). Fill (316) was covered by a dark black charcoal layer (312). The rest of the fills from this fire pit ranged from dark brownish black to light brown in colour and were generally sandy silt in composition. Charcoal and faunal remains were recovered from these fills. Pit (379) lay 0.9 m to the north-east of the fire-pit. It measured 0.4 m in length, 0.4 m in width and 0.23 m in depth. It was circular in shape with sides of a moderate gradient and had a flat base. Its primary fill was a dark reddish brown silty sand (375) containing slag material while the secondary deposit was a mid green grey silty sand (376). A sample from fill (299) contained a small amount of oak charcoal (4 fragments) and cereal remains, including oat (1), barley (2) and indeterminate (1). It also contained large legumes (1) and small legumes (1). A sample from fill (312) contained a lot of charcoal. This was dominated by oak (26 fragments) with hazel (2 fragments) also present. Fill (307) was rich in charcoal, it contained oak (35 fragments), hazel/alder (9 fragments), willow/poplar (2 fragments), pomoideae (3 fragments) and Prunus (3 fragments). It was also rich in cereals and small legumes. Cereals included oat (25), barley (5), bread wheat (65) and indeterminate (30). It also included hazelnut shell fragments (2), large legumes (2), small legumes (27), and weed seeds including oraches (3), plantain (3) and small grass seeds (2). A sample from fill (282) was very rich in charcoal, particularly oak (210 fragments), with hazel (6 fragments), Pomoideae (13 fragments) and elder (1 fragment). It was rich in plant remains. Cereals included oat (40), barley (3), bread wheat (110) and indeterminate (29). Weeds included knotgrass family (3), wild radish (1) and corncockle (4). Legumes (40) and grasses (5) were also present. A sample from fill (313) was also rich in cereals and legumes. Cereals included oat (84 fragments), barley (26 fragments), bread wheat (23 fragments), rye (1 fragment) and indeterminate (9 fragments). Legumes (38 large fragments and 12 small fragments) and beans (6 fragments) were also common. Weeds seeds (50 fragments) and grasses (33 fragments) also occurred.

Interpretation

Pit (314) was a very large fire pit located in close proximity to the hearth (385) described in sub-group 1502. The primary deposit (313) of the fire pit was produced as a result of in situ burning. The ash deposit (316) and charcoal layer (312) were waste materials formed as a result of this burning. As only faunal remains were recovered from the fills of this fire pit it would be more likely that this had a domestic rather than industrial use. The fill of pit (379)
did show evidence of burning, however, slag material was also recovered. While it is in close proximity to fire pit (314) we can not ascertain the exact relationship between these two features. All of the samples were dominated by oak charcoal, particularly those from fill (282). The large quantity of oak charcoal from fill (282) is rarely found in domestic fires/hearth contexts and is more commonly found from industrial contexts. The large amount of cereal remains from fills (307, 313 and 282) indicate either more than one drying episode or that the cereals were being used as fuel. (e.g. found at medieval site Lispole, Co. Kerry, Johnston, 2007). If this was the case it exhibits a real abundance, as cereals are valuable food and fodder material.

**Sub-group 1502: Hearth**

List of Contexts; C.384, 401, 411, 412, (385).

**Description**

This sub-group describes a hearth (385) located to the south-west of fire pit (314) described in sub-group 1501 and south of the structural features described in Group 10. Hearth (385) measured 1.7 m in length, 1.6 m in width and 0.35 m in depth. It was circular in shape with gentle or moderate sides and a concave profile. Its primary fill was a mid greyish orange pebbly sand (412) and its secondary fill was a mid orangish brown clay (411). Overlying (411) was a black silty sand (401) while the final deposit was a dark brown clay (384). Charcoal and faunal remains were recovered from fills (401) and (384). This hearth was later truncated by one of the north/south furrows (345). A sample from the hearth fill (411) had a small amount of charcoal oak (1 fragment) and hazel/alder (1 fragment) and it contained a very small amount of plant remains - wheat (1) and grass (1). A sample from the hearth fill (384) had a lot of oak charcoal – (24 fragments) and it was rich in plant remains – oat (168), barley (29) and bread wheat (37) were common. Weed seeds included Sheep’s sorrel (2), knotgrass family (3), goosefoot family (1), wild radish (1), pale persicaria (3), corncockle (3) and nipplewort (11). Beans (8) and legumes (7 large and 69 small) were plentiful. Grasses were also common (30). A single hazelnut shell fragment was present.

**Interpretation**

Pit (385) was a substantial hearth located in close proximity to the large fire pit (314) from sub-group 1501. The primary fill of this hearth (412) was a compact orange layer of burnt material identifying the central area of the hearth. In the fills that overlay (412) charcoal and animal bone were present as well as further burnt areas of clay. The remains recovered from this hearth point towards a domestic usage, perhaps related to the structure identified in Group 10.
Sub-group 1503: Fire-pit

List of Contexts; C.386, 383, 404, 405, (408), 422, (421).

Description

This sub-group represents a fire pit and an associated pit located to the north-west of hearth (371) described in sub-group 1505 and east of the partial circular structure described in Group 9. Fire pit (408) measured 1.1 m in length, 1.03 m in width and 0.33 m in depth. It was sub-circular in shape with steep or vertical sides and a concave profile. Its primary fill was an orangey clayey silt (405) which contained charcoal while its secondary deposit was a light greyish yellow silty sand (404). Deposit (404) was overlain by a mid brown sandy silt (383), which in turn was overlain by a dark brown sandy silt (386). Charcoal and faunal remains were recovered from these two fills. Pit (421) was located 0.28 m to the south-east of the fire pit. It measured 0.18 m in length, 0.14 m in width and 0.25 m in depth. It was oval in shape with vertical sides and a tapered rounded point in profile. It was filled by a mid brown silty sand (422) from which faunal remains were recovered. A sample from fill (405) was rich in charcoal, it contained oak (53 fragments), willow/poplar (10 fragments) and birch (2 fragments). It was also rich in plant remains. Cereals included oat (81), barley (1), wheat (53) and indeterminate cereal grains (9). Weeds seeds included goosefoot family (1), knotgrass family (3), corncockle (4) and nipplewort (7). Beans (4), legumes (3 large and 82 small), and grasses (19) were also present. A sample from fill (383) was also rich in charcoal, it contained oak (58 fragments), ash (5 fragments), hazel (15 fragments), hazel/alder (2 fragments), willow/poplar (1 fragment) and Pomoideae (3 fragments). It also contained a large cereal assemblage, including oat (45), barley (16), wheat (8) and indeterminates (26). Legumes (4 small), weed seed consisting of wild radish (1), and hazel nutshell fragment (1) were also identified. A sample from fill (386) contained a moderate amount of charcoal, including oak (9 fragments), ash (7 fragments), hazel (4 fragments) and Prunus (9 fragments). The sample had a large cereal assemblage, including oat (45), barley (25), wheat (6) and indeterminate (60). Weed seeds including cf sheeps sorrel (1), knotgrass family (1) and corncockle (1) were present. Legumes (2 small fragments), grass seed (1 fragment) and hazel nutshell fragment (3) were recorded. Fill (404) contained cereals, including oat (4 fragments) and indeterminate (1 fragment).

Interpretation

Fire pit (408) was located in close proximity to hearth (371) from sub-group 1505. Its primary fill was reddish burnt clay indicating the in situ burning within the fire pit, while its secondary deposit was the waste ash material produced by this fire. Charcoal and faunal remains were recovered from the fills of the fire pit indicating a possibly domestic use. The small size and steep sides of pit (421) possibly indicate that it was a post-hole which may have supported a post used as a pot holder connected to the domestic use of this fire pit. All of the samples
were dominated by oak. The large amount of cereal remains from indicate either more than one drying episode took place here or that the cereals were being used as fuel.

**Sub-group 1504: Hearth**

List of Contexts; C.370, 378, 380, 381, (371), 394, (393).

**Description**

This sub-group describes a hearth and an associated post-hole located to the west of fire pit (490) described in sub-group 1503 and south-east of fire pit (408) described in sub-group 1504. Hearth (371) measured 1.78 in length, 1.7 m in width and 0.23 m in depth. It was irregular in shape with gentle sloping sides. In the base of this hearth lay two fills and a post-hole that were all contemporary with each other. Fill (380) was a dark orange burnt clay with flecks of charcoal while fill (381) was a greyish white ash. Post-hole (393) was located 0.15 m to the north of the hearth. It measured 0.36 m in length, 0.30 m in width and 0.27 m in depth. It was circular in shape with vertical sides. It was filled by a light greyish brown sandy silt (394) which also contained charcoal flecks. These deposits and features were overlain by a mid brown sandy silt (378). The final deposit of this feature was a dark brown sandy silt (370). Charcoal and faunal remains were recovered from these deposits. A sample from the hearth fill (370) was rich in charcoal, it contained oak (35 fragments), hazel (9 fragments), willow/poplar (2 fragments) and Pomoideae (4 fragments). Cereals were predominantly oat (75). Barley was also found (16), bread wheat (15) and indeterminates (15). Legumes (5 large and 7 small), weed seeds of the knotgrass family (4), black bindweed (1), pale persicaria (1), nipplewort (5), and grasses (9) were also identified, as well as a hazelnut shell fragment. A sample from the post-hole fill (394) contained a moderate amount of oak charcoal (16 fragments) and a very small cereal assemblage, including barley (1), bread wheat (1) and indeterminate (1). Hearth fill (380) had a large cereal assemblage, including oat (22 fragments), barley (8 fragments), bread wheat (6 fragments) and indeterminate (12 fragments). Legumes (7 large fragments) and weed seeds including fat-hen (1 fragment), probable sheep’s sorrel (1 fragment) and knotgrass family (2 fragment) were also present. Hearth fill (378) was rich in plant remains. Cereals included oat (119 fragments), barley (29 fragments), rye (6 fragments), bread wheat (56 fragments) and indeterminate (29 fragments) occurred. Beans (4 fragments) and legumes (10 large fragments and 41 small fragments) were common. Weed seeds including goosefoot family (3 fragments), knotgrass family (6 fragments), black bindweed (2 fragments), pale persicaria (6 fragments), cleavers (1 fragment) and nipplewort (3 fragments), were also present.

**Interpretation**

Hearth (371) was a substantial hearth with a contemporary post-hole. It was created as a large pit which had an area for burning in the middle with a dump for waste material at the
southern end and a post-hole on the northern end. The post-hole possibly represents a pot
holder which was used in connection with the burning area. Deposits (378) and (370) repre-
sent accumulations over the hearth once it had gone out of use. The faunal remains recovered
suggest that this was a domestic hearth. Again, oak dominates the charcoal remains, this
charcoal is likely to have originated from a domestic hearth. The vast amount of cereals sug-
gest that this may have been a corn drying area.

Sub-group 1505: Features associated with the hearths / fire-pits.

Description
This sub-group describes four pits located in the centre of the group of hearths/fire-pits. The
pits varied in length from 0.27 to 1.13 m, varied in width from 0.25 to 0.65 m and varied
in depth from 0.04 to 0.28 m. They were generally oval in shape with a tapered rounded
point in profile. The sides of the pits varied from gentle to vertical in gradient. Their fills were
mostly sandy silt and ranged from mid brown to orange in colour. Charcoal flecks and fau-
nal remains were recovered from fill (407) and there was burnt material noted in fill (416). A
sample from fill (407) contained charcoal, including oak (18 fragments) and willow/popular
(3 fragments).

Interpretation
The pits described above are features which are related to the hearths and fire pits described in
sub-groups 1501 to 1505. Faunal remains and charcoal were recovered from the fills of some
of these pits and burnt material was noted in fill (416). However, there is little evidence to
determine the direct relationship between these features and the hearths. Pit (433) may have
been a double post-hole and possibly suggests a structural element to this group of features.

Sub-group 1506: Refuse pits associated with the hearths/fire-pits
List of Contexts; C.477, 481, 499, (480), 482, (483), 484, (485), 895, 903, (909), (896), 494,
(497).
**Description**

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</table>

Table 6: - Pit dimensions – sub-group 1506

This sub-group describes five pits and one post-hole located to the south of a possible rectangular structure described in Group 10 and south-east of hearth (371) from sub-group 1505. Pit (480) was irregular in shape with steep sides and tapered blunt point in profile. Its primary fill was a dark brown sandy silt (499) while its secondary fill was a mid orange silty sand (481) and its final fill was a light white silty sand (477). Charcoal was observed in fills (477) and (481). Pit (483) was sub-circular in shape with moderate or steep sides and a flat base. It was filled by a loose mid brown silty sand (482). Pit (485) was oval in shape with gentle or vertical sides and a concave profile. It was filled by a dark brown silty clay (484) from which charcoal and faunal remains were recovered. Pit (896) was sub-circular in shape with steep sides and tapered rounded point in profile. It was truncated by post-hole (909) which was also sub-circular in shape with steep sides. It measured 0.26 m in length, 0.22 m in width and 0.24 m in depth. The primary fill of pit (896) was a mid brown sandy silt (903) while its secondary fill was a dark brown sandy silt (895). Pit (497) was sub-rectangular in shape with gentle or moderate sides and a concave profile. It was filled by a dark brown sandy silt (494) which contained ash and slag material.

**Interpretation**

This group probably represent refuse pits which are closely associated with a series of hearths and fire-pits. The fills of the pits tend to suggest that they were used as dumping areas for the hearths and fire-pits that are located in close proximity. Charcoal was recovered from pits (480) and (485), ash material was recovered from pits (497) and (480) and faunal remains were recovered from pit (485). Slag material was recovered from pit (497) which may relate to the possible industrial hearths and fire-pits described in sub-groups 1501 and 1503.
Group 16 Domestic hearth

This group encompasses the domestic hearth and associated features located to the north of the interior of the ringfort.

Sub-group 1601: Hearth and associated pits and post-hole


Description

This sub group contains a hearth, a post-hole and three pits located to the north of the interior of the ring fort. Hearth (850) measured 0.8 m in length, 0.66 m in width and 0.17 m in depth. It was irregular in shape with either moderate or steep sides and was concave in profile. It was filled primarily by (763) and later by (764). Both fills were a light orangish white silt. Post-hole (729) was identified 0.8 m to the north of the hearth (850). This post-hole measured 0.38 m in length, 0.19 m in width and 0.11 m in depth. It was circular in shape with steep sides and was concave in profile. A light green silty sand packing material (791) was identified and the post-hole was filled by a light reddish orange clayey sand (788) which also contained some slag material. The hearth and the post-hole were overlaid by a mid brown yellow silty clay (765) from which slag material, charcoal and faunal remains were recovered. Overlying (765) was a layer of yellowish sand which was interpreted as redeposited natural (858). Pit (798) measured 1.61 m in length, 1.48 m in width and 0.48 m in depth. It was circular in shape with gentle or moderate sides and a concave profile. This pit was located immediately to the south of the hearth (850). Pit (798) was filled by a light brownish orange silty clay (724). Pit (798) was later truncated by pit (790). Ash pit (790) measured 0.91 m in length, 0.43 m in width and 0.31 m in depth. It was circular in shape and had a concave profile. The sides were gentle to the north, moderate to the south, vertical to the east and steep to the west. The ash pit was filled by a light orangish white sandy silt (723). Pit (797) measured 0.94 m in length, 0.84 m in width and 0.4 m in depth. It was circular in shape with a concave profile. The sides were gentle to the north and south, moderate to the east and steep to the west. This pit was filled by (724) which also filled pit (798). Pit (797) truncated the earlier pit (689). Pit (689) measured 1.09 m in length, 0.86 m in width and 0.42 m in depth. It was sub-circular in shape and was concave in profile. The sides of this pit were moderate to the north and south and steep to the east and west. Pit (689) was filled by a mid orangish brown clayey silt (682) with some large sub-angular stones. Layer (718) overlay the hearth, post-hole and two of the pits. It measured 2.14 m by 1.2 m in width and 0.1 m in depth. It was a light brown silty clay with charcoal flecks. Small pieces of fire affected stone were recovered from this deposit. Layer (718) was in turn covered by layer (711). This layer measured 1.6 m in
length, 1.42 m in width and 0.2 m in depth. It was a mid brown clayey silt and contained slag material, charcoal, fire affected stone and faunal remains. Layer (711) was later truncated by pit (871) from sub-group 1604. A sample from pit fill (682) contained a small amount of charcoal, consisting of oak (4 fragments) and willow/poplar (4 fragments). Another sample from the layer (711) contained a lot of charcoal. The charcoal was dominated by oak (180 fragments), with hazel (7 fragments), pomoideae (3 fragments) and Prunus (1 fragment). It was also rich in plant remains. Cereals, including oat (40), barley (7), bread wheat (14) and indeterminate (9) were recorded. Additionally legumes (13 large and 25 small), weed seeds including knotgrass family (4) and grasses (3) were recorded. A sample from the hearth fill (763) contained a small amount of oak charcoal (6 fragments) and cereals, including oat (5), barley (4) and indeterminate (1). It also contained a wide range of weed seeds. A sample from hearth fill (764) contained only one fragment of hazel/alder charcoal. Another sample from the spread (765) had a rich charcoal assemblage dominated by oak (38 fragments), with hazel (25 fragments), alder (8 fragments which had insect holes), willow/poplar (4 fragments), pomoideae (4 fragments) and Prunus (1 fragment) as well as a single grass seed. A sample from layer (718) contained a small to moderate amount of charcoal, including oak (14 fragments) and pomoideae (3 fragments) and a small amount of bread wheat (2).

**Interpretation**

This sub-group represents a domestic hearth with an associated post-hole, an ash pit, a large base pit, a possible refuse pit and a recut of this refuse pit. Post-hole (792) may have been the remains of a pot hanger used in connection with cooking over the domestic hearth. Ash pit (790) was probably used as a dumping area for the burnt materials from the hearth, while the large pit (798) may have provided an original base for the hearth and its associated features. Pits (797) and (689) represent two phases of a large probable refuse pit, connected to the domestic hearth. The later pit (797) is filled by the same deposit as pit (798), which is intimately connected to the hearth. While the inclusions within the hearth did include slag material, it was only in small quantities making this feature much more likely to be for a domestic rather than an industrial use. The samples were dominated by oak. Given the abundance of oak charcoal, oak was probably used in both industrial and domestic contexts in this area. Plant remains were frequent, indicating that drying of cereals was taking place or that the cereals were being used as fuel.

**Sub-group 1602: Two post-holes and a stake-hole surrounding the hearth**

List of Contexts; C.700, (710), 1282, (701), 704, (705), 702, (703), 873, 874, (883).

**Description**

This sub-group contains one stake-hole and two post-holes that surround the hearth (850). The post-holes are located 0.75 m to the south of the hearth while the stake hole was located
1.8 m to the north-west of the hearth. Post-hole (701) measured 0.15 m in length, 0.1 m in width and 0.14 m in depth. It was circular in shape with steep and concave sides. It contained a mid orange sandy clay packing material (1282) and was filled by a dark orangish brown sandy clay (700). This post-hole truncated an earlier post-hole (705). Post-hole (705) measured 0.39 m in length, 0.31 m in width and 0.12 m in depth. It was sub-circular in shape with moderately steep sides and a concave profile. It was filled by a mid orangish brown clayey sand (704). Post-hole (703) was located 0.2 m to the south-east of post-hole (705). It measured 0.32 m in length, 0.30 m in width and 0.20 m in depth. It was sub-circular in shape and concave in profile with moderate or steep sides. It was filled by a dark orangish brown sandy clay (702). Post-hole (703) and (705) were both covered by a layer of light orangish brown silty clay (528). Stake hole (883) measured 0.23 m in length, 0.16 m in width and 0.1 m in depth. It was circular in shape and had a tapered rounded point in profile. It was filled by a dark greenish brown silty clay (874). A post-hole fill (702) contained a small amount of charcoal, which consisted of 7 fragments of oak.

Interpretation
The two post-holes and stake-hole described above suggest a structure surrounding the domestic hearth (850). The proximity of post-holes (705), and (703) and stake-hole (883) to the hearth suggest a structure closely related to it. Post-hole (701) appears to be a recut for post-hole (705). This possibly represents a repair to this structure and possibly suggests a structure with a significant period of use. The layer (528) was a spread of redeposited natural sub-soil covering this part of the interior of the ring fort.

Sub-group 1603: Pits surrounding the hearth
List of Contexts; C.873, 874, (875), 881, (882), 664, 669, (681).

Description
This sub-group describes three pits that surrounded the hearth (850). Pits (875) and (882) were located 1.8 m to the north-west of the hearth and pit (681) was located 2 m to the east of the hearth. Pit (882) measured 0.78 m in length, 0.57 m in width and 0.30 m in depth. It was circular in shape, with moderate or steep sides and a concave profile. It was filled by a mid brown silty sand (881). Fill (881) was overlaid by (874). Pit (875) measured 0.74 m in length, 0.37 in width and 0.16 m in depth. It was sub-circular in shape with either gentle or moderate sides and concave in profile. It was filled by a greenish brown silty clay (874). Layer (873) was a mid orangish brown silty clay measuring 2.35 m in length, 0.52 m in width and 0.09 m in depth. This layer covered layer (874). Pit (681) measured 1.38 m in length, 0.79 m in width and 0.3 m in depth. It was a circular pit which was concave in profile. Its sides were steep to the north and west, gentle to the south and moderate to the east. The primary fill
was a mid greenish brown silty sand (669) while the secondary fill was a mid orangish brown silty sand (664).

**Interpretation**

These three pits are probably associated with the domestic hearth (850). Due to their proximity they may also be related to the structure connected with the hearth (see sub-group 1502), however, as no finds were recovered from the fills, it is difficult to determine their exact function and relationship to the other features in this group.

**Sub-group 1504: Isolated features north of the hearth**

List of Contexts: C. 868, (869), 861, 878, (870), 888, (889), 1299, (890), 885, (886), 879, (887), 865, 862, (863), 729, (871)

**Description**

This sub-group contains three post-holes and two pits. Post-holes (870), (887) and (890) were located 3.5 m north of the domestic hearth (850) while post-hole (863) was located approximately 6 m to the east of these post-holes. Pit (871) truncated the layers above hearth (850). Post-holes (870), (887) and (890) varied in length from 0.3 to 0.4 m, varied in width from 0.12 to 0.4 m and varied in depth from 0.09 to 0.23 m. While post-holes (870) and (887) were sub-circular in shape, post-hole (890) was sub-rectangular. All three had a concave profile and in general had moderate or steep sides. The fills of these post-holes, (868), (885) and (888), were in general sandy silt and varied in colour from a mid yellowish brown to a dark brown. All three post-holes contained packing material, (861), (879) and (1299). Pit (863) measured 0.19 m in length, 0.13 m in width and 0.07 m in depth. It is sub-circular in shape with a concave profile. The sides were steep to the north and west, moderate to the east and gentle to the south. It was filled by a mid brown medium sand (862). Fill (862) was overlaid by a mid brown medium sand layer (865) with moderate small, medium and large stones. Pit (871) measured 0.6 m in length, 0.23 m in width and 0.1 m in depth. It was sub-rectangular in shape with gentle or moderate sides and was concave in profile. The pit truncated layer (711) that overlay hearth (850). It was filled by a mid reddish brown silty sand (729). Slag material, charcoal and fire-affected stone were recovered from this fill. A sample from the post-hole packing (861) contained a moderate amount of charcoal, including oak (8 fragments), ash (1 fragment), hazel/alder (1 fragment) and pomoideae (2 fragments).

**Interpretation**

The three post-holes and one of the pits were located to the north of the hearth (850). The lack of information that was recovered from these features, as well as their somewhat isolated position meant that they could not be directly linked to any of the features in this area. Pit
(871) truncated the hearth and may have represented a re-cut. However the pit was more likely to have been a later dump for waste materials such as slag material and fire affected stone. While this pit is stratigraphically linked to the hearth, it is a later feature and therefore is not connected to its use.

**Group 17 Refuse pits**

This group describes the collection of refuse pits located within the centre of the ring fort located to the north of the circular house described in Group 6.

**Sub-group 1701: Large refuse pit**

List of Contexts; C.234, 235, 501, (212)

*Description*

The large pit (212) was located approximately 3.5 m to the north of the circular house described in Group 6. It was circular in shape, measuring 1.75 m in length, 1.75 m in width and 1.3 m in depth. It had a flat base with steep and concave sides to the north and east, a steep and irregular side to the south and a vertical and stepped side to the west. The primary fill of this pit was a dark greyish brown sandy clay (501). Two pieces of flint, faunal remains, slag material and fossils were recovered from this fill. The secondary fill was a mid brown stony silt (235) while the final fill was a dark brownish black silty clay (234). Faunal remains and shells were recovered from fills (234) and (235). All of the fills of pit (212) included moderate to frequent amounts of small, medium and large stones. A sample from the pit fill (501) contained a small amount of ash charcoal (2 fragments). A sample from the pit fill (235) continued oak (6 fragments), ash (3 fragments) and alder (7 fragments) and barley (1), wheat (2) and a knotgrass weed seed (1).

*Interpretation*

The large pit (212) was possibly a large refuse pit, associated with domestic waste originating from the circular house (Group 6). The sheer size of the pit (212), the varied inclusions that were recovered from its fills and its location, in close proximity to the circular house suggest its use as a refuse pit.

**Sub-group 1702: Small and shallow refuse pits**

List of Contexts; C.194, (193), 198, (195), 200, (199), 211, (210), 504, (455), 502, (503), 529, (530).
**Description**

The pits listed above were located within the centre of the ring fort, within 5 m of the large refuse pit (212). The pits varied in size from 0.5 to 1.83 m in length, 0.34 to 0.89 m in width and 0.11 to 0.20 m in depth. They were oval to circular in shape and their bases ranged from flat to concave. The sides of the pits varied greatly from gentle to steep in gradient. The fills of the pits varied from a dark greyish brown to a dark brownish black in colour and from a silty sand to a clayey silt in composition. The pit (530) measured 0.49 m in length, 0.37 m in width and 0.125 m in depth. It was irregular in shape with sides ranging from moderate to vertical in gradient and had a concave profile. The fill of the pit (529) was a dark greyish brown silty sand. The pit (530) was also located in close proximity to the large refuse pit (212) and was overlain by redeposited natural material (536). The pit (530) was originally interpreted as a post-hole but this was changed in the post excavation process.

**Interpretation**

These pits appear to be a group of refuse pits with a close connection to the large refuse pit (212). This is demonstrated by their proximity to the large pit (212). Their general size and shape were also similar to each other, however the lack of finds within their fills is unusual for refuse pits. The pit (530) may possibly have a structural relationship to pit (212) but is more likely to be a small refuse pit in association with the rest of this sub-group.

**Sub-group 1703: Later feature associated with the refuse pits**

List of Contexts; C.517, (516), 536.

**Description**

The sub-rectangular pit (516) was 2.03 m in length, 0.72 m in width and 0.14 m in depth. The sides of the pit were gentle and either concave or irregular and had a flat base. The break of slope of the feature was imperceptible or gradual. The fill of the pit was a mid brownish black sandy silt (517). Faunal remains were recovered from this fill. The pit (516) also truncated layer (536), a mid greenish grey silty sand representing a layer of redeposited natural.

**Interpretation**

Pit (516) was excavated later than the refuse pits described in sub-groups 5001 and 5002. A layer of redeposited natural (536) overlies the pit (530) from sub-group 5002. This layer of redeposited material may have originated from the excavation of the large refuse pit (212) which lies in close proximity. Without further information the use of this pit is difficult to determine.
Sub-group 1704: Isolated features located to the north of the refuse pits

List of Contexts; C.610, (609), 612, (611), 755, (756).

Description
This sub-group describes one pit and two post-holes located just to the north of the refuse pits. Post-hole (609) lay approximately 1 m to the north of refuse pit (210). Pit (611) and post-hole (756) were located 0.7 m and 3.9 m east of post-hole (609) respectively. Post-hole (609) measured 0.3 m in length, 0.17 m in width and 0.03 m in depth. It was sub-circular in shape with a flat base and gentle sides. This post-hole was filled by a light yellowish grey silty sand (610). Pit (611) measured 0.31 m in length, 0.21 m in width and 0.12 m in depth. It was a sub-circular pit with a concave profile and steep sides. It was filled by a mid yellowish grey silty sand (612). Post-hole (756) measured 0.7 m in length, 0.45 m in width and 0.14 m in depth. It was oval in shape with a concave profile. The sides were gentle to the north, moderate to the south and steep to the east and west. This post-hole was filled by a dark brown clayey sand (755). One fossil was recovered from this fill. A sample from post-hole fill (755) contained a single oat grain.

Interpretation
These two post-holes and a pit are a collection of features with a close proximity to each other. Due to the lack of information they cannot be linked directly to any of the other groups in this area.

Group 18 L-shaped linear features
This group describes five linear features with a distinctive sharp curve to one end. Although very similar in shape, these features all have different locations and orientations.

Sub-group 1801: L-shaped linear features
List of Contexts; C.302, (341), 1133, (1135), 556, 540, (557), 872, (884), 549, (550).

Description
These five features were spread across the interior of the ringfort. Feature (341) was located south of the lean-to structure described in group 7, feature (1135) was located north of the tree in the north-west area of the interior, features (557) and (550) were located east of the souterrain while feature (884) was in close proximity to potato clamp (880). These features varied in length from 2.4 to 4.6 m, varied in width from 0.4 to 1.05 m and varied in depth from 0.12 to 0.21 m. They were all fairly linear in shape with a distinctive sharp curve at one end. Feature (341) was orientated approximately east/west with the west end curving to
the south while feature (884) was orientated approximately north/south with the south end curving to the east. Features (1135), (557) and (550) were all orientated north-east/south-west with the north-east end curving to the east. Features (1135) and (550) were truncated by the north south running furrows (921). They all had generally moderately steep sides and either concave or flat bases. These features were filled by deposits which varied from mid to dark brown in colour and were generally a sandy silt composition. One metal object was recovered from fill (302) while faunal remains were recovered from fills (556), (540) and (302).

_Interpretation_

The interpretation of these features is difficult. Two of the five are truncated by north/south running furrows which indicates that they pre-date the early cultivation level. Due to their similar size and shape we may surmise that these features all have the same, or a similar purpose. A possible explanation may be that they are various drainage gullies for different features / structures within the ringfort.

Group 19 Souterrain

This group describes the souterrain construction located in the south-west quadrant of the ringfort interior.

_Sub-group 1: construction elements_

List of Contexts:C.(1266), 1254, 1253, 1252, 1061, 1267, 1124, 1263, 1264, 1265, 1316, 1319, 1320, 1334, 1337.

_Description_

The souterrain cut (1266) was roughly L-shaped in plan. The longer north/south section was sub-rectangular in shape and measured 14.3 m in length and was 1.90 m deep. The cut was 4 m wide to the south and narrowed to 3.4 m in width to the north. The east/west cut was again sub-rectangular in shape and was 9.10 m long, 3.60 m wide and was 1.90 m deep. The sides of the cut were steep and sharp. The souterrain consists of two chambers and a connecting drop creep. The walls (1254) of the souterrain were constructed using the dry stone technique. The walls were composed of weathered limestone boulders set in eight very rough and uneven courses. The lowest course was composed of larger more substantial stones. The walls were one stone in width and were built up against the cut. The space between the wall stones and the cut was filled with smaller stones and packing material (1334). The end walls of both chambers were slightly rounded and connected seamlessly with the side walls. The stones had average dimensions of 0.40 x 0.20 m. The outer face of the stones was covered in white calcite build up and was due to exposure in a damp hollow space.
The internal dimensions of the north/south chamber were 7.6 m x 1.6 m. The full height of the walls ranged from 1.4 – 1.6 m. The northern end of the side walls and the northern end wall survived to only one or two courses. The western wall had one large area of collapse but the integrity of the wall survived. The collapse may have been caused by burrowing as the space between the cut and the wall was filled with small loose stone and packing material.

The east/west chamber was 7.4 m long and was 1.6m wide to the west. The walls were 1.6 m high and were constructed in similar fashion to the north/south chamber. The chamber narrowed gradually to the east and was less then 1m wide at the top of the entrance steps (1319). Five steep steps were constructed at the eastern end of the chamber. The three lowest steps were built using three square limestone blocks for each step while the two upper steps utilized two blocks for each step. The individual steps were narrow and steep averaging 0.20m in depth and 0.20m in width. The steps were set into a yellowy sand material (1263) which appeared to act as a form of mortar securing the individual stones in place. The bottom step was also set into this material and was raised off the chamber floor by 0.05m.

The east/west chamber was linked to the slightly larger north/south chamber by means of a drop creep. Towards the western end of the southern wall of the east/west chamber a large limestone lintel covered an entrance into a small creep-way. The entrance below the lintel was 1 m in height and the creep itself was 1.7 m long and 0.84 m wide. The back wall of the creep-way was 0.60 m high. Due to collapse and deliberate destruction the exact method of entry between the two chambers is unclear. A solid sloping surface composed of compact yellow sand (1337) runs between the top of the back wall of the drop creep and the northern wall of the north/south chamber. This surface formed a connecting ramp between the drop creep and the main chamber.

A lintel corbelled roof survived across the southern end of the north/south chamber. Fifteen supporting lintels (1253) were placed on top of the wall but overhanging into the interior by approximately 0.30 m. The supporting lintels were large bedded limestone slabs measuring c. 1.10 x 0.70 x 0.17 m. A small corroded metal object and some animal bone were recovered from a thin deposit of mid brown sandy silt (1061) which covered the supporting lintels. Large rounded limestone counter balance boulders (1267) measuring 0.60 x 0.40 m were placed on top of the supporting lintels along the line of the souterrain side walls. These boulders were used to stabilise the supporting lintels prior to positioning the central roof lintels (1252) in place. The five in situ central lintels were composed of large bedded thick limestone slabs. The lintels measured on average 1.60 x 1.00 x 0.18 m.

The roof structure was covered by a strongly cemented layer of light greenish grey pebbly sand with small stone inclusions (1124). This cement like mixture was c. 0.50 m deep and sealed the souterrain and acted as a water-proofing layer and stabilizing agent. The mixture did not percolate down between the voids and cavities which were present between the chamber walls and the steep sides of the souterrain cut. The floors of both chambers (1264) and (1265) were composed of similar strongly cemented light grayish yellow sand with occasional fine and coarse pebbles and very small stone inclusions.
A blocked up linteled alcove was identified in the western wall of the north/south chamber. The alcove was located 0.70 m from the south west corner of the chamber. It was 0.70 m wide, 0.90 m long and 0.80 m high. Two covering lintels rested on the north and south side walls. The walls were built of limestone blocks and were five courses high. The steep sided souterrain cut was utilised to form the back wall of the alcove.

**Sub-group 2: Deposits possibly associated with primary use**

List of Contexts: C.1262, 1250, 1257, 1256

**Description**

Four fills located in the north/south chamber are possibly associated with the primary use of the souterrain. The north/south chamber floor (1262) was covered to a depth of 0.08 m by light yellowish brown clay with occasional pebbles and charcoal flecks (1250). Dark brown sandy silt (1262) was identified above the floor deposit at the base of the alcove. Two fills of loose grey silty sand (1256) and (1257) were identified above fill (1250) next to the northern end wall of the north/south chamber. The fills were possibly deposited as a result of the use of the connecting ramp between the north/south chamber and the drop-creep. Three samples from fill (1250) were analysed for charcoal. A moderate amount of charcoal was recorded, including oak (9 fragments), ash (26 fragments), hazel (4 fragments) hazel/alder (3 fragments) and willow/poplar (1 fragment). One sample from fill (1257) also contained charcoal, including oak (5 fragments), ash (6 fragments), hazel/alder (10 fragments), willow/poplar (7 fragments) and Pomoideae (1 fragment). Unlike the charcoal recovered from the ringfort and associated features, the charcoal from the souterrain is not dominated by oak but by ash and other wood types. The charcoal would seem to originate from a different source than that of the hearths and fire pits (mentioned above).

**Sub-group 3: Fills associated with possible primary collapse**

List of Contexts: C.1226, 1223, 1249

**Description**

Two fills located against the base stones of the northern wall of the north/south chamber next to the creep should possibly be interpreted as evidence for primary collapse. Both of them were firmly compacted mid (1226) and dark (1223) brown sandy clay with occasional pebbles and small stone inclusions. The fills also contained occasional charcoal and animal bone inclusions. These fills were covered by dark brown silty clay (1249) which spread across the base of the entire north/south chamber. This context contained a clay pipe and six corroded metal objects. The fill (1249) built up after the initial collapse but prior to the blocking up of
the alcove. One sample from fill (1249) contained a moderate amount of charcoal, consisting of oak (4 fragments) and Pomoideae (twig wood) (4 fragments).

**Sub-group 4: Blocking up the alcove**

List of Contexts: C.1260, 1261, 1316, 1251

**Description**

The alcove in the north south/chamber was deliberately blocked up. The alcove space was initially filled to a depth of 0.75 m by a strongly cemented mid greenish brown sandy silt (1261). Above this was added a greenish brown loosely compacted sand. A stone wall (1316) matching and in line with the western chamber wall was then built across the face of the alcove. Weakly cemented light yellowish grey sand (1251) was deposited against the base of the alcove blocking wall on the interior of the north/south chamber floor.

**Sub-group 5: East/west chamber fills**

List of Contexts: C.1229, 1220, 1219, 1123;

**Description**

Four separate fills were identified within the east/west chamber and the drop creep. The two lower fills, (1229) and (1220), were grey brown sandy clays and contained bedded limestone slab fragments. These fragments were possibly derived from the lintels which would have originally covered the chamber. It is likely then that these fills are contemporary with a phase of souterrain activity which saw the lintels removed from the east/west chamber. Dark brown silty clay (1219) covered the two lower deposits and the side walls of the chamber. This deposit was visible on the surface after the removal of the cultivation level as a thin band surrounding the main upper stone fill (1123). The stone fill (1123) consisted of small to medium sized sub-rounded stones with a brown sandy clay matrix and was up to 0.60 m in depth. Animal bone and charcoal were retrieved from all four fills of the east/west chamber. Five samples from fill (1229) were analysed and were found to have moderate amounts of charcoal. Ash dominated but a wide variety of wood types were present, demonstrating little evidence for deliberate wood species selection. The amounts observed were; oak (10 fragments), ash (56 fragments), hazel (12 fragments), hazel/alder (15 fragments), alder (7 fragments), willow/poplar (10 fragments), Pomoideae (8 fragments), *Prunus* (4 fragments) and birch (8 fragments). One sample from fill (1123) was analysed and was found to have moderate amounts of charcoal, including hazel/alder (3 fragments) and *Prunus* (17 fragments) (suspected *Prunus spinosa* as thorns were present).

Fill (1129) contained cereals, including barley and oat grains and indeterminates. It contained weed seeds, including goosefoot family, knotgrass family, black bindweed, pale per-
sicaria, wild radish and cleavers. Additionally, small legumes and hazelnut shell fragments were also present. The charcoal from these souterrain fills are more typical of a domestic hearth charcoal assemblage i.e. there were a wide variety of wood types with oak not specially used and many smaller trees/shrubs present. Small amounts of cereals were present in the samples.

**Sub-group 6: Fill of north/south chamber**

List of Contexts; C.1221, 1122

*Description*

The north/south chamber contained two main fills. The lower fill (1221) was light grey stony sand with occasional medium sized sub-rounded stones. A small metal fragment, a shroud pin and animal bone were all recovered from the fill. The main fill of the chamber was a deposit of small to medium sized sub-rounded stone with a greyish brown silty clay matrix (1122) which had a depth of c. 1 m. Animal bone was also recovered from this fill.

**Sub-group 7: Latest fills**

List of Contexts: C.1230, C.1222, C.1317.

*Description*

The three upper fills of the souterrain covered the latest collapse of the remaining souterrain structure. The fills were isolated in an area measuring 3.6 m east/west and 2.8 m north/south. Brownish black sandy clay (1230) with a depth of c. 1 m was identified. The fill contained pebble and small stone inclusions and also contained large volumes of window glass fragments, glass bottles, and ceramic pots and corroded metal. This fill was overlain by a layer of decayed concrete (1222) with a white render on one side which was in turn overlain by a thin layer of blue gravel (1317).

**Group 20 North/south furrows and potatoe clamps**

This group describes the earliest cultivation features within the ringfort interior; the north/south furrows and a series of associated oval pits which have been interpreted as potato clamps.

**Sub-group 2001: North/south cultivation furrows**

List of Contexts; C.187, (191), 929, (921), 171, (345), 523, (524).
Description

The north/south furrow pattern was only revealed once the cultivation level between the later east/west furrows was reduced to the interface with the underlying natural subsoil. The north/south pattern was not as consistent or regular as the east/west pattern. The furrows varied in width from 0.45 m – 0.60 m and the interval between furrows varied from 1.0 m – 0.3 m. They were filled with a dark greyish pebbley silt which contained faunal remains, chert, coffin nails and a copper shroud pin.

Interpretation

The furrows represent a period of cultivation that overlies and truncates the interior features of the ringfort but underlies the later east/west cultivation furrows as described in Group 23. These furrows represent a period of use in the area after the ringfort had been abandoned. The furrows appear to be bounded by the line of the ringfort bank and unlike the east/west furrows do not traverse the line of the bank.

Sub-group 2002: Potato clamps

List of Contexts: C. (948), (941), (971), (970), (951), (952), (989), (988), (880), (864).

Description

Sub-group 2002 is composed of five shallow pits that share the same north/south orientation. Four of the pits were situated directly to the north of the souterrain while the fifth was located to the west. The pits ranged from 1.5 to 3.25 m in length, 1.10 to 1.58 m in width and 0.11 to 0.43 m in depth, and were oval to sub-rectangular in plan. The base of the pits were generally concave in profile. The pits contained single fills (941), (970), (952), (988) and (864) of greyish mid brown silt with a varying sand and clay content and with a moderate volume of pebble inclusions and occasional larger stone inclusions. Faunal remains were recovered from fills (941), (970) and (988). Fill (941) also contained occasional charcoal flecks.

Interpretation

The features are considered to post date the main phase of ringfort activity. The most easterly of the pits (948), clearly truncated the post holes (962) and (960) from Group 13. It seems likely that the features were contemporary with the north/south aligned cultivation system, as the furrows appeared to terminate to the north of these features and then reappear to the south on the same alignment. This is further supported by the fact that the most north westerly pit within the group, (989), was truncated by linear (1026), described in Group 23, that clearly post-dates the north/south cultivation system. The composition of the deposits within the features suggests that they were mainly topsoil derived. The relatively high stone content indicates that the features were backfilled rather than being left to silt up gradually.
The faunal remains and charcoal within the deposits are therefore most likely to be residual. The pits appear to be contemporary with the north/south furrows and their function is likely to relate to some form of agricultural activity. The shape and size of the pits suggest that they may be shallow potato storage pits or potato clamps.

**Group 21 Quarry pits**

This group describes three sand and gravel quarry pits excavated into the edge of the ringfort ditch.

**Sub-group 2101: Quarry truncating the ringfort ditch in area 14**

List of Contexts; C.1205, 1204, 1192, 1184, 1191, 1, 1189, 1188, 1187, 1186, 1185, 1193, (1195).

**Description**

This sub-group describes the quarry pit (1195) that has truncated in the ringfort ditch in Area 14. This quarry was excavated into the inside edge of the ringfort ditch and measured 5.86 m in width and 1.16 m in depth. It was semi-circular in shape with moderate or steep sides and a flat base. Its fills represent natural deposition or slippages of material that indicate that the pit was left open for a lengthy period of time. The later fill (1184) represents a dump of material by human activity in order to re-fill the quarry pit. Sherds of post-medieval pottery were recovered from this deposit.

**Sub-group 2102: Quarry truncating ringfort ditch in area 3**

List of Contexts; C.18, 19, 20, 32, 23, 22, (1270).

**Description**

This sub-group describes the quarry pit (1270) which truncated the ringfort ditch in Area III.

This quarry was excavated into the inside edge of the ringfort ditch and measured 5.06 m in width and 1.26 m in depth. It was sub-circular in shape with moderate or vertical sides and a flat base. Fill (22) represents a series of natural slippages indicating a period of time when the quarry was left exposed. The other fills within this pit appeared to be large purposeful dumps of material, possibly in order to re-fill the quarry. Post-medieval ceramic and a metal arrow head were recovered from the final deposit (18).

**Sub-group 2103: Quarry truncating ringfort ditch south of the entrance.**

List of Contexts; C.189, 158, 157, 190, 163, 126, 125, (1342).
Description
This sub-group describes the quarry (1342) which truncated the ringfort ditch to the south of the entrance. This quarry was excavated into the inside edge of the ringfort ditch and measured 10.98 m in width. It was semi-circular in shape with a flat base. The primary fill of this quarry is a redeposited natural material (189) and may represent a slight backfilling of the quarry shortly after it was excavated. Faunal remains were recovered from this deposit. Deposit (158) represents a series of natural slips and indicates a period of time when the quarry was left exposed. Later fills all appear to represent purposeful dumps of material used to re-fill the quarry hollow. Furnace bottoms, metal and post-medieval glass and ceramic were recovered from these later deposits. A sample from the fill of a quarry pit (190) contained a small to moderate amount of charcoal, including ash (8 fragments), willow/poplar (2 fragments) and Prunus (3 fragments). It also contained hazelnut shell fragments (2).

Group interpretation
All of the features within this group were excavated into the inside edge of the ringfort ditch. The ringfort ditch had begun to silt up when these quarries were excavated, indicating a post-ringfort occupation date. Their similar sizes and shape indicate that these three quarry pits were probably relatively contemporary with one another. Within all three of the quarry pits there was evidence of natural slippages and accumulation suggesting that once the material had been quarried from the pits they had been left open and exposed for a lengthy period of time. The later and deliberate back filling of these three pits suggests that this was done for a specific purpose. A possible explanation may be the levelling of the area in order to establish the east/ west cultivation furrows.

Group 22 Large pits

Sub-group 2101: Large pit
List of Contexts; C.(1098), (1099), (1112), (1111), (1097).

Description
This sub-group is composed of a large north/south orientated pit located at the northern extent of the ringfort interior. The pit was circular in plan and had a varying profile, with a concave base. The pit contained four fills. The lowest fill (1112) was a mid grey stony sand with frequent pebble inclusions and occasional larger stone inclusions. Overlying this was fill (1111) a mid orangish brown silty sand with occasional pebble inclusions sub-angular in shape. The two uppermost fills (1097) and (1099) were both dark brown with varying degrees
of silt and sand. Fill (1097) contained occasional pebble inclusions while fill (1099) contained a higher volume of larger stone inclusions. Fill (1097) contained post-medieval pottery and faunal remains.

**Interpretation**

The function of this pit is unclear. Deposits within the feature appear to be the result of back-filling. The composition of fills (1112) and (1111) was clearly derived from natural deposits. The large stone inclusions within fills (1097) and (1099) suggest that they did not result from gradual deposition. The post-medieval pottery recovered confirms the late date assigned to this pit.

**Group 23 Features post-dating the north/south furrows**

This group consists of a series of features all within the interior of the ring fort that clearly post-date the north/south aligned cultivation system.

**Sub-group 2301: Features post dating the north/south furrows**

List of Contexts; (954), 955, (1121), 1120, (1101), 1100, (946), 945, 934, (1026), 1027, (813), 891, 826, 814, (660), 659, (1028), 1029.

**Description**

Pit (954) was sub-circular in shape, had an irregular profile and a flat base. Its maximum dimensions were 1.12 m in length, 1.10 m in width and 0.25 m in depth. It was filled by a mid orange silty clay with occasional pebbles and small stone inclusions (955), which contained a small volume of faunal remains. It truncated the north/south aligned furrows. Pit (1121) was oval in shape, was orientated east/west, had an irregular profile and measured 1.10 m in length, 0.68 m in width and 0.19 m in depth. The pit was filled by a mid orange brown clayey silt with occasional pebble and stone inclusions (1120). Post-hole (1101) measured 0.54 m in length, 0.30 m in width and 0.10 m in depth. It had moderate concave sides and a circular concave base. The post-hole contained a single fill of mid orange silty sand with a moderate volume of small pebble inclusions (1100). It truncated the north/south aligned furrows. Pit (946) was orientated north/south and was irregular in plan. Its dimensions were 2.04 m in length, 1.34 m in width and 0.33 m in depth. The sides of the pit were steep and concave and the base tapered to a rounded point. The primary fill was a compact mid orange brown silty sand with a moderate volume of pebble and stone inclusions (945) and the secondary fill was a mid brown sandy silt (934) which contained faunal remains. It truncated the north/south aligned furrows. Linear trench (1026) had steep concave sides, was orientated north-east/south-west and was truncated by one of the potato clamps (989) from Group 20. The fill, (1027) was a mid greyish yellowish brown silty clay with no stone inclusions. Linear trench
Pit (1028) measured 1.78 m in length, 0.32 m in width and 0.3 m in depth. It truncated linear trench (1026). It had steep or vertical sides and was concave in profile. It was filled by a dark yellowish brown clayey silt (1029). Pit (813) measured 1.72 m in length, 1.02 in width and 0.47 m in depth. It was sub-circular in shape with moderate or steep sides and a flat base. Its primary fill was a dark brownish black pebbly silt (814) which contained faunal remains. Its secondary deposit was a mid orange brown silty clay (826) which spread out of the cut to the south. This was overlain by redeposited natural (891) which also lay to the south, probably originating from the excavation of the pit. Pit (660) measured 0.77 m in length, 0.71 m in width and 0.08 in depth. It was sub-circular in shape with gentle sides and a flat base. It was filled by a dark brownish black clayey silt (659) which contained charcoal and slag material. Pit (660) truncated the north/south aligned furrows. A sample from the pit fill (659) was rich in oak charcoal (49 fragments). One fragment of Pomoideae was found.

**Interpretation**

Stratigraphically, all of the features within this sub-group post date the north/south aligned cultivation system. Pit fill (659) contained slag and therefore the charcoal from this context is likely to be from metalworking.

**Sub-group 2302: Graves**

List of Contexts; (177), (221), (265), (261).

**Description**

This sub-group represents the grave cuts of the human remains of three juveniles and one infant which truncated the north/south furrow system as described in group 20. These grave cuts held the remains of skeletons, 22, 26, 28 and 30.

The dimensions of the grave cuts varied from 0.51 to 0.75 m in length, 0.20 to 0.40 m in width and 0.06 to 0.20 m in depth. They were all sub-rectangular in shape with gentle to moderately steep sides and generally a concave profile.

**Interpretation.**

These four burials within the interior of the ringfort definitely post-date the north/south cultivation furrows.
Group 24 East/west furrows

Sub-group 2401: East/west cultivation furrows
List of Contexts; C.185, (1308), 170, (293), 510, (511), 815.

Description
A series of parallel ridge and furrows were revealed directly below the sod and topsoil across the interior of the ringfort. They are oriented approximately east/west. The furrows were between 0.35 m and 0.40 m wide and were 0.2 m deep. They were filled with topsoil and stones (0.10 m – 0.25 m in length) The ridges were between 1.7 m and 1.8 m wide and rose in height towards the centre where there was as little as 0.1 m of sod and topsoil covering the stony/gravel cultivation surface. The east/west ridge and furrow pattern was discernible across the majority of the site with the exception of the northern portion of the north-east and north-west quadrants.

Interpretation
The ridge and furrows represent a period of cultivation which post-dates the north/south furrows described in Group 20. These furrows represent a period of cultivation that took place after the north/south furrows had gone out of use. The cultivation level was created as a result of the process of ridge and furrow construction across the ringfort interior. This phase of cultivation may have had some relationship to the development of Mackney House at the turn of the 18th century.

Group 25 Miscellaneous features

This group is composed of 18 features located across the interior of the ringfort. Six pits and two linear trenches were located in the north-west quadrant, two pits, a post-hole and stake-hole were located in the south-west quadrant and two pits, two post-holes, a linear feature and a fire-pit were located in the south-east quadrant. Due to the lack of information that could be gathered from these features and due to their isolated locations they could not be grouped with any of the other features on site.

Sub-group 2501: Miscellaneous features
List of Contexts: (1130), 1129, (1079), 1078, (1131), 1132, (1115), 1114, (1109), 1108, (1126), 1125, (440), 434, (452), 435, (439), 437, (478), 474, 419, 438, 448, 471, 489, (490), 491, (493), (1338), 832, (579), 539, (552), 538, 569, 578, (650), 570, (648), (1096), 1092, 1091, 1318.
### Description

<table>
<thead>
<tr>
<th>Context No.</th>
<th>Area/ Grid</th>
<th>Type</th>
<th>Dimensions (Length, width, depth in metres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1130)</td>
<td>NW Quadrant - 80E 110N</td>
<td>Pit cut</td>
<td>0.39 x 0.33 x 0.15</td>
</tr>
<tr>
<td>(1079)</td>
<td>NW Quadrant - 90E 110N</td>
<td>Pit cut</td>
<td>0.7 x 0.4 x 0.18</td>
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<tr>
<td>(1131)</td>
<td>NW Quadrant - 115E 85N</td>
<td>Small pit cut</td>
<td>0.30 x 0.28 x 0.18</td>
</tr>
<tr>
<td>(1115)</td>
<td>NW Quadrant - 90E 115N</td>
<td>Pit cut</td>
<td>0.18 x 0.15 x 0.13</td>
</tr>
<tr>
<td>(1109)</td>
<td>NW Quadrant - 90E 115N</td>
<td>Shallow pit cut</td>
<td>1.1 x 0.93 x 0.11</td>
</tr>
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<td>(1126)</td>
<td>NW Quadrant - 95E 115N</td>
<td>Small pit cut</td>
<td>0.63 x 0.34 x 0.18</td>
</tr>
<tr>
<td>(440)</td>
<td>SE Quadrant - 100E 80N</td>
<td>Pit cut</td>
<td>0.5 x 0.3 x 0.08</td>
</tr>
<tr>
<td>(452)</td>
<td>SE Quadrant - 100E 90N</td>
<td>Pit cut</td>
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<tr>
<td>(439)</td>
<td>SE Quadrant - 100E 90N</td>
<td>Post-hole cut</td>
<td>0.16 x 0.13 x 0.1</td>
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<tr>
<td>(478)</td>
<td>SE Quadrant - 110E 90N</td>
<td>Linear feature</td>
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<td>(490)</td>
<td>SE Quadrant 115E 80N</td>
<td>Fire pit cut</td>
<td>1.32 x 1.3 x 0.4</td>
</tr>
<tr>
<td>(493)</td>
<td>SE Quadrant 115E 80N</td>
<td>Post-hole cut</td>
<td>0.15 x 0.14 x 0.08</td>
</tr>
<tr>
<td>(1338)</td>
<td>SW Quadrant - 80E 90N</td>
<td>Pit cut</td>
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<tr>
<td>(579)</td>
<td>SW Quadrant - 90E 95N</td>
<td>Post-hole cut</td>
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<tr>
<td>(650)</td>
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<td>Pit cut</td>
<td>2.40 x 1.30 x 0.46</td>
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<tr>
<td>(648)</td>
<td>SW Quadrant - 95E 85N</td>
<td>Stake-hole cut</td>
<td>0.20 x 0.18 x 0.12</td>
</tr>
<tr>
<td>(1096)</td>
<td>NW Quadrant – 85E 100N</td>
<td>Pit cut</td>
<td>0.33 x 0.26 x 0.11</td>
</tr>
</tbody>
</table>

Table 7: - Dimensions – Group 25
Two of the pits from the north-west quadrant, (1130) and (1131) underlay layer (1116) which appears to represent collapse from the ringfort bank. Three of the other pits from this area, (1109), (1115), (1126) underlay spread (1087) which may also have originally been derived from bank material. The primary fill of fire-pit (490) was a reddish brown layer which showed the primary burning area. A mid grey silty sand ash layer was overlying it, a result of the waste material from the burning. Slag material was present in these fills as well as faunal remains suggesting possibly an industrial use. Post-hole (493) was contemporary with this fire pit and suggests a possible pot holder that was used in connection with it. This fire pit lies in proximity of the interior ringfort bank, however, its stratigraphic relationship with the bank is uncertain. It is either overlain by the bank material or truncates it, indicating that it is not contemporary with the occupation within the ringfort. The pit (1096) was sub-circular in shape with steep to vertical sides and a flat base and it measured 0.33 x 0.26 x 0.11 m. The lowest fill (1092) was a mid red brown silty sand with occasional pebble and small stone inclusions sub-angular in shape. The fill also contained a significant volume of burnt clay. Overlying this was fill (1091), a mid brown red silt clay approximately 0.05 m in depth with occasional small pebble inclusions. Located on the northern edge of the feature was a large heat affected stone (1318) sub-angular in shape with a maximum diameter of approximately 0.32 m. A sample from the pit fill (832) contained a large amount of charcoal from a variety of wood types, including oak (2 fragments), ash (2 fragments), hazel (16 fragments), pomoideae (13 fragments) and *Prunus* (10 fragments). It contained a single oat grain. Fill (1129) also contained charcoal from a variety of wood types, including oak (14 fragments), ash (2 fragments), hazel/alder (6 fragments), willow/poplar (1 fragment), pomoideae (5 fragments) and birch (1 fragment). A sample from spread (448) contained a small amount of charcoal, including oak (1 fragment), hazel (3 fragments) and *Prunus* (2 fragments). A sample from the fill (570) contained a small amount of plant remains, including barley (1), orache (1) and hazelnut shell fragment (1). A sample from pit fill (1132) contained a single indeterminate cereal grain.

**Interpretation**

It is unclear as to whether the majority of these features formed naturally or have an archaeological origin. The shallow irregular nature of some of the cuts and the lack of faunal remains or anthropogenic material within the feature fills suggest the possibility that some of them they may have been formed through natural processes. The charcoal assemblage from this sub-group has more in common with the souterrain samples than the hearth/fire-pit samples.

**Sub-group 2502: Two linear trenches**

List of Contexts: (1165), (1164), (1170), (1169).
Description

This sub-group consists of two north/south aligned linear features situated at the most northern extent of the interior of the ringfort and very close to the edge of the enclosing ditch. (1165) measured 1.50 x 0.40 x 0.12m and (1170) measured 2.62 x 0.15 x 0.06 m. (1170) had a very regular profile with steep concave sides and a concave base, while (1165) had gently sloping irregular sides at its southern and western extent. Both linear features contained a single fill, with no anthropogenic material or faunal remains recovered. The fills (1164) and (1169) were mid to dark brown silty sand with frequent pebble inclusions sub-angular to sub-rounded in shape and contained a moderate volume of stone inclusions. One retouched flake (E2444:1164:1) was recovered from fill (1164).

Interpretation

The interpretation of these features is problematic. Group 2 clearly underlay the remaining deposits of the ringfort bank indicating either they were associated with the bank construction or pre-dated it. No deposits associated with the ringfort bank survived over sub-group 2502 as the two linear trenches directly underlay the topsoil. The two trenches shared an alignment with two of the furrows belonging to the north/south cultivation system. It is therefore unclear as to whether these features should be considered as pre or early ringfort features or whether they represent a continuation of the north/south aligned furrows.
### Appendix 4: Finds register

<table>
<thead>
<tr>
<th>Context No.</th>
<th>NMI Find No.</th>
<th>Total No.</th>
<th>Area</th>
<th>Material</th>
<th>Description</th>
</tr>
</thead>
<tbody>
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<td>3</td>
<td></td>
<td>From Testing - Phase 1</td>
<td>Metal</td>
<td>Iron wedge</td>
</tr>
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<td>Clay pipe bowl</td>
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<td>Pottery Body sherd</td>
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Legend:
- **Topsoil**: Top 30-40 cm of soil.
- **Sod & Topsoil**: Soil below 30 cm.
- **Layer Numbers**: Indicate specific layers or locations within the site.
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<th>Date</th>
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<th>Location</th>
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<td>Iron coffin nails (x3) from initial excavation</td>
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<td>78/89</td>
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<td>Bone</td>
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Appendix 5: Osteological Report

By Linda Lynch

Abstract
This report details the osteoarchaeological analysis of one hundred and forty-three human skeletons as well as associated/disarticulated human skeletal remains that were excavated at Mackney, Ballinasloe, Co. Galway. The excavation was undertaken by Eachtra Archaeological Projects for Galway County Council and the National Roads Authority. The burials primarily comprised young children and infants including pre-term infants, although three adults were also recovered. In addition, most of the burials were confined to the ditch of the ringfort. This site is the classic definition of a cillín or ‘children’s burial ground’.

Osteological Terms Used
A number of basic terms are used frequently in osteo-archaeology and these are outlined below. The definitions are taken from White and Folkens (1991, 28-35) and Bass (1995, 319-321).

Directions - General
Superior - toward the head of the body.
Inferior - opposite of superior, body parts away from the head.
Anterior - toward the front of the body.
Posterior - opposite of anterior, toward the back of the individual.
Medial - toward the midline of the body.
Lateral - opposite of medial, away from the midline of the body.
Proximal - nearest the axial skeleton, usually used for long bones.
Distal - opposite of proximal, furthest from the axial skeleton.
Palmar - relating to the hand, the palm side
Plantar - relating to the foot, towards the sole of the foot
Dorsal - relating to the hand and foot, the back of the hand, the top side of the foot
External - outer.
Internal - opposite of external, inside.
Endocranial - inner surface of the cranial vault.
Ectocranial - outer surface of the cranial vault.
Figure 1. Annotated diagram showing main skeletal elements (after Mays 1998, 2, fig. 1.1)

**Direction - Teeth**

*Mesial* - toward the point on the midline where the central incisors contact each other.

*Distal* - opposite of mesial.

*Lingual* - toward the tongue.

*Labial* - opposite of lingual, toward the lips.

*Buccal* - opposite of lingual, toward the cheeks.

*Incisal* - the biting surface of the tooth.

*Occlusal* - the chewing surface of the tooth.

**General bone features/terms**

*Process* - a bony eminence.

*Eminence* - a bony projection, usually not as prominent as a process.

*Spine* - generally a long, thinner, sharper process than an eminence.

*Tuberosity* - a large, usually roughened eminence of variable shape, often the site of a ligament attachment.
**Tubercle** - a small, usually roughened eminence, often a site of a ligament attachment.

**Trochanters** - two large, prominent, blunt, rugose processes found on the distal femur.

**Malleolus** - a rounded protuberance adjacent to the ankle joint.

**Boss** - a smooth round broad eminence.

**Articulation** - an area in which adjacent bones are in contact at a joint.

**Condyle** - a rounded articular process.

**Epicondyle** - a non-articular projection adjacent to a condyle.

**Head** - a large, rounded, usually articular end of a bone.

**Shaft or diaphysis** - the long, straight section between the ends of a long bone.

**Epiphysis** - usually end portion or extremity of a long bone, expanded for articulation.

**Neck** - the section of a bone between the head and the shaft.

**Torus** - a bony thickening.

**Ridge** - a linear bony elevation, often roughened.

**Crest** - a prominent, usually sharp and thin ridge of bone.

**Line** - a raised linear surface, not as thick as a torus or as sharp as a crest.

**Facet** - a small articular surface, or tooth contact.

**Metaphysis** – a line of junction between epiphysis and diaphysis.

**Osteoblastic** - process of bone formation

**Osteoclastic** - process of bone resorption

1. **Introduction**

1.1 **Background to Project**

The archaeological excavation of a ringfort in the townland of Mackney, Ballinasloe, Co. Galway was undertaken by Eachtra Archaeological Projects for Galway County Council and the National Roads Authority and forms part of a wider archaeological excavation programme undertaken by Eachtra within approximately 15 km of the proposed N6 Galway to Ballinasloe dual carriageway scheme (figure 2; Delaney, n.d., 2).

The excavated ringfort is located in the townland of Mackney at NGC 183745, 229417, 5 km north-east of Aughrim and 1.5 km south-west of Ballinasloe. The enclosure measures 58.0m in diameter north/south by 55.0m. A souterrain was also excavated. The site is situated on a level platform in an undulating landscape which rises gently to the north. It lies within the demesne of Mackney House and has a large beech tree planted within its north western quadrant. The courtyard, stables and walled garden associated with Mackney House lie just to the west of the enclosure. A farm trackway leading from the courtyard to the field to the east of the enclosure ran across the southern, least well preserved half of the site. (Delaney, n.d., 2).
Human burials were recovered primarily from the ditch of the ringfort, while a number were also recovered from the interior (figure 3). Most were contained within the fill of the ditch, particularly in a 15.0m stretch of the ditch in the southwest of the site. These burials were all located at least 1.2m below the surface of the infilled ditch.

Coffin nails and shroud pins were recovered from a number of the burials, as well as fragments of textiles (Delaney n.d., 4-5).

Figure 2: Route of the N6 Galway to Ballinasloe dual carriageway scheme (Contract 4) showing location of Mackney Ringfort (from Delaney n.d.)
Figure 3. Post-excavation plan of Mackney Ringfort (supplied by Eachtra Archaeological Projects) The burials are particularly concentrated in the southwest quadrant of the site, in the ditch.

1.2 Scope of Study

This report details the osteoarchaeological analysis of the skeletal remains of one hundred and forty-three individuals, as well as disarticulated/associated human bones that were excavated at Mackney ringfort, Ballinasloe, Co. Galway. There is a brief outline of the materials (that is, the bones) that were examined (Section 1.3). The methodology utilised in the study is presented below (Section 1.4). The results of the osteological analysis is presented in Section 2. A summary of the analysis and a discussion of the osteo-archaeological results are provided in Section 3, while the conclusions of the present study are provided in Section 4. A catalogue of the human skeletal remains is presented in Section 6, (both articulated in situ burials and associated/diarticulated human bones), as well as metrical data.

1.3 Materials

All of the bones had been processed by washing in post-excision and were received by the writer in clean, clearly-labelled bags. In addition, the writer also had access to the on-site recording forms, photographs, and plans, as well as various databases drawn up by Eachtra Archaeological Projects during the post-excision works.
The preservation of the bones varied. In some instances, the preservation was extremely poor, with only denuded traces of trabecular bone surviving (plate 1). In other cases the preservation was quite astounding, such as the excellent preservation of the remains of two young perinates, Skeleton 10 (29.2 foetal weeks, plate 2) and Skeleton 20 (24.0 foetal weeks). This may be linked to the actual physical location of each individual skeleton or the length of time of burial, or indeed a combination of both.
Each skeleton was classed by the writer as to the level of preservation. The categories used were ‘very poor’, ‘poor’, ‘good’, and ‘very good’. These categories took into account the completeness of the skeleton, and the level of erosion and fragmentation. Figure 4 illustrates the preservation levels of the skeletons by age-at-death in each of the aforementioned categories.

![Figure 4. Skeletal preservation by age-at-death ('Peri' – perinate 24-<42 foetal weeks; 'Inf' – infant 42 foetal weeks-<1 year; 'Juv1' – juvenile1 1-6 years; 'Juv2' – juvenile2 7-12 years; 'AA' – adult)](image)

The chart (figure 4) refers to the numbers of individuals in each level of preservation group. It does not reveal the true diversity in the rates of preservation between the age groups. For example, in one interpretation of the figures above 50.0% of Juvenile2’s were in a very good state of preservation, compared with 43.8% of perinates. However, in reality just one Juvenile2 was in a very good state of preservation compared with a total of twenty-one perinates. Therefore the rates per level of preservation are provided in figure 5.

Figure 5 illustrates the true variety in the level of preservation of the Mackney skeletons. Almost 50.0% of individuals who were classed in the ‘very good’ level of preservation and 36.8% classed as ‘good’ were perinates. In contrast, 61.8% of those classed as ‘very poor’ and 75.0% of those classed ‘poor’ were infants. In short, the level of preservation in some of the perinates in particular was exceptional.
Figure 5. Preservation of Mackney skeletons by level from very poor to very good

A total of one hundred and forty-three individual skeletons were excavated at Mackney. The numbers used to identify the burials run from ‘Skeleton 1’ to ‘Skeleton 148’. However, a number of issues need to be clarified here regarding the numbering.

Firstly, the numbers 2, 3, 41 and 84 were not used. Secondly, ‘Skeleton 40’ consisted of animal bones (disarticulated) and is therefore excluded from this report. Thirdly, six numbers – Skeletons 60, 78, 85, 94, 99, and 104 – were all disarticulated collections of bones. Finally, in the case of a number of burials – Skeletons 45, 47, 80, 109, 125, and 148 – the remains of a second individual was identified in the analysis of each of the original set of remains, and these appear to represent the remains of earlier, severely truncated burials. These have subsequently been allocated an ‘a’ and ‘b’ system in the current report.

1.4 Methods

The analysis of human skeletal remains from archaeological contexts can provide information on demography, health, diet, disease, trauma, and possible genetic variations and relations, as well as data on sociological and cultural trends. Standardised methods of assessing the osteological aspects of various skeletal populations allow for comparisons and contrasts to be made across both space and time. When the osteological information is broadened using a bioarchaeological approach the results of osteoarchaeological analysis can yield detailed and invaluable information. The keys to this approach are firstly the use of standardised methods of analysis, and secondly the size and preservation of the skeletal population in question. The assessment of age-at-death, sex, stature, and dental remains are the primary methods that have been standardised. These methods have generally been formulated using data from known populations.
The skeletal remains recovered from Mackney Ringfort were almost exclusively from juveniles. Just three adults were recovered. The ages-at-death of these adult individuals were determined on the basis of the morphology of both the auricular surface of the ilium (Lovejoy et al. 1985), and the pubic symphysis (Brooks and Suchey 1990). The method of assessing the rates of dental attrition to determine age-at-death of the adults (Brothwell 1981, 71-2) were not utilised in this study. That method determines the age-at-death on the premise that as one ages the teeth will progressively have more attrition or wear on them. It is probable that the most, if not all, of the Mackney skeletons are relatively recent in origin. Thus the adult individuals would, in life, have been consuming a relatively non-abrasive diet. In addition, dental attrition may be affected by a wide variety of factors, such as individual mastication or chewing traits, dietary preferences, and access to foodstuffs. Rates of fusion of secondary epiphyses were also considered in relation to the younger adults (Scheuer and Black 2000). Archaeological adult skeletons cannot be aged very accurately and are assigned into broad age categories. These are “young adult” (18-24 years), “middle adult” (25-44 years), and “old adult” (45+ years). The method used for each individual is provided in the catalogue in Section 6.1. The sex of the adults was determined on the basis of morphological traits in the pelvis and skull (Buiskstra and Ubelaker 1994), and on metrical analysis (Bass 1995). The basis of the differences between the female and male skeletons lies in the basic principle that females tend to be slender and small, with marked particular traits in the pelvis for the birthing process. Males tend to be larger and more robust. The methods used in the determination of the sex of each adult are provided in the catalogue in Section 6.1. The statures of the adults were estimated using the equations of Trotter (1970).

The methods used in the determination of the age-at-death of juvenile individuals are more accurate and specific, and are assessed on the basis of the known rates of growth and development of parts of the skeleton. The present study highlighted the reality that broadly the most accurate method of age-at-death for juveniles is the assessment of the calcification and eruption of teeth (Moorrees et al. 1963a, 1963b; Smith 1991). However, the most accurate method for determining the age-at-death of perinates (from 24 weeks gestation to 7 postnatal days; Scheuer and Black 2000, 468) is the assessment of long bone length (after Scheuer et al. 1980). This is partly related to the fact that dental remains in perinates may be very delicate and often will not survive in archaeological contexts. In addition, given the very good preservation of many of the perinates in Mackney it was possible to establish a very detailed listing of the ages-at-death (see section 2.1). Assessments of the rates of growth and fusion of various bones (after Scheuer and Black 2000) were used for the older juveniles, in conjunction with dental assessment. Age-at-death of juveniles can also be estimated from diaphyseal long bone length (Maresh 1970; Scheuer and Black 2000). The ages-at-death of juveniles can be determined with more accuracy than adults as the rates of formation of the bones and teeth are more specific, and these specific ages-at-death of each of the juveniles are provided in the text when known. The juveniles are also grouped together under the broader age ranges of ‘infant’ (<1 year), ‘juvenile1’ (1-6 years), ‘juvenile2’ (7-12 years), and ‘adolescent’ (13-17 years). The
infant category is further broken down in this report (see section 2.1). The methods utilised
to determine the age-at-death of each juvenile is provided are Section 6.1. It is not possible
to accurately determine the sex of juvenile individuals as the sex-specific morphological bone
manifestations do not develop clearly until the onset of puberty.

Permanent teeth were recorded using the following chart:

<table>
<thead>
<tr>
<th>18</th>
<th>17</th>
<th>16</th>
<th>15</th>
<th>14</th>
<th>13</th>
<th>12</th>
<th>11</th>
<th>21</th>
<th>22</th>
<th>23</th>
<th>24</th>
<th>25</th>
<th>26</th>
<th>27</th>
<th>28</th>
</tr>
</thead>
<tbody>
<tr>
<td>48</td>
<td>47</td>
<td>46</td>
<td>45</td>
<td>44</td>
<td>43</td>
<td>42</td>
<td>41</td>
<td>31</td>
<td>32</td>
<td>33</td>
<td>34</td>
<td>35</td>
<td>36</td>
<td>37</td>
<td>38</td>
</tr>
</tbody>
</table>

right           left

The upper row represents the maxilla and the lower row represents the mandible. These are
further sub-divided into left and right quadrants. Each permanent tooth (1-8) is prefixed by
the number of the quadrant it belongs to (1-4).

Deciduous teeth were recorded using the chart below:

<table>
<thead>
<tr>
<th>55</th>
<th>54</th>
<th>53</th>
<th>52</th>
<th>51</th>
<th>61</th>
<th>62</th>
<th>63</th>
<th>64</th>
<th>65</th>
</tr>
</thead>
<tbody>
<tr>
<td>85</td>
<td>84</td>
<td>83</td>
<td>82</td>
<td>81</td>
<td>71</td>
<td>72</td>
<td>73</td>
<td>74</td>
<td>75</td>
</tr>
</tbody>
</table>

right           left

Again, the upper row represents the maxilla while the lower row represents the mandible,
and is subdivided into left and right quadrants. Each deciduous tooth (1-5) is prefixed by
the number of the quadrant it belongs to (5-8). In some instances, a combination of the two
charts were used.

The following symbols can be used to record the teeth:

P - tooth present
E - tooth erupting
U - tooth unerupted
CA - tooth congenitally absent
R - root only

B - tooth broken post-mortem
PM - tooth lost post-mortem
AM - tooth lost ante-mortem

12 - socket absent

All incidences of dental diseases such as calculus, caries, enamel hypoplastic defects, as
well as any other anomalies were also recorded (section 2.3).

Finally, a number of pathological conditions were observed on the bones and these are
detailed below (section 2.4).

A catalogue of all one hundred and forty-three skeletons is provided in section 6.1. The
catalogue details the age-at-death, sex, and stature (including the methods of determination)
of each individual. It also summarises the level of preservation, the in situ position, attitude,
and orientation of the burial, whether there were any other skeletons directly associated and whether there were any finds. However, primarily the catalogue provides details on the bones and teeth present, and the pathological lesions that may have been observed on both. Any anomalies are noted and any additional comments are also included. Soil samples were taken from many of the burials during excavation. The human bone fragments from these samples are also identified with the relevant skeletons in section 6.1.

Basic metrical information relating to long bone lengths are provided in section 6.2.

A catalogue is also provided of all of the disarticulated and/or associated human bones that were recovered during the excavation, section 6.3. That catalogue lists all loose bones that were recovered in direct association with individual burials. The analysis of disarticulated human remains is more restricted than the study of a complete articulated human skeleton. Due to the nature of the materials (that is, disarticulated), many skeletal elements typically are either absent or fragmented. One of the primary aims of examining a disarticulated sample is to establish the minimum number of individuals (MNI). This is achieved by counting unique elements and cross-comparing the numbers with the age profile. However, given the lack of intercutting of burials at Mackney, the individual burials themselves may be taken as a reliable indicator of the number of individuals interred in the area that was excavated. Nonetheless it is essential to provide an accurate catalogue of disarticulated remains, thus the inclusion of such in this report.

Most individual bone was given a unique identification number (ID, beginning at 1001) to facilitate the osteological analysis. For example, each tooth and the bone of a mandible are given a unique identification number. This enables total bone counts to be more accurate, and helps in matching bone fragments together. There were some exceptions in the cataloguing where, for example, multiple cranial vault fragments were all allocated a single ID number. For example, 74 cranial vault fragments of a young juvenile/s were listed under the single ID no. of 1198. Two hundred and twelve records are listed in the inventory in section 6.3. This represents 930 individual fragments of bone, with fragments of cranial remains and ribs in particular being grouped together for individual contexts.

Fourteen fields were used to compose the disarticulated database. The ‘ID number’ is the first field of the database. There are also fields listing the ‘Skeleton No.’, the ‘Context’, and the ‘Area’ from which the bone/s were recovered. The identified fragment/s is then listed as a bone type under ‘Skeletal Element’ as well as the skeletal ‘Code’ (based on Chamberlain and Witkin 2000, see section 6.3). The ‘Side’ from which the bone is from also noted. The age-at-death of is presented under two headings. Firstly ‘Age1’ refers to if a bone fragment is from an adult (‘AA’, 18+ years), juvenile (‘JUV’, 1-17 years), or an infant (‘INF’, <1 year) individual. ‘Age2’ specifies the age-group if known. The ‘Sex’ of the individual is also recorded, if known. Any ‘Dental’ or ‘Skeletal’ pathological conditions are noted, and there is also a field for further ‘Notes’. In general, the identified fragments are noted in more detail in the ‘Notes’ section, which also details information on possible links with other fragments. The final field
lists the number of fragments assigned to each individual ID number, as already described above.

All of the raw osteological data on the human skeletons recovered from Mackney Ring-fort, Ballinasloe, Co. Galway are housed with the writer. The skeletal remains will presently be returned to the client for storage, and the curation of these individuals will be determined by the National Museum of Ireland.

2. Analysis

Demography

A total of one hundred and forty-three individual skeletons were recovered from Mackney, as well as a quantity of disarticulated/associated bones. Taking the broad ages-at-death categories as outlined above (see section 1.4), table 1 provides the numbers of individuals, and the percentage of the total population sample in each age-at-death group.

<table>
<thead>
<tr>
<th>Age-at-death</th>
<th>Age Category</th>
<th>No. of individuals</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1 year</td>
<td>Infant</td>
<td>116</td>
<td>81.1</td>
</tr>
<tr>
<td>1-6 years</td>
<td>Juvenile1</td>
<td>22</td>
<td>15.4</td>
</tr>
<tr>
<td>7-12 years</td>
<td>Juvenile2</td>
<td>2</td>
<td>1.4</td>
</tr>
<tr>
<td>13-17 years</td>
<td>Adolescent</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>18-24 years</td>
<td>Young Adult</td>
<td>2</td>
<td>1.4</td>
</tr>
<tr>
<td>25-44 years</td>
<td>Middle Adult</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td>45+ years</td>
<td>Old Adult</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td>143</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 1: Demographic profile of Mackney skeletons

The infant age group is particular may be broken down into more specific divisions, given the more accurate methods of determination of age-at-death. The group can very basically be divided between individuals up to full term (that is, 42 foetal weeks) and those from that age up to 1 year old. A total of 41.4% of infants (48 individuals) were in the former group, while 58.6% of infants (68 individuals) were in the latter age group. These may be further divided, see table 2.

<table>
<thead>
<tr>
<th>Age-at-death</th>
<th>No. of Individuals</th>
<th>% of Total Infants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perinate: Pre-term &lt;37 foetal weeks</td>
<td>6</td>
<td>5.2</td>
</tr>
<tr>
<td>Perinate: Full-term 37-42 foetal weeks</td>
<td>39</td>
<td>33.6</td>
</tr>
<tr>
<td>Perinate: age-at-death undetermined</td>
<td>3</td>
<td>2.6</td>
</tr>
<tr>
<td>Infant: 0-3 months</td>
<td>10</td>
<td>8.6</td>
</tr>
<tr>
<td>Infant: 3-6 months</td>
<td>23</td>
<td>19.8</td>
</tr>
<tr>
<td>Infant: 6-9 months</td>
<td>17</td>
<td>14.7</td>
</tr>
<tr>
<td>Infant: 9-12 months</td>
<td>16</td>
<td>13.8</td>
</tr>
<tr>
<td>Infant: Age-at-death undetermined</td>
<td>2</td>
<td>1.7</td>
</tr>
<tr>
<td>Totals</td>
<td>116</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 2: Details of infant ages-at-death, as % of total infants
Over one-third (33.6%) of all infants were full-term foetuses. This is 27.7% (39/143) of the total skeletal population recovered from Mackney ringfort. These represent infants dying during childbirth and just before or just after birth. A total of 8.6% of infants were aged between 0-3 months at the time of death, and it is probable that at least some of these represent individuals that died very soon after birth. The pre-term perinates (5.2% of infants) represent premature births and deaths and/or miscarriages.

It was possible to determine the sex of all of the three adults. There was one young adult female (Skeleton 25), one young adult male (Skeleton 90), and one middle adult male (Skeleton 22).

**Stature**

A total of thirty-nine individuals were full-term infants at the time of death. It was possible to determine the crown-to-heel lengths of thirty-six of these infants. They varied between 48.8cm (Skeleton 70, 37.7wks) to 59.1cm (Skeleton 77, 41.5wks). The average range of crown-to-heel lengths of full-term foetuses (37-42 weeks) is 48cm to 53cm (Williams and Bannister 1995, 345). In total, 20 (55.6%) of the full-term infants from Mackney were greater than the largest average of 53cm, but none were less than the smallest average of 48cm.

It is not possible to estimate the living stature of archaeological juveniles. Instead, the method most frequently applied is to compare the dental age-at-death determination with the diaphyseal age-at-death estimation (for example see Saunders et al. 1993). The premise is that long bone growth may be influenced in particular by the nutritional and health status of the individual, while the dental age-at-death is more reliable. Thus comparisons of the two age-at-death determination results should pinpoint individuals that may have been undersized for their actual age. The theory is simply applied in this report and it is envisaged that a more detailed assessment of bone growth will be undertaken in the future. Perinates (up to and including full-term infants) were not included here as they are examined separately above. Instead all infants older than full-term infants, and all juveniles were examined. It was possible to estimate a dental age-at-death (based on Moorrees et al. 1963a, 1963b; Smith 1991) and an age-at-death based on diaphyseal length (Maresh 1970; Scheuer and Black 2000) for fifty-one individuals (thirty-three infants, sixteen juvenile1s, two juvenile2s). A total of 45.1% (fourteen infants, seven juvenile1s, two juvenile2s) showed a disparity between the two estimates and these are listed in table 3.
<table>
<thead>
<tr>
<th>Skel</th>
<th>Infant</th>
<th>Dental Age</th>
<th>Diaphyseal Age</th>
<th>Bone Used</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Infant</td>
<td>4-6mths</td>
<td>1.5mths</td>
<td>Humerus</td>
<td>Undersized</td>
</tr>
<tr>
<td>16</td>
<td>Infant</td>
<td>4-6mths</td>
<td>1.5-3mths</td>
<td>Radius</td>
<td>Undersized</td>
</tr>
<tr>
<td>26</td>
<td>Infant</td>
<td>1-0mths</td>
<td>1.5mths</td>
<td>Femur</td>
<td>Large</td>
</tr>
<tr>
<td>28</td>
<td>Infant</td>
<td>4-6mths</td>
<td>6-12mths</td>
<td>Humerus</td>
<td>Large</td>
</tr>
<tr>
<td>33</td>
<td>Infant</td>
<td>3-6mths</td>
<td>1.5-3mths</td>
<td>Tibia</td>
<td>Undersized</td>
</tr>
<tr>
<td>34</td>
<td>Infant</td>
<td>6-9mths</td>
<td>1.5-3mths</td>
<td>Femur</td>
<td>Undersized</td>
</tr>
<tr>
<td>44</td>
<td>Infant</td>
<td>9-10mths</td>
<td>6mths</td>
<td>Femur</td>
<td>Undersized</td>
</tr>
<tr>
<td>56</td>
<td>Infant</td>
<td>3-5mths</td>
<td>1.5-3mths</td>
<td>Femur</td>
<td>Undersized</td>
</tr>
<tr>
<td>67</td>
<td>Infant</td>
<td>0-1mth</td>
<td>1.5-3mths</td>
<td>Femur</td>
<td>Large</td>
</tr>
<tr>
<td>69</td>
<td>Infant</td>
<td>3-4mths</td>
<td>0-1.5mths</td>
<td>Femur</td>
<td>Undersized</td>
</tr>
<tr>
<td>105</td>
<td>Infant</td>
<td>6-8mths</td>
<td>1.5-6mths</td>
<td>Radius</td>
<td>Undersized</td>
</tr>
<tr>
<td>130</td>
<td>Infant</td>
<td>0-1mths</td>
<td>1.5-3mths</td>
<td>Femur</td>
<td>Large</td>
</tr>
<tr>
<td>145</td>
<td>Infant</td>
<td>3-6mths</td>
<td>1.5-3mths</td>
<td>Radius</td>
<td>Undersized</td>
</tr>
<tr>
<td>148a</td>
<td>Infant</td>
<td>3-6mths</td>
<td>1.5-3mths</td>
<td>Femur</td>
<td>Undersized</td>
</tr>
<tr>
<td>1</td>
<td>Juvenile1</td>
<td>4.5-5.5 yrs</td>
<td>3.5yrs</td>
<td>Femur</td>
<td>Undersized</td>
</tr>
<tr>
<td>8</td>
<td>Juvenile1</td>
<td>4-5 yrs</td>
<td>2-2.5yrs</td>
<td>Femur</td>
<td>Undersized</td>
</tr>
<tr>
<td>17</td>
<td>Juvenile1</td>
<td>21-24mths</td>
<td>1-1.5yrs</td>
<td>Femur</td>
<td>Undersized</td>
</tr>
<tr>
<td>23</td>
<td>Juvenile1</td>
<td>4-5 years</td>
<td>2yrs</td>
<td>Femur</td>
<td>Undersized</td>
</tr>
<tr>
<td>123</td>
<td>Juvenile1</td>
<td>15-22mths</td>
<td>12mths</td>
<td>Femur</td>
<td>Undersized</td>
</tr>
<tr>
<td>134</td>
<td>Juvenile1</td>
<td>15-21mths</td>
<td>6-12mths</td>
<td>Femur</td>
<td>Undersized</td>
</tr>
<tr>
<td>135</td>
<td>Juvenile1</td>
<td>12-14mths</td>
<td>6-12mths</td>
<td>Femur</td>
<td>Undersized</td>
</tr>
<tr>
<td>4</td>
<td>Juvenile2</td>
<td>8-10yrs</td>
<td>7-7.5yrs</td>
<td>Femur</td>
<td>Undersized</td>
</tr>
<tr>
<td>106</td>
<td>Juvenile2</td>
<td>10-12yrs</td>
<td>75-8yrs</td>
<td>Femur</td>
<td>Undersized</td>
</tr>
</tbody>
</table>

Table 3: Variation in age-at-death estimates of infants (+0mths) and juveniles, many suggestive of stunted growth

Table 3 indicates that three of the very young infants (Skeletons 26, 67, 130) were quite large for their dental age-at-death, and this may be a follow-on from the large perinates described above that were apparent in this population. An older infant (Skeleton 28) was also quite large. In all other instances, the individuals were undersized for their ages-at-death, which suggests that they were under some physiological stress (probably diet related) that affected the normal growth process.

It was possible to determine the living statures of all of the three adults from Mackney. The young adult female (Skeleton 25) measured 156.8cm, while the young male (Skeleton 90) and the middle adult male (Skeleton 22) measured 171.0cm and 169.6cm in height respectively. The actual date of burial of these individuals is not yet known. However, it is probable that they are relatively recent in date. Table 4 provides information on the average statures of a number of Irish populations from the medieval period up until modern times.
Table 4: Comparison of statures of various populations

The female individual from Mackney, at 156.8cm, would appear to have been shorter than average than any of the average female statures spanning from the medieval period up to modern times. The two males, at 171.0cm and 169.6cm, are relatively comparable with a number of the populations in table 4. However without further details on dating at present, this is largely speculative. In addition, the number of adults available for assessment is very low and may bias the results.

Dental Analysis

Dental remains were recovered from one hundred and twenty-seven skeletons or 88.8% of the population sample. This is a high level of recovery. Table 5 provides a summary of the age-at-death profile of the individuals from whom dental remains were recovered.

Table 5: Individuals with dental remains, by age group

Almost 80% of dental remains were recovered from infants and perinates. In most instances, the teeth of the infants were either unerupted, or just starting to erupt at the time of death (the teeth were unerupted in all cases of the perinate individuals). In addition, these
individuals would not have been consuming the same diet as their adult counterparts – indeed in many instances they may only ever have been fed on milk – and they would not be expected to display the dental lesions and processes that may ordinarily be apparent on the dental remains of adults recovered from archaeological contexts. Thus it is not surprising to see that there are very low rates of any observable dental conditions in these age groups (see below).

Two of the sixty-two infants with observable dentitions had enamel hypoplastic defects – Skeleton 64, 9-11mths (plate 3) and Skeleton 141, 6-9mths. Enamel hypoplastic defects can appear as a depressed line or series of lines or pits on the surface of the enamel. They occur as a result of a disturbance to the growth of the organic matrix, which is later mineralised to form enamel. The disturbance to the growth is thus reflected in the enamel (Mays 1998, 156; Hillson 1986). The defects can occur as a result of a number of diseases and/or nutritional deficiencies including diarrhoea, parasitic infestations of the gut, scurvy, rickets, allergic reactions, vitamin deficiencies and general malnutrition (Mays 1998, 158). Once the enamel is formed the growth patterns cannot be altered. Teeth calcify in childhood and therefore, enamel hypoplastic defects are a reflection of stresses suffered by an individual in youth. Both of the infants referred to above had molar teeth with severe pitting indicating serious physiological stress in early infancy, which may have contributed to their early death.

The rate of dental conditions increases in the juvenile groups. Almost half of all individuals aged between 1 and 6 years at the time of death (Juvenile 1, 10/22 individuals, 45.5%) and both of the individuals aged between 7 and 12 years at the time of death (Juvenile 2, 2/2 individuals, 100%) had some observable dental conditions or lesions. Table 6 details those juveniles that had some observable dental lesions.

The central lower deciduous incisors of one perinate (Skeleton 107, 38.9 foetal weeks) were congenitally absent and this is included in section 2.4.5.

<table>
<thead>
<tr>
<th>Skeleton No.</th>
<th>Age-at-death</th>
<th>Dental Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Juvenile 1, 4.5-5.5 years</td>
<td>Hypoplastic defects</td>
</tr>
<tr>
<td>8</td>
<td>Juvenile 1, 4-5 years</td>
<td>Calculus; Carious lesions</td>
</tr>
<tr>
<td>23</td>
<td>Juvenile 1, 4-5 years</td>
<td>Calculus</td>
</tr>
<tr>
<td>24</td>
<td>Juvenile 1, 2 years</td>
<td>Hypoplastic defects</td>
</tr>
<tr>
<td>36</td>
<td>Juvenile 1, 12-18 months</td>
<td>Hypoplastic defects</td>
</tr>
<tr>
<td>57</td>
<td>Juvenile 1, 12-18 months</td>
<td>Calculus</td>
</tr>
<tr>
<td>87</td>
<td>Juvenile 1, 12-15 months</td>
<td>Hypoplastic defects</td>
</tr>
<tr>
<td>108</td>
<td>Juvenile 1, 12-14 months</td>
<td>Hypoplastic defects</td>
</tr>
<tr>
<td>110</td>
<td>Juvenile 1, 2-2.5 years</td>
<td>Calculus</td>
</tr>
<tr>
<td>117</td>
<td>Juvenile 1, 12-18 months</td>
<td>Hypoplastic defects</td>
</tr>
<tr>
<td>4</td>
<td>Juvenile 2, 10-12 years</td>
<td>Calculus</td>
</tr>
<tr>
<td>106</td>
<td>Juvenile 2, 8-10 years</td>
<td>Calculus; Trauma</td>
</tr>
</tbody>
</table>

Table 6: Dental conditions in juveniles
The most commonly observed lesion in the juveniles was dental enamel hypoplastic defects at 27.3% (6/22) of juveniles aged between 1 and 6 years, again indicating stress in early childhood. However, in some instances the stresses occurred in utero. No such defects were recorded in the older juveniles however. Deposits of calculus were present on the teeth of four of the younger juveniles (18.2%), and on both older juveniles (100%). Calculus, or calcified plaque, is often the most frequently observed dental disease on archaeological teeth. Plaque occurs as a result of the consumption of a diet of soft mushy foods, which stick to the teeth (Power 1994, 102). The deposits can be generally removed through good dental hygiene using for example a small brush or stick, but the deposits may also be inadvertently removed through the consumption of grittier foods. Calculus deposits in a population may suggest both poor oral hygiene and the possible consumption of quite a soft and sucrose-based diet (Roberts and Manchester 1995, 55). In the four younger juveniles the deposits were all slight in severity. In both of the older juveniles (Skeleton 4, 8-10 years; Skeleton 106, 10-12 years, plate 4) there were severe deposits of calculus. In the former the deposits occurred on the anterior teeth, while in the latter the severe deposits were very much confined to the right side of the mouth, which may indicate personal mastication or chewing habits.

Carious lesions were also present on the teeth of one of the younger juveniles - Skeleton 8, 4-5 years. Bacteria contained in plaque can metabolise certain carbohydrates into an acidic waste that can dissolve the enamel of the teeth resulting in cavities (Mays 1998, 148). These cavities are known as caries or carious lesions. Sugars are known to be cariogenic (Hillson 1986, 293; Woodward and Walker 1994). There is also some evidence to suggest that carbohydrates may be a contributory factor, although this is not certain (Hillson 1986, 293). The frequency of dental caries has increased over time, particularly with the increased consumption of refined sugars from the post-medieval period onwards. The lesions were mild in severity in the case of Skeleton 8.

All of the dental pathological lesions and deposits as described above were present in the dentitions of the adult individuals also. One of the two adults – Skeleton 90, young adult male – had dental enamel hypoplastic defects, indicative of stress in childhood. In the case of this adult the physiological stress occurred between the ages of 2.5 years and 4.5 years. Calculus deposits were present on the dentitions of both of the two adults and the deposits were slight to moderate in severity. Carious lesions were present on the teeth of Skeleton 22, middle adult male. In the case of this individual, the lesions on two of the teeth were small. However, the crown of the lower left third molar was completely destroyed by a carious lesion.

This latter individual had further dental conditions which were not observed in any of the juveniles or infants. Evidence of periodontal disease, varying from slight to severe in intensity was present in both the upper and lower dentition. Periodontitis occurs when the gums become inflamed (gingivitis) and may transfer to the underlying alveolar bone (periodontitis) (Roberts and Manchester 1995, 56). The bone may resorb significantly (this is what is observable in archaeological skeletons) and can ultimately lead to tooth loss. Deposits of calculus in particular can aggravate the problem. However in the case of Skeleton 22 it appears to have
been dental abscesses that aggravated the gums. Abscesses were recorded in association with the three upper right molars (plate 5), and the 1st and 2nd upper left molars. Dental abscesses occur as a result of the exposure of the pulp cavity of the tooth through attrition, caries, or trauma, and the subsequent infection of the cavity by bacteria. The pus resulting from the infection extrudes from the area of the tooth root out through the alveolar bone. The abscess can occur externally on maxilla or mandible, or it may drain inwards particularly into the maxillary sinuses, and can cause a variety of other physiological problems. With Skeleton 22, four of the five abscesses drained externally. The abscess associated with the upper right 3rd molar drained internally into the maxillary sinus (plate 6), and may have caused this individual further health problems.

Finally, slight dental trauma was present in the teeth of three individuals - Skeleton 106, 10-12 years, Skeleton 24, 2 years, and Skeleton 90, young adult male. In Skeleton 106 (10-12 years) the mesial aspect of the incisal or biting edge of the upper right 1st permanent incisor was chipped (plate 7). This may have contributed to the unusual pattern of calculus deposition observed in this individual (see above), although this is unlikely as it is probable that this would not have caused the individual much pain. This appears to be an accidental chipping. The incisal edge of the upper left lateral deciduous incisor of Skeleton 24 (2 years) has broken off at the point of occurrence of a severe hypoplastic defect (plate 8). Finally, there is chipping to the incisal and/or occlusal edges of the upper central and left teeth of Skeleton 90 (young adult male, plate 9). In the case of the former the chipping may be accidental while in the latter the chipping may be related to occupational use of the teeth.

2.4 Pathological Conditions

A variety of pathological lesions were observed on the skeletons of the individuals recovered from Mackney. However, given the strong bias toward individuals under the age of 1 year at the time of death the numbers of individuals involved are understandably relatively low. This is due to the fact that only a very limited selection of pathological conditions will present on infantile bones as, prior to modern medicine, these individuals would have succumbed to physiological stress relatively quickly. The various pathological lesions observed are divided by type below.

2.4.1 Joint Disease

Evidence of joint disease was present on just two individuals from Mackney, and both were adults. Joint disease (often referred to as degenerative joint disease, “DJD”, or arthropathies) is usually one of the most commonly observed pathological conditions on the human skeleton. The onset of the disease tends to be age related, as it appears to primarily occur as a result of repeated “wear and tear” on the joints through degeneration of the articular cartilage (Ortner and Putschar 1981, 419-20). The disease can be accelerated by occupational activities
and may also be brought on by trauma. The evidence of joint degeneration in skeletal remains is manifested in the form of porosity or pitting of the joint surface and/or additional bone growths or osteophytes. In more advanced cases, eburnation or polishing of the bone can occur as the bones of the joint rub off each other. The presence of eburnation is pathognomonic of osteoarthritis (Rodgers and Waldron 1995).

Mild degenerative joint disease was present in the left ankle bones of Skeleton 22, middle adult male. The marginal osteophytes occurred secondary to a fracture of the distal left tibia and fibula, where there was subsequent fusion of various skeletal elements (see section 2.4.4 below). The joint disease appears to have occurred as a direct result of the fracture. In addition, marginal osteophytes were present on a number of the lower vertebral bodies (thoracic and lumbar) of this individual. Again, this is likely to be a response of the spine attempting to adjust to the abnormal gait of this individual due to the aforementioned fracture and fusion of the left ankle.

Skeleton 22 (middle adult male) and Skeleton 25 (young adult female) both had similar joint lesions on the vertebral bodies known as Schmorl's nodes. These manifest as small, depressed lesions on the superior and/or inferior bodies of the vertebra. The nodes occur in youth as a result of the rupturing of the nucleus pulposus - the pulposous gelatinous core of the intervertebral disk. This expands or bursts into the adjacent vertebral body as a result of pressure (Mann and Murphy 1990, 52; Ortner and Putschar 1981, 323). This pressure can be caused either by a fall or by straining the spine by - for example - lifting heavy objects incorrectly.

2.4.2  Non-specific Infection

Acute infections, by their nature, rarely leave any trace on skeletal remains. Chronic, long-term infections where an individual is actually strong enough to survive long enough for the disease to manifest on the bone are often identified in archaeological populations. In most instances the bone lesions are non-specific, although specific infections may occasionally be identified, such as leprosy. A number of instances of non-specific infections were observed in this population, exclusively in the form of fibre bone or periostitis. Periostitis occurs when the fibrous layer - the periosteum - directly overlying the bone becomes infected. The process of inflammation, with the accumulation of pus and infected matter, forces the periosteum to rise and a new layer of bone may form underneath. When the lesions are active the layer of bone may be grey in colour and may be striated or disorganised. With time the new layer of bone can heal and be remodelled into lamellar bone. Periostitis is confined to the surface of the bone. A list of all of the individuals with lesions indicative of infection is provided in table 7.
Lesions of non-specific infection were recorded in all age groups. The youngest was a full-term infant (Skeleton 43) that had active periosteal lesions on the humeri (plate 10). While the nature of infant bone growth can mimic periosteal lesions, the case of fibre bone being deposited over normal bone in Skeleton 43 is very clear. The possible aetiologies of these types of lesions are varied, and have been linked with generalised infection, scurvy, hypervitaminosis A, infantile cortical hyperostosis, and physiological periostitis of the neonate (Anderson and Kent 1994). It is also possible, though unlikely, that the lesions are linked to trauma endured at the time of birth.

Three infants had endocranial (internal surface of the skull) deposits of fibre bone at the time of death. In two cases the lesions were active (Skeleton 9, 2-4 months; Skeleton 120, 9-12 months, plate 11), while in the third individual (Skeleton 31 7-10 months) the lesions were in the process of healing when the infant died. The aetiology of these lesions may be either haemorrhagic (epidural trauma following on, for example, from trauma) or inflammatory (particularly meningitis) (Schultz 2001; Ortner 2003, 84). In the case of the infants it is possible that the lesions relate to trauma that occurred at the time of birth or soon afterwards. Skeleton 120 (9-12 months) also had ribs that were abnormally thickened and had traces of healed fibre bone. This individual had other lesions suggestive of vitamin C deficiency (see section 2.4.3), but the lesions on the ribs suggest a pulmonary infection. However, the individual is very young for such lesions and they may have an entirely different aetiology.

Generalised periosteal lesions on the long bones of the legs were present in the remains of a number of individuals. These include Skeleton 1 (4.5-5.5 years), Skeleton 4 (8-10 years),
and Skeleton 22 (middle adult male). Periosteal lesions on the tibiae are a common finding in archaeological skeletal populations (Manchester 1987, 164).

Fibre bone was present on both the ectocranial and endocranial bones of Skeleton 4 (8-10 years), and they are directly associated with a compression fracture to the left parietal (see section 2.4.4). The internal deposits represent increased vascularity while the external deposits are indicative of inflammation and possible infection just beginning to set in as the child died. Skeleton 106 (10-12 years) had active fibre bone on the anterior sacrum, that occurred as patchy deposits from the first through to the fifth vertebra. The aetiology of this is undetermined.

Finally, the young adult male (Skeleton 90) had a number of lesions attributable to an infectious origin. There were circumferential disorganized but remodelling fibre bone deposits on the distal half of the diaphysis of a right proximal hand phalanx (plate 12). There were patchy active fibre bone deposits on three left rib shaft fragments and at the medial end of the first right rib (plate 12). Healed fibre bone was present on the diaphysis of the left femur, while patchy active deposits were present on the tibiae. It is difficult to pinpoint a specific aetiology for these lesions, and indeed they are not necessarily related to each other. The multiple bones affected suggests a generalised infection, but with a certain longevity, given that there are both healed and active lesions. Typically periostitis on the ribs is indicative of a pulmonary infection. However, the involvement of the first right rib (high up, just under the neck, and not adjacent to the lungs) suggests a pulmonary problem was not the cause. The lesion in the hand phalanx in particular is unusual. No other adjacent bones are involved. There is no indication as to the cause of the lesion in the finger bone (for example, trauma). While it is not possible to determine precisely what this individual was suffering from, it is apparent that he did have some generalised infection at the time of death.

Two fragments of disarticulated bone (ID 1198) had endocranial bone lesions, similar to those described above. The fragments were associated with Skeleton 60, and were the cranial fragments of a young juvenile.

Metabolic Conditions

Iron-deficiency

Certain porotic lesions of the eye orbits and skull vault are readily identifiable as specific pathological lesions due to the process of their formation. The cranial pathological lesions - porotic hyperostosis - and the orbital lesions - cribra orbitalia - are indicative of a metabolic disorder relating to iron deficiency. This condition occurs when, as a result of a deficiency of iron, the body’s marrow increases its output of iron (Mays 1998, 142). The middle layer of the bone expands and there is a corresponding thinning of the outer surface of the bone. This can result in the diagnostic appearance of small holes or foramina on the outer surface of the bone. Although it is frequently assumed that these lesions are indicative of iron deficiency anaemia, recent studies indicate that when a body is under stress from an invading organism
(such as a parasitic infestation of the gut), the system increases its output of iron in order to counteract the stress. Thus this pathological process may actually be a sign of a healthy defence system (Stuart-Macadam 1991, 105; Roberts and Manchester 1995, 166-7).

A very limited number of individuals in the Mackney population had lesions as described above. Those with the lesions are listed in table 8.

<table>
<thead>
<tr>
<th>Skeleton No.</th>
<th>Age-at-death</th>
<th>Pathological lesion</th>
</tr>
</thead>
<tbody>
<tr>
<td>57</td>
<td>Juvenile1, 12-18 months</td>
<td>Porotic hyperostosis</td>
</tr>
<tr>
<td>90</td>
<td>Adult, young adult male</td>
<td>Porotic hyperostosis</td>
</tr>
<tr>
<td>79</td>
<td>Infant, 6-7 months</td>
<td>Cribra orbitalia</td>
</tr>
<tr>
<td>120</td>
<td>Infant, 9-12 months</td>
<td>Cribra orbitalia, plate 13</td>
</tr>
<tr>
<td>148a</td>
<td>Infant, 3-6 months</td>
<td>Cribra orbitalia</td>
</tr>
<tr>
<td>1</td>
<td>Juvenile1, 4.5-5.5 years</td>
<td>Cribra orbitalia</td>
</tr>
<tr>
<td>117</td>
<td>Juvenile1, 12-18 months</td>
<td>Cribra orbitalia</td>
</tr>
</tbody>
</table>

Table 8. Lesions of porotic hyperostosis and cribra orbitalia in Mackney skeletons

In the Juvenile1 group the rate of porotic hyperostosis was 4.8% (1/21 juvenile1s with observable crania) and the rate of cribra orbitalia was 10.0% (2/20 of juvenile1s with one or both orbits observable). Three infants also presented with lesions that were indicative of cribra orbitalia (3/43 of infants with one or both orbits observable). In the case of one individual – Skeleton 120, 9-12 months – the lesions were severe (plate 13). In all other instances the lesions were relatively mild. While lesions of this nature are not common in infants, they are not unknown. In particular also, if a woman has had multiple pregnancies she may become anaemic, and later infants may suffer the consequences of this (Molleson and Cox 1993, 43). One adult (50.0% or 1/2 adults with observable crania) had lesions of healed porotic hyperostosis.

Numerous instances of porotic lesions in both the cranium and/or orbits of other individuals were recorded in this population (see table 9). However, the lesions presented as actual deposits of porous bone rather than the process as described above and these lesions have a different aetiology. These are discussed below.

Vitamin C deficiency

Ten infants and four young juveniles all had lesions that, while not exactly similar to each other, are suggestive of a single aetiology. Those individuals are listed in table 9. Broadly the lesions manifest as porous ectocranial bone deposits, bulbous lateral rib ends, and metaphyseal flaring. Unfortunately in many instances the preservation of those individuals affected was poor.
Table 9: Lesions of possible scurvy/vitamin C deficiency

The lesions in the infants aged from 0 months to <1 year take on a very distinct pattern. In eight of the ten infants ectocranial (that is, on the external surface of the cranium) deposits of porous bone were present. The porous bone is very clearly overlying the normal bone surface of the cranium (plate 15, in comparison to the porotic hyperostosis referred to above which is a different manifestation of porosity on the cranial vault). The lesions were recorded on the parietals, the frontals, and to a lesser extent the occipital. In the frontal bones the lesions were particularly concentrated in the area of the glabella (between the brow ridges and above the nose) and in one case the lesions were apparent in the eye orbits (Skeleton 28, 4-6 months).

There are a limited number of disease processes that may manifest with such lesions. Porous hypertrophic lesions particularly to the frontals and parietals are intimately associ-
ated with vitamin C deficiency. Vitamin C deficiency or scurvy is caused by the prolonged inadequate intake of vitamin C (Ortner 2003, 383). The abounding physical manifestation of scurvy is haemorrhaging, either spontaneously or following minor trauma (ibid.). In the orbit, bone such as this would be deposited as a result of the haemorrhaging that is particularly associated with scurvy (after Ortner 2003, 386). Similarly with the lesions on the ectocranial skull bones. Studies have indicated that problems with chewing may arise as a result of scurvy, and may result in porotic bone in the sphenoid and mandible (ibid.; Ortner and Ericksen 1997; Ortner et al 2001). None of the latter lesions however were identified in the Mackney skeletons, although given that these are all infants chewing would have been minimal and those lesions simply may not have occurred. Two infants (Skeleton 96 and Skeleton 130) also has very noticeably ‘bulbous’ lateral rib ends, which may also be attributable to vitamin C deficiency. Sub-periosteal haemorrhaging in the leg bones is also a common feature of scurvy, although the generalised lesions noted in the long bones of Skeleton 9 (2-4 months) are more indicative of a generalised infectious process. Vitamin C deficiency rarely occurs in new-borns. Unless the mother is suffering from scurvy the necessary nutrients pass freely to the foetus. Even if after birth little or no vitamin C is absorbed by the infant it would take a few months before the disease would manifest. Infantile scurvy is rarely observed before 4 months, and reaches its zenith between 8 and 10 months (Ortner 2003, 384). Virtually all of the infants presenting with lesions suggestive of scurvy were older than 4 months at the time of death. The exceptions are Skeleton 130 (44.0 foetal weeks) and Skeleton 9 (2-4 months).

The skeletal manifestation of vitamin D deficiency (rickets) in infants is very similar to that of scurvy, and indeed an individual may suffer from both conditions simultaneously (Ortner 2003, 385). Vitamin D deficiency may result from dietary inadequacies, but is more strongly associated with short ultraviolet rays of sun (Stuart-Macadam 1988). Thus the disease has been extensively recorded in urban populations with inadequate exposure to daylight, and infrequently in rural though malnourished populations (ibid.). The primary skeletal changes associated with rickets are deformities ‘characterised by a metabolic defect in mineralisation of bones at sites of endochondrial bone formation’ (Aufderheide and Rodríguez-Martín 1998, 305). The disease can manifest in the cranium, ribs, spine, and limb bones of the affected individual and are very similar to the skeletal manifestations of scurvy (see Ortner 2003). It is the characteristic bowing of the limb bones that is usually most readily identifiable in archaeological skeletal remains. Scurvy and rickets share a number of skeletal manifestations, namely widened metaphyses of the long bones and prominent ‘knobby’ costochondral rib junctions (Aufderheide and Rodríguez-Martín 1998, 313).

Very similar lesions, particularly in the form of metaphyseal flaring and bulbous ribs are present in a four of the older juveniles also. There are a number of factors that would suggest an aetiology of scurvy over rickets. Rickets is classically an urban disease. It would be rare to witness it in a rural population, and extremely unlikely with the numbers of individuals that suffered with the symptoms as recorded in this population. In addition, the very specific location of lesions in some individuals in the glabellas, and the eye orbits in the case of one
individual, is classically associated with the haemorrhaging in scurvy. No bowing of any long bones, which is so diagnostic of rickets, were recorded in this population. With rickets infants arm bones may become bowed as the infant crawls, and in older children the leg bones are affected as the child becomes more mobile. Yet there was not a single case of bowing in the Mackney skeletons. This would suggest that the causative factor for the lesions in many if not all of the individuals in table 9, is vitamin C deficiency.

2.4.4 Trauma

Evidence of skeletal trauma was identified on two skeletons. Some trauma was also identified in association with dental remains, and these have been referred to in section 2.3 above.

The distal left tibia and fibula of Skeleton 22 (middle adult male), had both been fractured a considerable time before death, probably in early adulthood if not before that. This is just superior to or above the left ankle. The fracture was not attended to professionally and resulted in fusion of the distal tibia and fibula to each other and the fusion of the talus (ankle bone) to the distal tibia (plate 18), with subsequent diminished movement in that joint. It also resulted in a mild form of osteoarthritis of the ankle joint, and the onset of the mild DJD in the lower spine is also likely to be related to it (see section 2.4.1). The disabled left ankle would have affected the entire gait of this individual. The spinal DJD may be the response of the spine literally trying to right itself and an ossified ligament was also recorded in the fourth lumbar vertebrae, which further points at the vertebral elements attempting to stabilise with additional bone growth. Indeed, compensation for the diminished movement was also noted in the right leg bones, which were substantially larger than those on the left.

Two fractures were identified in the skeletal remains of Skeleton 4, 8-10 years. There was a well-healed midshaft fracture of 6th left rib (plate 19), which happened a considerable time before death, and was only apparent as a slight misalignment of the rib. There was also a compression fracture of the left parietal of the skull (plate 20), with associated inflammation and infection. There is complete separation of the superior and posterior margins of the fractured segment from cranial vault, and there are secondary fracture lines radiating posteriorly and inferiorly from inferior posterior margin of injury. The bone fragment is displaced endocranially and there is associated endocranial and ectocranial reactive bone. This indicates that the individual survived for a short time after the injury. However death did ensue, and is likely to have been directly related to the head injury. This individual was subsequently buried in a very unusual position (plate 28).

Congenital Defects

A number of congenital or developmental defects were present on the skeletal remains from Mackney. In all instances the defects were minor and would not have adversely affected the lives of the individuals involved. Most of the defects were in the vertebral remains and are listed in table 10.
Table 10: Congenital defects in the Mackney skeletons

In the case of one perinate (Skeleton 107, 38.9 foetal weeks), it appeared that the central lower deciduous incisors were congenitally absent (plate 21). If the infant Skeleton 76 had survived, it is possible that the fusion of the right neural arches of two of the cervical or neck vertebrae (plate 22) would have resulted in some loss of mobility with the neck, but it is very unlikely that it would have been any serious debilitating effects. The ‘congenital fusion of two or more vertebral segments into a block with a single spinous process, neural arch, and vertebral body’ is known as Klippel-Feil syndrome (Aufderheide and Rodríguez-Martín 1998, 75). However, only one side of the cervical vertebrae is involved in the case of Skeleton 76, and so it is unlikely that this is a manifestation of Klippel-Feil syndrome. The variation in the number of vertebrae/ribs in Skeleton 23 is a normal variation and would have had no serious implications for the child. The mandibular symphysis of Skeleton 110 is only partially fused (plate 23). This individual was between 2 years and 2.5 years at the time of death. This symphysis normally fuses in the first year of life (Scheuer and Black 2000, 144). This appears to be an unusual but minor delay in fusion – which was in progress at the time of death – and the defect is unlikely to have impinged on this individual in any way.

The manubrium of Skeleton 110 is malformed, in that a segment has failed to fuse to the main body of the manubrium. Typically the multiple centres of ossification of the manubrium fuse together and form the bone as in its typically identifiable form by 6 months (Scheuer and Black 2000, 225). However, with Skeleton 110 the right lateral has failed to fuse to the primary centre of ossification (plate 24). One study has found that the manubrium developed from two centres, one above the other, in 90% of children suffering from Down’s syndrome (Currarino and Sawson 1964, after Scheuer and Black 2000, 225). However, that is not the case with the manubrium of Skeleton 110 and instead it appears to be a developmental abnormality. Its physiological effect cannot be ascertained.

The cleft S1 (upper vertebra of the sacrum at the base of the spine) in Skeleton 106 (plate 25), and the open posterior arch of S1 in Skeleton 22 (plate 26), are mild variations of the
serious condition of spina bifida, which may result in critical and often fatal neural tube defects. In both cases at Mackney, just one of the sacral vertebrae is involved and it is probable that the individuals were unaware of the defect. Similarly with Skeleton 90, where the posterior synchondrosis of C1 (the posterior arch segment) had failed to fuse. Normally this fuses between 4 and 5 years, but it is not unusual for it to remain open (Scheuer and Black 2000, 199).

Finally in addition to the abnormalities listed in table 10, the anterior fontanelle – the so-called ‘soft-spot’ in the forehead of infants - was still open in three older individuals at the time of death. These were Skeleton 100 (9-12 months), Skeleton 111 (14-15 months), and Skeleton 134 (15-21 months). However, as 96% of fontanelles are closed by the age of 2 years (Scheuer and Black 2000, 107) these individuals cannot be considered to actually have defects.

**Non-metric Traits**

A limited selection of non-metric traits were present in the Mackney skeletons. Non-metric traits are minor variations in skeletal formation, which may show familial inheritance (Buikstra and Ubelaker 1994, 85). The common traits take four forms – 1) ossicles or small bones that occur within the cranial sutures; 2) abnormal proliferative ossifications such as bony spurs or bridges; 3) ossification failure leading to defects; and 4) variation in foramen number and location (*ibid*). In the case of the Mackney skeletons three specific non-metric traits were apparent – Allen’s fossae, metopic sutures, and Inca bones (table 11).

<table>
<thead>
<tr>
<th>Skeleton No.</th>
<th>Age-at-death</th>
<th>Non-metric trait</th>
</tr>
</thead>
<tbody>
<tr>
<td>138</td>
<td>Infant, 9-12mths</td>
<td>Inca bones</td>
</tr>
<tr>
<td>1</td>
<td>Juvenile1, 4.5-5.5yrs</td>
<td>Allen’s fossae</td>
</tr>
<tr>
<td>8</td>
<td>Juvenile1, 4-5yrs</td>
<td>Allen’s fossae, metopic suture</td>
</tr>
<tr>
<td>23</td>
<td>Juvenile1, 4-5yrs</td>
<td>Allen’s fossae</td>
</tr>
<tr>
<td>4</td>
<td>Juvenile2, 8-10yrs</td>
<td>Inca bones (plate 27), Allen’s fossae</td>
</tr>
<tr>
<td>106</td>
<td>Juvenile2, 10-12 years</td>
<td>Metopic suture</td>
</tr>
<tr>
<td>25</td>
<td>Adult, young adult female</td>
<td>Allen’s fossae</td>
</tr>
<tr>
<td>90</td>
<td>Adult, young adult male</td>
<td>Allen’s fossae</td>
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**Table 11: Non-metric traits in the Mackney skeletons**

Allen’s fossa is a depression which occurs on the anterior margin of the femoral head, close to the border of the proximal head (Finnegan 1978, after Buikstra and Ubelaker 1994, 94). It is perhaps most prominent when the trabecular bone beneath is exposed. The aetiology is uncertain and it is considered an anomaly (Scheuer and Black 2000, 377). It was present in three young juveniles (3/16 observable individuals or 18.8%), one older juvenile (1/2 observable individuals or 50.0%), and two adults (2/3 observable individuals or 66.7%).

The metopic suture is the midline suture that separates the left and right frontal bones in infants. It normally fuses between 2 years and 4 years (Scheuer and Black 2000, 108). It was
present in one young juvenile (Skeleton 8, 4-5 years) and in one older juvenile (Skeleton 106, 10-12 years). It may simply be delayed closure in the case of the former, but in the latter, certainly the suture should have fused by the time that individual died. Metopic sutures were also apparent in a number of other young juveniles (Skeletons 17, 73, 110, 117) but all were younger than 4 years at the time of death.

Inca bone/s occur through a ‘failure of fusion of the primary ossification centres of the squamous portion of the occipital bone’ (Buikstra and Ubelaker 1994, 89). Thus the superior or upper portion of the normally robust plate of bone at the back of the cranium is separated into either another single plate, or a number of large plates (ibid.), as opposed to the smaller wormian bones or ossicles that can also occur in the lambdoidal suture. The aetiology is uncertain (Scheuer and Black 2000, 51). Three large separate bones made up the superior portion of the occipital of Skeleton 4 (8-10 years, plate 27), while two large separate bones were apparent in the same area of Skeleton 138 (9-12 months).
Plate 3. Skeleton 64, infant 9-11 months, severe dental hypoplastic defects

Plate 4. Skeleton 106, juvenile 10-12 years, severe deposits of calculus (arrowed)
Plate 5. Skeleton 22, middle adult male, dental abscesses in right maxilla (arrowed)

Plate 6. Skeleton 22, middle adult male, inferior view of right maxilla, note hole or abscess at root base that drained internally
Plate 7. Skeleton 106, juvenile 2, 10-12 years, anterior view of upper right incisors, note chipping of mesial aspect of 1st incisor

Plate 8. Skeleton 24, juvenile 1, 2 years, traumatic chipping of upper left 2nd incisor (arrowed), caused by weakness due to hypoplastic defects
Plate 9. Skeleton 90, young adult male, multiple instances of chipping of teeth of maxilla

Plate 10. Skeleton 43, perinate 40.7 foetal weeks, periosteal lesions on humeri (posterior view)
Plate 11. Skeleton 120, infant 9-12 months, active fibre bone lesions on endocranial or internal surface of occipital (back of skull)

Plate 12. Skeleton 90, young adult male, generalised periosteal lesions on three left ribs and 1st right rib, and one a right proximal hand phalanx
Plate 13. Skeleton 120, infant 9-12 months, severe cribra orbitalia

Plate 14. Skeleton 9, infant 2-4 months, periosteal lesions on femora (arrowed), tibiae, and fibulae
Plate 15. Skeleton 109b, infant 6-9 months, section view of active fibre bone overlying normal bone.

Plate 16. Skeleton 120, infant 9-12 months, active fibre bone overlying normal bone at glabella of left frontal.
Plate 17. Skeleton 87, juvenile 12-15 months, flared distal metaphyses of humerus (left) and femur (right)

Plate 18. Skeleton 22, middle adult male, healed fracture of distal left tibia and fibula, with fusion to talus
Plate 19. Skeleton 4, juvenile 8-10 years, healed fracture of sixth left rib

Plate 20. Skeleton 4, juvenile 8-10 years, compression fracture of left parietal, endocranial view from superior, lower arrow marks where fragment has separated from rest of parietal, upper arrow indicates area of increased vascularity
Plate 21. Skeleton 107, perinate 38.9 foetal weeks, congenital absence of lower central incisors

Plate 22. Skeleton 76, infant 42.0 foetal weeks, fused right arches of C3 and C4
Plate 23. Skeleton 110, juvenile 1 2-2.5 years, partially fused mandibular symphysis

Plate 24. Skeleton 132, juvenile 1 2.5-3.5 years, malformed manubrium (upper portion of breastbone)
Plate 25. Skeleton 106, juvenile 2 10-12 years, malfusion of posterior process of S1

Plate 26. Skeleton 22, middle adult male, malfusion of posterior process of S1
Plate 27. Skeleton 4, juvenile 8-10 years, Inca bones in occipital
3. Synthesis

3.1 Summary of Analysis

A total of one hundred and forty-three individual skeletons were recovered from Mackney, as well as a quantity of disarticulated/associated bones. A total of 96.5% of the population were under the age of 6 years at the time of death, and 33.6% of the 116 infants were full-term at the time of death. A number of probable miscarriages were also buried here, the youngest being an individual just 24.0 foetal weeks. Just three adults were recovered: a young adult female, a young adult male, and a middle adult male.

The crown-to-heel lengths of the full-term perinates, the long bones of the older infants and juveniles, and the statures of the adults were all assessed. With the full-term foetuses 55.6% were larger than the average expected size, and this is likely to have led to complications at birth. None were undersized. Some of this appears to be evident in the older infant group also. However, the predominant factor with many of the observable older infants and juveniles was that there were undersized for their age-at-death (37.3% or 19/51 observable infants >0mths and juveniles), which is likely to be linked to poor health status and subsequent stunted growth. It is possible that the female adult was quite small in stature but the adult males are comparable with a number of populations. The numbers of observable individuals in this instance militates against a proper assessment.

Dental remains were recovered from 88.8% (127/143) of the population sample. Unsurprisingly, there was a very low rates of any observable dental conditions in these perinate group (teeth unerupted) and indeed in the older infants. Dental enamel hypoplastic defects and deposits of calculus were the most commonly observed in the infants and juveniles, and a single incidence of caries was observed. These were also present in the observable adult individuals. One adult also had additional severe carious lesions and associated dental abscesses and periodontal disease. Slight dental trauma (chipping of the enamel) was also identified in the dentition of three individuals.

The variety and severity of the pathological lesions present in the Mackney skeletons were low. The incidence of joint disease was low, probably due to the young age profile of the population. One adult had secondary DJD of the spine and left ankle associated with a healed fracture of the left ankle. Spinal joint disease was also recorded in another adult.

Lesions of non-specific infection were recorded in all age groups (from a full-term infant up to an adult). The endocranial or internal surface of the cranium was affected in a number of cases, as were the leg bones. One adult had an unusual distribution of both healed and active lesions which suggest a chronic infectious process. In addition, the lesions recorded in the cranium of Skeleton 4 relate directly to a depression fracture of the skull vault.

The nutritional status of this group was also highlighted with regards to metabolic disease. While the level of iron-deficiency anaemia (which may indicate a healthy immune system) was not significant, a number of individuals presented with lesions that appear to be repre-
sentative of vitamin C deficiency or scurvy. The lesions were evident in the infant (>0mths) and young juvenile age groups.

The evidence of trauma was limited (dental cases have been referred to above). One adult had suffered a fracture of the left leg, just above the ankle. This led to fusion of a number of bone elements of the ankle, secondary DJD of the ankle and spine, an altered gait, and an increase in size of the right leg bones. Two fractures were identified in the skeletal remains of Skeleton 4, 8-10 years. There was a well-healed midshaft fracture of 6th left rib which happened a considerable time before death. There was also a compression fracture of the left parietal of the skull with associated inflammation and infection. This individual died soon after the fracture.

A number of congenital defects were recorded, particularly relating to defects in the spine and malfusion of various elements. None appear to have been life-threatening, and none would have seriously interfered with the lives of the individuals concerned.

Finally a number of non-metric traits were recorded – Inca bones, Allen’s fossa, and metopic suture.

3.2 Discussion

There is no evidence that any human society treats infant or foetal death lightly, but many societies, past and present, do assign different values and meanings to the dead infant. (Scott 1999, 37).

The site of Mackney is unique for a number of reasons. Firstly, there is a very high rate of young individuals in this population sample. Just 2.1% of the skeletal sample were adults. Secondly, the site comprises primarily a large ringfort measuring 58.0m in diameter north/south, with a souterrain (Delaney n.d.). Ringforts are typically defined as Early Medieval farmsteads, thus used for secular purposes. Inhumations would not ordinarily be expected to be recovered from them. Thirdly, the usual outlay of most cemeteries – particularly a site with at least one hundred and forty-three inhumations – is for the burials to be confined and contained by an enclosing boundary. However, in this instance the vast majority of the burials that were recovered were almost exclusively confined to the area of the ditch. Fourthly, although the indications are that the burials date to the Christian period, they do not conform to the traditional practice of Christian inhumation. While all were more or less supine (lying on the back) and extended, the orientations vary. Many were indeed laid in the Christian orientation of west/east with the head to the west. However, the plan of the burials indicates that the graves were actually orientated along the ditch in a primarily clockwise direction, with the head to ’12 noon’ (figures 3 and 9). Finally, site lies within the demesne of Mackney House and the courtyard, stables and walled garden associated with the house lie just to the west of the ringfort (Delaney, n.d.). Given that the burials are likely to be relatively modern
in date, their location adjacent to the house is unusual. Thus this site immediately presents a number of unusual factors.

In terms of Irish archaeological Christian cemetery populations there is almost consistently a lack of infants and young children. In the centuries before the practice of modern medicine young infants were at the mercy of a host of diseases and the mortality rates would have been very high. Theoretically then, there should be a high number of infants recovered from cemeteries. This is rarely the case. For example, in both of the cemeteries of Tintern Abbey, Co. Wexford, and St. Peter’s Church, Co. Waterford (Ó Donnabháin 1985; Power 1997), there was an under representation of young individuals. Similarly, in the Early Christian cemetery at Colp West, in Co. Meath, no young juveniles or infants were recovered in a sample of over one hundred individuals (Gowen 1989). In contrast, 71.7% of individuals recently analysed by Eileen Murphy from Tonybaun in Co. Galway were less than 6 years at the time of death (Nolan 2006). At Mackney this rate is even higher, with 96.5% of the individuals being less than 6 years at the time of death (figure 6). As with Tonybaun, the latter figure suggests that Mackney is a specialised place of burial, outside of the typical consecrated Christian burial ground.

![Figure 6: Age-at-death breakdown of Mackney skeletons as % of total](image)

The practice of burying certain individuals away from the main population of a Christian community occurred for a variety of reasons in the past. The most frequent practice involved the selected individual being denied burial in consecrated ground due to a perceived uncleanliness - either physically, mentally, or spiritually - that separated the unworthy individuals both from the living society and the afterlife. Most notably, it is the separate burial of children that attracts most study. This is possibly due to the fact that the ratios of their presence or absence in a skeletal population is often either very low or very high, and can be almost immediately recognised, as was the case with Mackney.
In Christian contexts, infants were often selected for separate burial primarily because of the fact that they may have died without baptism. These individuals were frequently interred in a well known Irish site type known as a *cillín* or children's burial ground. Essentially these are sites, located in areas of liminality, were reserved for the burial of individuals that were not fully integrated into the community, or indeed those who had been ostracized either by their own actions and/or as a result of their perceived spiritual status. Un-baptised infants and stillbirths, through naturally high mortality rates, may be expected to be the largest component of any such group.

However, numerous other ‘categories’ of individuals may also have been denied burial in consecrated ground (see Lynch 1998). These include certain older children, suicides, some executed individuals, strangers, drowned people, excommunicants, pregnant women, and women recently delivered of a child, to name but a few (*ibid*.). Thus while the presence of a high number of infants/children may suggest the use of a site as a *cillín*, the presence of adult individuals at such a site should not be unexpected.

![Figure 7. Age-at-death of Mackney infants (<1yr) as % of total infants](image)

Over a third of all of the infants buried in Mackney were full-term infants that were either still-born or died during or very soon after birth (figure 7). It is also possible that some of the individuals classed as 0-3 months at the time of death may be full-term infants, or individuals that died within days or weeks of birth. Therefore up to 44.8% of infants may have been full-term infants at the time of death. In addition, there were a number of individuals that may be classed as pre-term, that is <38 foetal weeks. These – certainly Skeleton 10 at 24.0 foetal weeks – are likely to represent miscarriages.
Infant mortality rates now stand at 6/1000 births (Rousham and Humphrey 2002, 133). In post-famine Ireland that rate was 115/1000 births (Clarkson and Crawford 2001, 239). It is likely that prior to this the levels were even higher. Secure reliable data on infant mortality in the past is relatively limited as it was not even considered a separate entity to other deaths in the population (Guy et al. 1997). However, it is known that over half of children died before the age of 10 years in the early 19th century (Farmar 2004). Complications at birth which now may be counteracted with relative ease would, in many instances, have been fatal in the past. In addition, premature infants would not have survived as these individuals are particularly vulnerable and need intensive modern medical care to survive.

Children are traditionally the most vulnerable of any population, both physically and socially (Rousham and Humphrey 2002, 124). The physical vulnerability derives from the immature immune system, which leaves them more susceptible to infectious diseases. This is combined with a high energy and nutrient requirement relative to body weight. The social vulnerability lies with the fact that a child is completely dependant on others for care in the first year of life and highly dependant up until 5 years of age (ibid.).

Mortality rates in children are at their highest during infancy. The rates decrease between 1 year and 4 years, and are at the minimum at 5 years to 9 years (Rousham and Humphrey 2002, 124). Higgins (1989, 185) has summarised some of the main causes of death in infants and young children:
Birth to one month – death usually linked with effects of prematurity or birth injuries, congenital abnormalities, and immediately acquired infections
One to twelve months – death usually as a result of infectious diseases such as bronchitis, pneumonia, and gastroenteritis
One to four years – frequency of infectious diseases decrease and malnutrition increases.

In total, 20 (55.6%) of the full-term infants from Mackney were greater than the largest average of 53cm, but none were less than the smallest average of 48cm. Typically, it is the very small and very large foetuses who are most at risk during birth (Molleson 1989, 31). The large size of many of the full-term infants buried at Mackney was no doubt a major contributing factor to their deaths, probably causing complications during the birthing. In addition to the actual trauma of birth, the infant is at risk on the third day when heart defects particularly come to the fore (Scott 1999, 32). Until 3-4 months the infant has a very limited capacity to produce antibodies in response to infection (Johnston 1994, 125), and so may quickly succumb to infection. Between the ages of 4 months and 6 months the larynx descends and this appears to be another dangerous period (Scott 1999, 32). Diptheria, measles, poliomyelitis, and whooping cough can also claim a high death toll in the infant age group (Macpherson 1992). Weaning has widely been recognised as a particularly treacherous time for infants primarily through the introduction of non-sterile foods (Scott 1999, 32).

There is evidence of non-specific infection in the Mackney skeletons but in most instances it cannot be directly linked to any causative factors. But certainly some individuals were suffering from infections at the time of death. Indeed, given the age profile of this population
it is likely that there were many more suffering also. However, it takes time for the skeletal lesions to manifest and it is probable that many succumbed to the infectious assault quickly.

There were a number of pathological lesions in this group that appear to relate to the level of nutritional intake. Malnutrition has three manifestations – consuming too little food, consuming too much food, and consuming an imbalanced diet (Frazier et al 1996, 206). In the Mackney individuals it was apparent that individuals were suffering from metabolic disorders, particularly iron-deficiency anaemia and probably vitamin C deficiency. Given that many of the individuals affected were infants and thus presumably still being breast-fed, it is possible that the malnutrition was being passed on as a direct result of the foodstuffs being consumed by the mother. However, there is evidence to contradict this.

Again in reference to the average crown-to-heel lengths of the full-term infants, it is unexpected that none were smaller than the average range for infants of this age. It may be surmised that the community that utilised this particular site were from a low socio-economic group. Foetal health is directly linked to maternal health (Higgins 1989, 179). Small maternal size will reflect in the size of the foetus, because the growth of the infant may be literally restricted by the size of the mother (Higgins 1989, 180). Yet there is certainly no evidence here that the mothers of these infants and consequently the infants themselves were seriously compromised by specifically chronic malnutrition during pregnancy. Essentially the physiological stresses suffered by the perinates appear to have specifically occurred around the time of birth and in the immediate months following.

To understand the health of the general populace of post-medieval and early-modern Ireland one must appreciate the huge influence of the potato on the population. In the 17th century the potato was basically a garden crop. By the 18th century it had become a major field crop. And by the 19th century the potato had become the predominant source of food (Clarkson and Crawford 2001, 232). Yet this in itself was not necessarily a bad thing. ‘Potatoes are almost the perfect nutritional package, supplying calories, high-quality protein, dietary fibre, and vitamin C’ (Clarkson and Crawford 2001, 229). Potatoes lack vitamins A and D, but if they are combined with milk then the package is complete (ibid.). The healthy visage of the Irish peasant was famed in the early 19th century (Clarkson and Crawford 2001, 224), and this is despite the abject poverty that enveloped much of the country. Prior to the mid-18th century diets typically included meat, offal, and milk, with grain-based foods such as bread, porridge, and beer (Clarkson and Crawford 2001, 223), but a diet of potatoes and milk is nutritionally superior. The serious problem arose when the potato crops failed for prolonged periods, most notoriously during the Great Famine of the mid-19th century. In addition, the tea, sugar, white bread, jam, and fatty bacon that became the mainstay of the Irish in the aftermath of the famine instigated a whole new host of malnutrition issues (ibid.).

The massive rise in population levels in Ireland prior to the famine, with the constant sub-dividing of lands accounted for some of the utter poverty that was prevalent in early modern Ireland. In very general terms, the staple crop of the potato allowed the population to grow unchecked. The Census of 1841 records a population of 8,175,124 (O’ Connor 1995,
111). Even before the Great Famine there were numerous and devastating disease outbreaks throughout Ireland including typhus and cholera (see Robins 1995). Add to this at least twenty-four failures in the staple crop between the 1720s and the 1850s (O’Connor 1995, 113), and one begins to appreciate some of the pressure that the majority of the Irish population were under in the 19th century. These stresses, combined with high infant mortality, probably account for many of the individuals interred at Mackney.

The nature of the in situ burials themselves also reveal invaluable information regarding Mackney. For example the burials of Skeletons 48 and 49. The former was aged 37.1 foetal weeks while the latter was aged 37.2 foetal weeks at the time of death. Both infants were buried simultaneously together. The indications are that these are twins that both died around the time of birth. Both individuals had been carried to full-term yet both died. Considering the strain of a multiple pregnancy and the subsequent birth, the deaths of these individuals at the point when they should have been beginning life must have been particularly traumatic for the mother. As noted earlier (section 1.3), in a number of instances the remains of two individuals were recovered from single graves (Skeletons 45a + b, 47a + b, 80a + b, 109a + b, 125a + b, and 148a + b). However, there is no clear indication from any of these that they were double burials. Rather it appears that some burials truncated earlier graves. In some other cases, one burial overlay another (Skeleton 116 over 117, Skeleton 81 over 87, Skeleton 66 over 68). Again however, at least the first two sets of these clearly represent truncation of earlier graves. However, in the case of Skeleton 66 (41.5 foetal weeks) and Skeleton 68 (1-2 months) the in situ photographs suggest that these two individuals may have been buried simultaneously. They may be directly related or perhaps it represents the convenient burial of two young infants that died in the community at around the same time.

Most of the burials at Mackney were basically supine and extended. There are some minor deviations, with legs being slightly flexed and variations in the positions in the arms. Given the high numbers of children in this skeletal sample and its identification as a cillín, the writer was somewhat surprised that there was no evidence of prone burials (where the individual is lying on the stomach) in this burial ground. None were recorded at the time of excavation. In addition the in situ photographs of the skeletons were examined by the writer, in case some prone burials had been inadvertently not recognised during the excavation, but there were none. This is essentially a site for the disposal of individuals that are deemed to be outside the normal Christian community. This would include illegitimate children. There was a strong folklore tradition in Ireland relating to the death of an illegitimate child, particularly when the child had been denied by the father (O’Connor 1981). If an illegitimate child was buried face down it was believed that the father would never sire another child. So strong was this belief that parents were warned to be careful when burying their child for fear the face would turn to the ground and thus deny them another child (ibid.). The site at Mackney would be the classic location for the burial of young infants that were both unbaptised and illegitimate, but perhaps the tradition mentioned in relation to the burial of illegitimate children was not prevalent in this area.
Most of the burials excavated at Mackney were recovered from the ditch – a total of one hundred and seventeen burials (Delaney n.d., 4). Some burials were also recovered from the interior of the ringfort. The vast majority of these lay in a rough west/east alignment, with the head to the west. But it was apparent the burials also followed the alignment of the ditch itself (figures 3 and 11). There were some noticeable exceptions to this and these are illustrated in figures 8 and 9.

Figure 8: Detail of burials aligned opposite to majority of ditch burials
(amended from copy supplied by Eachtra Archaeological Projects)

Apart from the burial positions of the individuals indicated in figures 8 and 9, there is nothing immediately different about these burials in comparison with the others in Mackney. The adult individual (Skeleton 22) would have walked with a limp, which may or may not be related to the reason he was interred in unconsecrated ground.

There is one individual from the site that stands out from all others and that is Skeleton 4 (8-10 years). The location of this individual is shown in figure 10, while the burial position is shown in plate 28.
Figure 9: Further burials aligned opposite to majority of ditch burials (amended from copy supplied by Eachtra Archaeological Projects)
Figure 10. Location of Skeleton 4, note main concentration of burials to southwest of site (amended from copy supplied by Eachtra Archaeological Projects)

Plate 28. Skeleton 4 in situ (courtesy of Eachtra Archaeological Projects)
The individual pictured in plate 28 had significant dental problems, had a well-healed rib fracture, and received a fracture to the cranial vault soon before death. Subsequently this individual was buried in an unconsecrated burial ground, but far from the main concentration of burials (literally on the opposite side of the site) and in an extremely unusual burial position. There was no evidence of a coffin (not unexpected given the burial position) or shroud pins with this individual. There is something inherently sinister about this particular burial. Indications are that this child was undersized for its age-at-death and the dental problems suggest a poor diet. Evidence of trauma is rare in children. Yet this individual has evidence of two traumatic insults. While there is the possibility that this individual was simply unfortunate and literally ‘accident-prone’, it is also possible that she/he was the victim of abuse. The combination of apparent ill-health, an old healed fracture, a skull fracture received close to the time of death, the interment far distant to other burials in the site even with it being an unconsecrated burial ground, and the extremely unusual burial position, all suggest that this individual may have severely suffered in life at the hands of others and this is reflected in the burial record.

Of course, as with any other archaeological site, it would be wrong to assume that Mackney had a number of clearly defined functions through time, that is, its origin as a ringfort and its later use as an unconsecrated burial ground primarily for the interment of infants. It is unlikely that all individuals here died ‘naturally’ through the various assaults that life in the past inflicted on the living population such as natural high infant mortality and diseases. The issue of illegitimate children has been referred to already above. There has always been the case that some pregnancies are unwanted. Now with modern medicine many unwanted pregnancies may be electively terminated. But this was not always an option in the past, and the methods available in most instances may have been extremely hazardous to the pregnant women. Instead infanticide was the safer option. Infanticide is the ‘wilful destruction of newborn babes through exposure, starvation, strangulation, smothering, poisoning, or through the use of some lethal weapon…’ (Langer 1974). This would be carried out very soon after the birth of the infant (Scott 1999, 66). The high numbers of full-term infants in Mackney has already been noted above and it is possible that some of these were victims of infanticide.

The burial positions of some of the individuals has already been discussed above. In a number of instances shroud pins and/or coffin nails were recovered from burials. The presence of either or both provides instant tangible evidence that some individuals were buried with respect and reverence, despite the location in unconsecrated ground. However, the absence of either shroud pins or coffin nails from a burial should not immediately indicate a clandestine disposal of an unwanted infant corpse. The presence of green staining was present on the remains of a number of skeletons from Mackney. This staining is indicative of the presence of copper alloy, presumably related to shroud pins in particular. A total of fifty-three individuals had this staining, with cranial stains on thirty-one individuals, post-cranial stains on four individuals, and both cranial and post-cranial stains on eighteen individuals. These are indicative of the probable location of the shroud pins used to secure the shroud,
although some post-depositional movement would be expected. However, of those fifty-three individuals shroud pins were only recovered from thirty-four of them. In addition, shroud pins were recovered from thirteen other individuals, but no copper alloy staining was present on the skeletal remains. This is likely to be due to taphonomic factors, and it is possible that at least sixty-six individuals at Mackney were buried in shrouds that were secured with pins. However it is noted that not all copper alloy staining on the Mackney skeletons may be exclusively indicative of shroud pins, and not all shroud pins will leave such stains. In addition other shrouds or winding sheets may have been used where a pin was not required to secure it. At least thirty-four in situ burials had evidence of a coffin, particularly through the finding of coffin nails. Twenty-two of these had also either shroud pins (three), copper alloy staining (seven), or both (twelve). The use of shroud pins and/or coffins immediately indicate that the respectful disposal of many of these individuals, albeit in an unconsecrated burial ground, was important to the family.

Plate 29. Copper alloy staining on external surfaces of frontal or forehead bones of Skeleton 38, infant 2-4 months. Two shroud pins were also recovered with the skeletal remains of this individual.

Plate 30. Copper alloy staining on cervical vertebra and left clavicle of Skeleton 16, 4-6 months. One shroud pin was recovered with the skeletal remains of this individual.
4 Conclusions

‘There is a feeling that children aren’t meant to die’ (HEA 1994, 105, after Scott 1999, 25). Many modern observers of the classic *cillín* (that is, with high numbers of infants) may interpret it as being a very poignant place of sorrow and sadness. That, to a certain degree, these are the places were tiny infants that never had a chance at life were abandoned and forgotten. But this is very much a modern view of infancy. On the one hand infants and children are seen as immature, incomplete versions of adults. ‘Adults are implicitly regarded as complete’ (Sofaer 2006, 121). On the other hand they are also imbued with the notion of a perfect unsoiled being, innocent and untainted by the corrupted adult world. ‘Western culture sympathises in a wash of vicarious emotion with the parents of babies and young children who have died, encoding the deceased young with ethereal innocence’ (Scott 1999, 26). But these are modern views. It is only in very recent times that a formal recognition of the deceased infant and even the pre-term infant has become widespread and acceptable. The sheer level of infant mortality in the past, combined with the general fragility and harshness of life, ensured that death was a familiar experience for most from a young age. The Mackney skeletons are a manifestation of a time is Ireland that is socially and culturally unrecognisable to the modern observer yet surprisingly very close in time.
5 Project References


6 Appendix

6.1 Catalogue of Human Skeletal Remains

Skeleton 1
Age: Juvenile 4.5-5.5 years (dentition)
Sex: -
Stature: -

Skeletal Preservation: Very good. Almost complete, with minimal erosion and fragmentation.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: North/south, head to north
Associated Skeleton(s): -
Associated Finds: -

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, one unidentified left carpal, left MC1 and 2 MCs, three proximal and two intermediate left hand phalanges, right MC1 and 3 MCs, four proximal and two intermediate right hand phalanges. Four sternum segments, twelve left and twelve right ribs, vertebrae from C1 to sacral fragments. Ilia, ischia, left pubis. Femora, tibiae, fibulae, all left tarsals and metatarsals and one proximal foot phalanx, all right tarsals, right MT1 and 2 MTs, and four proximal and one distal foot phalanges.

Dental Inventory:

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15 erupted deciduous teeth, 14 erupting/unerupted permanent teeth

Dental Pathology: Hypoplastic defects – 4/15 deciduous teeth (52, 51, 61, 82), in utero stress

Skeletal Pathology: Non-specific infection – active fibre bone on femora, tibiae, fibulae
Metabolic – mild cribra orbitalia left and right orbits

*Anomalies:* Allen’s fossae

*Comments:* May be undersized for age-at-death

**Skeleton 2**

*Number not used*

**Skeleton 3**

*Number not used*

**Skeleton 4**

*Age:* Juvenile 8-10 years (dentition)

*Sex:* -

*Stature:* -

*Skeletal Preservation:* Good. Virtually complete, some fragmentation.

*Skeletal Position:* Supine

*Skeletal Attitude:* Flexed. Left arm flexed at 180° so that left hand overlies left shoulder, right forearm extends 45° out from body with the forearm drawn right up so head rests on right hand. Left upper leg extending out from body at 90°, with the lower leg drawn back in with the left foot resting just inferior to the pelvis. The right leg is completely flexed up over the abdomen and chest area, with the right knee resting on the right chest and the foot overlying the right hip.

*Orientation:* Southeast/northwest, head to southeast

*Associated Skeleton/s:* -

*Associated Finds:* -

*Bones Present:* Cranium and mandible. Clavicles, scapulae, humeri (including proximal left and distal right epiphyses), radii, ulnae (including distal left ulnar epiphysis), left capitate and 1 carpal, left MC1-MC5, and five proximal, two intermediate and two distal hand phalanges, right MC2-MC5, and four proximal and four intermediate hand phalanges. Five sternum segments, twelve left and twelve right ribs, vertebrae from C1 to S5. Ilia, ischia, pubes. Femora (including proximal epiphyses and distal right epiphysis), tibiae (including proximal right epiphysis and distal epiphyses), fibulae (minus distal epiphyses), left calcaneus, talus, cuboid, 1st cuneiform, MT1-MT5, and three proximal foot phalanges, right calcaneus, talus, cuboid, MT1-MT4, and four proximal and one distal foot phalanges.
Dental Inventory:

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10 erupted deciduous teeth; 13 erupted, 2 erupting, and 3 unerupted permanent teeth

Dental Pathology: Calculus – 11/13 erupted permanent (16, 11-22, 26, 46, 42-32, 36, slight to severe, latter on upper and lower incisors), 10/10 erupted deciduous teeth (slight to moderate)

Skeletal Pathology:

Trauma – well-healed midshaft fracture of 6th left rib; depression fracture of left parietal, partially healed, measuring 51.8mm superior/inferior and 45.8mm anterior/posterior, secondary fracture lines radiating posteriorly and inferiorly from inferior posterior margin of injury. Complete separation of superior and posterior margins of fractured segment from cranial vault. Bone fragment is displaced endocranially and there is associated endocranial and ektocranial reactive bone.

Non-specific Infection – There is vascular bone deposits on the endocranial surface of the left parietal and extending slightly over the coronal suture to the left frontal; reactive fibre bone also on ektocranial left parietal; healed striated bone on medial anterior tibiae diaphyses.

Anomalies: There are at least 4 inca bones in the occipital; Allen’s fossae on the femora.

Comments: Diaphyseal length suggests younger age-at-death (6-8 years). In addition to the unusual burial position, this skeleton was covered with small to medium stones.

Examination of sieved samples: Sample no. 10, [c13], Right upper second incisor, unidentified deciduous canine, unfused anterior of C1, 32 unidentified irregular fragments.

Skeleton 5

Age: Perinate 36.2+/1.87 foetal weeks (left femur and tibia)

Sex: -

Stature: 47.2cm (left tibia)

Skeletal Preservation: Very good. Complete and well preserved.

Skeletal Position: Supine

Skeletal Attitude: Extended (slight disarticulation)

Orientation: South/north, head to south

Associated Skeletons: -

Associated Finds: -

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1-MC5 and four proximal hand phalanges, right MC1-MC5 and four proximal hand phalanges, five unsided intermediate and two unsided distal hand phalanges. Two sternum seg-
ments, twelve left and twelve right ribs, vertebrae from C1 to S4. Ilia, ischia, pubes. Femora, tibiae, fibulae, left MT1 and right MT1, 7 unsided MTs and eight unsided proximal foot phalanges.

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6 unerupted deciduous teeth and cusps of an unidentified deciduous M2

**Dental Pathology:** -

**Skeletal Pathology:** -

**Anomalies:** -

**Comments:** -

**Examination of sieved samples:** Sample no. 18, [c30], 1 proximal hand phalanx
Skeleton 6
Age: Infant 4-6 months (dentition)
Sex: -
Stature: -

Skeletal Preservation: Good. Quite complete, but significant erosion to lower half of skeleton.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: West/east, head to west
Associated Skeleton/s: -
Associated Finds: 16 coffin nails and wood

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20 unerupted deciduous teeth
Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: Scalp and hair fragments.

Skeleton 7
Age: Perinate 40.6+/1.87 foetal weeks (long bones)
Sex: -
Stature: 54.1

Skeletal Preservation: Good, quite complete, some erosion and minimal fragmentation.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: West/east, head to west
Associated Skeleton/s: -
Associated Finds: -
Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, 3 left MCs and 2 proximal and one intermediate hand phalanges, right MC2-5 and one proximal hand phalanx. Eight left and ten right ribs, vertebrae from C1 through to sacral fragments. Ilia, ischia, right pubis. Femora, tibiae, right fibula.

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5 unerupted deciduous teeth

Dental Pathology:
Skeletal Pathology: -
Anomalies: -
Comments: -

Examination of sieved samples: Sample no. 55, [c78] – 1 sternal segment, 2 vertebral bodies, 1 proximal hand phalanx, 2 proximal foot phalanges, 5 unidentified fragments.

Examination of sieved samples: Sample no. 55, [c78], 1 proximal hand phalanx, 2 proximal foot phalanges, 1 sternal segment, 2 vertebral bodies, 5 unidentified fragments.

Sample no. 56, [c78], 2 ?thoracic body fragments.
Sample no. 57, [c78], 4 sacral fragments, 1 long bone fragment of older infant.

Skeleton 8

Age: Juvenile 4-5 years (dentition)
Sex: -
Stature: -

Skeletal Preservation: Very good. Virtually complete with bones in excellent condition.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: East/west, head to east
Associated Skeleton/s: -
Associated Finds: -

**Bones Present:** Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, 2 unsided MCs, 4 unsided proximal and 2 unsided intermediate hand phalanges. Manubrium, twelve left and twelve right ribs, vertebrae from C1 to S5. Ilia, ischia, pubes. Femora, tibiae, fibulae, left talus, calcaneus, 2 MTs, and 1 proximal foot phalanx, right calcaneus and 1 proximal foot phalanx.

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17 erupted deciduous and 5 unerupted permanent teeth

**Dental Pathology:** Calculus 4/17 (85, 84, 74, 75, all slight); Caries 1/17 (51, small)

**Skeletal Pathology:** -

**Anomalies:** Metopic suture still open. Allen’s fossae.

**Comments:** Possibly undersized for age. Copper alloy staining on frontals and left parietal.

**Examination of sieved samples:** Sample no. 58, [c78], 4 irregular unidentified fragments.

Sample no. 60, [c78], unfused proximal humeral epiphysis, 1 sternal segment, 1 sacral body, 1 intermediate hand phalanx, upper left 1st incisor with slight caries, 1 rib shaft fragment, 3 unidentified fragments.

**Skeleton 9**

**Age:** Infant 2-4 months (dentition)

**Sex:** -

**Stature:** -

**Skeletal Preservation:** Very good. Quite complete and well preserved.

**Skeletal Position:** Supine

**Skeletal Attitude:** Extended

**Orientation:** Northwest/southeast, head to northwest

**Associated Skeletons:** -

**Associated Finds:** -

**Bones Present:** Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1 and 2 MTs and one intermediate hand phalanx, right MC1, 3 MCs and two proximal hand phalanges. Manubrium, twelve left and twelve right ribs, vertebrae from C1 to S2. Ilia, left ischium, pubes. Femora, tibiae, fibulae, left calcaneus and talus and MT1, right calcaneus and talus and MT1.
**Dental Inventory:**

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19 unerupted deciduous teeth

**Dental Pathology:** -

**Skeletal Pathology:** Non-specific Infection – active and remodelled endocranial lesions; active periostitis on humeral diaphyses, right ulna diaphysis, radial, femoral, tibial, and fibular diaphyses.

**Anomalies:** -

**Comments:** -

**Skeleton 10**

**Age:** Perinate 29.2+/−1.87 foetal weeks (left femur and tibia)

**Sex:** -

**Stature:** 36.4cm (left tibia)

**Skeletal Preservation:** Very good. Complete and well preserved.

**Skeletal Position:** Supine

**Skeletal Attitude:** Extended

**Orientation:** West/east, head to west

**Associated Skeleton/s:** -

**Associated Finds:** -

**Bones Present:** Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, 7 unsided MCs, eight unsided proximal, three unsided intermediate, and 2 unsided distal hand phalanges. Eleven left and twelve right ribs, vertebrae from C1 to S2. Ilia, ischia, left pubis. Femora, tibiae, fibulae, 3 unsided MTs.

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2 unerupted deciduous teeth

**Dental Pathology:** -

**Skeletal Pathology:** -

**Anomalies:** -

**Comments:** Copper alloy staining on left parietales and ribs.

**Examination of sieved samples:** Sample no. 74, [c78], 1 right thoracic arch
**Skeleton 11**

*Age:* Juvenile 15-24 months (dentition and long bones)
*Sex:* -
*Stature:* -

*Skeletal Preservation:* Very good, quite complete, little erosion, some fragmentation.
*Skeletal Position:* Supine
*Skeletal Attitude:* Extended
*Orientation:* West/east, head to west

*Associated Skeleton/s:* -
*Associated Finds:* -

*Bones Present:* Cranium and mandible. Clavicles, scapulae, humeri, ulnae, left MC2-5 and three proximal and one intermediate hand phalanx, 3 right MCs and one proximal hand phalanx. Manubrium and two sternal body segments, eleven left and eleven right ribs, vertebrae from C1 through to sacral fragments. Ilia, ischia, pubes. Femora, tibiae, fibula, left MT2-5, right MT1-5 and one proximal foot phalanx.

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8 erupted deciduous teeth; 4 erupting deciduous teeth; 4 unerupted permanent teeth

*Dental Pathology:*

*Skeletal Pathology:* -

*Anomalies:* -

*Comments:* Copper alloy staining on cranial vault frag., inferior mandibular body, hyoid, cervical vert., left clavicle

*Examination of sieved samples:* Sample no. 64, [c?], 1 intermediate and 1 proximal hand phalanx, 5th sacral body, 6 unidentified fragments.

**Skeleton 12**

*Age:* Infant 4-6 months (dentition)
*Sex:* -
*Stature:* -

*Skeletal Preservation:* Poor. Partially incomplete but significant erosion and fragmentation.
*Skeletal Position:* Supine
*Skeletal Attitude:* Extended
*Orientation:* West/east, head to west
Associated Skeleton/s: -
Associated Finds: 4 shroud pins and material

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, two proximal and two intermediate right hand phalanges. Nine left and ten right ribs, incomplete vertebral fragments from C2 to sacrum. Ilia, left ischium, right pubis. Femora, tibiae, fibulae. All bones are incomplete.

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13 unerupted deciduous teeth

Dental Pathology: -
Skeletal Pathology: -
Anomalies: -

Comments: Copper alloy staining on right mandible, temporal and humerus. Two fragments of shroud pins with adhering fabric were recovered with the cranium, and there is fabric still adhering to the right gonial angle of the mandible.

Skeleton 13

Age: Infant 6-10 months (dentition)
Sex: -
Stature: -

Skeletal Preservation: Very poor. Extremely incomplete and very eroded.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: West/east, head to west
Associated Skeleton/s: -
Associated Finds: -

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri. Unsided rib shafts, incomplete cervical vertebrae and unidentified body fragments. Unsided femoral shaft fragment. All bones very incomplete.

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7 erupted, 11 erupting deciduous teeth; 4 unerupted permanent teeth plus cusp fragments
Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: -

Skeleton 14

Age: Juvenile 12-16 months (dentition)
Sex: -
Stature: -

Skeletal Preservation: Poor. Quite incomplete with significant erosion and resulting fragmentation.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: West/east, head to west
Associated Skeletons: -
Associated Finds: 20 coffin nails, 1 shroud pin

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, left radius and ulna. Seven left and eight right ribs, incomplete cervical and thoracic vertebrae. Femora.

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3 erupted, 2 erupting, 4 unerupted deciduous teeth; 12 unerupted permanent teeth

Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: Copper alloy staining on left temporal.

Examination of sieved samples: Sample no. 1143, [c1159], 1 vertebral body.

Skeleton 15

Age: Juvenile 12-14 months (dentition and long bones)
Sex: -
Stature: -
**Skeletal Preservation**: Very good. Partially incomplete but preserved bones are in excellent condition.

**Skeletal Position**: Supine

**Skeletal Attitude**: Extended

**Orientation**: West/east, head to west

**Associated Skeleton/s**: -

**Associated Finds**: -

**Bones Present**: *Pars basilaris*, teeth. Right clavicle, scapulae, humeri, radi, ulnae, 1 MC from each of the left and right hands. Manubrium and 2 sternal body segments, eleven left and eleven right ribs, C1 and C2, T1-S5. Ilia, ischia, pubes. Femora, tibia, fibulae, 1 left MT.

**Dental Inventory**:

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2 deciduous teeth

**Dental Pathology**: -

**Skeletal Pathology**: -

**Anomalies**: -

**Comments**: The excavation record notes that the head of this individual was lifted during the ‘evaluation excavation’, and was originally labelled ‘Skeleton 3’.

**Examination of sieved samples**: Sample no. 79, [c91], 1 proximal hand phalanx, 1 rib, 2 unidentified fragments.

**Skeleton 16**

**Age**: Infant 4-6 months (dentition)

**Sex**: -

**Stature**: -

**Skeletal Preservation**: Good. Fairly complete but fragmentation of cranium and leg bones. Minimal erosion.

**Skeletal Position**: Supine

**Skeletal Attitude**: Extended

**Orientation**: West/east, head to west

**Associated Skeleton/s**: -

**Associated Finds**: 1 shroud pin
Bones Present: Cranium and mandible. Clavicles, left scapula, humeri, radi, ulnae, left MC1 and 3 MCs, and three proximal and two intermediate hand phalanges, right MC1-MC5 and three proximal, two intermediate and four distal hand phalanges. Two sternum segments, eleven left and twelve right ribs, vertebrae from C1 through to S1. Ilia. Right femur, tibiae, left fibula, right talus, MT1-MT5 and one proximal foot phalanx.

Dental Inventory:

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8 unerupted deciduous teeth; 1 unerupted permanent tooth

Dental Pathology: -

Skeletal Pathology: -

Anomalies: -

Comments: Bright blue/green copper alloy staining on lateral right clavicle and left and right arches and body of a middle cervical vertebra. May be undersized.

Examination of sieved samples: Sample no. 1081, [c91], 3 proximal and 1 distal hand phalanges, 1 vertebral body, 3 rib fragments, 17 small unidentified fragments.

Skeleton 17

Age: Juvenile 21-24 months (dentition)

Sex: -

Stature: -

Skeletal Preservation: Very good. Complete with minimal erosion or fragmentation.

Skeletal Position: Supine

Skeletal Attitude: Extended

Orientation: West/east, head to west

Associated Skeletons: -

Associated Finds: 5 coffin nails

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri (including proximal epiphyses), radi, ulnae, left MC1-MC5 and five proximal, one intermediate, and three distal hand phalanges, right MC1-MC5 and four proximal, three intermediate, and one distal hand phalanges. Manubrium and 2 sternum segments, twelve left and twelve right ribs, vertebrae
from C1 through to S4. Ilia, ischia, pubes. Femora, tibiae, fibulae, left calcaneus, talus, MT1, 3 MTs, and three proximal foot phalanges, right calcaneus and talus, MT1-MT5, and one proximal foot phalanx.

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15 erupted, 4 unerupted deciduous teeth; 4 unerupted permanent teeth

Dental Pathology:

Skeletal Pathology:

Anomalies:

Comments: Long bone diaphyseal assessment suggests this individual was small in size. Metopic suture is open but this is not unusual in an individual of this age.

Examination of sieved samples: Sample no. 78, [c96], 1 right nasal bone, 2 rib fragments.

Skeleton 18

Age: Perinate 39.5+/−2.08 foetal weeks (right femur)

Sex: -

Stature: 55.1cm (right femur)

Skeletal Preservation: Good. Some erosion but minimal fragmentation

Skeletal Position: Supine

Skeletal Attitude: Extended

Orientation: South/north, head to south

Associated Skeleton/s: -

Associated Finds: -

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, 3 right MCs. Seven left and nine right ribs, incomplete vertebral fragments from C1 through to one sacral body. Ilia. Femora, right tibia.

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2 unerupted deciduous teeth

Dental Pathology:

Skeletal Pathology:

Anomalies:

Comments: -
Skeleton 19

*Age:* Infant 9-12 months (dentition)
*Sex:* -
*Stature:* -

*Skeletal Preservation:* Very poor. Very incomplete and eroded.
*Skeletal Position:* Supine
*Skeletal Attitude:* ?
*Orientation:* ?
*Associated Skeleton/s:* -
*Associated Finds:* -

*Bones Present:* Highly incomplete cranium.
*Dental Inventory:*

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2 erupted, 5 erupting, and 2 unerupted deciduous teeth;
2 unerupted permanent teeth, plus unidentified lower central permanent incisor
*Dental Pathology:* -
*Skeletal Pathology:* -
*Anomalies:* -
*Comments:* Animal bone fragments recovered with this skeleton.

Skeleton 20

*Age:* Perinate 24.0+/−1.87 foetal weeks (long bones)
*Sex:* -
*Stature:* 27.7cm (left tibia)

*Skeletal Preservation:* Very good. Slightly incomplete, with minimal erosion and fragmentation.
*Skeletal Position:* Supine
*Skeletal Attitude:* Extended
*Orientation:* West/east, head to west
*Associated Skeleton/s:* -
*Associated Finds:* 7 coffin nails with wood, 1 metal fragment
**Bones Present:** Cranium and mandible. Left clavicle and humerus, radi, ulnae, 2 left MCs and 2 left proximal hand phalanges. Twelve left and eleven right ribs, incomplete vertebrae from C1 to one lumbar arch. Iliia, left ischium. Femora, tibiae, fibulae, 2 left MTs and 1 right MT.

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**Dental Pathology:** -

**Skeletal Pathology:** -

**Anomalies:** -

**Comments:** -

**Examination of sieved samples:** Sample no. 111, [c172] 2 unsided MTs.

Sample no. 127, [c171], left arch of C2, 1 right cervical arch, 1 left thoracic arch, right MT1, unsided MT.

**Skeleton 21**

**Age:** Perinate 38.4+/-2.08 foetal weeks (long bones)

**Sex:** -

**Stature:** 54.8cm (left tibia)

**Skeletal Preservation:** Poor. Quite incomplete. There is no fragmentation but there is erosion.

**Skeletal Position:** ?

**Skeletal Attitude:** ?

**Orientation:** ?

**Associated Skeletons:** ?

**Associated Finds:** ?

**Bones Present:** Right clavicle, scapula, radius and ulna, 2 unsided MCs. Eight right ribs, extremely incomplete cervical, thoracic, and lumbar vertebrae. Iliia. Right femur, left tibia and fibula.

**Dental Inventory:** n/a

**Dental Pathology:** -

**Skeletal Pathology:** -

**Anomalies:** -

**Comments:** Excavation record notes that Skeleton 21 was Skeleton 4 in original assessment. This does not appear to relate to the Skeleton 4 as recorded above (8-10 years old).
Skeleton 22

Age: Middle Adult 25-35 years (pubic symphysis, auricular ilium)
Sex: Male (pelvis, skull, metrics)
Stature: 169.6+/-3.37cm (left tibia)

Skeletal Preservation: Very good. Complete and well preserved.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: South/north, head to south
Associated Skeleton/s: -
Associated Finds: -

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, all left carpals and MCs, incomplete left hand phalanges, all right carpals and MCs, incomplete right hand phalanges. Manubrium and sternum, twelve left and twelve right ribs, complete vertebrae from C1 to S5. Ilium, ischia, pubes. Femora, patellae, tibiae, fibulae, all left tarsals and MTs, and incomplete left foot phalanges, all right tarsals and MTs, and incomplete right foot phalanges.

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27 permanent teeth, with another 4 teeth lost AM and 1 tooth lost PM

Dental Pathology: Calculus – 26/27, on all except 38, slight to moderate
Caries – 3/27, small lesions on 15 and 28, crown of 38 completely destroyed
Abscesses – 5 abscesses, 18 (internal), and 17, 16, 26, 27 (external)
Periodontal disease – slight (13-24, 45-35), moderate (15, 14, 25, 47, 46, 36), severe (18-16, 26-28, 48, 37, 38)

Skeletal Pathology: Joint disease – Schmorl’s nodes T5-T12, L1-L4; mild marginal osteophytes on bodies of T7, T8, T10-T12, L4; secondary DJD in left ankle (talus and calcaneus) associated with fracture (see below)
Trauma – fracture of distal left tibia and fibula with subsequent fusion of both to talus, long standing with resulting DJD of left ankle and possible ossification of ligament associated with spine as a reaction of a change in gait. Right left bones are also more robust, probably as a compensatory measure.
Non-specific Infection – traces of well remodelled fibre bone on medial anterior aspects of tibiae.
Congenital – posterior arch of S1 is unfused.
Anomalies: Ossified ligament on body of L4
Comments: -
Examination of sieved samples: Sample no 136, [c227], 6 irregular fragments.

Skeleton 23
Age: Juvenile 4-5 years (dentition)
Sex: -
Stature: -

Skeletal Preservation: Very good. Almost complete, with intact cranium.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Southwest/northeast, head to southwest
Associated Skeletons: -
Associated Finds: -

Bones Present: Cranium, mandible. Clavicles, scapulae, humeri, left radius and ulna, 1 left MC and three proximal hand phalanges, right MC1 and 2 right MCs, four proximal, 2 intermediate, and 1 distal hand phalanges. Two sternal body segments, eleven left and eleven right ribs, vertebrae from C1 to S4 (only 11 thoracic). Ilia, ischia, pubes. Femora, tibiae, left fibula, left calcaneus, talus, and unident. tarsal, Mt1-MT5, one proximal and one intermediate foot phalanx, right calcaneus and talus.

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15 erupted deciduous, 6 unerupted permanent

Dental Pathology: -

Calculus – 6/15 deciduous teeth (55, 54, 64, 65, 85, 75)

Skeletal Pathology: -

Anomalies: Allen’s fossae; only 11 thoracic vertebrae and left and right ribs

Comments: Possibly undersized for age-at-death

Examination of sieved samples: Sample no. 138, [c182], 1 carpal, 1 unsided MC1, 2 unidentified MCs, 1 proximal and 1 intermediate hand phalanges, S5, upprt right 1st deciduous incisor.

Skeleton 24
Age: Juvenile 2 years (dentition and long bones)
Sex: -  
Stature: -  

Skeletal Preservation: Very good. Complete and well preserved.  
Skeletal Position: Supine  
Skeletal Attitude: Extended  
Orientation: North/south, head to north  
Associated Skeleton/s: -  
Associated Finds: -  

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri (including proximal epiphyses), radi, ulnae, left MC1 and 3 MCs, and three proximal, one intermediate, and one distal hand phalanges, right MC1-MC5, five proximal and two intermediate hand phalanges. Manubrium, twelve left and twelve right ribs, vertebrae from C1 through to S5. Ilia, ischia, pubes. Femora (including proximal and distal epiphyses), tibiae (including proximal and distal epiphyses), fibulae, left calcaneus, talus, MT1, 3 MTs, and one proximal foot phalanx, right calcaneus and talus.  
Dental Inventory: 

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| 46 | 85 | 84 | 83 | 82 | 81 | 71 | 72 | 73 | 74 | 75 | 36 |

16 erupted deciduous teeth; 4 unerupted permanent teeth  
Dental Pathology: Hypoplastic defects – 3/16 deciduous teeth (52, 51, 62), all with severe line, with traumatic breaking of incisal edge of 62 due to the line.  
Skeletal Pathology: Trauma – breaking of incisal edge of upper lateral left incisor, due to presence of severe hypoplastic defect.  
Anomalies: -  
Comments: -  

Examination of sieved samples: Sample no. 174, [c223], 8 vault fragments, sternal fragment, left pubis, 1 left rib, 2 unfused epiphyses, 6 unidentified fragments.  

Skeleton 25  
Age: Young Adult 20-25 years (epiphyseal fusion)  
Sex: Female (pelvis and metrics)  
Stature: 156.8+/-2.99cm (left femur and tibia)  

Skeletal Preservation: Poor, quite incomplete but bones well preserved  
Skeletal Position: Supine  
Skeletal Attitude: Extended
Orientation: Northeast/southwest, head to northeast
Associated Skeleton/s: -
Associated Finds: -

Bones Present: Unsided hand phalanges. One left and two right ribs, vertebrae from T11 to S3. Left pelvis, incomplete right ilium and pubis. Femora, left tibia and fibula, left MT3, right talus, MT1, and MT2, and one right proximal foot phalanx.
Dental Inventory: n/a
Dental Pathology: n/a
Skeletal Pathology:
Joint Disease – Schmorl’s node on T12.
Anomalies: Allen’s fossae
Comments: Associated disarticulated teeth (see disarticulated catalogue 1001-4)
Examination of sieved samples: Sample no. 147 [c157], 4 unidentified bone fragments.
Sample no. 148, [c157], 2 rib fragments.

Skeleton 26
Age: Infant 42.8+/-2.12 foetal weeks (right tibia)
Sex: -
Stature: -

Skeletal Preservation: Good. Fairly complete, some fragmentation
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeleton/s: -
Associated Finds: -

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left and right MC1s, 7 unsided MCs, five left and five right proximal hand phalanges, and 4 unsided intermediate hand phalanges. Sternum segment, nine left and seven right ribs, vertebrae from Cl to S2. Ilia, ischia, pubes. Femora, tibiae, fibulae, one unsided MT.
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4 unerupted deciduous teeth
Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Examination of sieved samples: Sample no. 162, [c171], 2 right thoracic arches, 1 vertebral body, 6 rib fragments.
Examination of sieved samples: Sample no. 161, [c171], pars basilaris.

Skeleton 27
Age: Infant 7-12 months (dentition)
Sex: -
Stature: -

Skeletal Preservation: Poor. Partially incomplete with significant fragmentation. No erosion.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: West/east, head to west
Associated Skeletons: -
Associated Finds: -

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, left radius and ulna, fragments of right forearm. Manubrium and 1 sternum segment, six left and seven right ribs, vertebrae from C1 to L5. Iilia, right ishium. Femora, left tibia, fragments of lower right leg bones. All bones quite incomplete.
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14 unerupted deciduous teeth
Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: -
Examination of sieved samples: Sample no. 173, [c223], 11 vault fragments.

Skeleton 28
Age: Infant 4-6 months (dentition)
Sex: -
Stature: -

Skeletal Preservation: Good. Partially incomplete but well preserved. Some fragmentation.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeleton/s: -
Associated Finds: 1 metal object, possible coffin nail

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, 1 left MC, right MC2-MC5 and four proximal and two intermediate hand phalanges. Manubrium and 2 sternum segments, eleven left and seven right ribs, vertebrae from C1 to S3. Ilia, left ischium and pubis. Femora (including left distal epiphysis), tibiae, fibulae, 2 left MTs, right MT2-MT5 and one proximal foot phalanx.

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17 unerupted deciduous teeth; 2 unerupted permanent teeth

Dental Pathology: -
Skeletal Pathology: Metabolic disease (possible) – active fibre bone at least on left glabella, traces of healed fibre bone at anterior margins of medial eye orbits.

Anomalies: -
Comments: Copper alloy staining on right frontal. Possibly large for age-at-death.

Examination of sieved samples: Sample no. 201, [c172], 1 small unidentified fragment. Sample no. 200, [c172], vertebral fragment, 17 cranial vault fragments.
Skeleton 29
Age: Perinate 38.8+-1.87 foetal weeks (left femur and tibia)
Sex: -
Stature: 51.7cm (left tibia)

Skeletal Preservation: Very good. Complete and well preserved.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeleton/s: -
Associated Finds: -

Bones Present: Cranium and mandible. Right clavicle, scapulae, humeri, radi, ulnae, unsided MC1 and 7 unsided MCs, five unsided proximal and two unsided intermediate hand phalanges. Twelve left and eleven right ribs, vertebrae from C1 to S4. Ilia, right ischium, pubes. Femora, tibiae, fibulae, left MT1, right MT1, and five unsided MTs.
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9 unerupted deciduous teeth plus unidentified molar cusps
Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: Cranium and mandible appear very small. Copper alloy staining on right parietal, left and right gonial angles of the mandible, right lateral clavicle.

Examination of sieved samples: Sample no. 188, [c247], 1 vertebral body, 1 rib fragment, 1 unidentified fragment.
Sample no. 190, [c247], 1 MT, 1 rib fragment, 1 left thoracic arch, 4 vertebral bodies.

Skeleton 30
Age: Perinate 40.2+-2.08 foetal weeks (right femur)
Sex: -
Stature: 56.5cm (right femur)

Skeletal Preservation: Poor. Quite incomplete, eroded and fragmented.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeleton/s: -
Associated Finds: 1 shroud pin and possible coffin nail

Bones Present: Cranium and mandible. Left clavicle, scapulae, humeri, right radius and ulna.
Seven left and four right ribs, incomplete cervical and thoracic vertebrae. Right ilium and
ischium. Right femur.

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6 unerupted deciduous teeth
Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: -

Skeleton 31
Age: Infant 7-10 months (dentition)
Sex: -
Stature: -

Skeletal Preservation: Very poor. Fairly incomplete with severe erosion and fragmentation
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Southwest/northeast, head to southwest
Associated Skeleton/s: -
Associated Finds: -
**Bones Present:** Cranium and mandible. Left clavicle, humeral diaphyses, fragments of diaphyses of ulnae and radi. Five right ribs plus shaft fragments, very incomplete vertebral fragments from C1 through to S1. Left ilium. Diaphyses of femora and right tibia. *All bones very incomplete, eroded, and fragmented*

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4 erupting and 9 unerupted deciduous teeth; 1 unerupted permanent tooth

**Skeletal Pathology:** Non-specific Infection – layer of remodelled fibre bone on superior half of endocranial surface of occipital, up to 3.5mm thick;

Metabolic disease (possible) - partially remodelled fibre bone on ectocranial surface of frontals (at glabella), parietals (certainly on right boss) and occipital (around sutural margins);

**Anomalies:**

**Comments:** There may be further periosteal deposits on the limb bones in particular, but the extremely eroded nature of the bone militates against a proper and conclusive assessment.

**Examination of sieved samples:** Sample no. 224, [c308], 14 vault fragments, cusp of lower permanent incisor.

**Skeleton 32**

**Age:** Perinate 41.0 +/− 2.08 foetal weeks (left femur)

**Sex:** -

**Stature:** 58.0cm (left femur)

**Skeletal Preservation:** Very good. Complete with very good preservation.

**Skeletal Position:** Supine

**Skeletal Attitude:** Extended

**Orientation:** Northwest/southeast, head to northwest

**Associated Skeletons:** -

**Associated Finds:** -

**Bones Present:** Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1-MC5, and five proximal, two intermediate, and one distal hand phalanges, right MC1-MC5, and four proximal and three intermediate hand phalanges. Manubrium and 2 sternum segments, eleven left and eleven right ribs, vertebrae from C1 through to S4. Ilia, ischia, pubes. Femora, tibiae, fibulae, left calcaneus, talus, MT1, and 3 MTs, right talus, MT1, and one MT.
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15 unerupted deciduous canine

Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: -

Skeleton 33

Age: Infant 3-6 months (dentition)
Sex: -
Stature: -

Skeletal Preservation: Very poor. Quite incomplete with significant erosion. There is minimal fragmentation.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeleton/s: -
Associated Finds: 27 coffin nails and wood fragments

Bones Present: Cranium and mandible. Left humerus, radius, and ulna. Five left ribs, very incomplete cervical and thoracic vertebrae. Diaphyseal fragments of left femur, tibiae and fibulae.

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6 unerupted deciduous teeth
Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: Copper alloy staining on right frontal. Possibly undersized for age-at-death.
Examination of sieved samples: Sample no. 334, [c410], 6 eroded cranial vault fragments.
Sample no. 335, [c410], 1 rib fragment, upper left deciduous 2nd molar, 1 unidentified fragment.

Skeleton 34
Age: Infant 6-9 months (dentition)
Sex: -
Stature: -

Skeletal Preservation: Poor. Partially incomplete but there is severe erosion.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Southwest/northeast, head to southwest
Associated Skeleton/s: -
Associated Finds: 1 shroud pin

Bones Present: Cranium and mandible, clavicles, right scapula, shaft fragments of left arm, right humerus, radius, and ulna. One left and six right ribs, incomplete cervical, thoracic, and lumbar vertebrae. Iliac body fragments. Femora, tibiae, fibulae. All bones quite incomplete.

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| 6 erupting and 12 unerupted deciduous teeth; 8 unerupted permanent teeth and a canine cusp
Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: Copper alloy staining of left lateral wing of occipital and right fibula. Possibly undersized for age-at-death.
Examination of sieved samples: Sample no. 365, [c453], 17 highly eroded and unidentified fragments.

Skeleton 35
Age: Perinate 40.1+/-1.87 foetal weeks (left femur and tibia)
Sex: -
Stature: 53.7cm (left tibia)

Skeletal Preservation: Very good. Complete and well preserved.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: West/east, head to west
Associated Skeleton/s: Overlay Skeleton 38
Associated Finds: 4 shroud pins

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1-MC5, and three proximal and two intermediate hand phalanges, right MC1-MC5, and five proximal and two intermediate hand phalanges. Eleven left and twelve right ribs, vertebrae from C1 to S2. Ilia, ischia, pubes. Femora, tibiae, fibulae, left calcaneus, talaus, MT1 and 3 MTs, and one proximal foot phalanx, right calcaneus, talaus, MT2-MT5, and two proximal foot phalanges.

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7 unerupted deciduous teeth

Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: Copper alloy staining on left parietal and temporal.
Examination of sieved samples: Sample no. 387, [c486], primarily animal bone, fragment of adult C2.
Skeleton 36
Age: Juvenile 12-18 months (dentition)
Sex: -
Stature: -

Skeletal Preservation: Good. Fairly complete but significant erosion of metaphyses.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: West/east, head to west
Associated Skeletons: -
Associated Finds: -

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, unidentified metacarpal fragments. Manubrium, twelve left and six right ribs, incomplete thoracic, lumbar, and sacral vertebrae (cervical vertebrae recovered in sieved sample, see below). Ilia, ischia, pubes. Femora, tibiae, fibulae, left MT1-MT5, 3 right MTs. All bones quite incomplete.

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9 erupted, 4 erupting, 2 unerupted deciduous teeth; 6 unerupted permanent teeth plus canine cusp

Dental Pathology: Hypoplastic defects - 5/7 permanent teeth (16, 11, 21, 26, and canine), lower permanent molar unobservable. Severe pitting of observable permanent teeth indicating stress from 3 months to death.

Skeletal Pathology: Metabolic disease (possible) – lateral ends of ribs bulbous, metaphyses flared

Anomalies: -
Comments: Associated bone ID no. 1091.

Examination of sieved samples: Sample no. ?, [c235], 'from cranium spoil', left and right arches of C1-C7, 1 cervical body, dens C2, left and right arch T1, 1 right thoracic arch, 2 rib fragments, 14 unidentified fragments.

Skeleton 37
Age: Perinate 39.5+/-2.20 foetal weeks (right ulna)
Sex: -
Stature: 53.6cm (right ulna)

Skeletal Preservation: Very poor. Extremely incomplete with some erosion.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: West/east, head to west
Associated Skeleton/s: -
Associated Finds: -

Bones Present: Cranium, Right radius and ulna. Ilia.
Dental Inventory: -

Dental Pathology: n/a
Skeletal Pathology: -
Anomalies: -
Comments: -

Skeleton 38
Age: Infant 2-4 months (dentition)
Sex: -
Stature: -

Skeletal Preservation: Very good. Complete with minimal erosion and fragmentation.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: West/east, head to west
Associated Skeleton/s: Underlay Skeleton 35
Associated Finds: 2 shroud pins and textiles

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1-MC5, four proximal and four intermediate hand phalanges, right MC1-MC5, five proximal and three intermediate hand phalanges. Manubrium and one sternum segment, eleven left and twelve right ribs, vertebrae from C1 through to S4. Ilia, ischia, pubes. Femora (including distal epiphyses), tibiae (including proximal epiphyses), fibulae, left calcaneus, talus, MT1-MT5, five proximal and one intermediate foot phalanges, right calcaneus, talus, MT1-MT5, and two proximal foot phalanges.
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19 unerupted deciduous teeth

**Dental Pathology:** -

**Skeletal Pathology:** -

**Anomalies:** Superior tips of scapulae are orientated anteriorly.

**Comments:** Copper alloy staining on left and right frontals. Limb bones appear slightly thicker than normal but no pathological process evident. Bone growth on tibiae are similar to periosteal lesions but it is natural bone growth.

**Skeleton 39**

**Age:** Perinate 40.7+/-2.08 foetal weeks (right femur)

**Sex:** -

**Stature:** 57.5cm (right femur)

**Skeletal Preservation:** Very good. Partially incomplete but well preserved.

**Skeletal Position:** Supine

**Skeletal Attitude:** Extended

**Orientation:** Southwest/northeast, head to southwest

**Associated Skeleton/s:** -

**Associated Finds:** -

**Bones Present:** Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1, 3 MCs, five proximal, one intermediate, and one distal hand phalanges, right MC1-MC5 and five proximal hand phalanges. Manubrium and one sternum segment, nine left and ten right ribs, vertebrae from C1 to S3. Ilia, ischia, pubes. Right femur.

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3 unerupted deciduous teeth

**Dental Pathology:** -

**Skeletal Pathology:** -

**Anomalies:** -

**Comments:** -

**Examination of sieved samples:** Sample no. 416, [c508], 1 cranial vault fragment, upper right deciduous first molar, 12 unidentified fragments.
**Skeleton 40**

*The bones identified as ‘Skeleton 40’ comprise 21 animal bone fragments*

**Skeleton 41**

*Number not used*

**Skeleton 42**

*Age:* Juvenile 13-18 months (dentition)  
*Sex:* -  
*Stature:* -

*Skeletal Preservation:* Very good. Quite complete, some fragmentation.  
*Skeletal Position:* Supine  
*Skeletal Attitude:* Extended  
*Orientation:* West/east, head to west  
*Associated Skeletons:* -  
*Associated Finds:* 1 shroud pin

*Bones Present:* Cranium and mandible. Clavicles, scapulae, humeri (including proximal epiphyses), radi, ulnae, left MC1-MC4, and five proximal, four intermediate, and one distal hand phalanges, right MC1-MC5 and four proximal hand phalanges. Manubrium and 3 sternum segments, twelve left and twelve right ribs, vertebrae from C1 to S3. Ili, ischia, pubes. Femora (including right proximal and left distal epiphyses), tibiae (including distal epiphyses), fibulae, left calcaneus, talus, MT1-MT5, and four proximal foot phalanges, right calcaneus, talus, and 1 tarsal, MT1-MT5, and three proximal and one distal foot phalanges.

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8 erupted, 3 erupting, and 3 unerupted deciduous teeth; 3 unerupted permanent teeth

*Dental Pathology:* -  
*Skeletal Pathology:* -  
*Anomalies:* -  
*Comments:* -

**Skeleton 43**

*Age:* Perinatal 40.7+/-.212wks (long bones)  
*Sex:* -
Stature: 55.2cm (right tibia)

Skeletal Preservation: Good. Almost complete, some erosion of metaphyses, minimal fragmentation.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: West/east, head to west
Associated Skeletons: -
Associated Finds: -

Bones Present: Cranium and mandible. Right clavicle, scapulae, humeri, left radius, ulnae, right MC1-MC5, four proximal and two intermediate right hand phalanges. Ten left and eleven right ribs, vertebrae from C1 through to S1. Ilia, ischia, right pubis. Femora, tibiae, right fibula.

Dental Inventory:

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7 unerupted deciduous teeth

Dental Pathology: -
Skeletal Pathology: Non-specific Infection – active fibre bone deposits on diaphyses of humeri and right clavicle.
Anomalies: -
Comments: -

Examination of sieved samples: Sample no. 674, [c843], 2 MC fragments, 1 intermediate and 1 distal hand phalanges, 1 fragment of zygomatic arch.

Skeleton 44

Age: Infant 9-10 months (dentition)
Sex: -
Stature: -

Skeletal Preservation: Good. Quite complete, some erosion.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: West/east, head to west
Associated Skeletons: -
Associated Finds: 5 shroud pins
**Bones Present:** Cranium and mandible. Clavicles, scapulae, humeri, radi, left ulna. Manubrium and one sternum segment, twelve left and ten right ribs, partially incomplete vertebrae from C1 through to S4. Ilia, ischia, right pubis. Femora (including proximal epiphyses), tibiae, fibulae.

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10 unerupted deciduous teeth; 2 unerupted permanent teeth

**Dental Pathology:** -

**Skeletal Pathology:** -

**Anomalies:** -

**Comments:** Copper alloy staining on cranial bones. Possible undersized for age-at-death.

**Examination of sieved samples:** Sampel no. 694, [c848], 8 cranial vault fragments.

**Skeleton 45a**

**Age:** Infant 7-10 months (dentition)

**Sex:** -

**Stature:** -

**Skeletal Preservation:** Very good. Quite complete with some erosion.

**Skeletal Position:** Supine

**Skeletal Attitude:** Extended

**Orientation:** Northwest/southeast, head to northwest

**Associated Skeletons:** Skeleton 45b

**Associated Finds:** 26 coffin nails

**Bones Present:** Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, right MC1, 2 MTs, and two proximal hand phalanges. Twelve left and twelve right ribs, vertebrae from C1 through to S1. Ilia, ischia, pubes. Femora (including distal epiphyses), tibiae (including proximal epiphyses), fibulae, left calcaneus, talus, one unidentified tarsal, MT1-MT5, and two proximal foot phalanges, right calcaneus, talus, and MT1-MT5.

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8 erupting, 5 unerupted deciduous teeth; 3 unerupted permanent teeth (plus 5 cusps of permanent incisors and a canine)

**Dental Pathology:** -
Skeletal Pathology: -
Anomalies: -

Comments: Originally excavated as a single individual but clear remains of two individuals, now renumbered Skeleton 45a (original skeleton) and Skeleton 45b (identified as second individual). Associated bones ID nos 1074-1076.
Examination of sieved samples: Sample no. 933, [c78/89], 1 intermediate hand phalanx, 1 unidentified fragment.
Sample no. 934, [c78/89], 1 vertebral body, left arch T1, 1 cranial vault fragment.

Skeleton 45b
Age: Perinate 38.8+/−2.33 foetal weeks (left humerus)
Sex: -
Stature: 51.9cm (left humerus)

Skeletal Preservation: Poor. Quite incomplete but excellent preservation.
Skeletal Position: ?
Skeletal Attitude: ?
Orientation: ?
Associated Skeleton/s: Skeleton 45a
Associated Finds: -

Bones Present: Incomplete cranium. Unsided medial clavicle, humeri, right ulna, unsided distal radius. Five left ribs, very incomplete vertebral fragments from cervical through to sacrum. Left ilium. Right femur.
Dental Inventory: -

Dental Pathology: n/a
Skeletal Pathology: -
Anomalies: -
Comments: Originally excavated as a single individual but clear remains of two individuals, now renumbered Skeleton 45a (original skeleton) and Skeleton 45b (identified as second individual).

Skeleton 46
Age: Perinate 37.3+/−1.87 foetal weeks (left femur and tibia)
Sex: -
Stature: 49.3cm (left tibia)

Skeletal Preservation: Very good. Complete and well preserved.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeletons: -
Associated Finds: 2 shroud pins, 14 coffin nails

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left 3 MCs and one proximal hand phalanx, right 1 MC and one proximal hand phalanx. Eleven left and eleven right ribs, vertebrae from C1 through to S2. Ilia, ischia. Femora, tibiae, fibulae, left MT1 and three MTs, right MT1 and 2 MTs.

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5 unerupted deciduous teeth; unidentified permanent canine and molar cusp fragments

Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: Slight copper alloy staining on left frontal, right parietal, temporal, zygomatic, left mandible, and occipital, with some blackened scalp and hair fragments.

Examination of sieved samples: Sample no. 936, [c1150], 1 sternum segment.
Sample no. 937, [c1150], Ethmoid fragment, right upper first deciduous incisor, dens C2, 1 proximal and 1 intermediate hand phalanges.

Examination of sieved samples: Sample no. 938, [c1150], 1 intermediate and 1 distal hand phalanges.

Skeleton 47a
Age: Infant 6-12 months (dentition)
Sex: -
Stature: -

Skeletal Preservation: Poor. Quite incomplete and very eroded and fragmented.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeletons: Skeleton 47b
Associated Finds: 1 coffin nail

Bones Present: Cranial and mandible fragments. Right scapula, humerus, radius, ulna, 2 left MCs and two proximal and 1 intermediate left hand phalanges, two proximal and one in-

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termediate right hand phalanges, two unsided and unidentified MCs. Manubrium and one sternum segment, four left and two right ribs, very incomplete cervical, thoracic, and lumbar fragments. Right ilium. All very eroded and incomplete.

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9 erupted and 4 unerupted deciduous teeth, 2 unerupted permanent teeth

Dental Pathology: -

Skeletal Pathology: Metabolic disease (possible) – partially remodelled fibre bone deposits on ectocranial surface of frontals.

Anomalies: -

Comments: Skeleton 47 was excavated as a single individual. However, osteological analysis revealed the remains of a second individual comprising cranium, mandible and vertebrae. This latter individual was numbered Skeleton 47b in the analysis while Skeleton 47a refers to the more complete burial. Additional fragments of another juvenile were recorded in the disarticulated database, see ID no. 1014.

Examination of sieved samples: Sample no. 950, [c1160], 4 vault fragments, upper left second deciduous incisor, lower right second incisor, upper left permanent 1st molar, 8 rib fragments, dens of C2, left arch C1, 1 cervical body, left cervical arch, 10 unidentified fragments.

Examination of sieved samples: Sample no. 951, [c1160], 1 MC fragments, 7 unidentified fragments.

**Skeleton 47b**

*Age:* Infant 6 months (dentition)

*Sex:* -

*Stature:* -

*Skeletal Preservation:* Very poor. Very incomplete and fragmented.

*Skeletal Position:* ?

*Skeletal Attitude:* ?

*Orientation:* ?

*Associated Skeleton/s:* Skeleton 47a

*Associated Finds:*

*Bones Present:* Cranium and mandible. Incomplete cervical and thoracic fragments.
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9 unerupted deciduous teeth

Dental Pathology: -

Skeletal Pathology: -

Anomalies: -

Comments: Skeleton 47 was excavated as a single individual. However, osteological analysis revealed the remains of a second individual comprising cranium, mandible and vertebrae. This latter individual was numbered Skeleton 47b in the analysis while Skeleton 47a refers to the more complete burial. Additional fragments of another juvenile were recorded in the disarticulated database, see ID no. 1014.

In addition, there is copper alloy staining on the ectocranial surfaces of two cranial vault fragments.

Skeleton 48

Age: Perinate 37.1+/−1.87 foetal weeks (long bones)

Sex: -

Stature: 49.1cm (right tibia)

Skeletal Preservation: Very good. Virtually complete with minimal erosion and fragmentation.

Skeletal Position: Supine

Skeletal Attitude: Extended

Orientation: Northwest/southeast, head to northwest

Associated Skeletons: Buried with Skeleton 49

Associated Finds: -

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC2-MC5, four proximal and two intermediate left hand phalanges, left MC1 and 3 MCs, five proximal and three intermediate right hand phalanges. One body segment of sternum, twelve left and twelve right ribs, vertebrae from C1 through to S3. Ilia, left ischium. Femora, tibiae, fibulae, left MT1 and 1 MT, two proximal left foot phalanges, right MT1 and 1 MT, two proximal right foot phalanges.

Dental Inventory:
9 unerupted deciduous teeth, unidentified deciduous canine cusp and three cusps of unidentified deciduous molar

*Dental Pathology*: -

*Skeletal Pathology*: -

*Anomalies*: -

*Comments*: -

*Examination of sieved samples*: Sample no. 955, [c78/89], bag 2, lower deciduous incisor, 1 incus, 1 unidentified fragment.

Sample no. 955, [c78/89], ‘Skeleton 48/49’, 1 intermediate hand phalanx.

**Skeleton 49**

*Age*: Perinate 37.2 +/- 1.87 foetal weeks (long bones)

*Sex*: -

*Stature*: 49.7cm (left femur)

*Skeletal Preservation*: Very good. Complete and well preserved.

*Skeletal Position*: Supine, but lying on right side, facing Skeleton 48

*Skeletal Attitude*: Extended

*Orientation*: Northwest/southeast, head to northwest

*Associated Skeletons*: Buried with Skeleton 48

*Associated Finds*: -

*Bones Present*: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1 and 1 MC, four proximal, three intermediate, and one distal left hand phalanges, five proximal and four intermediate right hand phalanges. Eleven left and eleven right ribs, vertebrae from C1 through to S3. Ilia, ischia, pubes. Femora, tibiae, fibulae, left calcaneus and talus, 3 MTs and one proximal left foot phalanx, right MT2-MT5.

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7 unerupted deciduous teeth

*Dental Pathology*: -

*Skeletal Pathology*: -

*Anomalies*: -

*Comments*: -

*Examination of sieved samples*: Sample no. 956, [c78/89], 1 unidentified bone fragment. *See also Skeleton 49.*
Skeleton 50
Age: Infant 0-3 months (on basis of size)
Sex: -
Stature: -

Skeletal Preservation: Poor. Quite incomplete and fragmented.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: West/east, head to west
Associated Skeleton/s: -
Associated Finds: 1 shroud pin

Bones Present: Right clavicle, scapulae, humeri, radi, ulnae. Four left and five right ribs, very incomplete cervical and thoracic vertebrae. Ilia. Femora, tibiae, right fibula. All very eroded.
Dental Inventory: n/a
Dental Pathology: n/a
Skeletal Pathology: -
Anomalies: -
Comments: Copper alloy staining of right shoulder bones.
Examination of sieved samples: Sample no. 958, [c1166], 1 thoracic body fragment.

Skeleton 51
Age: Perinate 37.9+/−2.08 foetal weeks (long bones)
Sex: -
Stature: 52.0 (left femur)

Skeletal Preservation: Good. Quite complete but some erosion.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: West/east, head to west
Associated Skeleton/s: -
Associated Finds: -

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC2-MC5 and one proximal hand phalanx, right MC2-MC5 and two proximal hand phalanges. Eight left and eight right ribs, vertebrae from C1 through to S1. Ilia, ischia. Femora, tibiae, fibulae.
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2 unerupted deciduous teeth

Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: -

Skeleton 52

Age: Infant 4 months (dentition)
Sex: -
Stature: -

Skeletal Preservation: Very poor. Very incomplete, but minimal erosion and fragmentation.
Skeletal Position: Supine
Skeletal Attitude: ?
Orientation: West/east, head to west
Associated Skeletons: -
Associated Finds: 1 shroud pin, 16 coffin nails

Bones Present: Cranium. Upper cervical vertebrae.

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3 unerupted deciduous teeth

Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: Copper alloy staining on endocranial lateral occipital wings and left mandible.

Examination of sieved samples: Sample no. 1016, [c1213], 1 hand phalanx, 5 unidentified fragments.

Skeleton 53

Age: Perinate 38.4+/−2.12 foetal weeks (long bones)
Sex: -
Stature: 51.3cm (left tibia)
**Skeletal Preservation:** Very poor. Very incomplete, some erosion with minimal fragmentation

**Skeletal Position:** ?

**Skeletal Attitude:** Extended?

**Orientation:** Northwest/southeast, head to northwest

**Associated Skeleton/s:** -

**Associated Finds:** 9 coffin nails

**Bones Present:** Left parietal fragment, right scapula, 2 unsided MCs, and two unsided proximal hand phalanges. Two left and two right ribs, very incomplete thoracic and lumbar fragments. Tibiae, fibulae, left calcaneus, talus, MT1 and one MT and proximal foot phalanx, right calcaneus, talus MT1 and 3 right MTs.

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1 unerupted deciduous tooth

**Dental Pathology:** -

**Skeletal Pathology:** -

**Anomalies:** -

**Comments:** Bones were not all articulated, there has been some post-depositional disturbance of the remains.

**Skeleton 54**

**Age:** Perinate (on basis of size)

**Sex:** -

**Stature:** -

**Skeletal Preservation:** Very poor. Very incomplete with significant erosion and fragmentation.

**Skeletal Position:** Supine

**Skeletal Attitude:** Extended

**Orientation:** Southwest/northeast

**Associated Skeleton/s:** -

**Associated Finds:** -

**Bones Present:** Cranium. Right clavicle, unsided scapula fragment, dipahyses of right humerus and ulna. One left and two right ribs, extremely incomplete cervical and thoracic fragments. All very eroded.
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2 unerupted deciduous teeth

Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: -

Skeleton 55
Age: Perinate 39.8 +/- 1.87 foetal weeks (long bones)
Sex: -
Stature: 54.2cm (left femur)

Skeletal Preservation: Very good. Virtually complete and well preserved.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: West/east, head to west
Associated Skeletons: -
Associated Finds: 2 shroud pins, 14 coffin nails

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1-MC5, five proximal and two intermediate left hand phalanges, right MC2-MC4, three proximal, four intermediate, and three distal right hand phalanges. Manubrium and two sternum segments, twelve left and twelve right ribs, vertebrae from C1 through to S3. Ilia, ischia, pubes. Femora, tibiae, fibulae, left MT1, right MT1-MT5.

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2 unerupted deciduous teeth
Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: Copper alloy staining on left and right ramus of mandible. Parietal fragment with blackened scalp remnants and hair.
Examination of sieved samples: Sample no. 977, [c1179], 2 sacral fragments.
Skeleton 56

Age: Infant 3-5 mths (dentition and long bones)
Sex: -
Stature: -

Skeletal Preservation: Very good. Almost complete with some erosion and minimal fragmentation.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeleton/s: -
Associated Finds: -

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, 1 left MC and 2 left proximal hand phalanges, 2 right MCs and 1 right proximal hand phalanx. Manubrium and 1 body segment, eleven left and eleven right ribs, vertebrae from C1 through to S5. Ilia, ischia, pubes. Femora, tibiae, fibulae, left calcaneus and talus.

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13 unerupted deciduous teeth
Dental Pathology: -
Skeletal Pathology: -
Anomalies: -

Skeleton 57

Age: Juvenile 12-18 months (dentition)
Sex: -
Stature: -

Skeletal Preservation: Good. Fairly complete but some significant erosion, with resulting fragmentation.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast
Associated Skeleton/s: -
Associated Finds: 29 coffin nails
**Bones Present:** Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1 and 3 MCs, three proximal and 1 intermediate left hand phalanges, right MC1 and 2 MCs, and one proximal right hand phalanx. Manubrium, eleven left and twelve right ribs, vertebrae from C1 through to S4. Ilia, ischia. Femora, tibiae, fibulae, left MT1, right MT2 and 2 MTs. All with some erosion.

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17 erupted deciduous teeth, 10 unerupted permanent teeth

**Dental Pathology:** Calculus – 6/17 deciduous teeth (55, 54, 64, 65, 84, 74, all slight)

**Skeletal Pathology:** Metabolic – active porotic hyperostosis on posterior left parietal and superior left lateral occipital.; also ‘trumpeting’ of metaphyses and bulbous lateral rib ends

**Anomalies:** -

**Comments:** - Associated left eye orbit of young infant.

**Examination of sieved samples:** Sample no. 982, [c78/89], 6 cranial vault fragments, lower left deciduous 2nd incisor, 2 unidentified fragments.

Sample no. 983, [c1206], MC fragment, 2 unidentified fragments.

**Skeleton 58**

**Age:** Infant 9-12 months (dentition)

**Sex:** -

**Stature:** -

**Skeletal Preservation:** Good. Slightly incomplete, some erosion of metaphyses, minimal fragmentation.

**Skeletal Position:** Supine

**Skeletal Attitude:** Extended

**Orientation:** Northwest/southeast, head to northwest

**Associated Skeletons:** -

**Associated Finds:** 2 shroud pins, 22 coffin nails
Bones Present: Cranium and mandible. Clavicle, scapulae, humeri, radi, ulnae, 2 left MCs. Ten left and eleven right ribs, slightly incomplete vertebra from C1 to T12. Illia. Femora, tibiae, fibulae, left MT1 and 3 unidentified MTs, right MT1.

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11 erupted, 2 erupting, and 4 unerupted deciduous teeth; 3 unerupted permanent teeth

Dental Pathology: -

Skeletal Pathology: -

Anomalies: -

Comments: Copper alloy staining of anterior left and right shoulder areas

Examination of sieved samples: Sample no. 984, [c1196], fragment of possible calcaneus, 5 unidentified fragments.

Skeleton 59

Age: Infant 6-9 months (dentition)

Sex: -

Stature: -

Skeletal Preservation: Very poor. Very incomplete with significant erosion and fragmentation.

Skeletal Position: Supine but lying on left side

Skeletal Attitude: Legs slightly flexed

Orientation: Northeast/southwest, head to northeast

Associated Skeletons: -

Associated Finds: -

Bones Present: Cranium and mandible. Clavicles, right scapula, humeri, right radius and ulna. Twenty-six rib shaft fragments, very incomplete cervical and thoracic vertebrae. Nine unidentified leg bone fragments. All very incomplete.

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3 erupting, 10 unerupted deciduous teeth

Dental Pathology: -

Skeletal Pathology: -

Anomalies: -
Comments: -
Examination of sieved samples: Sample no. 997, [c10], [c11], 1 cranial vault fragment, 2 unidentified fragments.

Skeleton 60
Disarticulated bones, ID nos 1166-1198, presenting at least one possible full-term perinate, and two young juveniles (1-2 years) Active endocranial bone deposits on two cranial vault fragments. One coffin nail also recovered.
Examination of sieved samples: Sample no. 1001, [c78/89], upper ?right 1st permanent incisor.

Skeleton 61
Age: Infant 43.2+/- 1.87 foetal weeks (long bones)
Sex: -
Stature:

Skeletal Preservation: Very good. Skull incomplete and highly fragmented, and there is slight erosion.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeletons: -
Associated Finds: -

Bones Present: Cranium and mandible. Left clavicle, scapulae, humeri, radi, ulnae, 1 left MC, three proximal, four intermediate and one distal left hand phalanges, right MC2-MC5, four proximal and three intermediate right hand phalanges. Manubrium and two sternum segments, twelve left and ten right ribs, vertebrae from C1 through to S1. Femora, tibiae, fibulae, left MT2-MT5 and two proximal foot phalanges, right MT2-MT5 and two proximal and one distal foot phalanges.

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17 unerupted deciduous teeth
Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: -
Examination of sieved samples: Sample no. 1009, [c1208], 6 unidentified fragments.
Skeleton 62

Age: Infant 1-2 months (dentition)
Sex: -
Stature: -

Skeletal Preservation: Poor. Fairly incomplete and highly fragmented.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeleton/s: -
Associated Finds: -

Bones Present: Cranium and mandible. Clavicles, right scapula, humerus, radius, ulna, 2 right MCs and one proximal and three intermediate hand phalanges. Shaft fragments of left and right ribs, incomplete vertebrae from C1 through to scarum. Left ilium, right ischium. Femora, tibiae, fibulae.

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12 unerupted deciduous teeth

Dental Pathology: -
Skeletal Pathology: -
Anomalies: Periosteal-like lesions on femora and tibiae but normal growth.
Comments: Associated bone ID nos 1102.

Skeleton 63

Age: Perinate 38.9 +/- 1.87 foetal weeks (left femur and tibia)
Sex: -
Stature: 51.3cm (left tibia)

Skeletal Preservation: Very good. Complete and well preserved.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: West/east, head to west
Associated Skeleton/s: -
Associated Finds: -
Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, 3 left MCs and four proximal and three intermediate hand phalanges, 3 right MCs and one each of the proximal, intermediate, and distal hand phalanges. Manubrium and 2 sternum segments, twelve left and twelve right ribs, vertebrae from C1 to S4. Ilia, ischia, pubes. Femora, tibiae, fibulae. Left MT1 and 2 MTs and one proximal foot phalanx, right calcaneus, talus, MT1, 2 MTs, and two proximal foot phalanges.

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11 unerupted deciduous teeth

Dental Pathology: -
Skeletal Pathology: -

Anomalies: -

Comments: Copper alloy staining at right EAM and right lateral occipital wing.

Examination of sieved samples: Sample no. 1021, [c771], 2 unidentified fragments.

Skeleton 64

Age: Infant 9-11 months (dentition)

Sex: -

Stature: -

Skeletal Preservation: Poor. Relatively complete but significant erosion.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: West/east, head to west
Associated Skeletons: -
Associated Finds: -

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, 1 left MC, 1 right MC and one proximal hand phalanx. Manubrium and two sternum segments, four left and five right ribs, incomplete vertebrae from C1 through to S1. Left ilium. Femora, tibiae

All very eroded.

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8 erupted/erupting deciduous teeth, 11 unerupted deciduous teeth, 4 unerupted permanent teeth

*Dental Pathology*: Hypoplastic defects – serious pitting on all four unerupted permanent 1st molar, indicating stress from c. 1 month to 6 months.

*Skeletal Pathology*: -

*Anomalies*: -

*Comments*: -

*Examination of sieved samples*: Sample no. 1025, [c?], lower left deciduous canine, 2 unidentified fragments.

**Skeleton 65**

*Age*: Perinate 39.0+/−1.87 foetal weeks (left femur and tibia)

*Sex*: -

*Stature*: 52.1cm (left tibia)

*Skeletal Preservation*: Good. Fairly complete, some fragmentation but minimal erosion.

*Skeletal Position*: Supine

*Skeletal Attitude*: Extended

*Orientation*: Northwest/southeast, head to northwest

*Associated Skeleton/s*: -

*Associated Finds*: 4 coffin nails

*Bones Present*: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC2-MC5 and four proximal and three intermediate hand phalanges, right MC1-MC5, and three proximal and four intermediate hand phalanges. Eleven left and ten right ribs, vertebrae from C1 through to S5. Ili, ischia, pubes. Femora, tibiae, fibulae, right MT2-MT5 and two proximal foot phalanges.

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5 unerupted deciduous teeth

*Dental Pathology*: -

*Skeletal Pathology*: -

*Anomalies*: -

*Comments*: -
Examination of sieved samples: Sample no. 1019, [c1217], left lateral occipital wing.

**Skeleton 66**

*Age:* Perinate 41.5+/−1.87 foetal weeks (left femur and tibia)
*Sex:* -
*Stature:* 55.9cm (left tibia)

**Skeletal Preservation:** Good. Almost complete, some fragmentation
**Skeletal Position:** Supine
**Skeletal Attitude:** Extended
**Orientation:** Northwest/southeast, head to northwest
**Associated Skeleton/s:** Overlay Skeleton 68
**Associated Finds:** 1 shroud pin, 1 coffin nail

**Bones Present:** Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1-MC5 and four proximal and two intermediate hand phalanges, right MC1-MC5 and three proximal and four intermediate hand phalanges. One sternum segment, twelve left and twelve right ribs, vertebrae from C1 to S4. Ilia, ischia, pubes. Femora, tibiae, fibulae, left calcaneus, talus, MT1-MT5, and four proximal foot phalanges, right calcaneus, talus, 1 tarsal, MT1-MT5, and five proximal foot phalanges.

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8 unerupted deciduous teeth
**Dental Pathology:** -
**Skeletal Pathology:** -
**Anomalies:** -
**Comments:** Copper alloy staining on unidentified cranial vault fragments and 1st and 2nd left ribs.

Examination of sieved samples: Sample no. 1040, [c78/89], 2 possible carpals.

**Skeleton 67**

*Age:* Infant 43.6+/−2.08 foetal weeks (left femur)
*Sex:* -
*Stature:* -

**Skeletal Preservation:** Good. Partially incomplete but excellent preservation.
**Skeletal Position:** Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeleton/s: -
Associated Finds: -

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae. Eleven left and twelve right ribs, vertebrae from C1 through to S3. Ilia, ischia, right pubis. Femora, tibiae.

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10 unerupted deciduous teeth

Dental Pathology: -

Skeletal Pathology: -

Anomalies: -

Comments: Possibly large for age-at-death.

Examination of sieved samples: Sample no. 1038, [c1224], incus, 7 cranial vault fragments, left and right deciduous lower incisors, right greater wing of sphenoid. Sample no. 1039, [c1224], 5 unidentified fragments.

Skeleton 68

Age: Infant 1-2 months (dentition and long bones)
Sex: -

Stature: -

Skeletal Preservation: Poor. Incomplete and very dry and brittle with moderate fragmentation.

Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast

Associated Skeleton/s: Underlay Skeleton 66
Associated Finds: 3 shroud pins

Bones Present: Cranium and mandible. Right scapula, humeri, radi, ulnae, 3 right MCs, and one proximal, two intermediate and one distal right hand phalanges. One left and seven right ribs, very incomplete cervical, thoracic and lumbar fragments. Right ilium, left ischium, right pubis. Left femur, tibia, and fibula. All quite eroded.
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1 unerupted deciduous tooth

Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: Copper alloy staining on left and right parietal bosses.

Skeleton 69

Age: Infant 3-4 months (dentition)
Sex: -
Stature: -

Skeletal Preservation: Good. Fairly complete, some erosion.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeletons: -
Associated Finds: 2 shroud pins

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC2-MC5, and five proximal, three intermediate, and one distal hand phalanges, 3 right MCs, and two proximal, three intermediate, and one distal hand phalanges. Eight left and one right rib, partially incomplete vertebrae from C1 to S4. Ilia, ischia, pubes. Femora (including distal left epiphysis), tibiae, fibulae, left calcaneus, talus, MT1, 2 MTs, and one proximal foot phalanx, 2 right MTs and two proximal foot phalanges.

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9 unerupted deciduous teeth

Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: May be undersized for age-at-death. Periosteal-like lesions on long bones but it is normal infant bone growth. Copper alloy staining of clavicles, right scapula, right occipital and temporal, posterior occipital, left mandible. Associated bone ID nos 1201-1203, bagged.
as right leg of Skeleton 69, but additional to the latter. Bones are slightly larger than Skeleton 69.

*Examination of sieved samples:* Sample no. 1053, [c78/89], no bone recovered, mollusc remains only.

**Skeleton 70**

*Age:* Perinate 37.7+/−1.87 foetal weeks (long bones)

*Sex:* -

*Stature:* 48.8 cm (left tibia)

*Skeletal Preservation:* Very good. Virtually complete with minimal erosion and fragmentation.

*Skeletal Position:* Supine

*Skeletal Attitude:* Extended

*Orientation:* Northwest/southeast, head to northwest

*Associated Skeletons:* -

*Associated Finds:* -

*Bones Present:* Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1 and one MC, and five proximal, four intermediate, and one distal left hand phalanges, right MC1-MC5, and three proximal and four intermediate right hand phalanges. Manubrium and two sternum segments, eleven left and eleven right ribs, vertebrae from C1 through to S3. Iilia, ischia, pubes. Femora, tibiae, fibulae, left MT1 and 3 MTs, two proximal right foot phalanges, right calcaneus and talus, right MT1-MT5.

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5 unerupted deciduous teeth

*Dental Pathology:* -

*Skeletal Pathology:* -

*Anomalies:* -

*Comments:* Associated bones ID nos 1077-1078.

*Examination of sieved samples:* Sample no. 1050, [c78/89], 1 vertebral body, 2 unidentified fragments.

**Skeleton 71**

*Age:* Perinate 36.8+/−1.87 foetal weeks (left femur and tibia)

*Sex:* -
Stature: 48.1cm (left tibia)

Skeletal Preservation: Good. Quite complete and well preserved.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeleton/s: -
Associated Finds: 3 shroud pins, 2 coffin nails

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1-MC5, and five proximal and three intermediate hand phalanges, right MC1-MC5, and three proximal and two intermediate hand phalanges. Eleven left and ten right ribs, vertebrae from C1 to S5. Ilia, ischia, left pubis. Femora, tibiae, fibulae, left calcaneus and talus, MT1-MT5, and one proximal foot phalanx, right calcaneus and talus, MT1 and 1 MT.

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2 unerupted deciduous teeth

Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: Copper alloy staining on left clavicle, scapula, humerus, tibia, and fibula. Associated bones of a very young perinate, pre-term infant, ID nos 1199-1200.
Examination of sieved samples: Sample no. 1058, [c78/89], 3 rib fragments, 1 vertebral body. Sample no. 1059, [c78/89], 2 sacral arch fragments, 1 distal hand phalanx.

Skeleton 72
Age: Perinate 40.1+/-2.12 foetal weeks (left tibia)
Sex: -
Stature: 54.1cm (left tibia)

Skeletal Preservation: Good. Quite complete but there is significant fragmentation.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeleton/s: -
Associated Finds: 5 shroud pins
**Bones Present**: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, 3 left MCs and three proximal and two intermediate hand phalanges, 3 right MCs and four proximal, two intermediate, and one distal hand phalanges. One sternum segment, ten left and ten right ribs, vertebræ from C1 through to S4. Iliæ, ischia, right pubis. Femora, tibiae, fibulae, left talus calcaneus and one proximal foot phalanx, right talus and calcaneus.

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10 unerupted deciduous teeth

**Dental Pathology**: -

**Skeletal Pathology**: -

**Anomalies**: -

**Comments**: Copper alloy staining on cranial vault fragments, right temporal, left mandible.

**Examination of sieved samples**: Sample no. 1060, [c78/89], spine of left scapula.

**Skeleton 73**

**Age**: Juvenile 12-15 months (dentition)

**Sex**: -

**Stature**: -

**Skeletal Preservation**: Good. Fairly complete, some fragmentation.

**Skeletal Position**: Supine

**Skeletal Attitude**: Extended

**Orientation**: West/east, head to west

**Associated Skeletons**: -

**Associated Finds**: -

**Bones Present**: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1-MC5, and four proximal, three intermediate, and one distal hand phalanges, 1 right MC, and five proximal and two intermediate hand phalanges. Manubrium, twelve left and ten right ribs, vertebræ from C1 to S5. Iliæ, ischia, pubes. Femora (including distal epiphyses), tibiae (including distal epiphyses), fibulae, left calcaneus, talus, 2 tarsals, MT2-MT5, and two proximal and one distal foot phalanges, right MC1, 3 MTs, and three proximal foot phalanges.

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5 erupted, 6 erupting, and 8 unerupted deciduous teeth; 4 unerupted permanent teeth

*Dental Pathology:* -

*Skeletal Pathology:* -

*Anomalies:* -

*Comments:* Metopic suture is still open but this is not unusual in an individual of this age.

*Examination of sieved samples:* Sample no. 1062, [c1227], 1 intermediate hand phalanx. Sample no. 1064, [c1227], sample comprised two stones only.

**Skeleton 74**

*Age:* Infant 9-12 months (dentition)

*Sex:* -

*Skeletal Preservation:* Very poor. Cranium good, but post-cranial skeleton extremely incomplete and eroded.

*Skeletal Position:* Supine

*Skeletal Attitude:* Extended

*Orientation:* Northwest/southeast, head to northwest

*Associated Skeletons:* -

*Associated Finds:* -


*Dental Inventory:*

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9 erupting, 7 unerupted deciduous teeth; 3 unerupted permanent teeth

*Dental Pathology:* -

*Skeletal Pathology:* -

*Anomalies:* -

*Comments:* -

*Examination of sieved samples:* Sample no.1069, [c78/89], 2 unidentified fragments.

**Skeleton 75**

*Age:* Infant 9-12 months (dentition)

*Sex:* -

*Skeletal Preservation:* -
Skeletal Preservation: Poor. Quite incomplete with significant erosion.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeleton/s: -
Associated Finds: 1 shroud pin

Bones Present: Cranium and mandible. Arm bone shaft fragments. Eight left and nine right ribs, very incomplete cervical and thoracic vertebrae. Iliac fragments. Leg bone shaft fragments. All bones very incomplete and eroded.
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6 erupted, 8 erupting, 4 unerupted deciduous teeth; 4 unerupted permanent molars and 2 cusps of permanent incisors
Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: The severe erosion initially appears as a pathological condition, but this is not the case.
Examination of sieved samples: Sample no. 1065, [c78/89], 3 unidentified fragments.

Skeleton 76
Age: Infant 42.0+/-1.87 foetal weeks (left femur and tibia)
Sex: -
Stature: -

Skeletal Preservation: Very good. Quite complete with minimal erosion. Cranium is highly fragmented.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeleton/s: -
Associated Finds: -

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1-MC5 and four proximal and one distal hand phalanges, 2 right MCs and one proximal hand
phalanx. Manubrium and one sternum segment, ten left and eight right ribs, vertebrae from C1 through to S4. Ilia, ischia, pubes. Femora, tibiae, fibulae, left calcaneus and talus and MT1, right talus and MT1-MT5.

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5 unerupted deciduous teeth

**Dental Pathology:** -

**Skeletal Pathology:** Congenital – right arches of C3 and C4 are fused.

**Anomalies:** -

**Comments:** Copper alloy staining on left cervical vertebrae.

**Examination of sieved samples:** Sample no. 1072, [c78/89], 2 medial rib ends.

**Skeleton 77**

**Age:** Perinate 41.5+/-2.08 foetal weeks (left femur)

**Sex:** -

**Stature:** 59.1cm (left femur)

**Skeletal Preservation:** Very good. Quite complete, with little erosion and some fragmentation.

**Skeletal Position:** Supine

**Skeletal Attitude:** Legs flexed slightly to right

**Orientation:** Northwest/southeast, head to northwest

**Associated Skeletons:** -

**Associated Finds:** 2 shroud pins

**Bones Present:** Cranium and mandible. Clavicles, scapulae, humeri, ulnae, radi, 1 left MC, three proximal, one intermediate, and one distal hand phalanges, right MC2-5, three proximal and two intermediate hand phalanges. Two sternum segments, ten left and eleven right ribs, slightly incomplete vertebrae from C1 to S1. Ilia, left ischium, pubes. Femora, tibiae, fibulae, left MT1-MT5, one right MT.

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14 unerupted deciduous teeth

**Dental Pathology:** -

**Skeletal Pathology:** -
**Skeleton 78**

*Disarticulated bones, ID nos 1083-1086, and 1204-1213. Remains of at least one infant, 4-5 months at the time of death.*

*Examination of sieved samples: Sample no. 1102, [c78/89], 2 unidentified fragments.*

**Skeleton 79**

*Age: Infant 6-7 months (dentition)*

*Sex: -*

*Skeletal Preservation: Very good. Quite complete, some fragmentation.*

*Skeletal Position: Supine*

*Skeletal Attitude: Extended*

*Orientation: Northwest/southeast, head to northwest*

*Associated Skeletons: -*

*Associated Finds: -*

**Bones Present:** Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1-MC5, and four proximal and two intermediate hand phalanges, 2 right MCs, and one proximal and two intermediate hand phalanges. Manubrium and one sternum segment, twelve left and nine right ribs, vertebrae from C1 to S5. Ilia, ischia, pubes. Femora, tibiae, fibulae, left talus, right calcaneus and talus.

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1 erupting and 14 unerupted deciduous teeth; 2 unerupted permanent teeth plus 2 unidentified lower incisor permanent cusps

**Dental Pathology:**

**Skeletal Pathology:** Metabolic – mild cribra orbitalia on left and right eye orbits

*Anomalies: -*

*Comments: -*

*Examination of sieved samples: Sample no. 1079, [c78/89], 1 unfused epiphysis.*

*Sample no.1080, [c78/89], 9 unidentified fragments.*
**Skeleton 80a**

*Age:* Perinate 39.4+/–2.08 foetal weeks (right femur)

*Sex:* -

*Stature:* 54.9 cm (right femur)

*Skeletal Preservation:* Very poor. Very incomplete but bones well preserved.

*Skeletal Position:* ?

*Skeletal Attitude:* ?

*Orientation:* ?

*Associated Skeleton(s):* Skeleton 80b

*Associated Finds:* 1 shroud pin

*Bones Present:* Incomplete cranial vault fragments. One left rib, very incomplete cervical and thoracic fragments. Right ischium. Right femur and unidentified leg bone fragments, one unsided MT.

*Dental Inventory:* -

*Dental Pathology:* n/a

*Skeletal Pathology:* -

*Anomalies:* -

*Comments:* Originally recorded as a single burial. However, clear remains of two individuals, now renumbered as Skeleton 80a and Skeleton 80b. Also associated bone, ID nos 1055-1057.

**Skeleton 80b**

*Age:* Infant 9-12 months (dentition)

*Sex:* -

*Stature:* -

*Skeletal Preservation:* Very poor. Very incomplete and eroded.

*Skeletal Position:* ?

*Skeletal Attitude:* ?

*Orientation:* ?

*Associated Skeleton(s):* Skeleton 80a

*Associated Finds:* see Skeleton 80a

*Bones Present:* Cranial vault fragments. Right ulna. 11 unsided rib shaft fragments, very incomplete cervical, thoracic, and lumbar fragments. Right femur and fibula, other long bones completely shattered.
**Dental Inventory:**

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1 unerupted permanent tooth

**Dental Pathology:** -

**Skeletal Pathology:** -

**Anomalies:** -

**Comments:** Originally recorded as a single burial. However, clear remains of two individuals, now renumbered as Skeleton 80a and Skeleton 80b. Also associated bone, ID nos 1055-1057.

**Skeleton 81**

**Age:** Juvenile 6-9 months (dentition)

**Sex:** -

**Stature:** -

**Skeletal Preservation:** Very poor, cranium in good condition but remainder is significantly eroded and fragmented.

**Skeletal Position:** Supine

**Skeletal Attitude:** Extended

**Orientation:** Northwest/southeast, head to northwest

**Associated Skeletons:** Overlay Skeleton 87

**Associated Finds:** 39 coffin nails and 11 fragments of coffin nails

**Bones Present:** Cranium and mandible. Clavicles, left scapula, diaphyses of humeri, radi, ulnae. Manubrium, two left and three right ribs, very incomplete cervical, thoracic, and lumbar vertebrae. Un sided iliac body frag. Diaphyses of femora and tibiae.

**Dental Inventory:**

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10 unerupted and 6 erupted deciduous teeth, and 2 unerupted permanent teeth

**Dental Pathology:** -

**Skeletal Pathology:** -

**Anomalies:** -

**Comments:** Associated remains of a 12-18 month old juvenile (see disarticulated catalogue 1005-12)
Examination of sieved samples: Sample no. 1095, [c1233], lower left deciduous 2nd incisor, lower right deciduous canine, nasal bone fragment, 3 rib fragments, 6 unidentified fragments.

Skeleton 82

Age: Infant 1-4 months (dentition)
Sex: -
Stature: -

Skeletal Preservation: Very poor. Very incomplete, with fragmentation following significant erosion. Diaphyses of legs relatively solid.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeleton/s: -
Associated Finds: 2 shroud pins, 33 coffin nails

Bones Present: Incomplete cranium and mandible. Fragment of right scapula, diaphyseal fragments of humeri, right radius and ulna. Five left and three right ribs, 2 left and 3 right thoracic arches. Right iliac fragment. Diaphyses of femora, tibiae, fibulae, fragment of possibly left calcaneus, and 2 right MTs.

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1 unerupted deciduous tooth

Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: -
Examination of sieved samples: Sample no.1094, [c1231], upper left 1st and 2nd deciduous incisors.

Skeleton 83

Age: Infant 9-14 months (dentition)
Sex: -
Stature: -

Skeletal Preservation: Good. Quite complete, but some erosion.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeleton/s: -
Associated Finds: 32 coffin nails

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, left ulna, two intermediate and one distal left hand phalanges. Eleven left and eight right ribs, vertebrae from C1 through to incomplete lumbar vertebrae. Ilii, ischia, pubes. Femora, tibiae, fibulae, 2 left MTs, right calcaneus and talus, MT1-MT5 and one proximal foot phalanx.

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7 erupted. 4 erupting, and 8 unerupted deciduous teeth; 3 unerupted permanent teeth

Dental Pathology: -
Skeletal Pathology: -
Anomalies:

Comments: Copper alloy staining on endocranial surface of inferior left parietal.
Examination of sieved samples: Sample no. 1116, [c1238], 1 cranial vault fragment, 1 rib fragment, 8 unidentified fragments.

Skeleton 84
Number not used

Skeleton 85
Number used for disarticulated bones, ID nos 1079-1082.
Examination of sieved samples: Sample no. 1107, [c91], cusp of unidentified canine, 1 unidentified bone fragment.

Skeleton 86
Age: Perinate full-term (no complete long bones, dentition only)
Sex: -
Stature: -

Skeletal Preservation: Very poor. Very incomplete but bones well preserved.
Skeletal Position: Supine
Skeletal Attitude: Extended?
Orientation: West/east, head to west
Associated Skeleton/s: -
Associated Finds: 3 shroud pins

Bones Present: Cranium and mandible. Clavicles, scapulae, fragment of right humerus. Seven left and four right ribs, incomplete cervical and thoracic fragments.

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3 unerupted deciduous teeth

Dental Pathology: -
Skeletal Pathology: -
Anomalies: -

Comments: Copper alloy staining on unidentified ectocranial fragments, lefty maxilla. Black ?skin fragments on lateral right clavicle.

Skeleton 87

Age: Juvenile 12-15 months (dentinon)
Sex: -
Stature: -

Skeletal Preservation: Very poor. Very incomplete, cranial bones relatively well preserved but post-cranial bones extremely incomplete and eroded.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeletons: Underlay Skeleton 81
Associated Finds: -

Bones Present: Cranium and mandible. Left clavicle and scapula, humeri. One left and two right ribs, incomplete cervical and thoracic vertebrae. Right femur. Post-cranial bones very poorly preserved.

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3 erupted, 3 erupting, 3 unerupted deciduous teeth; 3 unerupted permanent molars plus unidentified permanent incisor

Dental Pathology: Hypoplastic defects – 4/4 permanent teeth, severe pitting of developing crowns with line just prior to death, indicating physiological stress from birth to death.
**Skeletal Pathology:** Metabolic disease (possible) – partially remodelled fibre bone on ectocranial parietals and frontal, distal metaphyses of the left humerus and right femur are very flared.

**Anomalies:** -

**Comments:** Associated bones IDs 1070-1073.

**Examination of sieved samples:** Sample no. 1110, [c78/89], 4 cranial vault fragments, right deciduous 2nd incisor with severe hypoplastic defects, 3 unidentified bone fragments.

**Skeleton 88**

**Age:** Perinate 37.5+/1.87 foetal weeks (left femur and tibia)

**Sex:** -

**Stature:** 49.1cm (left tibia)

**Skeletal Preservation:** Very good. Well preserved with minimal fragmentation and erosion.

**Skeletal Position:** Supine

**Skeletal Attitude:** Extended

**Orientation:** Northwest/southeast, head to northwest

**Associated Skeletons:** -

**Associated Finds:** 5 shroud pins

**Bones Present:** Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1-MC5, and three proximal, four intermediate, and four distal hand phalanges, right MC1-MC5, and four proximal, four intermediate, and one distal hand phalanges. One sternum segment, eleven left and eleven right ribs, vertebrae from C1 to S3. Ilia, ischia, left pubis. Femora, tibiae, fibulae, left calcaneus and talus, MT1-MT5 and one proximal foot phalanx, right talus, MT1-MT5 and three proximal foot phalanges.

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5 unerupted deciduous teeth, plus cusps of unidentified deciduous molar

**Dental Pathology:** -

**Skeletal Pathology:** -

**Anomalies:** -

**Comments:** -

**Examination of sieved samples:** Sample no. 1111, [c78/89], right upper deciduous 1st incisor, 1 left thoracic arch, 1 rib fragment.
**Skeleton 89**

*Age:* Perinate 39.8+/−1.87 foetal weeks (left femur and tibia)  
*Sex:* -  
*Stature:* 53.6cm (left tibia)

*Skeletal Preservation:* Very good. Complete with minimal erosion and fragmentation.  
*Skeletal Position:* Supine  
*Skeletal Attitude:* Extended  
*Orientation:* Northwest/southeast, head to northwest  
*Associated Skeleton/s:* -  
*Associated Finds:* -

*Bones Present:* Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1, 3 left MCs and four proximal and three intermediate hand phalanges. Eleven left and nine right ribs, vertebrae from C1 to S2. Iliac, ischia, pubes. Femora, tibiae, fibulae.  

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11 unerupted deciduous teeth  
*Dental Pathology:* -  
*Skeletal Pathology:* -  
*Anomalies:* -  
*Comments:* -  
*Examination of sieved samples:* Sample no. 1108, [c78/89], 5 unidentified fragments.

**Skeleton 90**

*Age:* Young Adult 17-20 years (epiphyseal fusion)  
*Sex:* Male (pelvis, skull, metrics)  
*Stature:* 171.0+/−4.32cm (left ulna)

*Skeletal Preservation:* Good. Mostly complete, some erosion and fragmentation  
*Skeletal Position:* Supine  
*Skeletal Attitude:* Extended  
*Orientation:* Northwest/southeast, head to northwest  
*Associated Skeleton/s:* -  
*Associated Finds:* -
Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radii, ulnae, all left carpals and MCs, and incomplete hand phalanges, all right carpals, MC2-MC5, and all hand phalanges. Manubrium and sternum, ten left and twelve right ribs, vertebrae from C1 to coccyx. Ilia, ischia. Femora, tibiae, left fibula, all left tarsals, MT1-MT4, and incomplete foot phalanges, all right tarsals, MTs, and incomplete foot phalanges.

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31 permanent teeth

Dental Pathology: Calculus – 21/31 (all lower teeth, plus 18, 14, 13, 26, 27, slight to moderate); Hypoplastic defects – 2/31 (43, 33, 2.5-4.5 years); Chipped teeth – 12, 11, 21, 22, 23, 26, incisal or occlusal edges all have ante-mortem chipping

Skeletal Pathology: Non-specific Infection – remodelling striated bone on diaphysis of left femur; active patchy deposits of fibre bone on proximal metaphysis of left tibia and on distal metaphyses of tibiae; active patchy fibre bone deposits on internal surfaces of three unidentified left ribs; partially remodelled fibre bone on medial end of 1st right rib; disorganised circumferential fibre bone on one right proximal hand phalanx

Metabolic – on superior parietals traces of healed porosity indicating porotic hyperostosis

Congenital – the posterior synchondrosis of C1 is unfused

Anomalies: Allen’s fossae on femora.

Comments: Given the age-at-death of this individual, the bones are large and robust and there is significant wear on the teeth. Associated bones ID nos 1143-1148.

Examination of sieved samples: Sample no. 1113, area between 2 and 3, 2 posterior processes of vertebrae, 1 left and 1 right inferior processes of thoracic, 1 left cervical arch, 2 distal hand phalanges, left upper permanent 3rd molar, distal half of MC1, 1 sesamoid bone, 64 unidentified fragments.

Skeleton 91

Age: Perinate 39.7+/-1.87 foetal weeks (right femur and tibia)

Sex: -

Stature: 52.9cm (left tibia)

Skeletal Preservation: Very good. Quite complete and well preserved.

Skeletal Position: Supine

Skeletal Attitude: Extended

Orientation: West/east, head to west
Associated Skeleton/s: -
Associated Finds: -

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, 3 left MCs and five proximal and two intermediate hand phalanges, right MC1, 2 MCs and one proximal and one intermediate hand phalanges. Manubrium, ten left and ten right ribs, vertebrae from C1 through to S5. Ilia, ischia, pubes. Femora, tibiae, fibulae, left and right MT1s and 2 unsided MTs.

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5 unerupted deciduous teeth

Dental Pathology: -

Skeletal Pathology: -

Anomalies: -

Comments: -

Examination of sieved samples: Sample no. 1127, [c78], 2 unidentified fragments.

Skeleton 92

Age: Perinate full-term (no complete long bones, dentition only)

Sex: -

Stature: -

Skeletal Preservation: Very poor. Very incomplete but well preserved.

Skeletal Position: Supine

Skeletal Attitude: Extended

Orientation: ?

Associated Skeleton/s: -

Associated Finds: -


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2 unerupted deciduous teeth

Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: -
Examination of sieved samples: Sample no. 1126, [c78/89], 1 ?thoracic body.

Skeleton 93
Age: Infant 9-12 months (dentition)
Sex: -
Stature: -

Skeletal Preservation: Good. Fairly complete, but significant fragmentation of limb bones.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeleton/s: -
Associated Finds: 5 shroud pins, 2 coffin nails

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, right radius and ulna, two right proximal hand phalanges. Manubrium and two sternum segments, twelve left and eleven right ribs, vertebrae from C1 to S4. Iilia, ischia, pubes. Femora, tibiae, fibulae.

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3 erupted, 9 erupting, 5 unerupted deciduous teeth; 1 unerupted permanent tooth

Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: Copper alloy staining on cranial vault fragments, left clavicle, right scapula, right ribs. Significant amount of associated/disarticulated bone, ID nos 1058-68.

Examination of sieved samples: Sample no. 1130, [c78/89], 3 cranial vault fragments, 1 left thoracic arch, 1 unidentified fragment.
Sample no. 1130, [c78/89], upper left 2nd deciduous incisor, posterior half of right mandible with cusp fragments, 3 cranial vault fragments, 7 unidentified fragments.

Skeleton 94
Diarticulated bones, see ID nos 1149-1163, representing at least one young infant and one older infant.
Examination of sieved samples: Sample no. 1153, [c78/89], 3 cranial vault fragments, 2 vertebral fragments.

**Skeleton 95**

*Age:* Infant 6-8 months (dentition)

*Sex:* -

*Skeletal Preservation:* Very good. Complete with mild erosion

*Skeletal Position:* Supine

*Skeletal Attitude:* Extended

*Orientation:* Northwest/southeast, heads to northwest

*Associated Skeletons:* -

*Associated Finds:* 3 shroud pins with material (top of skull, left mandible, left arm), 27 fragments of coffin nails

*Bones Present:* Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC2-MC5, and three proximal, four intermediate, and one distal hand phalanges, right MC2-MC5 and four proximal hand phalanges. Manubrium, eleven left and twelve right ribs, vertebrae from C1 to S5. Ilia, ischia, left pubis. Femora (including distal epiphyses), tibiae (including proximal epiphyses), fibulae, left calcaneus, talus, 2 MTs, and two proximal foot phalanges, right calcaneus, talus, MT1-MT5, and four proximal foot phalanges.

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1 erupting and 16 unerupted deciduous teeth; 2 unerupted permanent teeth

*Dental Pathology:* -

*Skeletal Pathology:* -

*Anomalies:* -

*Comments:* Copper alloy staining on left frontal, left mandible, left clavicle, left first and second ribs.

Examination of sieved samples: Sample no. 1145, [c1237], 1 unidentified fragment.

Sample no. 1146, [c1237], 1 intermediate hand phalanx.

**Skeleton 96**

*Age:* Infant 10-12 months (dentition and long bones)

*Sex:* -

*Skeletal Preservation:* -
**Skeletal Preservation:** Very good. Almost complete with minimal erosion and fragmentation.
**Skeletal Position:** Supine
**Skeletal Attitude:** Extended
**Orientation:** Northwest/southeast, head to northwest
**Associated Skeleton/s:** -
**Associated Finds:** 5 shroud pins

**Bones Present:** Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, 3 left MCs, and four proximal and four intermediate left hand phalanges, one unidentified right carpal, 2 right MCs, and two proximal right hand phalanges. Manubrium and one sternum segment, eleven left and eight right ribs, partially incomplete vertebrae from C1 through to sacral fragments. Iliia, ischia, pubes. Femora (including proximal epiphyses) tibiae (including left distal epiphysis), fibulae, 1 left MT and one left proximal foot phalanx, one right MT.

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5 erupted, 3 erupting, and 8 unerupted deciduous teeth, 4 unerupted permanent teeth
**Dental Pathology:** -
**Skeletal Pathology:** Metabolic disease (possible) – bulbous ends to sternal ends of numerous ribs.
**Anomalies:** -
**Comments:** Copper alloy staining on cranium, right ribs, left ilium, left tibia.
**Examination of sieved samples:** Sample no. 1148, [c78/89], 1 left cervical arch, 1 rib fragment.

**Skeleton 97**

**Age:** Infant 3-5 months (dentition)
**Sex:** -
**Stature:** -

**Skeletal Preservation:** Good. Quite complete but significant erosion
**Skeletal Position:** Supine
**Skeletal Attitude:** Extended
**Orientation:** Northwest/southeast, head to northwest
**Associated Skeleton/s:** -
**Associated Finds:** 1 shroud pin and material on skull, 34 coffin nails and wood
Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1 and 3 MCs, right MC1, and 3 MCs and two proximal hand phalanges. Ten left and twelve right ribs, incomplete vertebrae from C1 to S2. Iilia, left ischium, pubes. Femora, tibiae, fibulae, left MT2-MT5, 2 right MTs. Post-cranial skeleton quite eroded

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9 unerupted deciduous teeth

Dental Pathology: -

Skeletal Pathology: -

Anomalies: -

Comments: Copper alloy staining on left frontal and left parietal with fragments of scalp and hair

Examination of sieved samples: Sample no. 1138, [c1244], 1 proximal foot phalanx, 6 unidentified fragments.

Skeleton 98

Age: Infant 3-6 months (dentition)

Sex: -

Stature: -

Skeletal Preservation: Very poor. Very incomplete with significant erosion.

Skeletal Position: Supine

Skeletal Attitude: Extended

Orientation: Northwest/southeast, head to northwest

Associated Skeletons: -

Associated Finds: 3 shroud pins, 19 coffin nails

Bones Present: Cranium and mandible. Humeral shaft fragments. Ten shaft fragments of each of the left and right ribs, very incomplete cervical and thoracic fragments. Iilia, left ischium. Left femur, tibia, fibula.

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6 unerupted deciduous teeth

Dental Pathology: -

Skeletal Pathology: -
Anomalies: -
Comments: Copper alloy staining on superior process of left zygomatic. Associated bones of a young infant ID nos 1092-1098, not part of Skeleton 98.

Skeleton 99
Disarticulated bone, see ID nos 1132-1136. Remains of full-term perinate. Bag labelled as 'human remains, from the top of Skeleton 95'. The latter is an older individual that Skeleton 99.

Skeleton 100
Age: Infant 9-12 months (dentition)
Sex: -
Stature: -

Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: West/east, head to west
Associated Skeletons: -
Associated Finds: 4 shroud pins

Bones Present: Cranium and mandible. Clavicles, scapulae. Two left and three right ribs, cervical vertebrae.

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2 erupted, 6 erupting, and 6 unerupted deciduous teeth; 4 unerupted permanent teeth

Dental Pathology: -
Skeletal Pathology: -
Anomalies: -

Comments: Copper alloy staining on left and right superior ectocranial surface of frontals, and right clavicle. The anterior fontanelle was still open at the time of death but this is not unusual for an individual of this age.

Examination of sieved samples: Sample no. 1158, [c78/91], 1 unidentified fragments.
Sample no. 1161, [c78/91], ‘Bag 2’, lower deciduous incisor, upper left permanent 1st incisor, upper left permanent canine, 1 thoracic body, 5 unidentified fragments.
Sample no. 1161, [c78/91], 5 rib fragments, 25 unidentified fragments.
Skeleton 101

*Age:* Perinate 30.8+/−1.87 foetal weeks (left femur and tibia)

*Sex:* -

*Stature:* 38.6cm (left tibia)

*Skeletal Preservation:* Good. Almost complete and well preserved.

*Skeletal Position:* Supine?

*Skeletal Attitude:* Extended?

*Orientation:* Northwest/southeast, head to northwest, there were stones around the burial

*Associated Skeleton/s:* -

*Associated Finds:* Metallic material near legs

*Bones Present:* Cranium and mandible. Left clavicle and scapula, humeri, radi, ulnae, unsided MC1, left MC2-MC5 and right MC2-MC5, two unsided proximal hand phalanges. Eleven left and eight right ribs, partially incomplete vertebrae from C1 through to ?L4. Ili, ischia. Femora, tibiae, fibulae.

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No dental remains recovered

*Dental Pathology:* -

*Skeletal Pathology:* -

*Anomalies:* -

*Comments:* -

*Examination of sieved samples:* Sample no. 1159, [c78/89], left and right MT1s, 3 unidentified MTs, 1 MC and 1 proximal and 1 intermediate hand phalanges, 1 rib fragment, 1 incus, 7 unidentified fragments.

*Examination of sieved samples:* Sample no. 1160, [c78/89], 1 rib fragment, 1 vertebral arch fragment, unsided MC1, 5 proximal and 3 intermediate hand phalanges, 2 unidentified fragments.

Skeleton 102

*Age:* Perinate 40.4+/−2.08 foetal weeks (left femur)

*Sex:* -

*Stature:* 56.9cm (left femur)

*Skeletal Preservation:* Very good. Complete and well preserved.
**Skeletal Position:** Supine

**Skeletal Attitude:** Extended

**Orientation:** West/east, head to west

**Associated Skeletons:** -

**Associated Finds:** -

**Bones Present:** Cranium and mandible. Scapulae, clavicles, humeri, radi, ulnae, left MC1-MC5, and five proximal and four intermediate hand phalanges, right MC1-MC5 and four proximal, two intermediate, and one distal hand phalanges. Eleven left and ten right ribs, vertebrae from C1 to S2. Ili, ischia, pubes. Femora, tibiae, fibulae, one unsided MT.

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10 unerupted deciduous teeth

**Dental Pathology:** -

**Skeletal Pathology:** -

**Anomalies:** -

**Comments:** -

**Skeleton 103**

**Age:** Perinate 39.6+/-.1.87 foetal weeks (left femur and tibia)

**Sex:** -

**Stature:** 52.6cm (left tibia)

**Skeletal Preservation:** Very good. Complete with some fragmentation.

**Skeletal Position:** Supine

**Skeletal Attitude:** Extended

**Orientation:** Northwest/southeast, head to northwest

**Associated Skeletons:** -

**Associated Finds:** -

**Bones Present:** Cranium and mandible. Scapulae, clavicles, humeri, radi, ulnae, left MC1-MC5, and four proximal and three intermediate hand phalanges, right MC1-MC5, and five proximal, three intermediate and two distal hand phalanges. Manubrium and one sternum segment, eleven left and twelve right ribs, vertebrae from C1 to S5. Ili, ischia, pubes. Femora, tibiae, fibulae, left MT1-MT5 and one proximal foot phalanx, right MT1-MT5 and three proximal foot phalanges.
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6 unerupted deciduous teeth

Dental Pathology: -

Skeletal Pathology: -

Anomalies: -

Comments: Associated bone ID nos 1129-1131.

Examination of sieved samples: Sample no.1164, [c78/89, dens C1.

Sample no. 1165, [c78/89], 1 cranial vault fragment.

Skeleton 104

Disarticulated bone, see ID nos 1104-1128. Remains of juvenile, 13-16 months old.

Skeleton 105

Age: Infant 6-8 months (dentition)

Sex: -

Stature: -

Skeletal Preservation: Poor. Fairly incomplete with significant erosion and fragmentation.

Skeletal Position: Supine

Skeletal Attitude: Extended

Orientation: Northwest/southeast, head to northwest

Associated Skeleton/s: -

Associated Finds: -

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae. Manubrium, eleven left and six right ribs, vertebrae from C1 through to S3. Ilia, femoral diaphyseal fragments.

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5 unerupted deciduous teeth

Dental Pathology: -

Skeletal Pathology: Metabolic disease (possible) – partially remodelled fibre bone overlying the normal ectocranial surface of the pariets and occipital.
Anomalies: -
Comments: Long bones length suggests this individual was undersized. Copper alloy staining on left frontal, occipital, right mandible, and upper four cervical vertebrae.
Examination of sieved samples: Sample no. 1176, [c78/89], 1 left lumbar arch.

Skeleton 106
Age: Juvenile 10-12 years (dentition)
Sex: -
Stature: -

Skeletal Preservation: Very good. Complete and well preserved.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeleton/s: -
Associated Finds: -

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, all left carpals and metacarpals, and five proximal, four intermediate and one distal hand phalanges. Manubrium and one sternum segment, twelve left and twelve right ribs, vertebrae from C1 to S5. Ilia, ischia, pubes. Femora, tibiae, fibulae, all left tarsals and metatarsals, and four proximal, one intermediate and one distal foot phalanges, all right tarsals and metatarsals, five proximal and two intermediate foot phalanges.

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5 deciduous teeth; 15 erupted and 8 erupting permanent teeth

Dental Pathology: Calculus – 4/5 deciduous (53, 65, 85, 75, slight to severe), 9/15 permanent teeth (16, 46, 43-33, 36 slight to severe). Severe deposits of calculus on lingual aspects of 85 and 46 in particular.

Trauma – medial aspect of incisal edge of 11 is chipped.

Skeletal Pathology: Non-specific Infection – active fibre bone on anterior aspect of sacrum, S1-S5.

Congenital – cleft posterior process of S1.

Anomalies: Metopic suture retained.

Comments: Diaphyseal long bones indicate age-at-death of 7.5-8.5 years. Copper alloy staining on cranium and right tibia.
Examination of sieved samples: Sample no. 1196, [c89/227], lower left deciduous 1st molar, plus 3 animal bone fragments. Sample no. 1197, [c89/227], 7 unidentified fragments.

Skeleton 107

Age: Perinate 38.9+/-.2 foetal weeks (right ulna)
Sex: -
Stature: 52.6cm (right ulna)

Skeletal Preservation: Good. Virtually complete, with some moderate erosion.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeleton/s: -
Associated Finds: 1 shroud pin, 22 coffin nails

Bones Present: Cranium and mandible. Clavicles, scapula, humeri, radi, ulnae. Eleven left and eleven right ribs, partially incomplete vertebrae from C1 to S3. Ilia, ischia. Femora, tibiae, fibulae.
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13 unerupted deciduous teeth.
Dental Pathology: Developmental Defect – there is no indication of sockets for the central lower incisors and they may be congenitally absent.
Skeletal Pathology: -
Anomalies:
Comments: -
Examination of sieved samples: Sample no. 1240, [c1249], 1 unidentified fragment.

Skeleton 108

Age: Juvenile 12-14 months (dentition)
Sex: -
Stature: -

Skeletal Preservation: Very poor. Very incomplete with severe erosion and resulting fragmentation.
Skeletal Position: Supine
**Skeletal Attitude:** Extended  
**Orientation:** Northwest/southeast, head to northwest (may be to southeast, records unclear)  
**Associated Skeletons:** -  
**Associated Finds:** -

**Bones Present:** Incomplete cranium and mandible. Fragments of clavicles, left scapula, diaphyses of humeri, fragment of proximal right ulna. Nine left and eight right ribs, incomplete vertebrae from C1 through to ?S2. Ischia. Diaphyses of femora, tibiae, fibulae, left MT1.  
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5 erupted, 4 erupting, and 3 unerupted deciduous teeth, 4 unerupted permanent teeth  
**Dental Pathology:** Hypoplastic defects – 4/4 permanent teeth with severe pitting from c. 2mths to death. Also pitting of deciduous upper incisors indicating possible *in utero* stress.  
**Skeletal Pathology:** Metabolic disease (possible) – ribs abnormally thick with bulbous lateral ends.  
**Anomalies:** -  
**Comments:** -

**Examination of sieved samples:** Sample no. 1190, [c78/89], 6 unidentified fragments.

### Skeleton 109a

**Age:** Infant 3-6 months (long bones)  
**Sex:** -  
**Stature:** -

**Skeletal Preservation:** Good. Fairly complete with minimum erosion but there is significant fragmentation of the metaphyses.  
**Skeletal Position:** Supine  
**Skeletal Attitude:** Extended  
**Orientation:** Northwest/southeast, head to northwest  
**Associated Skeletons:** Skeleton 109b  
**Associated Finds:** -

**Bones Present:** *Pars basilaris*. Clavicles, scapulae, humeri, ulnae, radi. Manubrium and one sternum segment, twelve left and twelve right ribs, vertebrae from C1 through to S3. Ilia. Femora, tibiae, fibulae.  
**Dental Inventory:** n/a
Dental Pathology: n/a
Skeletal Pathology: -
Anomalies: -
Comments: Skeleton 109 was excavated as a single skeleton. However, during analysis the remains were found to consist of two infants. Note the duplication of skeletal elements. These have been numbered Skeleton 109a (the best preserved) and Skeleton 109b.

Examination of sieved samples: Sample no. 1192, [c78/89], 1 vertebral body, cusp of upper 1st deciduous incisor, 11 unidentified fragments.
Sample no. 1193, [c78/89], 1 distal hand phalanx, 4 unidentified fragments.

Skeleton 109b
Age: Infant 6-9 months (dentition)
Sex: -
Stature: -

Skeletal Preservation: Very poor. Very incomplete with significant erosion and fragmentation.
Skeletal Position: ?
Skeletal Attitude: ?
Orientation: ?
Associated Skeletons: Skeleton 109a
Associated Finds: -

Bones Present: Cranium (including pars basilaris) and mandible. Vertebrae including C2 and a small number of cervical and thoracic fragments.

Dental Inventory:

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2 erupting and 7 unerupted deciduous teeth

Dental Pathology: -
Skeletal Pathology: Metabolic disease (possible) – partially remodelled bone layer overlying normal ectocranial surfaces of frontal, parietals, and occipital bones of cranium
Anomalies:

Comments: Skeleton 109 was excavated as a single skeleton. However, during analysis the remains were found to consist of two infants. Note the duplication of skeletal elements. These have been numbered Skeleton 109a (the best preserved) and Skeleton 109b.
In addition, there is copper alloy staining, with blackened scalp fragments on left frontal.

Examination of sieved samples: See Skeleton 109a.
Skeleton 110
Age: Juvenile 2-2.5 years (dentition and long bones)
Sex: -  
Stature: - 

Skeletal Preservation: Very good. Complete with minimal erosion and fragmentation.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeletons: -
Associated Finds: 1 shroud pin

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri (including proximal epiphyses), radii, ulnae, 5 left carpals, left MC1-MC5, and five proximal, four intermediate, and two distal left hand phalanges, right MC1-MC5, and four proximal, four intermediate, and two distal right hand phalanges. Manubrium and 4 sternal segments, twelve left and eleven right ribs, vertebrae complete from C1 to S5. Ili, ischia, pubes. Femora (including proximal and distal epiphyses), tibiae (including proximal and distal epiphyses), fibulae, all left tarsals, metatarsals and five proximal left foot phalanges, all right tarsals, metatarsals, and five proximal and one distal right foot phalanges.

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17 erupted deciduous teeth, 4 unerupted permanent teeth
Dental Pathology: Calculus – 6/17 (63, 64, 85, 72, 74, 75, all slight)
Skeletal Pathology: Congenital defect - mandibular symphysis unfused.
Anomalies: -
Comments: Copper alloy staining at bregma. The metopic suture is unfused but this is not unusual in an individual of this age.
Examination of sieved samples: Sample no. 1194, [c78/89], no human remains, 5 animal bone fragments and 2 unidentified fragments.

Skeleton 111
Age: Juvenile 14-15 months (dentition)
Sex: -  
Stature: -
**Skeletal Preservation:** Good. Partially incomplete but some erosion, especially to lower legs.

**Skeletal Position:** Supine

**Skeletal Attitude:** Extended

**Orientation:** Northwest/southeast, head to northwest

**Associated Skeletons:** -

**Associated Finds:** 13 coffin nails and 10 coffin nail fragments

**Bones Present:** Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1. One sternum segment, eight left and eleven right ribs, vertebrae from C1 to S3. Ilia. Femora, tibiae, fibulae, left calcaneus, talus, MT1-MT5, and two proximal foot phalanges, right calcaneus, talus, unidentified tarsal, MT1-MT5, and one proximal foot phalanx.

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7 erupted, 7 erupting, 4 unerupted deciduous teeth; 4 unerupted permanent teeth

**Dental Pathology:** -

**Skeletal Pathology:** -

**Anomalies:** -

**Comments:** The anterior fontanelle was still open at the time of death but this is not unusual for an individual of this age.

**Examination of sieved samples:** Sample no. 1222, [c78/89], 1 incus, 1 rib fragment, 1 MC fragment, upper left deciduous canine, 2 unidentified fragments.

**Skeleton 112**

**Age:** Infant 6-9 months (dentition)

**Sex:** -

**Stature:** -

**Skeletal Preservation:** Poor. Fairly complete but post-cranial bones are extremely eroded and fragmented. Cranium is well preserved.

**Skeletal Position:** Supine

**Skeletal Attitude:** Extended

**Orientation:** Northwest/southeast, head to northwest

**Associated Skeletons:** -

**Associated Finds:** 2 shroud pins

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6 erupting and 10 unerupted deciduous teeth; 3 unerupted permanent teeth

**Dental Pathology:** -

**Skeletal Pathology:** -

**Anomalies:** -

**Comments:** -

**Examination of sieved samples:** Sample no. 1187, [c78/89], 1 rib fragment, 1 long bone fragment, 2 unidentified fragments.

Sample no. 1187, [c78/89], 6 cranial vault fragments, 1 rib fragment, 1 vertebral body, 4 vertebral arch fragments, upper left 2nd deciduous molar.

**Skeleton 113**

**Age:** Perinate 38.9 +/- 1.87 foetal weeks (right femur and tibiae)

**Sex:** -

**Stature:** 51.5cm (right tibia)

**Skeletal Preservation:** Good. Partly incomplete with slight erosion

**Skeletal Position:** Supine

**Skeletal Attitude:** Extended

**Orientation:** West/east, head to west

**Associated Skeletons:** -

**Associated Finds:** -

**Bones Present:** Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1 and 1 MC, right MC1, 6 unsided MCs, 5 unsided proximal and five unsided intermediate hand phalanges. Manubrium and 2 sternum segments, eleven left and eleven right ribs, vertebrae from C1 to S4. Ilia, left ischium, right pubis. Femora, tibiae.

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Skeletal Pathology: 
Anomalies: 
Comments: 
Examination of sieved samples: Sample no. 155, [c?], 1 malleus, 1 lateral rib end.

**Skeleton 114**

*Age:* Perinate 41.5+/−2.2 foetal weeks (right ulna)

*Sex:* -

*Stature:* 56.9cm (right ulna)

**Skeletal Preservation:** Good. Quite complete, some fragmentation.

**Skeletal Position:** Supine

**Skeletal Attitude:** Extended

**Orientation:** Northwest/southeast, head to northwest

**Associated Skeletons:** -

**Associated Finds:** 7 shroud pins, 2 on central vertebrae, 4 on right leg, 1 on right foot

**Bones Present:** Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, 3 left MCs and four proximal and three intermediate hand phalanges, 3 right MCs and four proximal, four intermediate, and two distal hand phalanges. Manubrium and four sternum segments, twelve left and eleven right ribs, vertebrae from C1 to S5. Ili, ischia, left pubis. Femora, tibiae, fibulae, 1 unsided MT.

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11 unerupted deciduous teeth

**Dental Pathology:** -

**Skeletal Pathology:** -

**Anomalies:** -

**Comments:** Associated bone ID nos 1137-1140. Copper alloy staining on thoracic vertebrae, medial ends of left and right ribs, right tibia and fibula.

*Examination of sieved samples:* Sample no. 1199, [c78/81], 1 rib fragments, 1 incus, 4 unidentified fragments.

Sample no. 1200, [c78/89], 1 unidentified fragment.

**Skeleton 115**

*Age:* Infant 3-6 months (dentition)

*Sex:* -
Stature: -

Skeletal Preservation: Poor. Very incomplete with significant fragmentation.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Southeast/northwest, head to southeast (typed catalogue supplied to writer, records west)
Associated Skeleton/s: -
Associated Finds: -
Examination of sieved samples: Sample no. 1201, [c89/227], 2 cranial vault fragments, 1 rib fragment.

Bones Present: Cranium and mandible. Right clavicle and scapula, humeri, right radius and ulna, one proximal and two intermediate right hand phalanges. One left and seven right ribs, incomplete cervical and thoracic vertebrae. Iliac fragments. Femora, tibiae, fibulae, 1 left MT.
All bones incomplete.

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15 unerupted deciduous teeth
Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: All bones are quite slender.

**Skeleton 116**

Age: Infant 2-4 months (dentition)
Sex: -
Stature: -

Skeletal Preservation: Good. Fairly complete, some fragmentation.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeleton/s: Over Skeleton 117
Associated Finds: 1 shroud pin
**Bones Present:** Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1-MC5, and three proximal, one intermediate and one distal hand phalanges, right MC1, 3 MCs, and four proximal and two intermediate hand phalanges. Manubrium and four sternum segments, ten left and eleven right ribs, vertebra from C1 to S4. Ilia, ischia, right pubis. Femora and distal epiphyses, tibiae and proximal epiphyses, fibulae, left talus, MT1 and 3 MTs, right calcaneus, talus, 3 MTs, and one proximal foot phalanx.

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9 unerupted deciduous teeth

**Dental Pathology:** -

**Skeletal Pathology:** -

**Anomalies:** -

**Comments:** Copper alloy staining on left frontal and left temporal.

**Examination of sieved samples:** Sample no. 1203, [c78/89], ‘Skeleton 116/117’, lower left deciduous incisor, 1 malleus, 4 unidentified fragments. Sample no. 1204, [c78/89], 1 proximal foot phalanx, 1 proximal hand phalanx, lower left 2nd deciduous molar.

**Skeleton 117**

**Age:** Juvenile 12-18 months (dentition)

**Sex:** -

**Stature:** -

**Skeletal Preservation:** Poor. Fairly incomplete but relatively well preserved.

**Skeletal Position:** Supine

**Skeletal Attitude:** Extended

**Orientation:** Northwest/southeast, head to northwest

**Associated Skeletons:** Under Skeleton 116

**Associated Finds:** 4 coffin nails

**Bones Present:** Cranium and mandible fragment. Right scapula, humerus, radius, ulna, 2 right MCs and one proximal hand phalanx. Three left and three right ribs, vertebrae from C1 to C7. Right ilium. Left tibia, one left MT.

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2 erupting, 1 unerupted deciduous teeth

Dental Pathology: Hypoplastic defects – 2/3 (52, 62), indicative of in utero stress

Skeletal Pathology: Metabolic – cribra orbitalia (mild) in left and right orbits

Anomalies: -

Comments: The metopic suture is open but this is not unusual in an individual of this age.

Examination of sieved samples: See Skeleton 116.

Skeleton 118

Age: Perinate 35.9+/−2.2 foetal weeks (right ulna)

Sex: -

Stature: 47.8cm (right ulna)

Skeletal Preservation: Good. Quite complete but fragmented.

Skeletal Position: Supine

Skeletal Attitude: Extended

Orientation: Northwest/southeast, head to northwest

Associated Skeletons: -

Associated Finds: 1 shroud pin on left hip

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1-MC5 and four proximal and two intermediate hand phalanges, right MC1-MC5, and five proximal and three intermediate hand phalanges. Eleven left and ten right ribs, vertebrae from C1 to S3. Ilia, ischia, left pubis. Femora, tibiae, fibulae, left MT1 and 3 MTs and one proximal foot phalanx.

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10 unerupted deciduous teeth and unidentified deciduous molar cusp

Dental Pathology: -

Skeletal Pathology: -

Anomalies: -

Comments: Copper alloy staining with hair and scalp on cranial vault fragments.

Examination of sieved samples: Sample no. 1206, [c78/89], 2 vertebral arch fragments, 1 intermediate and 1 distal hand phalanx, 4 unidentified fragments.

Skeleton 119

Age: Infant 9-10 months (dentition)

Sex: -
Stature: -

Skeletal Preservation: Good. Quite complete, some erosion and fragmentation.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeleton/s: -
Associated Finds: -

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, ulnae, left radius, 2 left MCs, three proximal, two intermediate, and one distal left hand phalanges, right MC1-MC5, two proximal and three intermediate right hand phalanges. Eleven left and twelve right ribs, vertebrae from C1 through to S4. Ilia, ischia, pubes. Femora, tibiae, fibulae, left calcaneus and talus, left MT1-MT5, one left proximal foot phalanx, right MT1, 3 right MTs, two right proximal foot phalanges.

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3 erupting and 10 unerupted deciduous teeth; 2 unerupted permanent teeth

Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: Copper alloy staining on anterior ectocranial parietals.

Examination of sieved samples: Sample no. 1226, [c78/89], 4 unidentified fragments.

Skeleton 120
Age: Infant 9-12 months (dentition)
Sex: -
Stature: -

Skeletal Preservation: Poor. Quite incomplete, little erosion, there is fragmentation of the metaphyses.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeleton/s: -
Associated Finds: 3 shroud pins
**Bones Present:** Cranium and mandible. Clavicles, humeri, right radius and ulna. Eight left and eleven right ribs, incomplete vertebrae from C1 through to S2. Right ilium and pubis. Femora, tibiae, fibulae. *Diaphyses only of long bones.*

**Dental Inventory:**

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4 erupting and 10 unerupted deciduous teeth; 3 unerupted permanent teeth

**Skeletal Pathology:** Non-specific Infection – active fibre bone deposits on endocranial surface of occipital and pariets.

Metabolic – severe cribra orbitalia; active grey fibre bone deposits on ectocranial left parietal and on frontal, particularly at glabella. In addition, all ribs appear abnormally thickened, traces of remodelled fibre bone evident.

**Anomalies:**

**Comments:** There is copper alloy staining on the left parietal, just lateral to the sagittal suture and midway along it. There is blackened scalp and hair remnants associated.

**Examination of sieved samples:** Sample no. 1230, [c78/89], 3 unidentified fragments. Sample no. 1231, [c78/89], 3 cranial vault fragments, 4 vertebral fragments, 10 unidentified fragments.

**Skeleton 121**

**Age:** Infant 3-6 months (dentition)

**Sex:** -

**Stature:** -

**Skeletal Preservation:** Very poor. Very incomplete. There is little erosion but the bones are brittle and highly fragmented.

**Skeletal Position:** Supine

**Skeletal Attitude:** Extended

**Orientation:** Northwest/southeast, head to northwest

**Associated Skeletons:** -

**Associated Finds:** -

**Bones Present:** Cranium and mandible. Right clavicle, left scapula and humerus, radi, ulnae, left MC1-MC5 and three proximal and two intermediate hand phalanges, right MC2-MC5 and three proximal and two intermediate hand phalanges. Nine left and six right ribs, incom-
plete cervical and thoracic fragments. Right ilium. Femora, one right proximal foot phalanx.  
*All bones quite incomplete.*

**Dental Inventory:**

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3 unerupted deciduous teeth

*Dental Pathology:* -

*Skeletal Pathology:* -

*Anomalies:* -

*Comments:* -

*Examination of sieved samples:* Sample no. 1213, [c78/89], 4 unidentified fragments. Sample no. 1214, [c78/89], 1 proximal, 2 intermediate, and 1 distal hand phalanges.

**Skeleton 122**

*Age:* Perinate (determined on estimate of maximum original length of PM eroded left humerus)

*Sex:* -

*Stature:* -

*Skeletal Preservation:* Poor. Quite incomplete with significant erosion and fragmentation.

*Skeletal Position:* Supine

*Skeletal Attitude:* Extended

*Orientation:* Northwest/southeast, head to northwest

*Associated Skeletons:* -

*Associated Finds:* -

*Bones Present:* Cranium and mandible. Clavicles, right scapula, left radius. Manubrium and 2 sternum segments, three left and nine ribs, vertebrae from C1 through to S3. Ilia, ischia. Femora, tibiae, left fibula. *All incomplete.*

**Dental Inventory:**

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*Dental Pathology:* -
Skeletal Pathology: -
Anomalies: -
Comments: -
Examination of sieved samples: Sample no. 1229, [c220], 1 rib fragment, upper left 1st deciduous incisor, 8 unidentified fragments.

Skeleton 123
Age: Juvenile 15-22 months (dentition and long bones)
Sex: -
Stature: -

Skeletal Preservation: Very good. Complete, some water erosion of bone surface and minimal fragmentation.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeletons: -
Associated Finds: 12 coffin nails

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, 3 left MCs, 1 right MC. Manubrium and 2 sternum segments, eleven left and twelve right ribs, vertebrae from C1 through to S1. Ilia, ischia. Femora, tibiae, fibulae, left calcaneus and talus, left MT1-MT5, right calcaneus and talus, right MT1, 3 right MTs.

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20 erupted deciduous teeth, 4 unerupted permanent teeth

Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: May be undersized for age-at-death.
Examination of sieved samples: Sample no. 1235, [c78/89], upper left deciduous 2nd incisor, upper left deciduous canine, left zygomatic, 1 right rib, 2 rib fragments, 8 unidentified fragments.
Sample no. 1236, [c78/89], S5, sternal segment fragment, unfused and unidentified epiphyseal fragment, 1 vertebral body.

Skeleton 124
**Age:** Infant 3-6 months (dentition and long bones)  
**Sex:** -  
**Skeletal Preservation:** Poor. Relatively incomplete but there is some erosion and significant fragmentation.  
**Skeletal Position:** Supine  
**Skeletal Attitude:** Extended  
**Orientation:** West/east, head to west  
**Associated Skeleton/s:** -  
**Associated Finds:** -  

**Bones Present:** Cranium and mandible. Clavicles, scapulae, humeri, left radius and ulna. Five left and six right ribs, partially incomplete vertebrae from C1 through to sacral fragments. Left ilium. Femora, tibiae, fibulae, two left proximal foot phalanges, right MT1, 2 right MTs and one proximal foot phalanx. All incomplete.

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17 unerupted deciduous teeth  
**Dental Pathology:** -  
**Skeletal Pathology:** -  
**Anomalies:** -  
**Comments:** Copper alloy staining on ectocranial aspect of a vault fragment.

**Skeleton 125a**

**Age:** Infant 6 months (long bones)  
**Sex:** -  
**Skeletal Preservation:** Poor. Quite incomplete.  
**Skeletal Position:** ?  
**Skeletal Attitude:** ?  
**Orientation:** ?  
**Associated Skeleton/s:** Skeleton 125b  
**Associated Finds:** -

**Bones Present:** Right clavicle and scapula, left radius and ulna, left MC1-MC5 and one proximal hand phalanx.
Dental Inventory: -

Dental Pathology: n/a
Skeletal Pathology: -
Anomalies: -
Comments: Skeleton 125 represents the remains of a 6mth infant that, while being recorded as disarticulated was excavated and recovered as an articulated but incomplete skeleton. Disarticulated remains indicate the remains of two perinates and one older infant. The remains of one of the perinates is surmised as constituting a second burial, now numbered Skeleton 125b, with the original burial renumbered Skeleton 125a. Disarticulated remains ID nos 1028-1054.

Skeleton 125b
Age: Perinate 40.3+/−2.29 foetal weeks (left radius)
Sex: -
Stature: 57.0cm (left radius)
Skeletal Preservation: Very poor. Very incomplete but well preserved.
Skeletal Position: ?
Skeletal Attitude: ?
Orientation: ?
Associated Skeleton(s): Skeleton 125a
Associated Finds:

Bones Present: Scapulae, humeri, left radius and ulna, one unsided MC. Left ilium.
Dental Inventory: -

Dental Pathology: n/a
Skeletal Pathology: -
Anomalies: -
Comments: Skeleton 125 represents the remains of a 6mth infant that, while being recorded as disarticulated was excavated and recovered as an articulated but incomplete skeleton. Disarticulated remains indicate the remains of two perinates and one older infant. The remains of one of the perinates is surmised as constituting a second burial, now numbered Skeleton 125b, with the original burial renumbered Skeleton 125a. Disarticulated remains ID nos 1028-1054.

Skeleton 126
Age: Perinate, just over 24 foetal weeks based on size comparison with Skel. 20
Sex: -
Stature: -

Skeletal Preservation: Very poor. Very incomplete. There is no erosion but there is significant fragmentation.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: West/east, head to west
Associated Skeleton(s): -
Associated Finds: -

Bones Present: Cranium and mandible. Clavicles, left scapula, humeri, ulnae, possible radial shaft fragments. Three left and three right ribs, incomplete cervical, thoracic, and lumbar fragments. Femora, tibiae, and probable fibular shaft fragments.

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No teeth fragments recovered
Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: The age of this individual is based on a comparison with Skeleton 20 (24.0 foetal weeks)

Skeleton 127
Age: Perinate 37.8+/−1.87 foetal weeks (long bones)
Sex: -
Stature: 50.1cm (left tibia)

Skeletal Preservation: Very good. Almost complete with minimal erosion and fragmentation.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: West/east, head to west
Associated Skeleton(s): -
Associated Finds: 1 shroud pin

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, 2 left MCs and one proximal and one intermediate hand phalanges, right MC2-MC5 and four proximal and one intermediate hand phalanges. Manubrium, twelve left and ten right ribs, vertebrae
from C1 through to S5. Ilia, ischia, right pubis. Femora, tibiae, fibulae, left MT1 and 2 MTs, right MT1 and 2 MTs.

**Dental Inventory:**

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2 unerupted deciduous teeth

**Dental Pathology:** -

**Skeletal Pathology:** -

**Anomalies:** -

**Comments:** Copper alloy staining (with associated blackened scalp and hair fragments) on ectocranial surface of unidentified cranial vault fragment.

**Skeleton 128**

*Age:* Infant 3-4 months (dentition)

*Sex:* -

*Stature:* -

**Skeletal Preservation:** Poor. Incomplete with significant erosion. Fragmentation is not excessive.

**Skeletal Position:** Supine

**Skeletal Attitude:** Extended

**Orientation:** Northwest/southeast, head to northwest

**Associated Skeletons:** -

**Associated Finds:** -

**Bones Present:** Cranium and mandible. Clavicles, right scapula, humeri, radi, ulnae. One segment of sternum, seven left and six right ribs, highly incomplete vertebral fragments from C1 to sacrum. Ilia, ischia, right pubis. Femora, tibiae, fibulae. *All bones are incomplete.*

**Dental Inventory:**

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5 unerupted deciduous teeth

**Dental Pathology:** -

**Skeletal Pathology:** -

**Anomalies:** -
Comments: -
Examination of sieved samples: Sample no. 1249, [c78/89], lateral end of right clavicle, 1 rib fragment, 1 vertebral body, 2 MC shafts, 12 cranial vault fragments, lower left 1st deciduous incisor, 15 unidentified fragments.
Sample no. 1250, [c78/89], 2 proximal hand phalanges, 1 intermediate hand phalanx.

Skeleton 129
Age: Perinate 41.3+/−1.87 foetal weeks (long bones)
Sex: -
Stature: 55.5cm (left tibia)

Skeletal Preservation: Very good. Virtually complete with minimal erosion and fragmentation.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: North/south, head to north
Associated Skeletons: -
Associated Finds: 1 shroud pin

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1-MC5 and two proximal hand phalanges, right MC1-MC5 and four proximal and two intermediate hand phalanges. Eleven left and twelve right ribs, vertebrae from C1 through to S4. Ilii, ischia, pubes. Femora, tibiae, fibulae.

Dental Inventory:

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6 unerupted deciduous teeth
Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: -
Examination of sieved samples: Sample no. 1265, [c89/227], 1 intermediate hand phalanx, 3 unidentified fragments.
Sample no. 1266, [c89/227], 1 rib fragment, 1 carpal, 1 intermediate and 1 unidentified hand phalanges.

Skeleton 130
Age: Infant 44.0+/-1.87 foetal weeks (left femur and tibia)
Sex: -
Stature: -

Skeletal Preservation: Very good. Very complete and well preserved, but skull highly fragmented
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeleton/s: -
Associated Finds: -

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1-MC5, and five proximal, three intermediate and one distal hand phalanges, right MC1-MC5, and four proximal and one distal hand phalanges. Manubrium and one sternum segment, nine left and twelve right ribs, vertebrae from C1 to S5. Iliia, ischia, pubes. Femora, tibiae, fibulae, left talus, calcaneus, one tarsal and MC1, right talus, calcaneus, and MT1, and 7 unsided MTs and two unsided proximal foot phalanges.

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6 unerupted deciduous teeth
Dental Pathology: -
Skeletal Pathology: Metabolic disease (possible) – lateral ends of ribs are bulbous.
Anomalies: -
Comments: This individual may be large for the age-at-death.
Examination of sieved samples: Sample no. 1247, [c78/89], 1 intermediate and one distal hand phalanges, cusp of right upper deciduous canine, lower left 1st deciduous molar, 18 unidentified fragments.
Sample no. 1248, [c78/89], 3 vertebral fragments, 2 distal hand phalanges.

Skeleton 131
Age: Infant 3-5 months (dentition)
Sex: -
Stature: -

Skeletal Preservation: Poor. Fairly incomplete with significant fragmentation
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest

Associated Skeleton/s: -

Associated Finds: 1 coffin nail

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, 1 right MT. Eight left and eight right ribs, incomplete vertebrae from C1 to lumbar. Iliac body fragments. Femora, tibiae, fibulae, left talus and MT1, right calcaneus and talus. All bones incomplete

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10 unerupted deciduous teeth

Dental Pathology: -

Skeletal Pathology: -

Anomalies: -

Comments: Copper alloy staining on cranial fragments.

Examination of sieved samples: Sample no. 1255, [c78/89], 3 rib fragments, 4 cranial vault fragments, 7 unidentified fragments.

Skeleton 132

Age: Juvenile 2.5-3.5 years (dentition)

Sex: -

Stature: -

Skeletal Preservation: Very good. Complete with minimal erosion and fragmentation.

Skeletal Position: Supine

Skeletal Attitude: Extended

Orientation: Northwest/southeast, head to northwest

Associated Skeleton/s: -

Associated Finds: -

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1-MC5 and one proximal hand phalanx, right MC1, 2 MCs, and four proximal and two intermediate hand phalanges. Manubrium and five sternum segments, twelve left and twelve right ribs, vertebrae from C1 through to coccyx. Ilia, ischia, pubes. Femora (including proximal and distal epiphyses), tibiae (including proximal and distal epiphyses), fibulae, left calcaneus, talus, cuboid, 3 MTs, right calcaneus, talus, 2 unidentified tarsals, MT1-MT5, and three proximal foot phalanges.

Dental Inventory:
19 erupted deciduous teeth; 4 unerupted permanent teeth

Dental Pathology: -

Skeletal Pathology: -Congenital defect - manubrium unfused/abnormally ossified.

Anomalies: -

Comments: May be undersized for age-at-death.

Examination of sieved samples: Sample no. 1259, [c89/227], 4 unidentified fragments.

**Skeleton 133**

*Age:* Infant 3-9 months (dentition)

*Sex:* -

*Stature:* -

Skeletal Preservation: Very poor. Highly incomplete, with significant fragmentation

Skeletal Position: Supine?

Skeletal Attitude: Extended?

Orientation: West/east, head to west

Associated Skeletons: Truncated by Skeleton 134

Associated Finds: -

Bones Present: Cranial vault. Humeral shaft fragment. One left rib, fragments of thoracic and lumbar vertebra. Right ilium. Right femur, tibial shaft fragment. All bones very incomplete

Dental Inventory:

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  16  55  54  53  52  51  61  62  63  64  65  26
  46  85  84  83  82  81  71  72  73  74  75  36
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1 unerupted deciduous tooth

Dental Pathology: -

Skeletal Pathology: -

Anomalies: -

Comments: Although recorded as ‘disarticulated’ this skeleton appears to have been recovered with limb bones in the correct anatomical position, indicating it was an in situ burial, though likely to have been seriously truncated and/or eroded.
**Skeleton 134**  
*Age:* Juvenile 15-21 months (dentition)  
*Sex:* -  
*Stature:* -  

*Skeletal Preservation:* Good. Quite complete, some fragmentation.  
*Skeletal Position:* Supine  
*Skeletal Attitude:* Extended  
*Orientation:* Northwest/southeast, head to northwest  
*Associated Skeletons:* Truncated Skeleton 133  
*Associated Finds:* -  

*Bones Present:* Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, 1 left MC and four proximal and three intermediate hand phalanges, three right proximal and one right intermediate hand phalanges. Manubrium and 2 sternum segments, twelve left and twelve right ribs, vertebrae from C1 to S4. Ilia, ischia, pubes. Femora, tibiae, fibulae, left talus, calcaneus and one talus, left MT1 and 3 MTs, right calcaneus, talus, MT1, 3 MTs, and three proximal foot phalanges.  
*Dental Inventory:*  

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16 erupted and 4 erupting deciduous teeth; 4 unerupted permanent teeth  
*Dental Pathology:* -  
*Skeletal Pathology:* -  
*Anomalies:* -  
*Comments:* Associated bone ID nos 1141-1142. The anterior fontanelle was still open at the time of death but this is not unusual for an individual of this age. May be undersized for age-at-death.  
*Examination of sieved samples:* Sample no. 1273, [c78/89], 4 unidentified fragments.  
Sample no. 1274, [c78/89], 1 unsided MC1, 2 proximal, 1 intermediate and 3 distal hand phalanges, 5 unidentified fragments.

**Skeleton 135**  
*Age:* Juvenile 12-14 months (dentition)  
*Sex:* -  
*Stature:* -  
*Skeletal Preservation:* Good. Partially incomplete, with significant erosion to lower half of skeleton
Skeletal Position: Supine  
Skeletal Attitude: Extended  
Orientation: Northwest/southeast, head to northwest  
Associated Skeletons: -  
Associated Finds: 1 coffin nail  

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, fragment of proximal right ulna, 2 left MCs, right MC1-MC5 and three proximal hand phalanges. Eight left and right ribs, vertebrae from C1 to S3. Iliac, ischia, pubes. Femora, tibiae, fibulae.  

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7 erupted, 6 erupting, and 4 unerupted deciduous teeth; 2 unerupted permanent teeth  
Dental Pathology: -  
Skeletal Pathology: -  
Anomalies: -  

Comments: The proximal epiphyseal surfaces of the humeri and the femora are slightly unusual. The humeri are very flat, while the femora appear as one large area of fusion for the epiphyses (more reminiscent of animal bone). It is likely that this is a normal variation. May be undersized for age-at-death.  

Examination of sieved samples: Sample no. 1271, [c1258], right lateral wing of occipital, lower right deciduous canine, left MC1, 2 proximal and 1 intermediate hand phalanges, 1 right cervical arch, 2 left lumbar arches, 2 vertebral bodies, 1 rib fragment, 9 unidentified fragments, plus animal bone long bone fragment.  

Skeleton 136  
Age: Perinate 40.0 +/- 1.87 foetal weeks (left femur and tibia)  
Sex: -  
Stature: 53.5cm (left tibia)  

Skeletal Preservation: Good. Almost complete, some fragmentation.  
Skeletal Position: Supine  
Skeletal Attitude: Extended  
Orientation: Northwest/southeast, head to northwest  
Associated Skeletons: -  
Associated Finds: 2 shroud pins
**Bones Present:** Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1-MC5, and four proximal and one intermediate hand phalanges, right MC1-MC5, and three proximal and one intermediate hand phalanges. Twelve left and ten right ribs, vertebrae from C1 to S4. Ilia, ischia, pubes. Femora, tibiae, fibulae.

**Dental Inventory:**

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3 unerupted deciduous teeth

**Dental Pathology:** -

**Skeletal Pathology:** -

**Anomalies:** -

**Comments:** Copper alloy staining on anterior mandible and right side of C1, and C3-C5. There is fibre bone on the clavicles but this is likely to be a result of normal infant growth.

**Examination of sieved samples:** Sample no. 1280, [c78/89], upper right 2nd deciduous molar, 2 sacral fragments, 1 intermediate and 1 distal hand phalanges, 4 unidentified fragments. Sample no. 1281, [c78/89], 1 distal hand phalanx, 1 unidentified fragment.

**Skeleton 137**

**Age:** Infant 7-9 months (dentition)

**Sex:** -

**Stature:** -

**Skeletal Preservation:** Poor. Fairly incomplete with significant fragmentation. There are strong root markers on the bones.

**Skeletal Position:** Supine

**Skeletal Attitude:** Extended?

**Orientation:** South/north, head to south

**Associated Skeleton/s:** -

**Associated Finds:** -

**Bones Present:** Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, three proximal, three intermediate, and one distal left hand phalanges, right MC1 and 1 MC, and one intermediate and one distal hand phalanges. Manubrium and 3 sternum segments, eleven left and twelve right ribs, vertebrae from C1 to S5. Ilia, ischia, left pubis. Femora. All bones incomplete.
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7 erupting and 11 unerupted deciduous teeth; 3 unerupted permanent teeth

**Dental Pathology:** -

**Skeletal Pathology:** -

**Anomalies:** -

**Comments:** Shroud pin and fabric recovered from cranial remains during analysis.

**Skeleton 138**

**Age:** Infant 9-12 months (dentition)

**Sex:** -

**Stature:** -

**Skeletal Preservation:** Very poor. Highly incomplete with significant fragmentation and erosion.

**Skeletal Position:** Supine

**Skeletal Attitude:** Extended

**Orientation:** Northwest/southeast, head to northwest

**Associated Skeletons:** -

**Associated Finds:** -

**Bones Present:** Cranium and mandible. Left clavicle, humeri. Rib shaft fragments, tiny eroded vertebral fragments. Diaphyseal fragments of femora. *All bones very incomplete.*

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8 erupting and 6 unerupted deciduous teeth; 3 unerupted permanent teeth

**Dental Pathology:** -

**Skeletal Pathology:** Metabolic disease (possible) – thick remodelled layer of bone over the normal ectocranial bone surface of the parietals.

**Anomalies:** 2 inca bones in occipital.

**Comments:** -

**Examination of sieved samples:** Sample no. 1283, [c78/89], upper right 2nd deciduous incisor, lower left 1st permanent molar, 1 vertebral fragment, 10 cranial vault fragments.
Skeleton 139
Age: Infant 7-10 months (dentition)
Sex: -
Stature: -

Skeletal Preservation: Poor. Quite incomplete with significant erosion of post-cranial skeleton.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeleton/s: -
Associated Finds: 10 coffin nails

Bones Present: Cranium and mandible. Right clavicle, scapulae, humeri, radi, ulnae. Manubrium, four left and four right ribs, incomplete vertebrae from C1 to lumbar fragments. Ilia. Femora, tibiae, right fibula. Post-cranial skeleton especially incomplete.

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14 unerupted deciduous teeth

Dental Pathology: -
Skeletal Pathology: -
Anomalies: -

Comments: Copper alloy staining on left occipital, parietal, and frontal.

Examination of sieved samples: Sample no. 1284, [c78/89], shaft of left clavicle, 3 rib fragments, lower right 1st and 2nd deciduous incisors, right greater wing of sphenoid.

Skeleton 140
Age: Juvenile 15-22 months (dentition)
Sex: -
Stature: -

Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeleton/s: -
Associated Finds: -
**Bones Present:** Cranium and right mandible. Right clavicle and humerus, fragments of left humerus. Extremely incomplete rib fragments, incomplete cervical vertebrae fragments. Unidentified leg bone fragments. All bones very incomplete.

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12 erupted and 3 erupting deciduous teeth; 9 unerupted permanent teeth (as above plus 11, 21, 43, 42, 41, 31 all unerupted)

**Dental Pathology:** -

**Skeletal Pathology:** -

**Anomalies:** -

**Comments:** -

**Examination of sieved samples:** Sample no. 1287, [c78/89], 2 cranial vault fragments, 1 vertebral arch fragment, 1 rib fragment, upper right 1st permanent incisor, lower left 2nd deciduous incisor, 1 unidentified fragment.

**Skeleton 141**

**Age:** Infant 6-9 months (dentition)

**Sex:** -

**Stature:** -

**Skeletal Preservation:** Poor. Fairly incomplete with significant erosion of post-cranial skeleton.

**Skeletal Position:** Supine

**Skeletal Attitude:** Extended

**Orientation:** West/east, head to west

**Associated Skeletons:** -

**Associated Finds:** 6 shroud pins, 43 coffin nails

**Bones Present:** Cranium and mandible. Clavicles, scapulae, humeri, left radius and ulna. Five left and six right ribs, vertebrae from C1 to C7. Ilia, right ischium. Femora, tibiae. All bones incomplete.

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12 unerupted deciduous teeth; 2 unerupted permanent teeth plus cusp of unidentified lower molar

_Dental Pathology:_ Hypoplastic Defects – the enamel of all deciduous second molars are severally pitted, indicating stress from birth to death.

_Skeletal Pathology:_ -

_Anomalies:_ -

_Comments:_ Periosteal-like lesions on tibiae, but normal bone growth. Associated bone ID no. 1101. Copper alloy staining on frontals and left parietal, scalp and hair visible on cranium.

**Skeleton 142**

_Age:_ Infant 3-4 months (dentition)

_Sex:_ -

_Stature:_ -

_Skeletal Preservation:_ Very poor. Very incomplete with significant erosion.

_Skeletal Position:_ Supine

_Skeletal Attitude:_ Extended

_Orientation:_ Northwest/southeast, head to northwest

_Associated Skeleton/s:_ -

_Associated Finds:_ 10 coffin nails

_Bones Present:_ Cranium. Left clavicle and scapula, humeri, left radius, ulnae. Three left and two right ribs, incomplete cervical vertebrae. Right ilium. Femora, right fibula. _All bones highly incomplete._

_Dental Inventory:_

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2 unerupted deciduous teeth

_Dental Pathology:_ -

_Skeletal Pathology:_ -

_Anomalies:_ -

_Comments:_ Copper alloy staining on left parietal.

_Examination of sieved samples:_ Sample no. 1299, [c78/89], upper left 2<sup>nd</sup> deciduous incisor, lower right 2<sup>nd</sup> deciduous incisor.

**Skeleton 143**

_Age:_ Infant 42.4±/1.87 foetal weeks (left femur and tibia)

_Sex:_ -
Stature: -

Skeletal Preservation: Good. Virtually complete, some erosion.
Skeletal Position: Supine
Skeletal Attitude: Extended
Orientation: Northwest/southeast, head to northwest
Associated Skeleton/s: -
Associated Finds: -

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, left MC1 and 3 MCs, and four proximal and one intermediate hand phalanges, right MC1 and 3 MCs, and one proximal hand phalanx. Manubrium and one sternum body, twelve left and twelve right ribs, vertebrae from C1 to S3. Ili. Femora, tibiae, fibulae, 3 left MTs, right MT1 and 1 MT.

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11 unerupted deciduous teeth

Dental Pathology: -

Skeletal Pathology: -

Anomalies: -

Comments: Copper alloy staining on cranial vault fragments, and right 11th and 12th ribs, and right ilium.

Examination of sieved samples: Sample no. 1294, [c78/89], 1 rib fragment, 1 proximal foot phalanx, 1 unidentified fragment, plus 3 fragments of animal tooth enamel.

Skeleton 144

Age: Infant 3-4 months (dentition)
Sex: -
Stature: -

Skeletal Preservation: Very poor. Very incomplete with severe erosion and fragmentation.
Skeletal Position: Supine
Skeletal Attitude: Extended  
Orientation: Northwest/southeast, head to northwest  
Associated Skeleton/s: -  
Associated Finds: 2 shroud pins

Bones Present: Cranium and mandible. Clavicles, left scapula, humeri. Shaft fragments of left and right ribs, incomplete cervical and thoracic vertebrae. Right ilium. Left femur. All bones extremely fragmented.

Dental Inventory:

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</table>

3 unerupted deciduous teeth  
Dental Pathology: -  
Skeletal Pathology: -  
Anomalies: -  
Comments: Associated bones ID no. 1100.

Skeleton 145

Age: Infant 3-6 months (dentition)  
Sex: -  
Stature: -  

Skeletal Preservation: Good. Quite complete but significant fragmentation.  
Skeletal Position: Supine  
Skeletal Attitude: Extended  
Orientation: Northwest/southeast, head to northwest  
Associated Skeleton/s: -  
Associated Finds: 1 shroud pin

Bones Present: Cranium and mandible. Clavicles, scapulae, humeri, radi, ulnae, two left intermediate hand phalanges. Ten left and nine right ribs, vertebrae from C1 through to incomplete lumbar. Ilia, left ischium, right pubis. Femora, tibiae, right talus. Metaphyses particularly incomplete.

Dental Inventory:

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11 unerupted deciduous teeth
Dental Pathology: -
Skeletal Pathology: -
Anomalies: -
Comments: Copper alloy staining on right frontal and right mandible. May be undersized for age-at-death.

Examination of sieved samples: Sample no. 1303, [c78/89], 14 fragments of long bones and ribs.

**Skeleton 146**

*Age:* Perinate full-term (on the basis of size)
*Sex:* -
*Stature:* -

**Skeletal Preservation:** Very poor. Very incomplete and fragmented.
**Skeletal Position:** Supine
**Skeletal Attitude:** Extended
**Orientation:** Northwest/southeast, head to northwest
**Associated Skeletons:** -
**Associated Finds:** 1 shroud pin

*Bones Present:* Cranium and mandible. Clavicles, left scapula, humeri, radi, ulnae, 2 left MCs and one proximal hand phalanx, 1 right MC. Eleven left and one right rib, very incomplete cervical and thoracic vertebrae. Left ilium. *All bones very incomplete.*

**Dental Inventory:**

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5 unerupted deciduous teeth

**Dental Pathology:** -
**Skeletal Pathology:** -
**Anomalies:** -

**Comments:** Associated bone ID no. 1099.

**Examination of sieved samples:** Sample no. 1301, [c78/89], 1 thoracic body, 1 unidentified left vertebral arch, upper right 2nd deciduous molar, 4 unidentified fragments.

**Skeleton 147**

*Age:* Infant possibly older infant (no elements of age determination preserved)
*Sex:* -
*Stature:* -
**Skeletal Preservation**: Very poor. Extremely incomplete and eroded.
**Skeletal Position**: Supine
**Skeletal Attitude**: Extended
**Orientation**: Northwest/southeast, head to northwest
**Associated Skeletons**: -
**Associated Finds**: -

**Bones Present**: Diaphyseal fragment of right arm bone. Four shaft fragments of right ribs. Diaphyseal fragments of right femur and tibiae. All bones highly incomplete and eroded.
**Dental Inventory**: -

**Dental Pathology**: n/a
**Skeletal Pathology**: -
**Anomalies**: -
**Comments**: -

**Skeleton 148a**
**Age**: Infant 3-6 months (long bones)
**Sex**: -
**Stature**: -

**Skeletal Preservation**: Very poor. Very incomplete but bones are well preserved.
**Skeletal Position**: ?
**Skeletal Attitude**: ?
**Orientation**: ?
**Associated Skeletons**: Skeleton 148b
**Associated Finds**: -

**Bones Present**: Cranium. One lateral rib end. Right femur.
**Dental Inventory**: -

**Dental Pathology**: n/a
**Skeletal Pathology**: Metabolic – mild cribra orbitalia in right orbit.
**Anomalies**: -
**Comments**: Two individuals are represented by the remains excavated originally as Skeleton 148. These have been renumbered in this report as Skeletons 148a and 148b. There is copper alloy staining on the medial superior aspects of the ectocranial frontals. Skeleton 148b appears to be the original skeleton as recorded on-site. This individual may be undersized for the age-at-death.
Skeleton 148b

Age: Infant 0-3 months (on basis of size of bones)
Sex: -
Stature: -

*Skeletal Preservation*: Poor. Quite incomplete, significant fragmentation but no erosion.
*Skeletal Position*: Supine
*Skeletal Attitude*: Extended?
*Orientation*: Northwest/southeast, head to northwest
*Associated Skeleton/s*: Skeleton 148a
*Associated Finds*: -

*Bones Present*: Right humerus, radi, ulnae. Five left and nine right ribs, very incomplete thoracic and lumbar fragments. Femora. *All bones quite incomplete.*
*Dental Inventory*: -

*Dental Pathology*: n/a
*Skeletal Pathology*: -
*Anomalies*: -
*Comments*: Two individuals are represented by the remains excavated originally as Skeleton 148. These have been renumbered in this report as Skeletons 148a and 148b. Skeleton 148b appears to be the original skeleton as recorded on-site.

**Sieved soils samples not allocated to any skeleton:**
Sample no. 1156, [c78/89], 2 cranial vault fragments;
Sample no. 1293, [c78/89], 3 cranial vault fragments;
Sample no. 1157, [c78/89], 23 cranial vault fragments.
### 6.2 Metrics

The long bones lengths of all individuals in numerical order is provided below:

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<th>Skel</th>
<th>Age</th>
<th>Age2</th>
<th>Sex</th>
<th>Humerus L</th>
<th>Ulna L</th>
<th>Radius L</th>
<th>Femur L</th>
<th>Tibia L</th>
<th>Fibula L</th>
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Appendix 6: Slag

By Thérèse Kearns

This report covers the visual macro assessment of an assemblage of ironworking remains from a ringfort site in the townland of Mackney, Co. Galway (E2442). A series of radiocarbon dates from the site revealed a long sequence of activity spanning the early to late medieval periods, with radiocarbon dates that range from the eighth to the seventeenth centuries. A total of 43 kg of ironworking slag was uncovered during excavations, all of which was examined to determine which ironworking technologies were represented. The report begins with a basic introduction to ironworking, followed by a description of slag samples uncovered from the site. This evidence will then be discussed with reference to archaeological, technological and temporal contexts.

Introduction to Ironworking

The term ironworking is used broadly to encompass the various stages in the production of iron from ore to finished artefact. Three distinct processes are involved: smelting of ore to produce a bloom of metallic iron; primary smithing of the raw bloom which results in a billet of iron; and secondary smithing of the iron billet to produce a bar of iron which can then be shaped into an artefact. All of these processes result in the formation of slag which is often the only indicator that ironworking has taken place on a site. While slag itself is easily identifiable, the difficulty lies in assigning individual slag samples to specific processes as they are often morphologically and chemically similar (Bachman 1982, Tylecote 1986).

Ore and Ore Processing

Iron is produced from minerals containing sufficient iron to make the process economically viable. The most common ores found in Ireland are haematites, limonites and pyrites (Scott 1990) all of which occur as vein deposits. In antiquity, an important source was bog ore (iron hydroxide) which is formed by the precipitation of iron compounds in lakes and bogs. Ores of this type are often characterised by the presence of phosphorus (0.5-3%) and manganese (Pleiner 2000, 88). Bog ores are porous and relatively easy to reduce. However, the iron content varies considerably, meaning that a certain amount of processing is necessary prior to smelting. Ore processing involves crushing the ore to small pieces, thus maximising the surface area available to the reducing gases of the furnace. The ore may then be roasted to drive off any excess water and to transform non-oxide ores into oxides which are more appropriate for smelting (Pleiner 2000, 107). This part of the process could be carried out on a simple bonfire.
Smelting

The bloomery process was the most common method of smelting iron in Western Europe until the 16th century (Craddock 1995). This is a solid state process in which two important reactions occur: the reduction of iron oxide to metallic iron which forms into a spongy mass known as a bloom; and the formation of a liquid slag from iron oxides and gangue oxides (silica, alumina etc.) contained in the ore. This is achieved in a charcoal fuelled furnace at temperatures in the region of 1250°C (Craddock 1995, 241; Pleiner 2000, 133; Sim 1998, 10). Air is introduced to the system by means of blow holes with bellows or possibly by natural draft, a method which has been suggested at Stanley Grange, Derbyshire (Challis 2002).

Bloomery furnaces can appear in a range of shapes and sizes, however these are difficult to reconstruct due to the lack of superstructure remains in the archaeological record. In Western Europe iron smelting furnaces are commonly thought to have consisted of a cylindrical shaft of variable height and diameter. In general, furnaces may be divided into two categories; those which had provision for the removal of slag during the smelting process – slag tapping; and those in which the slag would accumulate at the bottom of the furnace to be removed after each smelting cycle.

Slag tapping furnaces generally contain an opening or arch at the base of the furnace from which molten slag can flow or be raked out during the process. Tap slag is easily identifiable by smooth flow structures on the upper surface which form as molten slag flows from the furnace and cools.

In non-slag tapping furnaces, on the other hand, slag accumulates in the base of the furnace underneath the bloom, where it forms large cakes which are generally circular in plan and often plano-convex in shape. These are commonly referred to as furnace bottoms and are generally of similar dimensions to the furnace base. However, differentiation is not always ‘clear cut’, and many undiagnostic slag fragments/lumps are often uncovered.

Several examples of these so-called furnace bottoms have been recorded from Irish contexts (Fanning 1981, Raftery 1976b, Monk 1993, Scott 1990), as well as from Anglo-Saxon contexts (Bayley et al. 2001). These are generally thought to have been produced in bowl furnaces, characterised by a hemispherical hollow in the ground which may have been lined with refractory clay and/or occasionally stone (Pleiner 2000, 147). There is likely to have been a superstructure of some kind, however such evidence rarely survives. Substantial furnace remains are rare from Irish contexts however furnaces of this type have been reported from the same sites which yielded furnace bottoms; Reask, Co. Kerry (Fanning 1981), Rathgall, Co. Wicklow (Raftery 1976b), and Lisleagh, Co. Cork (Monk 1993), among others (Scott 1991, 159).

Bowl furnace technology is thought to have been the predominant means of iron smelting in Ireland until after the 9th century AD and although it is generally considered to be relatively primitive and inefficient (Scott 1990, 159; Pleiner 2000, 145) it was used in many parts of Europe and Africa until early modern times (Pleiner 2000, 147).
In the absence of superstructure remains, bowl furnaces can be easily mistaken for shaft furnaces, which Tylecote (1986, 133) suggests developed from a type of bowl furnace. Non-slag tapping shaft furnaces produce morphologically similar furnace bottoms to bowl furnaces. This, along with the superstructure issue, has led to much debate surrounding use of the bowl type. Tylecote, for example argues that a small bowl with a diameter of approximately 0.2 m is unlikely to be the remains of a bowl furnace, as the metal represented by such a small bowl would hardly be worth smelting. He suggests instead that a furnace with a base of such a small diameter could have had a superstructure over a metre high, the higher the shaft, the more efficient the furnace. Some of the best documented examples of shaft furnaces come from Roman Britain (Tylecote 1986) when iron was being produced on an industrial scale.

Furthermore, the notion that the bowl furnace was the predominant form used in Ireland until the late medieval period has recently been contested by Dowd and Fairburn (2005). However this work is ongoing and further archaeological assemblages will need to be investigated before the issue is resolved and the extent to which different types of technologies co-existed is understood.

Smelting slags may not be as morphologically distinctive as those described above, and a large proportion may have random shapes and sizes. These are more difficult to assign to a particular technology and are generally described as amorphous.

Refining/Smiting

When a raw bloom of iron is extracted from a furnace it must be refined before it can be manufactured into artefacts. This is done by smithing which involves two principal stages. The first, primary smithing or bloom smithing, involves consolidating the bloom by heating it to temperatures high enough to melt any slag which has become trapped during the smelting process. This operation can be carried out in a charcoal fuelled hearth though no specific type of installation is necessary and it is likely that the bowls of redundant furnaces were often used (Crew 1989; 1991). As the slag melts, some of it will liqurate into the hearth while more will be expelled on hammering, often as spheroidal balls, the iron can then be welded into a solid mass known as a billet. This is generally done on an anvil, though these are rarely found in situ.

Primary smithing experiments have shown that this stage of refining requires a great deal of skill and if the bloom is over heated, too much slag will liqurate resulting in the loss of unconsolidated pieces of iron, or indeed causing the bloom to shatter on hammering (Crew 1991, 29; Sim 1998, 12).

Secondary smithing is done to further refine the iron billet to a bar which can then be used to manufacture objects. This stage is also carried out in a charcoal fuelled hearth powered by bellows. The billet is repeatedly heated, then hammered until the desired bar shape is achieved. At this stage the smallest slag inclusions are expelled and the iron becomes fully welded together, making it possible to shape into an object. Some residual slag would ac-
cumulate in the hearth or be expelled on hammering. Flake hammerscale is also produced at this stage as a layer of iron oxide forms at the surface of the iron as it cools and is shattered off when hammered accumulating around the anvil area or in the hearth (McDonnell 1984). This material is magnetic and an important indicator that smithing has taken place, however due to its fragile nature it is easily fragmented and overlooked by excavators. In some cases, spatial analyses of hammerscale have been used to identify the precise location of the anvil.

Both stages of refining/smithing produce broadly the same kind of waste material. The most recognisable residues are smithing hearth bottoms (SHB) which form just below the blowing hole of the hearth on a charcoal bed. They are generally described as plano-convex bottoms, but are more commonly concave-convex in shape bearing an upper surface depression which results from the blast of air entering the hearth from the bellows. They are usually sub-circular in plan and can vary in size and weight from 0.5-2 kg. Their size is largely dependent on the amount of iron smithed and on the length of time in which they were allowed to form in the hearth before it had to be cleaned out (Crew 1991, Sim 1998, Bayley et al. 2001). As a result each individual cake is generally accepted to represent one episode of smithing, albeit of a primary or secondary nature.

In section, smithing hearth bottoms are usually very heterogeneous, containing layers of slag, hammerscale, charcoal and even fragments of metallic iron, which along with hammerscale makes them magnetic.

As well as diagnostic hearth bottoms, smithing debris also consists of randomly shaped lumps of smithing slags which can vary in weight from a few to several hundred grams. Isolated finds of these are difficult to interpret as they may be externally similar to amorphous slag derived from smelting.

Ironworking remains at Mackney

Slag samples from Mackney were firstly cleaned, then weighed and measured, while their general morphology was recorded. Samples were also tested with a magnet to determine their magnetic susceptibility. A small number were sectioned using tile cutters to examine their interior morphology.

Possible Metalworking Features

An area within the north-east quadrant of the site was identified as the metalworking area due to the presence of a series of features which had been used for high-temperature processes and a quantity of slag. In total 43 kg were uncovered, the majority of which had been dumped in various pits and deposits throughout the metalworking area.

Two of the features were described by excavators as a double bowl furnace (C.950 and C.937). The remains of both furnaces share similar dimensions.
The southern furnace (C.937) was oval in plan while its northern counterpart was circular; both were concave in profile. Adjacent to these was a cut (C.956), described as an annexe, which is slightly smaller than the two furnaces. At the base of the so-called annexe was a stone (measuring 0.33 x 0.28 x 0.15 m) which is thought to relate to metalworking.

Overlying these features were two later furnace re-cuts (C.910 and C.902). The first of these (C.910) measured 0.46 x 0.41 x 0.17 m, was circular in plan and concave in profile. The secondary re-cut (C.902) measured 0.57 x 0.42 x 0.12 m, it was sub-circular in plan and concave in profile. Both of these cuts were filled with material varying from orangish black to dark black silty sand. The fill of the first re-cut (C.907) contained charcoal and slag while the fill of the second recut (C.893) contained charcoal, fired stone, lumps of amorphous slag and one large slag cake.

A total of thirty-three furnace fragments were recorded and these may be the remains of superstructures which originally belonged to furnaces C.950 and C.937.

To the north of the bowl-furnaces and annexe, lay a circular pit (C.801) which measured 0.72 x 0.60 x 0.27 m. It had a flat base and roughly vertical sides. It was filled (C.799) with dark brown silty sand and contained a large quantity of burnt material including charcoal. It was later truncated by another pit (C.829) which measured 0.6 x 0.55 x 0.27 m, and which was also circular in plan with a flat profile. The fill was similar to that of pit (C.801) but also contained one fire affected stone.

Approximately 0.3 m to the south of the double furnace feature (C.937, 950) was a rectangular feature (C.809) measuring 0.9 x 0.29 x 0.13 m, with a flat base. The fill (C.808) was composed of a brownish black sandy silt and contained slag as well as an angular stone which had slag material attached to its upper surface; the stone fitted into the north-east corner of the feature.

Within a 5m radius of the double furnace feature were a number of pits various sizes (ranging in length from 0.31 – 1.22 m, in width from 0.29 – 0.75 m and in depth from 0.7 – 0.29 m). They ranged from oval to sub-rectangular in plan and all were concave in profile. Two of these pits contained slag and one large slag cake was uncovered from pit C.904 (fill 892).

**Slag**

Of the 43 kg of slag uncovered, the majority had been dumped in various pits and deposits within the metalworking area. A total of 7 samples weighing a total of approximately 12 kg were unique to the assemblage in terms their overall shape, size and weight (from contexts C.1054, C.1113, C.892, C.893, C.928, C.935, C.942). These were all roughly sub-circular.
to circular in plan and plano-convex in shape. Their dimensions ranged from 13 x 11 x 4 cm to 16 x 10 x 8 cm and individual weights varied from just over 1 to 2 kg. A number of these samples were sectioned and displayed a relatively homogeneous interior with a band of metallic iron accumulated towards their base. Some contained so much iron that they were impossible to section fully. It is possible that these are a collection of furnace bottoms which are the result of smelting in a non-slag tapping furnace. This suggestion is made with tentatively as the lack of any other smelting related remains such as ore hinders any interpretation.

The second morphologically distinct group of slags were all sub-circular in plan and plano-convex or convex-convex in section. They varied in size from 5 x 4 x 3 cm to 11 x 8 x 3 cm and in weight from 300 – 800 g. Several had slight depressions on their upper surfaces and in section were heterogeneous with layers, containing slag, hammerscale, clay, charcoal and droplets of metallic iron. Macroscopically these examples have all the characteristics of smithing hearth bottoms.

The third group consists of small randomly shaped lumps of slags, none of which have distinctive morphologies which makes it difficult to assign them to a specific ironworking process. Some of this material may be fragments of smithing hearth bottoms and/or furnace bottoms, either broken over time or deliberately broken to retrieve any trapped metal.

Small amounts of soil contained in slag sample bags were tested with a magnet and were shown to contain both spheroidal and flake hammerscale. This was particularly noticeable in the soil from C.893 which constituted the fill of a pit (C.902).

**Discussion**

Archaeological ironworking residues are seldom studied and poorly understood. In many cases slag is immediately associated with iron smelting, a presumption which can strongly bias any conclusions about a particular site. Distinguishing between smelting and smithing slag can be notoriously difficult and one must consider all available evidence if an accurate interpretation is to be made.

The slag assemblage from Mackney has been divided into three main categories: heavy circular, plano-convex cakes which resemble furnace bottoms derived from smelting; a selection of both large and small smithing hearth bottoms; and the remainder of the slag which consists of random amorphous lumps which are not indicative of any particular process and could be the result of smelting and/or smithing.

The characterisation of furnace bottoms has been done with caution as they can often be very similar to large smithing hearth bottoms. In this case interpretation has been made on the basis of their overall size, shape and weight, which averages approximately 1.6 kg. If this interpretation is correct, then we can say that they are the result of smelting in a non-slag tapping furnace, of the bowl or low shaft type. In total, these weigh approximately 12 kg, which is indicative of a small scale operation, and if each furnace bottom represents one smelting cycle, then we can say that at least seven different cycles took place. It is likely however that
much of the amorphous material also relates to smelting, however this remains difficult to quantify. Only one example of a furnace bottom was found in direct association with the remains of a furnace (deposit C.942 in furnace C.950).

Possible bowl furnaces (C.950 and C.937) did not include remains of a superstructure. However furnace fragments found elsewhere on site could relate to them. If this is the case, then it is likely that they were originally low shaft furnaces which were dismantled after each smelting cycle to clean out the slag (furnace bottom) accumulated in the base. The amount of iron contained in these suggests that the method of smelting was relatively inefficient and this may be one of the reasons that it was conducted on such a small scale and eventually abandoned. A possible annexe (C.956) to the bowl furnaces (C.950 and C.937) contained a large stone in situ at its base. It may have been used as a platform for primary smithing of the bloom when it was initially removed from the furnace. A series of post-holes in the vicinity of the double furnace and annexe may represent an associated structure; however, no pattern is discernable at present.

The second group of slag contained samples which were sub-circular in plan and plano-convex or convex-convex in shape. On the basis of their overall shape, their internal structure and magnetic susceptibility, they have been classified as smithing hearth bottoms. Approximately 20 complete examples weighing a total of 14 kg were contained in the assemblage and it is possible that some of the amorphous fragments are also related to smithing. The complete examples were similar in shape, however varied in size and weight. While it is almost impossible to distinguish macroscopically which particular stage of smithing (primary or secondary) individual samples are derived from, Crew suggests that larger smithing hearth bottoms are derived from primary smithing when the majority of slag liquates into the hearth, while the smaller examples are the result of secondary smithing of billet to bar and bar to artefact. If this is the case, then both primary and secondary smithing are represented at Mackney, which would be expected particularly if smelting was taking place. Through his experiments, Crew estimated that each stage of the smithing process would require a half to a full days work and that the processes combined could result in the loss of up to 25 wt% of the metal (Crew 1989, 15).

Also indicative of smithing is the quantity of flake and spheroidal hammerscale which was collected from soil contained in slag sample bags. As only a small sample was collected post-excavation, it is impossible to quantify.

A rectangular feature (C.809) located to the south-west of the double furnace is likely to have been used for smelting. This interpretation is made on the basis of the large stone with slag attached to its upper surface which is thought to have been used as an anvil. It is possible that primary smithing of the bloom was carried out in the annexe associated with the furnaces (C.956) while secondary smithing was carried out in context 809, though this cannot be said for certain. Find of such anvils in situ are rare from both Irish and British contexts.

Both smelting and smithing require large quantities of charcoal even if these activities are being carried out on a small scale. There was no evidence for the production of charcoal at
Mackney. However samples recovered from the site show that oak was the predominant type of wood used.

**Literary Evidence**

Early Irish texts contain numerous references to metal and metalworking; however, no text explicitly describes the processes involved. Where ironworking terminology does appear, one must be cautious in making an interpretation as our understanding of where this terminology fits into the language as a whole is lacking. This said, certain information can be retrieved from texts such as the 8th century document ‘Blaí ord indeóin’ (The Exemption of the Hammer and Anvil) which describes the responsibilities of the blacksmith if someone is injured in the forge and the amounts of compensation which must be paid, depending on the types of injury sustained (Scott 1983, 59). The tract makes no direct reference to the smelting furnaces or smithing hearths, but does mention the tasks that different individuals were responsible for: the smith, the bellows blower and someone to hold the iron while it was being struck. The tract also suggests that it was not only humans who were in danger of injury: it outlines the amounts of compensation to be paid should an animal sustain an injury. This, according to Scott, indicates that the forge was out in the open and boundary-less or simply covered by a flimsy structure (Scott 1983, 59-61). This matches the picture described for the potential smithing area (C.809) where there are no post-holes associated with the feature. However, as stated previously, some type of structure may have been associated with the smelting area.

**Scale and Timeframe**

A total of 42 kg of slag is representative of a small scale ironworking industry when compared to sites such as Lisleigh, Co. Cork where several hundred kilograms were uncovered. At Mackney Ringfort the majority of slag had been dumped in various pits and deposits within the metalworking area in the north-east quadrant of the site. The double furnace feature (C.950 and C.937) appears to be the earliest of the furnaces and later furnace recuts overlie these. It is possible that after each smelting cycle, the furnace had to be dismantled to retrieve the bloom and clean out the slag and therefore a new furnace was built for each smelt, one on top of another. A smithing hearth (C.809) with an anvil stone in situ suggests a certain degree of permanency, in particular the presence of the anvil stone. Slag itself is not dateable, however charcoal from the fill of the hearth (C.808) was radiocarbon dated to the early medieval period (cal. AD 988-1153). Metalworking was a key activity within this; however, the small assemblage of slag suggests that it was relatively short lived. In the case of smelting, this may have been because the method of production was inefficient. This is suggested by the large quantity of iron trapped in the furnace bottoms. Smithing may have ceased as an activity in the high medieval period because of a wider circulation of iron artefacts which put an end to the necessity for ironworking on site, or it may have continued to have been carried out seasonally or on a needs only basis.
Conclusions
The slag assemblage from Mackney Ringfort indicates a small scale ironworking industry. The metalworking dated to the medieval period and the area used for metalworking was defined by the remains of two furnace structures which may have been low shaft furnaces used for smelting. An associated annexe with an in situ flat stone may have been used for primary bloom smithing. A smithing hearth with an anvil stone in situ (C.809) was also found. From this, together with the assemblage of smithing hearth bottoms, we can say with certainty that smithing was being carried out in the early medieval period. The series of furnace cuts, together with furnace fragments and slag cakes in the shape of ‘furnace bottoms’, suggest that smelting was also carried out on a small scale. This interpretation is hindered by the lack of associated evidence, such as ore, which is strong indicator of smelting. Further analytical study of these so-called furnace bottoms would help confirm whether or not smelting was indeed carried out.

References


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Appendix 7: Plant remains

By Mary Dillon

Introduction

Mackney Ringfort was excavated in advance of the N6 Galway to Ballinasloe road scheme. The ringfort was located in the townland of Mackney 5 km north-east of Aughrim and 1.5 km south-west of Ballinasloe. The enclosure measured 58 m in diameter north-south and 55 m in diameter east-west. The site was situated on a level platform in an undulating landscape which rises gently to the north. The excavation at Mackney ringfort uncovered a long sequence of settlement and occupation activity and later reuse as a place of burial and cultivation. The ringfort encompassed a large souterrain, metal working area, postholes, possible house structure and pits and eight samples sent for radiocarbon dating returned dates between the 8th and 17th century. Over five hundred samples were scanned and seventy-six samples were found to contain plant remains. A wide variety of contexts were represented, which gives a good account of plant remains on the site. This report considers the information gathered from plant remains in terms of environment, agricultural practices and diet.

Methodology

Bulk soil samples were collected on site and were processed post-excavation using a simple flotation method. Each sample was saturated in water to allow the carbonised plant material to float, which was then poured off into a series of sieves (1 mm and 250 µm), trapping the ‘flot’ (floating material). This was air-dried and stored in air-tight plastic bags. The flots were sorted and scanned for plant material and charcoal using a low-powered binocular microscope (magnification x10 to x 40). Nomenclature and taxonomic orders follows Stace (1997). All soil samples were scanned for botanical material.

Results

Seventy-six samples yielded plant remains. However, most of these contained only a few seeds. Oat grains (43%) dominated the assemblage followed by wheat (23%) and barley (14%) (Figs 1 and 2). A large amount of legumes and Avena type grasses were present. Knotgrass (Polygonaceae) seeds, hazelnut shells, and nipplewort seeds were also well represented (Fig. 3). Most plant remains came from samples from hearth contexts.


**Phase 1 - Pre-bank features (Fig 4.)**

Only one sample represented. It had no cereal remains but had a small amount of legumes, weed seeds and small grass seeds.

**Phase 2 - Features from the 8th to 12th centuries (Fig. 5)**

A total of 31 samples came from Phase 2 contexts. Oat (42%) formed the majority of the cereals identified, while barley (27%) and wheat (17%) were also common. Two of the samples contained most of the wheat. However, these two samples are suspect as they also contained a large amount of small legumes, which, in large amounts, are synonymous with later medieval phases of excavation.

**Phase 3 - Features from the 14th to 17th centuries**

A total of 28 samples came from Phase 3 contexts. Oat (51%) formed the majority of the cereals identified, while wheat (24%) and barley (11%) were also common. Three times more cereals were identified from Phase 3 contexts as Phase 2 contexts, thus the overall percentages (see Fig.1) are more similar to those from Phase 3 rather than Phase 2.

**Discussion**

The plant remains were predominantly cereals (oat, wheat and barley) and a variety of weed seeds, some which are associated with growing among crops.

**Oat** was the most common cereal recovered from the samples, making up almost 50% of the cereals from the samples. Oat is listed as the least prestigious cereal in the 8th century law text *Breatha Déin Chécht*. The low value of oat appears to be based upon the quality of bread that can be obtained from the grain (Kelly 1998, 227). However, bread was not the only food that was made from cereals, as they were also used for making meals, porridges, gruels and soup bases (Sexton 1998, 76) and was possibly used as fodder. Oat occurs frequently in samples from the early medieval period; in several Munster sites, such as Lisleagh I, Killanuly and Lisnagun in Co. Cork and Ballyegan, and Loher in Co. Kerry, it was the most frequent cereal along with barley (Monk et al. 1998, 72). At an early medieval settlement at Whiterath, Co. Louth oat dominated the assemblage (Johnston 2000). At other medieval sites in Ireland, oat occurs frequently, although it is not always the most common (Monk, 1985/86). Oats identified from sites in Ireland include the cultivated variety (*Avena sativa*), wild oats (*A. fatua*) and the bristle pointed oats (*A. strigosa/brevis*; Monk et al. 1998, 68). Oat species are difficult to distinguish on the basis of their grains, and chaff fragments are normally required before identifications can be made. At Mackney ringfort, the oats could not be identified to species, as no characteristic chaff was found. Although oat grains were the most common grain type found, just presenting the number of grains found is biased in favour of oats, as their grain...
size is generally quite small. For example, Sample 326 from Context 384 contained 168 oat grains and 37 wheat grains meaning that oat is to wheat about 4.5 to 1. However, the 168 oat grains weighed just 0.66 g while the 37 wheat grains weighed 0.36 g which is a ratio of less than 2 to 1. Therefore, a large quantity of oat grains can take up the same volume, or weigh the same amount, as a much smaller quantity of wheat or barley grains. Also oats are easily identifiable and are much less likely to be represented in the indeterminate grain category. Just because oats frequently out-number other cereal types early medieval assemblages, does not necessarily mean that they were the most important crop.

Wheat made up 23% of the cereal assemblage at Mackney. Most of it could be identified as bread wheat. In the *Breatha Déin Chécht* bread wheat was more esteemed than spelt wheat and emmer wheat. This was probably because bread wheat has a high gluten content, which produces good quality bread (Kelly 1998, 220), it is a free-threshing cereal, making it easier to process and it is less common than other cereals as it is intolerant of damp and wet weather. Only a small amount of wheat was recovered in a survey of early medieval sites in Munster (Monk et al. 1998, 72) and there was also very little wheat in samples from the early medieval monastery at Illaunloughan, Co. Kerry (Bentley et al. 2005, 27-28). Wheat is slightly more common in early medieval sites from the east of Ireland (for example, it made up 8% of the cereal assemblage in early medieval deposits from a site excavated under at Kilgobbin, Co. Dublin (Johnston 2005), and it is particularly common at sites that may be of high status. An example includes the archaeobotanical assemblage from the ringfort at Whiterath, Dromiskin, Co. Louth where bread wheat formed a significant portion of the cereal assemblage, although oat was still the predominant crop type (Johnston 2000). However, wheat gets more common in the later medieval period, e.g. at Kilteragh, Co Kilkenny the excavation of a 13th to 15th century kiln site produced a high incidence of bread wheat in comparison to other cereals (Monk 1987, 86-87). Also at Killeen Castle in Co. Meath the medieval samples produced a majority of oat grains, followed by barley and wheat, while the later medieval samples produced a majority of wheat, followed by barley and oat (Dillon & Johnston 2006). It is clear that wheat was more popular in the 14th to 17th century phase (Phase 3) than in the 8th to 12th century phase (Phase 2) at Mackney.

Barley made up 14% of the cereal assemblage at Mackney. Barley, which originated as a wild grass in the Near East, was introduced to Ireland in the Neolithic (Monk 1985/86, 1), but became widespread during the Bronze Age period. It is frequently found at sites from the early historic period and remains popular into the medieval period. Barley was likely an important food source as well as possible animal fodder (Tierney and Hannon 2003, 155). Although it can be difficult to distinguish between two-row and six-row barley, the latter variety appears to be more common from Irish early medieval sites (Monk 1985/86, 3). No distinction could be made between two-row and six-row barley at Mackney ringfort. Barley is often the most dominant cereal from early medieval sites. At several Munster sites it was the most frequent
cereal along with oat (Monk et al. 1998, 72). At Ratoath in Co. Meath a number of corn-drying kilns were excavated and barley was the dominant cereal grain recovered (Lyons 2005) and barley was also the most common cereal found at the early medieval site at Athlumney, Co. Meath (Johnston 1999). Barley accounted for almost 80% of the total number of cereal grains found at Rosepark, Balrothery and there is evidence that at least some of the barley found at the site was malt being prepared in the kiln for brewing (Johnston 2002). Barley was more common from samples from Phase 2 compared to those from Phase 1, indicating that it decreased in popularity at Mackney in the later medieval period.

**Rye** was rare in the samples - only seven grains were identified, most of which came from the later medieval samples. Rye is ranked as the second most important cereal in the *Bretha Déin Chécht* (Kelly 1998, 221) and is found widely, but in small amounts on medieval sites such as some early medieval rural sites in Munster (Monk et. al. 1998, 72) and at Athlumney, Co. Meath (Johnston 1999).

Large **legumes** and **beans** were recovered in large quantities from the samples. Peas, beans and other legumes would have been a valuable source of protein (Kelly 1998, 249). Smaller legumes seeds were also recovered in the samples, in amounts that rivalled wheat and barley frequencies. These are found in large amounts in samples from late medieval contexts from Ireland, in particular in areas associated with Anglo-Norman agricultural practices e.g. at Killeen castle in Co. Meath (Dillon & Johnston 2006). They may be an indication of crop rotation, using nitrogen fixing plants such as legumes to aid rejuvenation of the soil and as a form of green manure although as yet there is relatively little evidence to date its use in Ireland. The legume rich samples are, in the majority, from the 14th to 17th century phase. Their presence in these samples suggests intensive agricultural practices. The large legumes imply that the later phases of Mackney occupation enjoyed a more varied diet than their previous occupants.

Other **weed seeds** recovered included nipplewort (*Lapsana communis*), knotweed family (including black bindweed), plantain, cleavers and wild radish. Most of these weeds grow alongside crops; these were probably harvested with the cereals that were then brought to site. The 14th to 17th century phase occupants had the same percentage of weed seeds to grain as their predecessors. The large amount of nipplewort seeds present in the samples suggests that it may have been growing prolifically in fields and was processed with the cereal crop. Alternatively, it may have been gathered as a food source as its leaves are edible and nutritious (Mabey 1972, 84). Weeds belonging to the knotgrass family normally are associated with disturbed and arable ground, but it has also been suggested that they were purposely collected and used to supplement the diet. Helbaek noted that knotgrass family weeds were eaten in prehistoric Denmark (Helbaek 1954) and Mitchell writes that goosefoot and knotweed seeds formed a large part of the diet in prehistoric and medieval times (Mitchell & Ryan 2001, 302). It is
possible that at Mackney weed seeds were purposely collected and possibly added to food stuffs. According to Behre (2007) however, to accept that a weed species was gathered as a foodstuff they have to fulfil mainly two criteria: they must occur in large and pure assemblages, separated from other species, and they should occur regularly in the stomach or gut of dead bodies. It is therefore only possible to say that certain weed seeds in the Mackney assemblage may have been used as foodstuffs. Weeds recovered in smaller amounts from Mackney include corn cockle (*Agrostemma githago*). This plant is a weed of cornfields and relies on a cultivated habitat for growth. It is poisonous in large amounts. However, it was common in medieval cess deposits and therefore evidently tolerated in small amounts (Geraghty 1996, 37). A small number of haws (*Crataegus*) were found, along with one elder (*Sambucus*) pip. These may have been eaten as food or been attached to wood that was used for burning.

Hazelnut shell fragments were present in small amounts in a considerable number of samples. The main reason for the preservation of carbonised hazel shell is that, once the nut was extracted, the shell was thrown into domestic fires as waste (Monk 2000, 75). Hazelnut shell has been recovered from a number of excavations of medieval ringforts in Munster (including those at Lisnagun and Lisleagh 1), in addition to other gathered foods such as blackberry (Monk et. al. 1998, 68). Clearly gathering of foods provided an important supplement to the diet of the time. Hazelnut shells were much more common in the 8th to 12th century phase than in the later medieval occupation, possibly signifying a decrease in the importance of gathered food stuffs in later medieval times, or alternatively, a decrease in the amount of easily accessible hazel trees. Hazelnuts are extremely nutritious as they have a high protein and high lipid content. Their nutritional value may be the reason that in ancient Irish mythology hazel was known as the tree of wisdom. In the saga of the Salmon of Knowledge it was from hazelnuts that a particular salmon, known as the Salmon of Knowledge, acquired its wisdom and was said to pass on its wisdom to the first person who tasted it (Cross and Slover 1936). In the *Breatha Comáithcesa*, the main law-text on farming from the early medieval period, hazel is renowned as being the ‘food-provider of the woods’ (Kelly 1998, 382). It is highly probable that during the duration of the settlement at Mackney ringfort hazelnuts were an important component of the diet. However, hazelnut shells survive well before and after carbonization and this may lead to a bias in their favour.

No chaff was recovered from the samples. The absence chaff is unusual in comparison to assemblages from other sites e.g. at a medieval grain-drying kiln at Rathdown Upper, Co.Wicklow a ratio of 15:1 wheat to wheat chaff was recovered leading the author to believe that the wheat had been threshed if not fully cleaned before drying in the kiln (Vaughan-Williams 2005). The absence of chaff in the samples from Mackney may indicate that there was a preservation bias against the chaff. Rachis material from free threshing cereals is destroyed at lower temperatures than the cereal grains themselves (Boardman and Jones 1990).
Comparative studies

Comparisons with plant remains studies from other early medieval include material from excavated crannogs. These studies reveal that a large amount of un-charred seeds would have been present on site. Because they were not charred these did not survive on sites where there were no waterlogged preservation conditions. For example, at Shrove crannog, Co. Sligo, a large amount of fruit seeds were recovered, as well as seeds from wetland plants in the surrounding area (McClatchie 2003).

At Loughbown 1 ringfort E2442, which was situated just a few miles from Mackney, 70 samples produced charred plant remains (Tierney 2007). Oat was present in 42% of the samples, barley in 29% and wheat in 28%. Rye was only recovered from one sample. Where identifiable, the wheat was primarily bread wheat. The results of this basic presence analysis are very similar to those obtained from Mackney. At Carnmore West, elsewhere on the present N6 road scheme, a cashel site with three corn-drying kilns produced an assemblage that was dominated by oat (42%), followed by barley (36%), wheat (7%) and rye (3%) (Dillon 2007). These results are similar to those from the 8th to 12th century phase at Mackney.

Summary

Oat, barley, wheat and rye were present in the samples from this site. Oat dominated, making up nearly 50% of the cereal assemblage. Wheat and barley were almost equally represented at 23% and 14% respectively. Only a few grains of rye were present. During the 8th to 12th century phase at Mackney, wheat was probably much less common than oat or barley. In the 14th to 17th century phase of occupation wheat replaces barley as the second most common grain. Based on the results from Mackney, if we assume that these charred grains give an accurate reflection of the most important crops used at the site, then it is probably quite likely that oats and barley, and then in the latter phase oats and wheat, were of equal importance. The large amount of weed seeds found may indicate that certain plants, such as nipplewort, were gathered as food stuffs, although this is very tentatively suggested as it is more likely that they were a weed of crops. The significant number of large legumes present indicates that these may have been an important protein source for the inhabitants of Mackney ringfort in the latter phase of occupation. Hazelnuts were evidently also a common food, particularly in the earlier phase. Perhaps they were replaced by legumes as a protein food as time went on.

The scenario from the latter phase of occupation is somewhat different to plant remains studies from a variety of early and later medieval sites around Ireland. The material from Cork and Kerry ringforts and cashels suggests that oats and barley were very common, but that wheat was virtually absent. At Mackney and Loughbown 1 wheat makes up a good proportion of the cereal assemblage. These differences in the cereal assemblages may be attributable to the fact that the Munster ringforts were not occupied in later medieval times. Soil and climate reasons, as well as social and cultural preferences, may also come into play. What is
significant here is that, even at a relatively simple level of analysis, differences and patterns are visible. Because of this, potential future research could focus on regional patterns in the evidence for crop exploitation at ringforts.

References

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![Pie chart showing percentage frequency of cereals](image_url)

Fig. 1 Percentage frequency of cereals
Fig. 2 Frequencies of cereals.

Fig. 3 Frequencies of the most common non-cereal plant remains. Legumes are rare while hazelnut shell is more common in the earlier phase.
Fig. 4 Percentage frequency of cereals from the 8th to 12th century phase at Mackney. Wheat is reduced to just 4% when two possibly later samples are removed.

Fig. 5 Percentage frequency of cereals from the 14th to 17th century phase at Mackney.
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<th>Context</th>
<th>Sample</th>
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<td>Indeterminate seeds from the Knotgrass family (Polygonaceae)</td>
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<td>Wild radish (Raphanus raphanistrum L.) capsule</td>
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<td>Beans (Phaseolus/Vigna/Vicia/Faba)</td>
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<td>Meadow/Creeping Buttercup (Ranunculus acris/repens L.)</td>
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<td>Corncockle fragments (Agrostemma githago L.)</td>
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<td>Indeterminate seeds from the Legume family (Fabaceae-lrg)</td>
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<td>Plantain (Plantago L. species)</td>
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<td>Nipplewort (Lapsana communis L.)</td>
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<td>Barley grains (Hordeum vulgare L.)</td>
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<td>Free threshing wheat (Triticum aestivum L./turgidum Desf./durum L.)</td>
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<td>Small grass seeds (Poaceae)</td>
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<td>Elder berry (<em>Sambucus nigra</em>)</td>
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<td>Nipplewort (<em>Lapsana communis</em> L.)</td>
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Appendix 8: Charcoal

By Mary Dillon

Introduction

Mackney ringfort E2444 was excavated in advance of the N6 Galway to Ballinasloe road scheme. The ringfort was located in the townland of Mackney 5 km north-east of Aughrim and 1.5 km south-west of Ballinasloe. The enclosure measured 58 m in diameter north – south and 55 m in diameter east – west. The site was situated on a level platform in an undulating landscape which rises gently to the north. The excavation at Mackney ringfort uncovered a long sequence of settlement and occupation activity and later reuse as a place of burial and cultivation. The ringfort encompassed a large souterrain, metalworking area, post-holes, possible house structure and pits. Because the number of samples with charcoal was low, all samples with charcoal were included in the analysis. Over three hundred and fifty samples were scanned and ninety samples were found to contain charcoal. A wide variety of contexts were represented, which gives a good account of wood use on the site. The results are considered in relation to past woodland environment, woodland exploitation and wood-type selection. The results of the charcoal analysis are compared to pollen diagrams from Mongon Bog (Parkes & Mitchell 2000; Hall 2005), which lies about 12 km from the site, near Clonmacnoise in Co. Offaly. Eight samples sent for radiocarbon dating so far have returned dates between the 8th and 17th centuries.

Methodology

Bulk soil samples were collected on site and were processed post-excavation using a simple flotation method. Each sample was saturated in water to allow the carbonised plant material to float, which was then poured off into a series of sieves (1 mm and 250 µm), trapping the ‘flot’ (floating material). This was air-dried and stored in air-tight plastic bags. All charcoal fragments of 2 mm or greater were identified. Each fragment was prepared for microscopic examination by fracturing it by hand and thereby exposing a clean surface along transverse, radial and tangential planes. All three planes were examined at a range of magnifications (x 5 to x 120) under a Nikon stereo microscope. For reference literature the website ‘wood anatomy’ was consulted. The number and weight of fragments were recorded for each wood type. The following details were also noted:

- Ring curvature (this analysis is broadly indicative of age and charcoal fragments with strong curvature, were classified as <5 years while negligible curvature was classified as 15+ years, i.e. mature wood)
• Pith (where present, the age of the fragment was noted, equal to the number of rings present)
• Insect infestation (holes, round and larger than vessels, are usually regarded as caused by burrowing insects and their frequency was noted since insect infestation is generally a sign of dead wood)

Results

In total, 2416 fragments were analysed from 115 samples (Table 2 & 3). The results are presented in Figs 1, 2, 3 and 4, where the percentage fragment frequency, percentage weight, fragment count and weight count of the various wood types are displayed.
The assemblage was dominated by oak (62% / 70%), followed by hazel (8% / 9%), ash (7% / 4%), Pomoideae (6% / 4%), and Prunus (4% / 4%), with results given as percentage fragment frequency and percentage weight respectively. Other wood types identified in
small amounts were hazel/alder, willow/poplar, alder, holly, birch, spindle, yew and elder. As regards the individual contexts, there is considerable variation between context types (see Figs 5-14 at end of document).

**Occupation phases**

Sampled occupation at the site was split into three phases (Phases 1-3). Three samples were taken from Phase 1 (pre-bank features) and the results are illustrated in Fig. 5. The charcoal from this was identified as oak (49%), yew (41%) and small amounts of hazel/alder, alder and willow/poplar. The high percentage of yew may be indicative of structural wood or artefact remains.

A total of 47 samples were examined from Phase 2 (8th to 14th centuries) and the results are illustrated in Fig. 6. The samples produced oak charcoal (53%), ash (16%), hazel (9%), hazel/alder (5%), alder (5%), willow/poplar (5%), Pomoideae (4%), *Prunus* (1%), birch (1%) and less than 1% of diffuse porous, holly, spindle and yew. Compared to the later medieval occupation (Phase 3) there is a larger variation in wood types and oak was not as dominant.

A total of 38 samples were taken from Phase 3 (14th to 17th centuries) and the results are illustrated in Fig. 7. The results indicate that oak charcoal was dominant (79%), ash (1%), hazel (8%), hazel/alder (3%), alder (1%), willow/poplar (3%), Pomoideae (4%), *Prunus* (2%), and less than 1% of birch and elder. Oak is dominant to the detriment of other wood types. In terms of quantity there was slightly more charcoal from the Phase 3 samples than from Phase 2.
Figs. 5-7 Percentage fragment frequency of wood types from Phase 1, 2 and 3 respectively

**Discussion**

Oak (*Quercus*) is well represented in the assemblage (62% / 70%) especially in samples from hearths / furnaces and pits (forming 73% and 71% of the assemblages respectively) and from Phase 3 samples in general. A large amount of slag was recovered from the site and it is likely that oak was utilised in metalworking firings. Oak is slow burning and gives out substantial heat as it burns which would have made it a natural choice for a metalworking as high temperatures of between 1100-1250° are needed to smelt iron (Waddell 1998, 286). It would
have been deliberately selected to fuel the iron smelting process. As the early historic period progressed, oak would have become less widespread but still would have been common according to the Parkes & Mitchell (2000) pollen diagram from Mongon Bog. Historically, oak was one of the preferred woods for making charcoal along with alder and strawberry tree (*Arbutus unedo*) (Feehan 2003, 299-355). In medieval England we know that oak was coppiced to provide a self-renewing supply of timber, without the need to clearfell woodlands. There is no evidence of coppiced oak being used at Mackney, possibly because there was a plentiful supply of oak woodland. There are two native species of oak in Ireland, namely *Q. petraea* and *Q. robur*. Unfortunately, it is difficult to distinguish these species on the basis of wood anatomy (Grosser 1977). A distinction was not attempted in these investigations. Much of the oak identified was from trunk or large branches. Some of the oak charcoal may represent the remains of oak posts and other building timbers. According to Halls pollen diagram from Mongon Bog (2005), woodland remained consistent until the 17th century, when there was a major fall off in tree pollen. From the charcoal analysis it appears that oak was much exploited as an industrial fuel, domestic fuel and probably as a construction material. During both phases of ringfort occupation more distance would have had to be crossed to obtain oak as woodland exploitation took its toll.

Hazel (*Corylus avellana*) accounts for 8% (or 9% percentage weight) of all charcoal fragments identified. It is represented equally in both Phase 2 and Phase 3. Hazel was widely exploited in both prehistory and historical times for its nutritious nuts and supple rods which were widely used for building. Hazel nuts were common in the plant remains, especially from Phase 2 occupation. It was likely used for constructing wattle panels on Mackney. Its coppice-like growth form makes it relatively easy to cut and there are normally substantial quantities of dead wood available near ground level. According to the pollen diagrams hazel was abundant in the landscape, by far the most common tree. Given this it is surprising that it was not more utilised on site. Much of the hazel wood was twiggy wood, especially that from the kiln.

*Ash* (*Fraxinus excelsior*) accounted for 7% of the assemblage (4% by weight) is present in small amounts in many of the samples, but dominates samples from the souterrian. Ash makes great fuel, burned green or dead, and it is surprising that it was not more common in the assemblages. According to the pollen diagrams it was available in the locality. Interestingly it forms 43% / 50% of the souterrian charcoal assemblage which is far above the average presence. It is more common in Phase 2 (16%) but rare from Phase 3 (1%) probably because oak was the wood of preference at this time.

Pomoideae type charcoal can include fragments from Rowan/Whitebeam (*Sorbus*), Hawthorn (*Crataegus*) and Crab apple (*Malus*). This charcoal type was consistently present in nearly all of the samples (forming 6% / 4% by weight of the assemblage). It is equally represented in Phase 2 and Phase 3. Woodlands and woodland-related environments are the normal habitats for the various woody plants that may be represented in this wood type. An important habitat, especially for hawthorn (*Crataegus*), is the so-called Mantel or edge com-
munities of woodlands (cf. Wilmanns and Brun-Hool 1982). The spines of hawthorn afford it a degree protection from grazing and enable it to establish and survive in the face of light grazing. Several carbonized haws were found on site (Dillon 2007a). Pomoideae was poorly represented in the pollen record (it is insect pollinated).

The charcoal type labeled as *Prunus* spp. includes wild cherry (*P. avium*), bird cherry (*P. padus*) and blackthorn (*P. spinosa*). *Prunus* charcoal is present in small amounts in many of the samples (forming 4% / 4% by weight of the assemblage) and was the dominant wood type in the kiln samples. Blackthorn may have been common in Mantel vegetation while wild cherry would be expected to occur in the woodlands. Bird cherry may also have been represented. Today, it is largely confined to the northern part of Ireland (Preston et al. 2002). Webb et al. (1996) regard it as introduced though this view is not universally accepted. *Prunus* was poorly represented in the pollen record (it is insect pollinated). One fragment of *Prunus* had thorn attached indicating that this was *Prunus spinosa*.

Willow/poplar (*Salix/Populus*) charcoal (4% / 2%) was recorded in many of the samples but in small amounts. Poplar is seldom recorded in Irish pollen diagrams and then mainly in the early Holocene. It is assumed that willow (one or more of several possible willow species) is mainly represented in the charcoal records. Willow prefers a wet or damp ground and a damp hollow occurred northeast of Mackney ringfort, providing a potential habitat.

Yew (*Taxus baccata*) Yew (3% / 2%) was present in a number of samples and made up 20% of the samples from post-holes. Yew was highly prized for its wood which was used in construction of tools, domestic utensils and religious artifacts (Feehan 2003, 344). The yew from the post holes may represent burnt posts. Some of the fragments had insect burrowing holes, which may be a further indication of structural wood. The vast majority of the yew charcoal came from Phase 1.

Alder (*Alnus glutinosa*) charcoal (2% / 3%) was present in small amounts in three context types – souterrain, kiln and pits. Alder is quite common in the local diagram, but was probably largely confined to damp/wet areas. Its diminutive presence in the assemblage is likely due to the fact that alder doesn’t burn very well. Some of the fragments identified came from twiggy wood.

Spindle (*Euonymus europaeus*) charcoal was present in small amounts (0.17% / 0.10%). This is an interesting addition to the more commonly occurring wood types in the charcoal record, especially because it is insect pollinated, and thus quite rarely found in pollen diagrams. It is a fine grained wood, and was used for making spindles and skewers in the past.

Birch (*Betula*) (0.54% / 0.16%) was present in very small amounts in just two samples. The Parkes & Mitchell (2000) pollen analysis from Mongan Bog indicates that birch was readily available in the region in the early historic period (2000) and is surprising that it was so scarce in the samples. The lack of birch charcoal in the assemblages indicates that birch wood may have been avoided. There are many examples of certain trees being taboo, despite their suitable physical properties, in cultures across the world (see Dillon 2006).
Elder (*Sambucus nigra*) (0.04% / 0.01%) was present in one sample. Elder is one of the first trees to invade a new hedgerow and grows in most conditions but prefers slightly damp ground. It was highly reputed in the past as a source for herbal medicines (Feehan 2003, 338). Interestingly a carbonised elder berry seed was also found on site (Dillon 2007a).

Holly (*Ilex aquifolium*) (0.04% / 0.005%) was present in one sample. Holly has a wide ecological amplitude in Ireland today and was thus probably available in the locality at the time. It is recorded as being used as winter animal fodder (Gale & Cutler 2000, 139; Neeson 1991, 29).

**Palaeo-environmental studies in the area - Pollen diagrams from Mongon Bog**

Apart from a pollen diagram carried out as part of the archaeological works in advance N6 Ballinasloe to Galway road scheme, there has been little palaeoenvironmental research carried out in this region. However, cores were taken for two different palaeoenvironmental studies in Mongon Bog near Clonmacnoise, some 12 km from Ballinasloe, gives some indication of vegetation history (Parkes & Mitchell 2000; Hall 2005. These diagrams give different pictures of the vegetation history of the area. Parkes & Mitchell (2000) indicate that there was extensive forest cover in the Neolithic with large oak and elm woodlands, which was somewhat reduced in the Early Bronze Age. Woodland dominated the landscape however, until AD 800, when a significant decline in cover was recorded which Parkes & Mitchell believed was probably a direct result of the establishment of the monastery at Clonmacnoise in the 6th century. In the diagram, hazel oak, ash, alder and birch were the most common trees represented during the early period (although alder and birch were probably over represented as a result of high pollen production and dispersal). According to Hall’s diagram, the woodland vegetation was largely unchanged between the 4th and 17th century, after which there was a major fall in tree pollen (Hall 2005). Hall’s diagram was dated using tephra as opposed to Parkes & Mitchells diagram which used radiocarbon dating. According to Pilcher, the former is a more accurate way to date a pollen core (1993).

**Comparative studies**

It is useful to compare these results with those from Loughbown I ringfort E2442, which lies just 1.7 km to the west of Mackney ringfort (Dillon 2007b). The assemblage at Loughbown I was also dominated by oak (62% / 37%), to a similar degree as at Mackney ringfort (62% / 70%). While Loughbown I showed a high frequency (98%) of oak from samples from a bowl furnace, all the hearths/firings from Mackney ringfort had a high percentage of oak (77%). It would seem likely that the high percentage of oak from Mackney is connected to
metalworking that took place on site. Slag, furnaces and heat-shattered stones were associated with a series of pits, fire-pits, hearths, and post-holes associated with metalworking processes. However, it would also seem plausible that oak was widely used on Mackney ringfort. Oak was probably considered the most important tree in the past and was referred to as the ‘Tara of all trees’ in the annals. It was highly valued for its timber, acorns and bark. The huge diameter of the enclosure, the depth of the ditch – up to 3 m in places – and the large size of the souterrain at Mackney may be an indication of the high status of this site and the prominence of oak wood at this site may be another suggestion of its high status. At shrive crannog, Co. Sligo, it is suggested that the use of locally gathered alder rather than a higher quality wood such as oak may imply that the site was of low status (Fredengren et. al. 2004, 177). Oak woodlands would have been an important resource and if a settlement had access to such resources it could well indicate that a position of high rank was held.

In contrast to Loughbown I where ash (15% / 22%), hazel (14% / 13%) and Pomoideae (12% / 16%) were important, trees other than oak are not so significant at Mackney ringfort. Ash, which was important at Loughbown 1 and in the Mongon Bog pollen diagrams, made up only 7% of the fragment count at Mackney.

After oak the next most common wood type at Mackney was hazel, which made up 8% of the fragment count. It is surprising that hazel was not more common given that it was well represented in the Mongon Bog pollen diagrams. In fact Hall concludes that, in contrast to assertions by some historians about unbroken oak woodland growing in Ireland down through the last two thousand years, it was hazel rather than oak that vegetated the midlands of Ireland (2005), although oak grew in the area.

Thirteen wood types were represented at Loughbown 1, compared to twelve at Mackney.

Buckthorn, elm and ivy were exclusively present at Loughbown 1, while spindle and elder were exclusive to Mackney. The scarcity of elm charcoal is a reflection of the elm decline, which began in the Neolithic and continued through prehistory.

Randalstown settlement near Kells in Co. Meath was excavated over four seasons in the 1970s and early 1980s. It was dated to between the 5th and 7th centuries AD (Dillon 2006). Hazel, oak, pomoideae and holly were the most common wood types found on the site. Similar to Mackney oak wood was used in industrial firings - one pit with slag had 98% oak wood.

While there is little published work on charcoal from ringforts, more has been written about waterlogged wood from crannogs. Given that this settlement type co-existed with ringforts in the early historic period it is interesting to compare the results with those from Mackney. Approximately 25 km from Mackney is the location of Ballinderry 2 crannog. Oak, birch and ash were used to make the palisades here (O’Sullivan 1998, 111). As the crannog was excavated in the 1950s, full wood analysis was not carried out. At Bofeenaun crannog in Co. Mayo wood analysis revealed that oak, birch, hazel and willow wood was used to construct the palisade (ibid, 121).
Woodland in early and later medieval Ireland had a relatively high economic value (Mac Niocaill 1971, 85). Enclosed woods had twice the value of unenclosed woods, as animals were prevented from foraging. Ireland’s woodland coverage fluctuated over time but given accounts from the annals and pollen diagram studies it is believed that woodland was plentiful until deforestation in the 17th and 18th century. Excavation of a number of early and later medieval post-and-wattle buildings reveals that oak was used for the posts and hazel for the rods, for example at Lisleagh 1, Co. Cork (Monk 1993). According to one study, a ringfort containing one post and wattle house and a number of outhouses would require ten acres of managed woodland to meet its structural and firewood needs (Tierney 1998, 55). However, evidence of managed woodland in medieval Ireland is sparse and more acreage would have been needed if the woodlands were not managed.

Presence in the charcoal assemblage does not necessarily indicate abundance in the local landscape. Studies of traditional societies have shown that local scarcity of a species and long distances to be crossed in order to obtain it, do not deter the wood gatherers from selecting their wood of choice (Théry-Parisot 2002, 246). In the opposite way, lack of charcoal from a certain species does not mean that it was rare in the locality. Charcoal identifications from Shrove crannog, in Co. Sligo, had a low percentage of alder, even though the site was located on a wetland where alder would have been common, and was the dominant species from the wood assemblage from the same site (Fredengren et al. 2004, 177).

Early Medieval Literature

According to Fergus Kelly (1999) the old Irish law text *Breatha Comaithecesa*, which dates from about the 8th century AD, arranges trees into four different groups, and lists the penalties payable for damage to a tree in each group. The most highly valued class is described as the ‘lords of the woods’ (Table 1), the second class was the ‘commoners of the wood’, the third class was the ‘lower divisions of the wood’ and finally the fourth class was the ‘bushes of the wood’. These are listed below:

- The lords of the wood (oak, hazel, holly, yew, ash, pine and apple) with penalties for damage; fine equivalent to two milch cows and a three year old heifer
- The commoners of the wood (alder, willow, hawthorn, rowan, birch, elm and wild cherry) with penalties for damage; one milch cow
- The lower divisions of the wood (blackthorn, elder, spindle, whitebeam, arbutus, aspen and juniper) with penalties for damage; one heifer
- The bushes of the wood (bracken, bog-myrtle, furze, bramble, heather, broom and wild rose) with penalties for damage; one sheep
There is a 9th century commentary attached to *Breatha Comaitheasa* as to why each the “lords of the wood” were so greatly valued.

<table>
<thead>
<tr>
<th>Tree</th>
<th>Reasons given for being a lord of the wood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oak</td>
<td>Its acorns and use in woodwork</td>
</tr>
<tr>
<td>Hazel</td>
<td>Its nutritious nuts and rods</td>
</tr>
<tr>
<td>Holly</td>
<td>Used to make chariot shafts. Also possibly used as winter fodder</td>
</tr>
<tr>
<td>Yew</td>
<td>Used to make objects</td>
</tr>
<tr>
<td>Ash</td>
<td>Used to make furniture and spear-shafts</td>
</tr>
<tr>
<td>Scots pine</td>
<td>Its resin was used as a preservative</td>
</tr>
<tr>
<td>Apple</td>
<td>Its fruit and bark. (It is unsure what its bark was used for, but it may have been used as a dye)</td>
</tr>
</tbody>
</table>

Table 1. Summary of why each lord of the wood was so highly valued (from Kelly 1999, 41-44). The list is useful because it reminds us how important woodland resources were during the early medieval period, not just for domestic and industrial fuel, but for the food, animal fodder, timber, tools etc.

**Conclusion**

The results of the charcoal analysis from Mackney ringfort gives us information on both the palaeowoodland environment of the area around Mackney during the medieval period and the use of such woodlands. Oak was represented most frequently in the assemblage. Oak was deliberately gathered for industrial firings and is over represented because of this i.e. the trees around Mackney were not two-thirds oak. Presence in the charcoal assemblage does not necessarily indicate abundance in the local landscape. Oak woodlands would have been an important resource and because Mackney settlement had access to such resources it could well indicate that a position of high rank was held.

One third of the assemblage was made up by eleven wood types, but trees such as hazel and ash which are common in the pollen diagrams (indeed hazel is dominant) are not so significant as one might expect. Certain trees such as alder and birch that we know were somewhat available from the pollen diagrams from Mongon Bog, were scarcely used. These trees may have been growing in boggy and wet inaccessible land or they may have been deliberately avoided for cultural reasons.

The large amount of trees represented in the assemblage gives us a good indication of the trees that were present in the environment at the time (some of which will not be represented in pollen diagrams as they are insect pollinated) as well as the large number of different types of trees which were utilized by the settlement.
References


Hall, V. 2005. The vegetation history of monastic and secular sites in the midlands of Ireland over the last two millennia. In: *Vegetation History and Archaeobotany* (online version).


Figs. 8-13 Percentage fragment frequency and percentage weight of wood types from the various features
Figs. 14-17 Percentage fragment frequency and percentage weight of wood types from the various features
Appendix 9: Animal bone

By Margaret McCarthy, MA, MIAI

Introduction

The excavations at Mackney ringfort revealed evidence for human activity spanning the early medieval to the early modern period. Animal bones were recovered, in varying quantities, from all phases and areas of the site although the vast majority of the faunal evidence originated from the fills of the deep enclosing ditch dating to the main early medieval phase of occupation at the site. Within the interior several large structures, pits, a small-scale metalworking area and a substantial souterrain relate to the same period of activity. A rather extensive phase of industrial activity associated with corn-drying occurred during the later medieval period and the fourth and final phase saw the abandonment of the ringfort and reuse of the site as a children’s burial ground and for ridge and furrow cultivation. There was no occupation of the site in the final abandonment phases and the recovered bone samples could be residual from earlier periods although there is no definitive evidence of this.

Condition and recovery

The faunal assemblage was in a reasonably good state of preservation with fragments from the ditch fills being notably less abraded than those in other feature types. The colour of the bones ranged from light to mid brown and with the exception of a few burnt fragments was fairly uniform within contexts. Bones from the souterrain, the various internal structures and the post-medieval cultivation furrows were not well-preserved and appeared to have suffered some degree of surface abrasion, indicating that many fragments had been redeposited from their primary contexts. The comparatively small number of complete bones and the fact that large numbers of loose teeth were recovered from all areas and phases of the site suggests that the material was in a fragmentary state. Fragmentation rates were constant throughout and this is attributed to the treatment the bone received either before or after it was deposited. A consequence of this extreme fragmentation, unfortunately, was that there was a shortage of measurable bones upon which size estimates of the domestic animals could be established.

Although dog bones are consistently represented in the samples, the material does not appear to have been effected to any great extent by canid consumption. While it has to be assumed that dogs had access to a certain amount of food waste, the indications are that domestic debris was rapidly disposed of into the deep enclosing ditch. Evidence of burning was equally scarce throughout the assemblage with only a few affected fragments present in a limited number of contexts. The nature of the burnt bone varied from being scorched to charred to calcined but this form of modification rarely accounted for more than 1% of the
remains from any one context. Butchery marks were not recorded in significant amounts and the paucity may be linked with the preservation conditions and the fact that a great deal of the bone was very finely fragmented.

Some of the bone came from the residue of bulk soil samples taken for sieving in order to recover organic remains. A few of these were bird bones but the bulk of the sieved assemblage consisted of small indeterminate fragments of animal long bones. Other diagnostic bones recovered from the sieved samples included amphibian bones and the limb bones of rats.

**Methodology**

All material recovered from dated contexts was assessed for this report. Where possible, fragments were identified to species or species group, using the reference collection in the Department of Archaeology in University College Cork. The archaeozoological analysis targeted bone from well-sealed stratified deposits and the bulk of these came from the enclosing ditch. Material from disturbed layers and modern features was separated at the initial stage of investigation and the data from these features are not included in the overall analysis and interpretation. The faunal remains were recorded by individual context and sorted into identifiable and non-identifiable specimens. Many bones could not be positively identified to species and these were sorted into three higher taxonomic categories. When a specimen could not be assigned to sheep or pig, the category ‘medium-sized mammal’ (MM) was used. In the same way, specimens that could not be positively identified as cattle and may also have belonged to horse or red deer were assigned to the category ‘large-sized mammal’ (LM). All ribs and many skull and vertebra fragments were classified as large and medium mammal remains only. The third group included those specimens that could not be identified to species, element or size category. These bones were counted and butchery marks, traces of burning and carnivore gnawing were recorded. The ageing of domestic animals was established using the epiphyseal fusion rates quoted by Silver (1971) for limb bones. All mandibles were recorded using Grant’s (1975) method, which involves the recording of eruption and wear stages on the molars and the assigning of a numerical value (nv) to the mandibles. Post-mortem tooth loss seems to have been a particular problem at Mackney and many of the mandibles found could not be assigned to a precise wear stage. The relative frequencies of the animals represented were estimated by the percentage of bones for each species identified and by the minimum number of individuals present. The latter figure was estimated for each context and was based on longbones only.

Sheep were distinguished from goat by close examination of suitable bones as outlined by Boessneck (1969) and Prummel and Frisch (1986) and by comparison with modern skeletal material. The ovicaprid bones are all referred to as ‘sheep’ in the text as many of them were definitely identified to this species by morphological traits and just two bones were positively identified as belonging to goat. Measurements were taken wherever possible according to the methods of Von den Driesch (1976) using a hand-operated digital callipers. Measure-
ments were taken on the bones where possible but the measurable sample was too small for a
detailed metrical analysis. Details of all measurements are provided in the appendices to this
report.

Analysis

A total of 6686 bones were recovered during the excavations and half of these were taken
with confidence to species level. Careful excavation techniques and an enlightened sampling
strategy resulted in the recovery of relatively large amounts of fragments that could only be
classified into large and medium-sized mammal categories (42%). The remaining 8% of the
assemblage remained indeterminate. Overall, the assemblage derived largely from ditch fills
(54%), souterrain fills (19%) and cultivation furrows (15%) with the remaining 12% coming
from a variety of other feature types. The material is described below by the various phases of
activity and the context groupings recognised by the excavators.

Phase 1: Possible pre-bank features

The earliest trace of activity at Mackney was recognised beneath in situ bank deposits and
below the remains of a buried sod layer that survived beneath the line of the bank. One of
these features, a fire pit, yielded charcoal that produced a radiocarbon date of cal AD 728 –
949. Animal bones were recovered from a few features associated with this pre-ringfort phase
of activity. The natural subsoil layers (C202 and C794) produced 19 animal bones and seven
of these were identified as the remains of cattle with identified elements including radius,
skull and vertebrae fragments. All of the vertebrae belonged to an immature individual. The
remainder of the sample represented the long bone fragments of medium and large-sized
animals. The buried ground deposits (C205 and C757) contained 10 animal bones and cattle
were again the only identified species, represented by the distal portion of a right calcaneum
and a tooth. The recovered animal bone sample is too small to be of any significance in terms
of interpreting livestock economy during this earliest phase of activity at the site.

Phase 2: Construction and occupation of ringfort

Radiocarbon evidence indicated that the construction of the enclosing ditch and bank and
the related internal features took place sometime during the eight and ninth centuries. The
entrance causeway and associated features, the central circular house (Structure A), the par
tial circular house (Structure C), the lean-to (Structure B), the refuse pits and the souterrain
have all been attributed to the primary phase of ringfort occupation. The identification of
other features with this primary phase, such as the post-hole concentration (Structure G), the
possible rectangular structure (Structure D), the post-hole arc (Structure E), the L-shaped
post-hole concentration (Structure F) and the L-shaped linear features is less certain in terms
of chronology and the possibility remains that some of these features may belong to later occupation phases.

A total of 5208 animal bones were recovered from contexts that could be assigned to the main early medieval phase of activity at the site. The quantities of recovered animal bone varied considerably between the excavated features and the distribution of bone material in each of the context groupings is detailed below in Table 1.

Table 1: Distribution of animal bones across features relating to the primary phase of occupation at the ringfort

<table>
<thead>
<tr>
<th>CONTEXT TYPE</th>
<th>NO. OF BONES</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enclosing ditch</td>
<td>3609</td>
<td>69</td>
</tr>
<tr>
<td>Enclosing bank</td>
<td>61</td>
<td>1.1</td>
</tr>
<tr>
<td>Entrance features</td>
<td>35</td>
<td>0.6</td>
</tr>
<tr>
<td>Structure A</td>
<td>16</td>
<td>0.3</td>
</tr>
<tr>
<td>Structure B</td>
<td>40</td>
<td>0.7</td>
</tr>
<tr>
<td>Structure C</td>
<td>13</td>
<td>0.2</td>
</tr>
<tr>
<td>Structure D</td>
<td>1</td>
<td>0.01</td>
</tr>
<tr>
<td>Structure E</td>
<td>1</td>
<td>0.01</td>
</tr>
<tr>
<td>Structure F</td>
<td>49</td>
<td>0.94</td>
</tr>
<tr>
<td>Structure G</td>
<td>14</td>
<td>0.2</td>
</tr>
<tr>
<td>Refuse pits</td>
<td>33</td>
<td>0.6</td>
</tr>
<tr>
<td>Souterrain</td>
<td>1264</td>
<td>24.2</td>
</tr>
<tr>
<td>Metalworking features</td>
<td>72</td>
<td>1.3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>5208</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Enclosing ditch*

The excavated sections of the large enclosing ditch revealed a series of complex deposits representing the construction, use, erosion, re-use and deliberate backfilling of the ditch. The deposits contained slag, furnace bottoms, iron fragments and faunal remains mixed with modern ceramic and glass suggesting that some of the material used to backfill the ditch was derived from the interior of the ringfort. The vast majority of vertebrate remains from Mackney were recovered from the fills of the enclosing ditch and most of these related to the main phase of ringfort occupation. Smaller sample of bone were found in deposits associated with
the burials and the early modern backfill layers but these were eliminated from the analysis, as it could not be determined whether they were residual or intrusive in origin.

Of the total of 3609 fragments recorded, 1739 were identified to taxon and details of the individual species present are represented in Table 2. Bones of cattle were the most frequently occurring (NISP 723) with a minimum of 49 individuals being estimated based on mandible fragments and immature long bones. All skeletal parts of cattle were represented, although skull fragments, teeth, vertebrae and meat-bearing upper limb bones were more frequent. Skull fragments were the most numerous elements and from their fragmented appearance it is likely that they had been smashed open to extract the brains. Loose teeth were also particularly abundant as well as mandible fragments, which may indicate that the ditch fills contain more slaughter waste than other feature types at the site. In all samples both fore and hind limbs were equally represented and it is clear that cattle were slaughtered on the site and consumed entirely. It would appear from the small numbers involved that horn cores were separated from the skull during the initial stages of butchery to be used for artefact manufacture, though the location of a horn-working or a bone-working industry was not identified during the excavation. The virtual absence of horn cores in the assemblage is noteworthy and may indicate that these elements along with their sheaths were taken off the site and traded for other items required by the occupants.

The ditch fills produced 19 mandibles ranging from juvenile to elderly but the majority of cattle appeared to have been slaughtered between 1-2.5 years of age. Over 60% of the jaws had a Grant numerical value (nv) around 25 with the third molar coming it to wear. Two had an nv of 35 or more, that is cattle with the third molar in full wear and thus probably aged four years old or more and representing animals kept for breeding and milk. An assessment of the state of fusion of the long bones indicated that there was little evidence of the presence of animals in their first year of life and the data supported the toothwear evidence in that a high percentage of the cattle were between one to three years of age at death. Due to the very fragmented nature of the material only limited metrical analysis was feasible and measurements taken were largely restricted to breadths and depths of the more robust bones. The measurements were all within the range of other early medieval sites (McCormick and Murray 2007) and specific withers heights of 107.1cm, 107.3cm, 108.5cm and 109.5cm were obtained from three metapodia and a radius. Regrettably, the bone data was insufficient to assess the ratio of males to females at the site as very few complete long bones and horn cores were recovered.

Sheep were the second most commonly occurring species in terms of minimum number of individuals (23) although the NISP (274) is lower than pig due to the occurrence of two partial piglet skeletons in the ditch fills. In terms of representation of skeletal parts, there was considerable disparity amongst the sheep remains. Skull fragments were conspicuous by their relative absence, carpals and tarsals were entirely absent and phalanges were also poorly represented. There were many mandible and vertebrae fragments whilst teeth were the most numerous elements. Only a small number of sheep complete mandibles were recovered therefore
a detailed analysis of the age structure using these elements was not possible. The evidence did show that the mandibles were fairly evenly distributed throughout the age range from young to mature. Two mandibles from an individual less than six months of age were present and a single jaw had an \( n,v \) of 38 representing an animal over four years or more and probably representing that proportion of the herd that was kept for breeding and wool production. The remaining mandibles came from individuals that seem to have been killed off towards the middle of their third year. Amongst the major limb bones, the proportion of sheep that were killed between 1.5 and 3 years of age was high (59%) indicating that the majority were killed at an intermediate age with a few older individuals kept for breeding and wool. Epiphyseal fusion data were generally supportive of the toothwear and indicated that sheep were slaughtered at every stage between the spring lamb and elderly age groups but over 50% had just reached adulthood at slaughter (about 30 months). The amount of metrical data available for sheep was minimal with withers heights being obtained for just four individuals. Shoulder heights of 53cm, 56cm, 63cm and 70cm were estimated from three metapodial bones and a radius and these fall within the range for other early medieval assemblages. It is tempting to interpret the smaller examples as ewes but the sample size is too small to be certain of this.

The NISP for pigs is considerably inflated by the presence of two almost complete piglets in one of the basal fills and if these are excluded from the counts the sample of pig bones is quite small. In terms of minimum numbers of individuals, pig bones were the least frequent of the main domestic food species with at least 11 adults and two neo-natal individuals being recognised. As with the sheep, skeletal element analysis pointed to a high proportion of mandibles and loose teeth but these are heavy, durable bones in pigs and tend to survive better than the more porous fragmentary skull bones. Most other parts of the body were also represented and the pork consumed at the site came from whole carcasses. As pigs are essentially food animals, they are always killed younger than cattle and sheep and this was borne out by an assessment of ageing based on mandibular toothwear and epiphyseal fusion. The twelve tooth-bearing mandibles indicated a broad range of ages from neonatal to one elderly individual probably kept for breeding. Nine mandibles gave an \( n,v \) of less than 20, following a common pattern of pig husbandry where animals tend to be slaughtered before they reach two years. Because the majority of pigs were killed so young, it was difficult to obtain sufficient mature bones to provide measurements although those taken fall within the range of domestic pigs for early medieval sites in Ireland (ibid.). Withers heights could not be estimated as no complete suitable bones were recovered.

The sample of 57 horse bones was scattered throughout the fills of the ditch and a minimum number estimate indicated that at least three individuals were represented. Although the sample was dominated by loose teeth, it included sufficient post-cranial bones to indicate that complete horses may have been discarded into the ditches. Four of the bones showed evidence of butchery associated with the dismemberment of the hind limb and the axial splitting of a tibia in order to gain access to marrow. The limited number of bones suggests that horse flesh was not eaten to any great extent at the site. It is more likely that horses were
kept for other purposes and on death the deep enclosing ditch formed an officially acceptable place for the disposal of their carcasses. All of the horse bones were from adult animals and none exhibited pathological feature despite their apparent advanced age. A single metatarsal indicated an individual 138cm at the withers, which corresponds in size to a modern pony of around 13 hands.

Dog bones (173 fragments) were common throughout the ditch fills although they mostly occurred in clusters representing partially disarticulated skeletons. The disintegration of the skeletons would seem to have been before or shortly after deposition since no complete dog skeletons were exposed in an articulated condition during the excavation. It is unlikely that disturbance to the skeletons was caused by other scavenging dogs, as none of the canid remains are chewed. Due to the limited metrical data no attempt could be made to describe the type or size of dogs, but all appeared to have been of sufficient size to have fulfilled functional roles such as hunting or protecting livestock from wild animals. An estimated shoulder height of 41cm was obtained from a complete tibia which is similar in size with a modern Collie.

There were relatively few bones of cat, just four fragments from an adult individual being recovered from two lower fills of the ditch.

The only wild mammals represented were red deer, *Cervus elaphus*, and hare, *Lepus* sp. Red deer was identified mostly from antler fragments (12) but the ditch fills also contained sufficient post-cranial material to indicate that these animals were occasionally hunted and butchered for their meat. The post-cranial elements included fragments of a skull, a humerus, a pelvis and a complete first phalanx with the humerus and pelvis displaying chop marks consistent with dismembering. The two individuals present were both carrying their antler when they were hunted and chop marks on the skull indicated that the antler was deliberately removed. The twelve antler fragments comprised three tines and nine small slivers. No clear traces of antler working were present on any of the remains. The nine hare bones were found in a single deposit and identified as vertebrae, a pelvis and ribs.

### Table 2: Anatomical distribution of mammals – Enclosing ditch

<table>
<thead>
<tr>
<th></th>
<th>Horse</th>
<th>Cow</th>
<th>S/G*</th>
<th>Pig</th>
<th>Dog</th>
<th>Cat</th>
<th>Deer</th>
<th>Hare</th>
<th>LM*</th>
<th>MM*</th>
<th>Indet*</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Antler</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Maxilla</td>
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<tr>
<td>Teeth</td>
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<td>110</td>
<td>93</td>
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<td>Vertebra</td>
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<td>Humerus</td>
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<tr>
<td>Ulna</td>
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<td>1</td>
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</tr>
<tr>
<td>Scapula</td>
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<td>42</td>
<td>11</td>
<td>16</td>
<td>2</td>
<td>6</td>
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</tbody>
</table>
In terms of butchery the three main livestock species all appear to have been treated in a similar manner. The vertebrae were mostly split laterally along the spinal column indicating that animals were butchered on the ground using heaving chopping implements, which is a common practice on early medieval Irish sites. The few horn cores in the ditch fills were all cut off at their base, presumably to utilise the horn though no horn-working industry was identified at the site. A few cattle and pig skulls appeared to have been split saggitally though invariably the skulls were crudely chopped in order to gain access to the brains. Butchery marks on the mandibles and some maxilla fragments were consistent with the removal of cheek meat and the tongue. The major limb bones were mostly chopped through the articulation and also through their midshafts presumably to remove the marrow. Metapodia were frequently chopped through the mid-shaft for marrow extraction, as these bones possess virtually no meat. The distal joint surface of two metapodia had superficial knife cuts, associated with skinning the carcass.

Enclosing bank

The excavation indicated that the bank was deliberately levelled in the past, and that at least two phases of cultivation subsequently denuded the remnants of the earth and stone bank. Most of the 56 bones from three in situ bank deposits along the north-east and south-west sections were unidentifiable mammal fragments although some cattle and sheep bones were recognised. A minimum of two individuals was estimated from the sample of 13 cattle bones, an adult over 2.5 years of age and a juvenile less than six months old. The sheep bones con-
sisted of a few fragments of meat-bearing elements from an individual over three years of age at slaughter.

**Entrance features**

A complex of substantial pits and post-holes were interpreted as representing the original gate providing access to the interior. A small collection of 12 animal bones were recovered from various fills of four pits (C980, C1020, C1070, C1076) as well as 23 bones from a layer (C928) that was present across the entrance features. As in the previous two context groupings, the majority of the 35 bones consisted of a mixture of meat-bearing and peripheral elements of cattle (10) and sheep (11). The sheep bones were a combination of upper limbs and loose teeth and the sample of cattle included phalanges, scapula, skull fragments, teeth, mandible and femur. Pig was present as a single tooth and a horse pelvis fragment was recovered from C928, a general spread across the entrance features.

**Internal structures**

The south-west quadrant of the interior seems to have been the designated domestic space with three large structures being excavated here. The remains of a central circular house (Structure A) and a lean-to building (Structure B) are definite structural features and there were partial remains of a secondary smaller circular building (Structure C) and a rectangular structure (Structure D). A large pit interpreted as a possible water cistern close to Structure A, appeared to have been centrally located to supply water for both the industrial and domestic requirements of the occupants. A concentration of post-holes (Structure G) to the north of the site represented some form of structure associated with the metalworking features. An arc of shallow post-holes with an associated central post-hole (Structure E) has been interpreted as a small structure associated with storage or for penning animals and an L-shape group of five post-holes (Structure F) also served some structural purpose. The remains of another possible building (Structure H) were found to the south-east of the souterrain. The animal bone samples recovered from the various buildings within the interior was minimal and most fragments probably made their way into the fills of the house trenches by natural taphonomic agencies. The condition of the bones was poor indicating that they had been lying on the surface over a long period of time before ending up in the fills of the house trenches. None of the bones bore evidence of burning or charring and from the small amount of fragments involved it is unlikely that they were deliberately used as a tempering agent for mud walls.

**Structure A**

A circular house structure was centrally positioned within the ringfort interior. The only animal bones found in the construction trench came from a single fill (C311) and consisted of 12 indeterminate fragments of long bones of a medium-sized mammal. The fill (C501) of a large pit in the immediate environs of the circular house produced a cow radius, a bird
bone, an almost complete calf skeleton and numerous frog bones. This pit may have originally functioned as a water cistern before it was re-used as a refuse pit. The calf was less than one month old and though the bones were in a disarticulated state over a half of the skeleton had survived. The presence of the frog bones is worthy of note given the early dates that have recently been obtained for the introduction of frog into Ireland (McCarthy forthcoming).

**Structure B**
A possible lean-to structure was identified just inside the line of the enclosing bank and to the south of the entrance. The fill (C289) of the foundation trench produced 38 animal bones with the only identified species being cattle (10 fragments) represented by fragments of a metatarsus, a calcaneum, skull, phalanx, vertebrae, scapula, teeth and mandible. The remaining 28 bones were identified as long bones of large-sized mammals (21 fragments) and medium-sized mammals (7 fragments). Two associated external pits produced a single bone each including the proximal portion of a cow metacarpus and the fused distal portion of a cow radius.

**Structure C**
The partial remains of a possible circular structure were located to the south of Structure A. Four pits were located just on or outside the projected line of the foundation trench and one of these (C473) contained 13 animal bones. The two identified specimens included a pelvis and a metacarpus of cow and the remaining sample was classified as medium mammal (7) and large mammals (4) remains.

**Structure D**
The remains of a possible rectangular structure were found to the south of Structures A and B and a long bone from a medium-sized mammal was recovered from the fill (C505) of one of the post-holes.

**Structure E**
Just one animal bone was recovered from this structure located in the north-western part of the ringfort and interpreted as a shelter or an animal pen. The bone was identified as an atlas from an immature cow.

**Structure F**
An examination of some 49 bones from various postholes, pits and spreads associated with the building revealed the remains of cattle (17), sheep (3) and pig (2). The cattle bones consisted of loose teeth and mandible fragments and most of these came from a cobble spread (C630) associated with the house. Two fragments of the proximal ends of a radius and tibia
were identified. Epiphyseal fusing and wear on individual teeth showed that the bones were all from animals slightly less than three years of age at slaughter. Five small fragments of indeterminate calcined bone were recovered from a refuse pit adjacent to the structure (C1083). Another pit fill (C864) contained five bones of which just one was identified, a tooth from a young male pig.

**Structure G**

Of the 14 fragments of bone in the fills of this group of post-holes and pits, cattle were the only identifiable animals. The distal fused portion of a radius was recovered from C672. Another pit (C 944) contained nine specimens including three cattle post-cranial bones one of which, a complete calcaneum, was extremely gnawed. Pit (C906) contained an adult cow metacarpus and one of the few horn cores from the site was also contained in this pit (C1023). An adult cow molar was found in a general layer around the structure.

**Refuse pits**

A series of isolated but centrally placed pits located to the north of the central circular house were interpreted as refuse pits. The large central pit may have used as a cistern to store water both for domestic and industrial purposes and the material from here has already been described for Structure A. The fills of the other pits contained just 33 animal bones and the identified sample was extremely small. The midshaft portion of a cattle ulna and two cattle teeth were identified along with a sheep radius and three sheep teeth. A single pig tooth was also recovered and the remaining 25 bones included large and medium mammal bones as well as indeterminate fragments.

**Souterrain**

The souterrain was located in the south-west quadrant of the ringfort and it consisted of two chambers, a connecting drop creep and a set of steep entrance steps giving access from the ground surface to the outer end of the east to west chamber. No animal bones were recovered from deposits associated with the primary use of the souterrain and the largest quantity of bones came from fills interpreted as evidence for primary collapse as well as backfilling once the souterrain went out of use.

The total number of bones examined was 1264, of which 947 were positively identified. As the souterrain was robbed of stone in the 19th century, probably during the construction of Mackney House, there is a distinct possibility that considerable mixing of bones has occurred. Large quantities of ceramic and glass bottles and other containers were found in the souterrain during the excavation and it was clear that the occupants of Mackney House used it as a convenient location for the disposal of domestic waste. It is likely therefore that much of the animal bone also derives from this phase of relatively modern dumping and that very few bones actually relate to the original construction and use of the souterrain during the
early medieval period. This is borne out by the presence of over 30 large sheep bones ten of which display horizontal saw marks associated with modern butchery. The presence of neonatal lambs and piglets indicates that the souterrain provided a convenient location for the disposal of these animals. Further evidence for recent deposition of bone is provided by the occurrence of relatively large amounts of bones of animals that probably accumulated in the souterrain through the activity of foxes.

Table 3: Relative proportions of identified species in souterrain

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>NO. OF BONES</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horse</td>
<td>6</td>
<td>0.5</td>
</tr>
<tr>
<td>Cattle</td>
<td>408</td>
<td>32.2</td>
</tr>
<tr>
<td>Sheep</td>
<td>159</td>
<td>12.5</td>
</tr>
<tr>
<td>Pig</td>
<td>80</td>
<td>6.3</td>
</tr>
<tr>
<td>Dog</td>
<td>75</td>
<td>5.9</td>
</tr>
<tr>
<td>Hare</td>
<td>3</td>
<td>0.2</td>
</tr>
<tr>
<td>Rabbit</td>
<td>168</td>
<td>13.2</td>
</tr>
<tr>
<td>Fox</td>
<td>4</td>
<td>0.3</td>
</tr>
<tr>
<td>Rat</td>
<td>44</td>
<td>3.4</td>
</tr>
<tr>
<td>Large Mammal</td>
<td>182</td>
<td>14.3</td>
</tr>
<tr>
<td>Medium Mammal</td>
<td>135</td>
<td>10.6</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>1264</strong></td>
<td></td>
</tr>
</tbody>
</table>

A total of 1264 bones were examined resulting in the identification to species of 947 bones, while 317 fragments were classified as large and medium-sized mammals. Identification of the bones revealed the presence of the following species – cattle, sheep, pigs, dogs, horses, rabbits, foxes, hares and rats. Of the main livestock animals, cattle were predominant followed by sheep and then pig bones. A minimum of 15 cattle were estimated from distal scapula and with the exception of the porous bones of an individual less than six months of age, all of the cattle bones came from adult individuals between 2-4 years of age. Sheep were the second most common species represented in the samples with a minimum of four individuals being calculated from proximal radius. Most of the pig bones (80 fragments) came from juvenile individuals indicating that slaughter rates were high. Horse was present as loose teeth and a few limb bones, all from a single adult individual. Dogs were almost as common as pigs in terms of recovered bones but most of the specimens belonged to a single adult individual similar in size to a modern Collie. Another individual was slightly smaller in
size, similar to a modern Spaniel. Bones identified to hares, rabbits and rats appeared to be modern in appearance and are most likely to represent the food remains foxes, which are also represented in the collection.

**Metalworking features**

A radiocarbon date obtained from charcoal associated with a bowl furnace to the north of the entrance was dated from the 8th –10th century. This date range links the metalworking activity to the primary phase of ringfort activity. A second radiocarbon date indicated that further metalworking was undertaken up to the mid 12th century. Various pits associated with the metalworking features contained animal bones but the overall quantity involved was too small a sample to study in depth. The material was generally badly preserved with high values for loose teeth. It also showed the highest value of medium and large-sized mammal fragments at the site presumably linked with slow build-up of deposits where bones may have been exposed over long periods before eventually becoming incorporated into the pits. In all, 72 animal bones were found in the various fills of three pits (C855, C904, C912). C855 produced 13 animal bones identified as the remains of an adult cow at least over two years of age at death. Pit (C912) contained just one bone, a rib from a medium sized animal. The largest sample of bones came from C904 (55 fragments) consisting of two sheep teeth, two large mammal fragments and 51 tiny fragments from a medium-sized animal. Animal bones were also found in the fill (C963) of a posthole (C1104). These were identified as two sheep teeth and a small fragment of a rib bone from a large-sized mammal.

**Phase 3: High medieval features**

A series of fire pits, hearths and other associated pits were located just inside the line of the bank in the south-east quadrant of the ringfort. Four large hearths/fire-pits and a series of associated pits and post-holes were excavated inside the line of the enclosing bank in the south-eastern quadrant of the ringfort interior. These had evidence for in situ burning and the indications were that they had been used for corn drying. The dates indicate a date range between the 14th and the 17th century. While these dates along with the recovery of two silver coins dating from the reigns of Henry III and Henry VIII and a socketed arrowhead provided evidence for substantial occupation activity within the ringfort in the later medieval period, very few animal bones were found and it would seem that the site was used mostly for industrial purposes at this stage in its history.

**Table 4: Phase 3 and Phase 4 - Distribution of animal bones**

<table>
<thead>
<tr>
<th>CONTEXT</th>
<th>NO. OF BONES</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE</td>
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</table>
Phase 3
Hearths and fire pits 65 4.3
Domestic hearth 1 0.06

Phase 4
Quarries 424 28.6
NS furrows and potato clamps 495 33.4
EW furrows 478 32.3
Features post-dating NS furrows 7 0.4
Burials 8 0.5
TOTAL 1478

Too few bones of late medieval date were present for the assemblage to deserve much attention. Within these limited numbers, however, it seems that cattle continued to be the species of most importance with seven bones coming from fills of fire pits (C314, C408) and hearths (C385, C371). No sheep bones were identified and single teeth of horse and pig were found in fire pit (C408). A clay layer (C765) associated with a domestic hearth in the same area of the site contained a fragment of a large mammal bone.

Phase 4: Post-medieval features
The earliest phase of post-medieval activity at the site was represented by a group of furrows, aligned north to south. These appeared to respect the lay out of the ringfort and did not traverse the remains of the enclosing bank. Four of the infant burials located in the southern half of the ringfort interior cut across the furrows.

North/South furrows
The earliest cultivation features within the ringfort interior were the north to south furrows and a series of associated oval pits, which have been interpreted as potato clamps. The fills of four furrows (C191, C921, C345, C524) produced a total of 495 animal bones most of which were poorly preserved and had clearly been subjected to considerable erosion and weathering prior to be sealed by the topsoil layer. The bulk of the identified specimens were from cattle (113) following by considerably smaller amounts of sheep (23) and pig (11). Other mammalian species present included horse (7), dog (3) and rabbit (1). The bones were not examined in any further detail, as their exact provenance is uncertain.
East/West furrows

This group of parallel ridge and furrows represented a period of cultivation that took place after the North/South furrows had gone out of use and it has been postulated that this phase of cultivation may relate to the development of Mackney House. A total of 478 bones were recovered from the fills of three furrows. The sample was highly fragmented with over half of the bones only identifiable as fragments of large and medium-sized mammals. Most of the bones were those of domestic ungulates – horse, cattle, sheep and pig. Cattle and sheep were the dominant species representing 57% and 30% of the identified sample respectively. Fourteen horse bones were present and the sample of 11 pig bones consisted mostly of loose teeth and skull fragments. The equids were similar in size to a large pony although none of the bones were measurable. Single incidences of deer and dog were both recovered from C170.

Features post-dating the North/South furrows

The features post-dating the North/South furrows contained such small quantities of bone fragments that they provide no useful information. Only seven bone fragments were recovered from a group of pits, linear trenches and post-holes. Three cattle bones including a tooth and two limb bones were recovered as well as a mixture of large and medium-sized mammal bones.

Children’s burial ground

The use of the site as an unconsecrated burial ground occurred within a specific section of the silted up ringfort ditch. The burial horizon was subsequently covered by a thick layer of locally derived glacial stone in what appeared to have been a deliberate attempt to discourage the use of the ditch as an informal burial ground. A very small quantity of animal bones resulted from the excavation of three grave cuts (C410, C600, C1213) probably excavated in the 19th century. A single cow tooth was identified, as well as a fragment of a mandible and a femur from an adult sheep. The remaining four bones were indeterminate.

Quarries

The three semi-circular quarries used to procure sand and gravel from what remained of the ringfort bank are all features backfilled with mixed material containing some modern finds. The fills of the quarries yielded a total of 424 bones of which just 159 were taken to species level. Cattle and sheep remains were the most common with horse and pig bones being recovered in almost equal quantities.
Bird bones

The bird assemblage was divided into three groups according to the area of the site in which they were found. The majority of the bones came from the various fills of the enclosing ditch with smaller amounts being found at the entrance and in the souterrain.

Ditch fills

Partridge       Perdix perdix
Woodcock        Scolopax rusticola
Starling        Sturnus vulgaris
Curlew          Numenius arquata
Crow            Corvus corone
Blackbird       Turdus merula
Bunting         Emberiza sp.
Buzzard         Buteo buteo

Entrance feature

Raven           Corvus corax

Souterrain

Domestic goose  Anser anser
Raven           Corvus corax

Enclosing ditch

The most interesting and varied range of bird species was found in the fills of the enclosing ditch. In all, just 25 bones were recovered with the most abundant taxon being starling (11 fragments). Identified bones of this species included humerus, ulna, carpometacarpus, coracoid (3), tibiotarsus (4) and dentary. The bones represented at least two individuals. Curlew, crow and blackbird were all represented though it is unlikely that they were eaten. The single woodcock and partridge would certainly have been consumed as these are good food birds and would have provided a tasty alternative to a diet consisting predominantly of beef and mutton. The smallest remains are those of small passerines and these have been identified as buntings, which make very good matches with red bunting and yellowhammer. Scavengers are also present including one record each of raven and buzzard. These birds might represent opportunistic scavengers that were attracted to the food waste being dumped in considerable quantities into the ditch. The presence of scavenger bones in the deposits would either suggest deliberate culling by humans, predation by dogs or cats or natural deaths which were discarded into the ditch.
Souterrain

The souterrain produced the partial skeleton of a partridge, a few domestic goose bones as well as two starling leg bones and a tarso-metatarsus of a moorhen. These remains were found in association with modern glass and ceramics and are probably relatively recent in origin.

Entrance

One of the entrance features (C188) contained a coracoid, a humerus and a sternum of a raven.

Discussion

This limited discussion is restricted to bone from early medieval contexts when the ringfort was occupied for a period spanning the 8th to the 12th century. Most animal bone came from the fills of the large enclosing ditch and contexts comprising the backfilling of the souterrain. The analysis of the assemblage has shown that domestic animals formed the major part of the assemblage. In all areas and phases of the site, cattle and sheep were the dominant taxa according to the NISP and MNI counts. Cattle dominated the livestock samples with the majority of the bones belonging to small domestic beasts of relatively low stature. The main peak of slaughter seems to have been in the second and third years with fewer cattle reaching advanced adulthood. It can be assumed that those animals over four years of age represent females being kept for dairying and breeding and males perhaps for traction. There were no bones from individuals less than six months old but this may be due to the preservation conditions. While there was no evidence that newborn calves were deliberately slaughtered, the presence of three individuals under six months of age indicates that young animals were killed and eaten on occasion. Few complete cattle skulls and long bones were found so little could be concluded with regard to the size and type of cattle present. From the available measurements it was apparent that the cattle at Mackney were of the rather small size typical of the early medieval period in Ireland.

Sheep were second in importance in terms of number of individuals present and the age range of the individual animals at death gives some indication of the agricultural system from which they derive. Most of the bones appeared to come from individuals of intermediate age, neither young nor old enough to suggest that the animals were being kept primarily for their wool. Few lamb bones were recovered and the indications are that most sheep were kept up to 2 years of age, at which stage they were slaughtered for their meat. The sheep sizes compare well with the means and ranges for nearby Loughbown and with other contemporary assemblages. Only four goat bones were identified suggesting that these animals were not common at Mackney, a situation also paralleled at Loughbown and other early medieval sites. Unfortunately, very few skull and long bones survived, which made it difficult to attempt reconstruction of the size and type of sheep present.
In common with other early medieval assemblages in the west of Ireland, pigs were less numerous than cattle and sheep although their remains are consistently represented across the site. Deaths in the pig population were largely of young animals, which would have been killed for meat at 1-2 years. Pig bones were largely immature and fragmentary and from their longbone and third molar measurements were clearly domestic stock with no evidence for cross-breeding with wild boar which might still have been living in the area. Pig measurements were also few but fit the quite narrow range of size observed for other early medieval sites.

The presence of bones of horses, dogs, cats and birds at the site shows that these species were also exploited. Horse remains were present in the assemblages from most areas and phases and were found distributed, in no great concentrations, amongst the remains of other animals. Overall, the proportion of horse bones was quite low, and in many cases only teeth were found. Butchery marks associated with dismemberment of the carcass were present on four bones indicating that horseflesh was occasionally processed though not to the same extent as beef, mutton and pork. Ageing data indicated that all horses had reached adulthood and from the few measurements that could be taken the animals seemed to be sturdy ponies in size.

The relatively large number of dog bones is artificially inflated as most bones were from a few contexts in the ditch fills and almost certainly represented just a few individuals. Many of the specimens were recovered as small groups of bones, which were probably articulated, but had been disturbed over time by various incursions into the ditch. The majority of the remains came from medium-sized animals of perhaps Collie size and all of the limb bones with surviving articulations were from mature individuals. It is unlikely that dogs were eaten as butchery marks were not found on any of the canid remains.

If the recovered animal bones reflect the true picture of animal exploitation, the data indicate that cats were not kept in any great quantity at Mackney. Four bones from a single mature individual were recovered from the ditch fills and their size indicated that the cat was domestic.

The scarcity of red deer bones suggested that venison rarely contributed to the food supply of the ringfort. While it is unlikely that deer were particularly plentiful in the area immediately surrounding the ringfort, they would have been available in forested areas of the region. Antler was the most common element although there was no evidence to suggest that the occupants went out into the forested areas to collect naturally shed antler during the springtime. In fact, the recovery of two skull fragments bearing traces of chop marks associated with antler removal suggests that deer were deliberately hunted both for their meat and their antler. The purpose of harvesting antler would have been as a raw material for object manufacture although the excavation did not reveal any evidence of this activity.

It is always difficult to assess how important a contribution birds made to the diet, as the quantities recovered will be influenced by preservation and excavation techniques. Although
sieved samples were taken from certain archaeological contexts these did not greatly increase the total of bird bones, and the only additions to the species list from the hand-collected assemblage were the small passerines. There were no domestic fowl or goose bones in the assemblage but a number of wild species some of which would have been hunted and eaten. While the contribution of wild fowl was of no real significance to the meat supply, the range of identified species provides an interesting picture of bird life in the vicinity of the site at this time.

The analysis of the animal bones from Mackney suggests a diet similar to that encountered at the nearby ringfort in Loughbown and other sites in the west of Ireland (McCarthy forthcoming). Overall there was an almost complete reliance on the three major livestock animals for meat complemented occasionally by horseflesh, venison, hare and wild fowl. The relative proportions of the major livestock species are similar to results from other Atlantic coast sites (McCormick and Murray 2007) and the general impression gained is that local environmental factors played a major part in animal husbandry practises in the region. The bones provide an adequate sample to draw some parallels with the collections from the nearby site at Loughbown 1 as well as other early medieval sites in Ireland and this will be discussed in greater detail in a future NRA monograph.

References

Boessneck, J. 1969 ‘Osteological differences between sheep and goat’ In D.R. Brothwell and E. Higgs (eds), *Science in Archaeology, a survey of progress and research*. Bristol.


McCormick, F. and Murray, E.V. 2007 *Knowth and the zooarchaeology of Early Christian Ireland*. Royal Irish Academy, Dublin


## Appendix 10: Radiocarbon dates

Radiocarbon analysis was carried out by the 14 Chrono Centre in Queen’s University Belfast. Dates were calibrated using Calib Rev5.0.2 (©1986-2005 M.Stuiver & P.J. Reimer) and in conjunction with Stuiver & Reimer 1993 and Reimer et al. 2004.

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<th>Period</th>
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# Appendix 11: Lithics

*By Farina Sternke*

## Introduction

Twenty-nine lithic finds from the archaeological excavation along the route of the N6 Galway-Ballinasloe Road at Mackney, Co. Galway, were presented for analysis (Tables 1a, 1b and 1c). These were associated with a ringfort with internal round houses.

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Table 1a: Composition of the lithic assemblage from Mackney
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**Table 1b:** Measurements of the lithic assemblage from Mackney
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<td>E2444:593:1</td>
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<td>Distal direct and left edge abrupt</td>
<td></td>
</tr>
<tr>
<td>E2444:618:1</td>
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<td>No</td>
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<td>No</td>
<td></td>
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<td>Yes</td>
<td>Distal and right edge direct abrupt</td>
<td></td>
</tr>
<tr>
<td>E2444:854:1</td>
<td>Yes</td>
<td>Distal direct abrupt, left edge inverse semi-abrupt</td>
<td></td>
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<tr>
<td>E2444:929:2</td>
<td>Yes</td>
<td>No</td>
<td></td>
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<tr>
<td>E2444:929:4</td>
<td>Yes</td>
<td>Left edge direct semi-abrupt</td>
<td>Yes</td>
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<td>E2444:978:1</td>
<td>No</td>
<td>Possibly right edge abrupt</td>
<td></td>
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<td>No</td>
<td>No</td>
<td></td>
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<td></td>
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<td>E2444:1164:1</td>
<td>Yes</td>
<td>Right and left edge direct semi-abrupt</td>
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**Table 1c:** Details of the lithic assemblage from Mackney

**Methodology**

All lithic artefacts were examined visually and catalogued using Microsoft Excel. The following details were recorded for each artefact: context information, raw material type, artefact type, the presence of cortex, artefact condition, length, with and thickness measurements, fragmentation and the type of retouch (where applicable). The technological criteria recorded are based on the terminology and technology presented in Inizan et al. (1999). The general typological and morphological classifications are based on Woodman et al. (2006).

**Quantification**

The lithics are 20 chert artefacts, two flint artefacts, one limestone artefact, five natural cherts and one natural chunk of an unknown fine-grained rock type (Table 1).
Provenance

The artefacts were recovered from the topsoil, bank fill, postholes, pits, the houses and cultivation ridges (Table 2).

<table>
<thead>
<tr>
<th>Find Number</th>
<th>Context</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
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<td>Stray</td>
<td>Stray</td>
<td>Possible Core</td>
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<tr>
<td>E2244:1:37</td>
<td>Topsoil</td>
<td>Topsoil.</td>
<td>Flake</td>
</tr>
<tr>
<td>E2244:1:38</td>
<td>Topsoil</td>
<td>Topsoil.</td>
<td>Chunk</td>
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<tr>
<td>E2244:178:5</td>
<td>178</td>
<td>Bank fill</td>
<td>Flake</td>
</tr>
<tr>
<td>E2244:178:6</td>
<td>178</td>
<td>Bank fill</td>
<td>Flake</td>
</tr>
<tr>
<td>E2244:292:1</td>
<td>292</td>
<td>Amorphous spread</td>
<td>Flake</td>
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<tr>
<td>E2244:311:1</td>
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<td>Upper deposit within circular house</td>
<td>Flake</td>
</tr>
<tr>
<td>E2244:448:1</td>
<td>448</td>
<td>Spread above the bank</td>
<td>Flake</td>
</tr>
<tr>
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<td>472</td>
<td>Stone Area in top of bank</td>
<td>Debitage</td>
</tr>
<tr>
<td>E2244:472:2</td>
<td>472</td>
<td>Stone Area in top of bank</td>
<td>Natural Chunk</td>
</tr>
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<td>E2244:472:3</td>
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<td>Stone Area in top of bank</td>
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</tr>
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<td>E2244:488:1</td>
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<td>Fill from possible circular structure</td>
<td>Debitage</td>
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<td>Fill of cut</td>
<td>Natural Chunk</td>
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<td>Cultivation ridge</td>
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<td>Cultivation ridge</td>
<td>Blade</td>
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<td>Flake</td>
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<td>Fill of pit</td>
<td>Scraper</td>
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<td>Fill of posthole</td>
<td>Natural Chunk</td>
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<td>Natural Chunk</td>
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<td>Scraper</td>
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<td>Scraper</td>
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<td>Fill of possible Pit</td>
<td>Core</td>
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<td>E2244:929:4</td>
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<td>Fill of possible Pit</td>
<td>Retouched Flake</td>
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<td>Retouched Chunk</td>
</tr>
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<td>Deposit of bank material</td>
<td>Blade</td>
</tr>
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<td>E2244:1113:4</td>
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<td>Deposit of bank material</td>
<td>Flake</td>
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<tr>
<td>E2244:1164:1</td>
<td>1164</td>
<td>Fill of possible Pit</td>
<td>Retouched Flake</td>
</tr>
</tbody>
</table>

Table 2  Context Information for the Assemblage from Mackney (E2444)

Condition

The lithics survive in variable condition. All but six lithics are struck or modified and six artefacts are incomplete.
Technology/morphology

The artefacts represent various types of flaking products, two cores and eight retouched artefacts.

The blades and flakes were produced using a direct percussion technique on single platform cores and occasionally on bipolar cores. The latter appears to have been a “smash-and-see” approach (O’Hare 2005) rather than a formally organized bipolar reduction on an anvil.

Retouched Artefacts

The eight retouched artefacts can be classified into four, possibly five, scrapers, two miscellaneous retouched flakes and one retouched chunk of limestone. The five scrapers are one large end scraper with two notches (E2244:510:15) and four small convex end scrapers (E2244:593:1, E2244:827:1, E2244:854:1 and E2244:1160:2). The latter derives from the fill of a grave, while the others were recovered from what appeared to be pits. The retouched flake E2244:929:4 refits onto its respective core (E2244:929:2). This is indicative of the very expedient use of lithics at Mackney (see below for a further discussion).
Dating

The clear diagnostic elements in this assemblage are the five small convex end scrapers which are associated with the Bronze Age (Woodman et al. 2006). These scrapers are very small and display rather steep retouch reminiscent of Early Bronze Age micro disc scrapers (Woodman et al. 2006). The remainder of the assemblage is generally undiagnostic.

Conservation

Lithics do not require specific conversation, but should be stored in a dry, stable environment. Preferably, each lithic should be bagged separately and contact with other lithics should be avoided, so as to prevent damage and breakage, in particular edge damage which could later be misinterpreted as retouch. Larger and heavier items are best kept in individual boxes to avoid crushing of smaller assemblage pieces.

Comparative Material

Similar assemblages containing small convex end scrapers can be found at a number of Bronze Age Beaker habitation sites, e.g. Ballynagilly, Co. Tyrone (ApSimon 1976) and Knockadoon, Co. Limerick (Grogan and Eogan 1987, Ó Riordáin 1954) and numerous chert scrapers similar to those found and Mackney were recovered at Roughan Hill, Co. Clare (O’Hare 2005).

Discussion

The lithic finds from the archaeological investigations at Mackney along the route of the N6 Galway - Ballinasloe Road are dominated by flakes and blades made of a fine-grained black chert which was commonly used for prehistoric lithic production in the Western Midlands. The retouched artefacts are predominantly small convex end scrapers. The assemblage is technologically and typologically diagnostic and dates to the Bronze Age, possibly the Early Bronze Age, and obviously pre-dates the construction of the ringfort at Mackney.

Bibliography


Appendix 12: Stone finds catalogue

By Sara Campese

The majority of the stone finds from Mackney ringfort are described in the lithics report (Appendix 11). This short report catalogues the remaining stone finds from the site. Only a small amount of stone finds were found. A few different object types were recovered from diverse contexts. In general these finds were insignificant.

**Stone Wedge** (E2444:911:1). L. 147.8 mm, W. 110.5 mm., Th. 60.08 mm. Col. 2.5Y, 7/3 (pale yellow). Triangular-shaped. Edge slightly polished on the short side.


**Marble Slate** (E2444:125:12). L. 109 mm, W. 102.3 mm., Th. 22.4 mm. Col. 2.5Y, 8/2 (pale yellow). Incomplete (with a diagonal break on the short side). Rectangular in shape. Trimmed and round-polished along the external edge.


**References**

Appendix 13: Bone artefacts catalogue

By Sara Camplese

A small collection of bone finds were recovered during excavation at Mackney ringfort. Where dateable, these appeared to be post-medieval (e.g. the toothbrush handle described below). Some other finds, such as the bone toggle, however, probably dated to an earlier period of occupation at the site. In general, none of the bone finds from Mackney were significant or high status objects.

**Bead** (E2444:1230:19). D. 11.9 mm. Small bead perforated at the bottom side with a rounded hole. Top side flat. Smoothed surface.

**Toothbrush Handle** (E2444:1230:20). L. 160.03 mm, W. 14.6 mm., Th. 5.8 mm. Elongated oval head with wide rounded handle. Four evenly spaced rows of circular perforation for bristles. The reverse of the head has four parallel slits. Wire was fed through these slits into the perforations in a series of loops into which half the number of bristle filaments were inserted. When the wire was pulled tight the bristle filaments were doubled up and drawn into the hole after which they were trimmed to an uniform length. Green staining present on the brush head suggests that a copper-based wire was used to secure the bristle tufts in place. Probable dating: 19th/20th centuries (Cfr. Hurley 1997, 267 Fig.109:2). Bone toothbrush handles appear to have been manufactured from the 17th century onwards but the majority of those recovered from excavations are 18th-20th Century in date (Cfr. Hurley 2003, 333-334).


**Worked Object** (E2444:1220:2). L. 84.3 mm., maximum D. 14.5 mm., minimum D. 6.3 mm. Worked deer antler, presents cutting signs. Circular in section. Incomplete.

**Toggle** (E2444:1122:6). L. 28 mm., D. 10 mm. Perforated pig phalanx (Figure 16). Complete but damaged on one side. Central carved perforation (D. 4.9 mm). (Cfr. Hurley 1997, 259 Fig. 106:4).
Bibliographic References


Appendix 14: Metal finds catalogue

By Sara Camplese

The metal finds from Mackney ringfort were examined by Susannah Kelly, conservator based in University College Dublin. These were x-rayed and subsequently a small portion of the finds were conserved based on the conservator’s assessment of their worth. These finds are described below in the section labelled ‘conserved’. All other finds were cleaned, stabilised and these are also described in this catalogue.

Conserved

Iron

Knife (E2444:157:1) Fe. L. 72.66 mm, W. 16.63 mm, Th. (of blade) 4.6 mm, Th. (of tang) 6.08 mm. Incomplete. Elongated palette-like blade, rectangular in section, slightly damaged at the end. Possible whittle tang triangular in section. Conserved.

Knife (E2444:89/227:1) Fe. L. 92.58 mm, W. 13.12 mm, Th. (of blade) 4.1 mm, Th. (of tang) 5.12 mm. Incomplete (final part of blade missing). Flat blade back, straight cutting edge. Blade triangular in section. Right angles down to tip. Whittle tang square in section. Type C knife (after Goodall 1990). Conserved. Cfr. Carroll & Quinn 2003 (259 Fig. 5.1:14).


Iron Bar (E2444:69:1) Fe. L. 31.45 mm, W. 13.02 mm, Th. 1.64 mm. Incomplete. Straight strip of iron with slightly irregular edges. Conserved.

Socketed Bodkin-Bladed Arrowhead (E2444:302:1) Fe. L. 81.89 mm, W. 8.67 mm, Th. 7.64 mm, L. (of socket) 32.87 mm, D. (of socket) 12.6 mm. Incomplete. Blade rectangular in section, point bent. Socket slightly damaged at terminal. A comparative example was recovered from a late 12th to early 13th century context during excavations in Cork city (Carroll & Quinn 2003, 284 Fig.5.13:2). Conserved. The socketed form of bodkin-bladed arrowheads is the most common type from medieval sites in contexts dating from the 10th to the 13th centuries.

Tool (E2444:92:1) Fe. L. 148.64 mm, W. 91.8 mm, W. (of shaft) 66.06 mm, Th. 3.9 mm. Complete. Probable ploughing tool/spade end. Sub-rectangular in shape, shaft widens to a square toward the terminal. Rounded edges. ‘C’ shaped in section.
Finds from Testing (Phase 1)

Iron

Nail (E2444:0:5) Fe. L. 101.4 mm, Th. (of shank) 7.2 mm, W. (of head) 10.03 mm. Complete. Shank straight, rectangular in section. Flat rectangular head. Corroded.

Nail (E2444:0:11) Fe. L. 59.2 mm, Th. (of shank) 5.5 mm, W. (of head) 12 mm. Incomplete. Shank straight, rectangular in section. Flat rectangular heads. Corroded.

Spike (E2444:0:8) Fe. L. 178.5 mm, Th. (of shank) 15.4 mm, W. (of head) 20.08 mm. Complete. Shank straight, square in section. Flat square head. Corroded.


Ring (E2444:0:9) Fe. D. 55.9 mm, Th. 20 mm. Complete. Probably a jointing piece for pipes. Corroded.

Wedge (E2444:0:3) Fe. L. 104.3 mm, W. (of shank) 61 mm, Th. (of head) 38.5 mm. Complete. Triangular in section. Flat and peaky. Flat rectangular head. Corroded.

Wedge (E2444:0:6) Fe. L. 157 mm, W. (of shank) 58 mm, Th. (of head) 56.3 mm. Complete but slightly damaged. Triangular in section. Flat and peaky. Flat rectangular head. Corroded.


Copper


Finds from Topsoil

Nails

Nail (E2444:1:34) Fe. L. 84.2 mm, Th. (of shank) 9.3 mm, D. (of head) 17.1 mm. Incomplete (final part of shank missing). Shank straight, rectangular in section. Flat sub-circular head. Corroded.

Nail (E2444:1:40) Fe. L. 65.5 mm, Th. (of shank) 5.9 mm, D. (of head) 10.01 mm. Incomplete. Shank straight, rectangular in section. Rounded sub-circular head. Corroded.

Nail (E2444:1:39) Fe. L. 61.5 mm, Th. (of shank) 4.4 mm, D. (of head) 10 mm. Complete. Shank slightly bent, rectangular in section. Flat rectangular head. Corroded.

Nail (E2444:1:10) Fe. L. 28.8 mm, Th. (of shank) 6.6 mm, W. (of head) 8 mm. Incomplete. Shank straight, rectangular in section. Rounded square head. Corroded.

Other Objects

Iron

Blade (E2444:1:11) Fe. L. 46.4 mm, W. 16.4 mm, Th. (of blade) 3 mm, Th. (of tang) 8.8 mm. Incomplete. Initial part of an apparent knife blade. Tang sub-rectangular in section. Corroded.

Possible blade (E2444:1:42) Fe. L. 56.4 mm, W. 13 mm, Th. 6.2 mm. Incomplete. Possible knife blade. Sickle-shaped. Very corroded.

Blade (E2444:1:16) Fe. L. 281 mm, W. 24.3 mm, Th. (of both blade and tang) 5 mm. Incomplete. Long blade, probably belonging to a tool. Rectangular-stretched in section. Straight with a thin tang at one end. Corroded.


Iron Tool (E2444:1:15) Fe. L. 123.1 mm, W. (of blade) 65.4 mm, Th. (of handle) 13.4 mm. Incomplete. Probably a small spade. Handle square in section and slightly inclined toward the blade, forming a concave angle. The blade is rhombus-shaped. Corroded.

Bar (E2444:1:44) Fe. L. 41.5 mm, W. 11.9 mm, Th. 6.5 mm. Incomplete. Rectangular in shape and section. It could be part of a blade. Corroded.

Bars (E2444:1:4) Fe. Average L. 93 mm, average W. 14.15 mm, average Th. 3.2 mm. Incomplete. Three iron bars. Rectangular stretched in shape and bent at an arch. Corroded.

Horseshoe (E2444:1:9) Fe. L. 96.5 mm, W. 92.1 mm, Th. 10 mm. Complete. Five nail-holes present. Corroded.

Horseshoe (E2444:1:43) Fe. L. 105.9 mm, W. 21.5 mm, Th. 10.03 mm. Incomplete (more than a half missing). Corroded.

Door Lock (E2444:1:13) Fe. L. 89.8 mm, W. 55.7 mm, Th. 3 mm. Complete. Modern door lock. Rectangular in shape with four hanging holes for fastening it, one at each corner. Key hole situated on the lower part of the lock. Corroded.

Hook (E2444:1:14) Fe. L. 121.9 mm, W. 18 mm, Th. 5 mm. Incomplete. Open hook with a flat rectangular-stretched shaped body. It narrows down at the other hand, forming a sort of nook. Probably another hook of the same type of the first was indeed present. Corroded.

Iron pieces (E2444:1:6) Fe. Average L. 82.9 mm, average W. 47.34 mm, average Th. 2.65 mm. Incomplete. Group of four pieces of iron. Irregular in shape. Corroded.

Iron fragments (E2444:1:12) Fe. L. from 63.7 mm. to 8 mm, W. from 46 mm. to 4 mm, Th. from 2.4 mm. to 1.1 mm. Incomplete. Group of at least 38 fragments of iron. Irregular in shape. Very corroded.

Iron pieces (E2444:1:3) Fe. Average L. 85.25 mm, average W. 61.95 mm, average Th. 1.4 mm. Incomplete. Two pieces of iron. Probably bent parts of some sort of slate. Irregular in shape. Corroded.
Tin


The Eley Brothers factory in London was established in 1824. (Cfr. [http://www.members.shaw.ca/cartridge-corner/shotgun.htm](http://www.members.shaw.ca/cartridge-corner/shotgun.htm). Probable dating: late 19th/early 20th century.

Silver


Finds associated with skeletons/graves

**Nails**

All the nails with attached wood uncovered on site belong to the coffins used in the graves. Comparative examples, as regards the shape, have been discovered in Waterford (Scully 1997a, 166, Fig.74:26) and at Drumlummin, Co. Tipperary (Cleary 1987, 133, Fig.23.12:139).

**Nails** (E2444:?:?) Fe. Maximum L. 59.6 mm, average Th. (of shank) 5 mm, maximum D. (of head) 12 mm. Group of 14 complete and incomplete coffin nails with attached wood. Associated with Skeleton #142. Shanks straight, rectangular in section. Flat sub-circular heads. Corroded.

**Nails** (E2444:78:2) Fe. Maximum L. 25.5 mm, average D. (of shank) 6.4 mm. Group of four incomplete coffin nails with attached wood. Associated with Skeleton #17. Shanks slightly bent, sub-circular in section. Headless. Very corroded.

Nails (E2444:78/89:6) Fe. Maximum L. 40.04 mm, average Th. (of shank) 4 mm, maximum D. (of head) 10 mm. Group of 10 complete and incomplete coffin nails with attached wood. Associated with Skeleton #45 or 53. Shanks straight, rectangular in section. Flat sub-circular heads. Very corroded.

Nails (E2444:78/89:7) Fe. Maximum L. 40.7 mm, average Th. (of shank) 3.5 mm, maximum D. (of head) 9 mm. Group of 23 complete and incomplete coffin nails with attached wood. Associated with Skeleton #46. Shanks straight, rectangular in section. Flat sub-circular heads. Very corroded.

Nail (E2444:78/89:9) Fe. L. 36.8 mm, Th. (of shank) 4.3 mm. Incomplete. Headless. Coffin nail with attached wood. Associated with Skeleton #60. Shank straight, rectangular in section. Corroded.


Nails (E2444:78/89:19) Fe. Maximum L. 47 mm, average Th. (of shank) 3 mm, maximum D. (of head) 10.05 mm. Group of 5 complete and incomplete coffin nails with attached wood. Associated with Skeleton #80. Shanks straight, rectangular in section. Flat sub-circular heads. Very corroded.

Nail (E2444:78/89:21) Fe. L. 35.5 mm, D. (of shank) 4.5 mm, Th. (of head) 8.2 mm. Complete. Associated with Skeleton #87. Shank straight, circular in section. Flat rectangular head. Corroded.

Nails (E2444:78/89:22) Fe. Maximum L. 54.2 mm, average D. (of shank) 6 mm, maximum D. (of head) 10.05 mm. Group of 18 complete and incomplete coffin nails with attached wood. Associated with Skeleton #111. Shanks straight, circular in section. Flat sub-circular heads. Corroded.

Nails (E2444:78/89:28) Fe. Maximum L. 48.8 mm, average Th. (of shank) 3.6 mm, maximum D. (of head) 9.5 mm. Group of five complete and incomplete coffin nails with attached wood. Associated with Skeleton #77. Shanks straight, rectangular in section. Flat sub-circular heads. Corroded.

Nails (E2444:78/89:30) Fe. L. 22 mm, Th. (of shank) 4.6 mm. Incomplete. Headless. Two coffin nails associated with Skeleton #71. Shanks straight, rectangular in section. Corroded.
Nails (E2444:78/89:37) Fe. Maximum L. 60.03 mm, average Th. (of shank) 4.5 mm, maximum D. (of head) 12 mm. Group of eleven complete and incomplete coffin nails with attached wood. Associated with Skeleton #139. Shanks straight, rectangular in section. Flat sub-circular heads. Very corroded.

Nails (E2444:78/89:40) Fe. Maximum L. 64 mm, average Th. (of shank) 4 mm, maximum D. (of head) 10.06 mm. Group of 31 complete and incomplete coffin nails with attached wood. Associated with Skeleton #141. Shanks straight, rectangular in section. Flat sub-circular heads. Corroded.

Nails (E2444:78/89:42) Fe. Maximum L. 44.4 mm, average Th. (of shank) 4.8 mm, maximum D. (of head) 10.06 mm. Group of 11 complete and incomplete coffin nails with attached wood. Associated with Skeleton #123. Shanks straight, rectangular in section. Flat sub-circular heads. Very corroded.

Nails (E2444:78/89:44) Fe. Maximum L. 49 mm, average Th. (of shank) 4.8 mm, maximum D. (of head) 11 mm. Group of 6 complete and incomplete coffin nails with attached wood. Associated with Skeleton #116. Shanks straight, rectangular in section. Flat sub-circular heads. Very corroded.

Nails (E2444:78/89:54) Fe. Maximum L. 36 mm, average Th. (of shank) 4.1 mm, maximum D. (of head) 10 mm. Group of 4 complete and incomplete coffin nails with attached wood. Associated with Skeleton #123. Shanks straight, rectangular in section. Flat sub-circular heads. Very corroded.

Nail (E2444:78/89:55) Fe. L. 26.4 mm, Th. (of shank) 4.5 mm, D. (of head) 10.01 mm. Incomplete, with attached wood. Associated with Skeleton #131. Shank straight, rectangular in section. Flat sub-circular head. Very corroded.

Nail (E2444:78/89:58) Fe. L. 48.4 mm, Th. (of shank) 6.3 mm, D. (of head) 10.08 mm. Complete, with attached wood. Associated with Skeleton #111. Shanks straight, rectangular in section. Flat sub-circular head. Very corroded.


Nails (E2444:78/89:62) Fe. Maximum L. 51.1 mm, average Th. (of shank) 5.7 mm, maximum D. (of head) 12.3 mm. Group of six complete and incomplete coffin nails with attached wood. Associated with Skeleton #142. Shank straight, circular in section. Flat sub-circular heads. Corroded.
wood. Associated with coffin of Skeleton #142. Shanks straight, rectangular in section. Flat sub-circular heads. Corroded.


**Nails** (E2444:147:2) *Fe.* Maximum L. 46.4 mm, average Th. (of shank) 5.3 mm, maximum D. (of head) 11.7 mm. Group of 4 complete coffin nails + 2 nail fragments with attached wood. Associated with Skeleton #20. Shanks straight, rectangular in section. Flat sub-circular heads. Corroded.

**Nail** (E2444:171:2) *Fe.* L. 20.6 mm, Th. (of shank) 4.8 mm, W. (of head) 11.5 mm. Incomplete. Found near Skeleton #30. Shank straight, rectangular in section. Flat rectangular head. Corroded.

**Nail** (E2444:171:3) *Fe.* L. 65.4 mm, Th. (of shank) 4.4 mm, W. (of head) 9.6 mm. Complete. Shank straight, rectangular in section. Flat rectangular head. Corroded.

**Nails** (E2444:410:1) *Fe.* Maximum L. 51.5 mm, average Th. (of shank) 4.5 mm, maximum D. (of head) 11 mm. Group of 26 complete and incomplete coffin nails with attached wood. Associated with Skeleton #33. Shanks straight, rectangular in section. Flat sub-circular heads. Very corroded.

**Nail** (E2444:1160:1) *Fe.* L. 33.5 mm, Th. (of shank) 3.6 mm, W. (of head) 10 mm. Incomplete and broken, with attached wood. Associated with Skeleton #47. Shank straight, rectangular in section. Flat sub-circular head. Corroded.

**Nails** (E2444:1179:2) *Fe.* Maximum L. 34.2 mm, average Th. (of shank) 4.5 mm, maximum D. (of head) 10 mm. Group of 10 incomplete coffin nails with attached wood. Associated with Skeleton #55. Shanks straight, rectangular in section. Flat sub-circular heads. Very corroded.


**Nails** (E2444:1197:1) *Fe.* Maximum L. 43.3 mm, average Th. (of shank) 3.2 mm, maximum D. (of head) 11.8 mm. Group of 30 complete and incomplete coffin nails with attached
wood. Associated with Skeleton #58. Shanks straight, rectangular in section. Flat sub-circular heads. Very corroded.


**Nails** (E2444:1206:2) *Fe*. Maximum L. 36.1 mm, average Th. (of shank) 4 mm, maximum D. (of head) 10.04 mm. Group of 16 incomplete coffin nails with attached wood. Associated with Skeleton #57. Shanks straight, rectangular in section. Flat sub-circular heads. Very corroded.

**Nails** (E2444:1206:3) *Fe*. Maximum L. 33.5 mm, average Th. (of shank) 3.5 mm, maximum D. (of head) 9.1 mm. Group of 19 complete and incomplete coffin nails with attached wood. Associated with Skeleton #57. Shanks straight, rectangular in section. Flat sub-circular heads. Very corroded.

**Nails** (E2444:1213:2) *Fe*. Maximum L. 51.1 mm, average D. (of shank) 5.2 mm, maximum D. (of head) 11 mm. Group of 21 complete and incomplete coffin nails with attached wood. Associated with Skeleton #95. Shanks straight, circular in section. Flat sub-circular heads. Corroded.

**Nails** (E2444:1217:1) *Fe*. Maximum L. 42 mm, average Th. (of shank) 3.7 mm. Group of five incomplete coffin nails with attached wood. Associated with Skeleton #65. Shanks straight, rectangular in section. Headless. Corroded.

**Nail** (E2444:1231:1) *Fe*. L. 30.2 mm, Th. (of shank) 3.6 mm, D. (of head) 7.9 mm. Incomplete, with attached wood. Associated with Skeleton #82. Shank straight, rectangular in section. Flat sub-circular head. Very corroded.

**Nails** (E2444:1232:2) *Fe*. Maximum L. 44.2 mm, average D. (of shank) 3.4 mm, maximum D. (of head) 12.2 mm. Group of 33 complete and incomplete coffin nails with attached wood. Associated with Skeleton #82. Shanks straight, circular in section. Flat sub-circular heads. Corroded.

**Nails** (E2444:1233:1) *Fe*. Maximum L. 34.3 mm, average D. (of shank) 2.9 mm, maximum D. (of head) 11 mm. Group of 7 incomplete coffin nails with attached wood. Associated with Skeleton #81. Shanks straight, circular in section. Flat sub-circular heads. Corroded.
Nails (E2444:1233:2) Fe. Maximum L. 40 mm, average Th. (of shank) 4 mm, maximum D. (of head) 10.09 mm. Group of 31 complete and incomplete coffin nails with attached wood. Associated with Skeleton #81. Shanks straight, rectangular in section. Flat sub-circular heads. Very corroded.


Nails (E2444:1237:1) Fe. Maximum L. 39.7 mm, average D. (of shank) 3.3 mm, maximum D. (of head) 10.04 mm. Group of 29 complete and incomplete coffin nails with attached wood. Associated with Skeleton #95. Shanks straight, circular in section. Flat sub-circular heads. Corroded.

Nails (E2444:1238:1) Fe. Maximum L. 47.3 mm, average Th. (of shank) 3.8 mm, maximum D. (of head) 10.07 mm. Group of 28 complete and incomplete coffin nails with attached wood. Associated with Skeleton #83. Shanks straight, rectangular in section. Flat sub-circular heads. Very corroded.

Nails (E2444:1238:2) Fe. Maximum L. 51.4 mm, average D. (of shank) 4.5 mm, maximum D. (of head) 11 mm. Group of 14 complete and incomplete coffin nails with attached wood. Associated with Skeleton #83. Shanks straight, circular in section. Flat sub-circular heads. Corroded.

Nail (E2444:1238:3) Fe. L. 42 mm, Th. (of shank) 3.6 mm, D. (of head) 11.8 mm. Complete, with attached wood. Associated with Skeleton #83. Shank straight, rectangular in section. Flat sub-circular head. Very corroded.

Nails (E2444:1240:1) Fe. Maximum L. 54.9 mm, average D. (of shank) 5 mm, maximum D. (of head) 11.6 mm. Group of 24 complete and incomplete coffin nails with attached wood. Associated with Skeleton #107. Shanks straight, circular in section. Flat sub-circular heads. Very corroded.

Nails (E2444:1242:2) Fe. Maximum L. 47.9 mm, average Th. (of shank) 4.4 mm, maximum D. (of head) 10.04 mm. Group of 21 complete and incomplete coffin nails with attached wood. Associated with Skeleton #98. Shanks straight, rectangular in section. Flat sub-circular heads. Very corroded.
Nail (E2444:1242:3) Fe. L. 28.2 mm, Th. (of shank) 4.7 mm, W. (of head) 8.4 mm. Incomplete with attached wood. Associated with Skeleton #98. Shank straight, rectangular in section. Flat rectangular head. Corroded.

Nail (E2444:1242:4) Fe. L. 49.6 mm, Th. (of shank) 4.8 mm, D. (of head) 11.3 mm. Incomplete, with attached wood. Associated with Skeleton #82. Shank straight, rectangular in section. Flat sub-circular head. Very corroded.

Nails (E2444:1244:1) Fe. Maximum L. 38.4 mm, average Th. (of shank) 4.6 mm, maximum D. (of head) 11.1 mm. Group of 32 complete and incomplete coffin nails with attached wood. Associated with Skeleton #97. Shanks straight, rectangular in section. Flat sub-circular heads. Very corroded.

Nails (E2444:1247:1) Fe. Maximum L. 41.7 mm, average Th. (of shank) 3.2 mm, maximum D. (of head) 11.8 mm. Group of 10 complete and incomplete coffin nails with attached wood. Associated with Skeleton #55. Shanks straight, rectangular in section. Flat sub-circular heads. Very corroded.

Nails (E2444:1258:1) Fe. Maximum L. 40.08 mm, average D. (of shank) 4 mm, maximum D. (of head) 10.06 mm. Group of 16 complete and incomplete coffin nails with attached wood. Associated with Skeleton #135. Shanks straight, circular in section. Flat sub-circular heads. Corroded.

Nail Fragment (E2444:78/89:5) Fe. L. 13.5 mm, Th. (of shank) 3 mm. Incomplete. Headless. Coffin nail stem fragment. Associated with Skeleton #60. Shank slightly bent, rectangular in section. Corroded.


**Shroud Pins**

A large amount of tiny copper alloy pins was found on site associated with the burials in the ditches. Often the pins were hung to the fabric used for the shrouds. Similar in shape and dimension to sewing pins from several sites. Generally they are all considered post-medieval in date. Comparative examples include 14th/16th century example in Hayden & Walsh (1997, 134, Fig.65:12), 18th century in Scully (1997b, 443, Fig.15.2:12), post-medieval examples in Hurley (1997, 120, Fig.39:4) and Carroll & Quinn (2003, 275, Fig.5.9:5).

**Pin** (E2444:55:1) *Cu. alloy.* L. 23.3 mm, D. (of shank) 0.9 mm, D. (of head) 1.7 mm. Complete. Shroud pin associated with Skeleton #137. Shank slightly bent, circular in section. Rounded circular head. Slightly corroded.

**Pins** (E2444:78/89:1) *Cu. alloy.* L. 25.3 mm, D. (of shank) 0.8 mm, D. (of head) 1.8 mm. Two complete shroud pins associated with Skeleton #56. Shanks straight, circular in section. Rounded circular heads. Slightly corroded.

**Pin** (E2444:78/89:2) *Cu. alloy.* L. 12 mm, D. (of shank) 0.6 mm, D. (of head) 1.6 mm. Incomplete and broken in two pieces. Shroud pin associated with Skeleton #66. Shank straight, circular in section. Rounded circular head. Slightly corroded.

**Pin** (E2444:78/89:3) *Cu. alloy.* L. 16.6 mm, D. (of stem) 0.6 mm, D. (of head) 1.4 mm. Incomplete. Shroud pin associated with Skeleton #69. Shank straight, circular in section. Slightly corroded.

**Pin** (E2444:78/89:4) *Cu. alloy.* L. 20 mm, D. (of shank) 0.6 mm, D. (of head) 1.6 mm. Incomplete and broken in three pieces. Shroud pin associated with Skeleton #68. Shank straight, circular in section. Rounded circular head. Slightly corroded.

**Pins** (E2444:78/89:8) *Cu. alloy.* Average L. 18.25 mm, D. (of shank) 0.6 mm, D. (of head) 1.3 mm. Two incomplete shroud pins associated with Skeleton #69. Shanks slightly bent, circular in section. Rounded circular heads. Slightly corroded.

**Pin** (E2444:78/89:11) *Cu. alloy.* L. 22.7 mm, D. (of shank) 0.4 mm, D. (of head) 1.5 mm. Complete but broken in two pieces. Shroud pin associated with Skeleton #75. Shank slightly bent, circular in section. Rounded circular head. Slightly corroded.

**Pins** (E2444:78/89:12) *Cu. alloy.* Maximum L. 25.4 mm, D. (of shank) 0.6 mm, D. (of head) 1.7 mm. Two complete shroud pins associated with Skeleton #75. Shanks straight, circular in section. Rounded circular heads. Slightly corroded.
Pins (E2444:78/89:14) Cu. alloy. Maximum L. 24 mm, D. (of shank) 0.6 mm, D. (of head) 1.5 mm. Group of four (2 complete + 2 broken) shroud pins associated with Skeleton #93. Shanks slightly twisted, circular in section. Rounded circular heads. Slightly corroded.

Pin (E2444:78/89:16) Cu. alloy. L. 23.8 mm, D. (of shank) 0.7 mm, D. (of head) 1.5 mm. Complete. Shroud pin recovered from near Skeleton #95. Shank straight, circular in section. Rounded circular head. Slightly corroded.

Pins (E2444:78/89:17) Cu. alloy. Maximum L. 40.8 mm, D. (of shank) 0.9 mm, D. (of head) 1.6 mm. Group of four shroud pins (3 complete + 1 incomplete) associated with Skeleton #88. Shanks straight, circular in section. Rounded circular heads. Slightly corroded.


Pins (E2444:78/89:29) Cu. alloy. Average L. 11.05 mm, D. (of shank) 0.6 mm, D. (of head) 1.3 mm. Incomplete. Group of four shroud pin fragments associated with Skeleton #71. Shanks straight, circular in section. Rounded circular heads. Slightly corroded.

Pins (E2444:78/89:36) Cu. alloy. Average L. 15.7 mm, D. (of shank) 0.6 mm, D. (of head) 1.3 mm. Incomplete. Two shroud pin fragments associated with Skeleton #136. Shanks straight, circular in section. Rounded circular heads. Slightly corroded.


Pins (E2444:78/89:41) Cu. alloy. Maximum L. 24.6 mm, D. (of shank) 0.7 mm, D. (of head) 1.8 mm. Two (1 complete + 1 stem fragment) shroud pins associated with Skeleton #100. Shanks straight, circular in section. Rounded circular heads. Slightly corroded.

**Pins** (E2444:78/89:45) *Cu. alloy*. Average L. 10.85 mm, D. (of shank) 0.6 mm, D. (of head) 1.3 mm. Incomplete. Group of four broken shroud pins associated with Skeleton #114. Shanks straight, circular in section. Rounded circular heads. Slightly corroded.

**Pin** (E2444:78/89:47) *Cu. alloy*. L. 15.7 mm, D. (of shank) 0.6 mm, D. (of head) 1.4 mm. Incomplete and broken. Shroud pin associated with Skeleton #112. Shank slightly bent, circular in section. Rounded circular head. Slightly corroded.


**Pin** (E2444:78/89:64) *Cu. alloy*. L. 24.2 mm, D. (of shank) 0.7 mm, D. (of head) 1.4 mm. Complete but broken in two parts. Shroud pin associated with Skeleton #111. Shank straight, circular in section. Rounded circular head. Slightly corroded.

**Pin** (E2444:78/89:65) *Cu. alloy*. L. 23.5 mm, D. (of shank) 0.7 mm, D. (of head) 1.8 mm. Complete but broken in two parts. Shroud pin associated with Skeleton #116/117. Shank straight, circular in section. Rounded circular head. Slightly corroded.


**Pins** (E2444:78/91:1) *Cu. alloy*. Maximum L. 25.3 mm, D. (of shank) 0.8 mm, D. (of head) 1.5 mm. Two (1 complete + 1 broken) shroud pins associated with Skeleton #100. Shanks straight, circular in section. Rounded circular heads. Slightly corroded.

Pin (E2444:171:1) *Cu. alloy.* L. 22 mm, D. (of shank) 0.8 mm, D. (of head) 1.6 mm. Complete. Shroud pin recovered from near Skeleton #30. Shank straight, circular in section. Rounded circular head. Slightly corroded.

Pin (E2444:227:1) *Cu. alloy.* L. 21.4 mm, D. (of shank) 0.6 mm, D. (of head) 1.6 mm. Incomplete and broken. Shroud pin associated with Skeleton #129. Shank straight, circular in section. Rounded circular head. Slightly corroded.

Pin (E2444:227:2) *Cu. alloy.* L. 23.4 mm, D. (of shank) 0.8 mm, D. (of head) 1.6 mm. Complete. Shroud pin associated with Skeleton #129. Shank straight, circular in section. Rounded circular head. Slightly corroded.

Pin (E2444:247:1) *Cu. alloy.* L. 24.7 mm, D. (of shank) 0.7 mm, D. (of head) 1.9 mm. Complete. Shroud pin associated with Skeleton #29. Shank slightly curved, circular in section. Rounded circular head. Slightly corroded.

Pin (E2444:453:1) *Cu. alloy.* L. 24 mm, D. (of shank) 0.7 mm, D. (of head) 1.5 mm. Complete. Shroud pin associated with Skeleton #34. Shank slightly curved, circular in section. Rounded circular head. Slightly corroded.

Pins (E2444:486:1) *Cu. alloy.* Maximum L. 19 mm, D. (of shank) 0.5 mm, D. (of head) 1.9 mm. Group of four (2 complete + 2 incomplete) shroud pins associated with Skeleton #35. Shanks straight, circular in section. Rounded circular heads. Slightly corroded.

Pin (E2444:600:1) *Cu. alloy.* L. 22.5 mm, D. (of shank) 0.6 mm, D. (of head) 1.5 mm. Complete. Shroud pin associated with Skeleton #42. Shank slightly bent, circular in section. Rounded circular head. Slightly corroded.

Pins (E2444:848:2) *Cu. alloy.* Maximum L. 24.9 mm, D. (of shank) 0.6 mm, D. (of head) 1.7 mm. Group of five (3 complete + 2 incomplete) shroud pins associated with Skeleton #44. Shanks slightly bent, circular in section. Rounded circular heads. Slightly corroded.

Pins (E2444:1150:2) *Cu. alloy.* Maximum L. 24.5 mm, D. (of shank) 0.8 mm, D. (of head) 1.5 mm. Group of three complete shroud pins associated with Skeleton #46. Shanks straight, circular in section. Rounded circular heads. Slightly corroded.

Pins (E2444:1179:1) *Cu. alloy.* Maximum L. 22.4 mm, D. (of shank) 0.8 mm, D. (of head) 1.4 mm. Two (1 complete + 1 broken) shroud pins associated with Skeleton #58. Shanks straight, circular in section. Rounded circular heads. Slightly corroded.
Pins (E2444:1179:3) Cu. alloy. Maximum L. 26.2 mm, D. (of shank) 0.7 mm, D. (of head) 1.5 mm. Two (1 complete + 1 broken) shroud pins associated with Skeleton #55. Shanks straight, circular in section. Rounded circular heads. Slightly corroded.

Pins (E2444:1197:2) Cu. alloy. Maximum L. 25.4 mm, D. (of shank) 0.6 mm, D. (of head) 1.5 mm. Two (1 complete + 1 broken) shroud pins associated with Skeleton #58. Shanks straight, circular in section. Rounded circular heads. Slightly corroded.

Pin (E2444:1213:3) Cu. alloy. L. 24 mm, D. (of shank) 0.7 mm, D. (of head) 1.8 mm. Complete. Shroud pin associated with Skeleton #52. Shank straight, circular in section. Rounded circular head. Slightly corroded.

Pins (E2444:1232:1) Cu. alloy. Maximum L. 21.6 mm, D. (of shank) 0.6 mm, D. (of head) 1.3 mm. Two (1 complete + 1 stem fragment) shroud pins associated with Skeleton #82. Shanks straight, circular in section. Rounded circular heads. Slightly corroded.

Pin (E2444:1238:4) Cu. alloy. L. 33.9 mm, D. (of shank) 0.9 mm, D. (of head) 2 mm. Complete. Shroud pin associated with Skeleton #83. Shank straight, circular in section. Rounded circular head. Slightly corroded.


Pins (E2444:1242:1) Cu. alloy. Average L. 17.3 mm, D. (of shank) 0.7 mm, D. (of head) 1.8 mm. Incomplete. Group of three (1 complete + 2 broken) shroud pins associated with Skeleton #98. Shanks slightly bent, circular in section. Rounded circular heads. Slightly corroded.

Pin (E2444:1244:2) Cu. alloy. L. 22.3 mm, D. (of shank) 0.5 mm, D. (of head) 1.1 mm. Complete but broken in two pieces. Shroud pin associated with Skeleton #97. Shank straight, circular in section. Rounded circular head. Slightly corroded.

Pin Fragment (E2444:?:?) Cu. alloy. L. 15.6 mm, D. (of shank) 0.5 mm. Incomplete. Headless. Shroud pin associated with Skeleton #44. Shank straight, circular in section. Slightly corroded.

**Pin Fragment** (E2444:1166:1) *Cu. alloy.* L. 12.5 mm, D. (of shank) 0.7 mm. Incomplete. Headless. Shroud pin associated with Skeleton #50. Shank straight, circular in section. Slightly corroded.

**Pin Fragment** (E2444:1213:1) *Cu. alloy.* L. 16.2 mm, D. (of shank) 0.7 mm. Incomplete stem fragment. Headless. Shroud pin associated with Skeleton #52. Shank straight, circular in section. Slightly corroded.

**Silver**

**Coin** (E2444:78/89:13) *Ag.* D. 26.34 mm, Th. 0.52 mm. Complete but extremely worn coin. It is most likely a silver groat from Henry VIII from 1546 that was struck in Bristol (Figure 1). It is the sixth and final issue of Henry’s reign and the most debased of the series (250 fineness). The earliest issues date from around 1530 (Simon 1810, 32-33) and were between .842 and .925 fineness. These coins are also known as ‘Harp Groats’ as they are the first coins minted with the harp as the symbol of Ireland featured on the reverse. The harp was recognised as the symbol of Ireland from about the thirteenth century. The harp illustrated on the coin is said to be representative of the Brian Boru Harp on display in Trinity College and still featured on modern Irish coinage today.

Illustration of Henry VIII groat of 1546, (from Simon 1810, Plate 5, 103).
The groat and comprises a crowned shield or scutcheon divided by a cross on the obverse. The displays the coat of arm of England and is divided into four panels with the fleur de lys in two and lions passant in the other two. The crowned shield is surrounded with the legend ‘HENRIC 8 DG ANGL FRANC’. The motif on the reverse essentially comprises a crowned harp on either side of which is the crowned or royal cipher, H and R, representing Henry and Rex (king). In the earlier issues of this coin the letter R was changed several times to the initial of his several wives, i.e. A for Ann Boleyn, J for Jane Seymour and K for Catherine Howard etc. The reverse legend comprised ‘WS ET HIBERNIE REX 38’. The complete legend which continues from the obverse to the reverse translates as ‘Henry VIII by the grace of God England France and Ireland King 38’. The letters DG represent Deo Gratia—grace of God and the number 38 represents Henry’s thirty-eight regnal year which was 1546 (Colgan 2003, 84; Simon 1810, 32-33).

The groat from Mackney is extremely worn and delicate (Plates 15 and 16). However, there are enough motifs and letters to assign it as the 1546 Harp Groat of Henry VIII. The crown over the shield is very worn and barely survives while ‘8 DG’ and ‘ANGL’ are the only discernible letters. The reverse is also extremely worn with the crowned harp barely visible. The royal cypher H and R are clearly visible. Very little of the reverse inscription survives. The letters ET are clearly legible separated by a double saltire while the only other discernible letters are the ERNI from HIBERNIE. The only other letters discernible, WS, refer to the Bristol mint master William Sharrington. Of interest is that this 1546 issue was also recorded in the Annals of the Four Masters for the same year and reads: ‘New coin was introduced into Ireland, i.e. copper, and the men of Ireland were obliged to use it as silver’ (Colgan 2003, 84).

Finds associated with modern pottery/glass/clay pipes

Nails

Nail (E2444:78/89:48a) Fe. L. 40.02 mm, Th. (of shank) 5 mm. Incomplete. Headless. Shanks bent at a right angle. Shank rectangular in section. Corroded.

Nail (E2444:78/89:48b) Fe. L. 15.4 mm, Th. (of shank) 3.5 mm, D. (of head) 9.5 mm. Complete. Tiny iron nail. Shank straight and spiky. Shank sub-circular in section. Flat circular head. Corroded.

**Nails** (E2444:126:1) Fe. Average L. 60 mm, average Th. (of shank) 5 mm, average W. (of head) 9.7 mm. Complete. Group of five iron nails. Shanks straight, rectangular in section. Flat heads (four rectangular, one circular). Corroded.

**Nails** (E2444:126:4) Fe. Average L. 44.3 mm, average Th. (of shank) 5.35 mm, average W. (of head) 10 mm. Complete. Group of four iron nails. Shanks straight, rectangular in section. Flat rectangular heads. Corroded.

**Nail** (E2444:126:11) Fe. L. 92.7 mm, Th. (of shank) 7.1 mm, D. (of head) 10.02 mm. Complete. Shank straight, rectangular in section. Flat circular head. Corroded.

**Nail?** (E2444:170:1) Fe. L. 66.8 mm, Th. (of shank) 6.5 mm. Incomplete. Headless. Probable carpentry nail. Shank straight, rectangular in section. Corroded.

**Nail** (E2444:170:9) Fe. L. 78.2 mm, Th. (of shank) 6.4 mm. Incomplete and broken in two pieces. Headless. Shank straight, rectangular in section. Very corroded.

**Nail** (E2444:170:10) Fe. L. 100.01 mm, Th. (of shank) 7.8 mm, W. (of head) 11.4 mm. Complete. Shank straight, rectangular in section. Flat rectangular head. Corroded.

**Nail** (E2444:185:1) Fe. L. 48.9 mm, Th. (of shank) 7.1 mm. Incomplete. Headless. Shanks slightly bent, rectangular in section. Corroded.

**Nail** (E2444:510:1) Fe. L. 47.3 mm, Th. (of shank) 5 mm, D. (of head) 9.7 mm. Complete. Shank straight, rectangular in section. Flat sub-circular head. Corroded.

**Nails** (E2444:510:7) Fe. Average L. 31.9 mm, average Th. (of shank) 6.45 mm. Incomplete. Headless. Two iron nails. Shanks slightly bent, rectangular in section. Corroded.

**Nail** (E2444:510:16) Fe. L. 54.7 mm, Th. (of shank) 9.8 mm, W. (of head) 15.2 mm. Incomplete (final part missing). Shank slightly bent, rectangular in section. Flat sub-rectangular head. Corroded.

**Nail** (E2444:510:17) Fe. L. 38.4 mm, Th. (of shank) 4.5 mm, D. (of head) 11.3 mm. Incomplete. Shank straight, square in section. Flat sub-circular head. Corroded.

**Nail** (E2444:815:1) Fe. L. 36.2 mm, Th. (of shank) 6.5 mm. Incomplete. Headless. Shanks straight, rectangular in section. Corroded.
Nail (E2444:815:2) Fe. L. 68.1 mm, Th. (of shank) 5.8 mm, W. (of head) 11.5 mm. Complete. Shank bent, rectangular in section. Flat sub-rectangular head. Corroded.

Other Objects

Iron

Arrowhead (E2444:18:2) Fe. L. 53.6 mm, W. 11.1 mm, Th. 6.8 mm. Complete. Socketed arrowhead. Triangular in shape.

Lock (E2444:126:2) Fe. L. 110.03 mm, W. 67.9 mm, Th. 22 mm. Complete. Big modern lock. Rounded-stretched in shape. Final part of the key broken inside. A horizontal leaf-shaped mark is applied on the front side. Very corroded.

Knife (E2444:815:3) Fe. L. 95.5 mm, W. 13.5 mm, Th. (of blade) 3.3 mm, Th. (of nook) 6.3 mm. Incomplete. Blade sickle-shaped. Nook bent at a right-angle. Corroded.

Knife (E2444:126:3) Fe. L. 131.5 mm, W. 22.6 mm, Th. (of blade) 2.5 mm, Th. (of tang) 6.3 mm. Incomplete. Blade rectangular in shape, broken at the end. Tang bent at a right-angle. Corroded.

Slate (E2444:510:6) Fe. L. 57 mm, W. 46 mm, Th. 2.3mm. Incomplete. Flat sub-circular in shape. Irregular edges. Corroded.


Rivet (E2444:170:3) Fe. L. 53 mm, W. 15.9 mm, Th. (in section) 4.7 mm. Incomplete. Rectangular-stretched in section. Bent at a right angle. One of the ends widens to a flat rounded ring with a central (probably for fastening nails/screws). Corroded.


**Horseshoe** (E2444:125:5a) *Fe.* L. 60 mm, W. 48.6 mm, Th. 4.6 mm. Complete. Five nail-holes present. Possible pony/young horse shoe. Corroded.

**Horseshoe** (E2444:125:5b) *Fe.* L. 69.6 mm, W. 77 mm, Th. 6.5 mm. Complete. Five nail-holes present. Corroded.

**Horseshoe?** (E2444:125:4) *Fe.* L. 49 mm, W. 8.3 mm, Th. 3.4 mm. Incomplete. Curved with a small nail put on the base. Possible pony/young horse shoe. Corroded.

**Key** (E2444:125:3) *Fe.* L. 64.2 mm, W. (of bow) 27.7 mm, Th. (of blade) 4.4 mm. Incomplete. Final part of blade missing. Blade circular in section. Bow elliptical in shape. Corroded. Similar to an iron rod (Fig.23.12:14, pag.133) from Drumlummin, Co.Tipperary. Cfr. Clearly 1987.


**Iron Bar** (E2444:185:9) *Fe.* L. 44.6 mm, W. 12.1 mm, Th. 6.2 mm. Incomplete. Rectangular-stretched in section. Slightly curved with a rounded end. Corroded.

**Iron Bar** (E2444:510:5) *Fe.* L. 50.07 mm, W. 26 mm, Th. 6 mm. Incomplete. Rectangular-stretched in section. Straight with a rounded button applied on the top. Corroded.

**Iron Bar** (E2444:929:1) *Fe.* L. 41.3 mm, W. 15.1 mm, Th. 8.2 mm. Incomplete. Rectangular-stretched in section. Possible part of a blade. Very corroded.

**Iron Bar** (E2444:185:2) *Fe.* L. 52.3 mm, W. 14.5 mm, Th. 5.4 mm. Incomplete. Rectangular-stretched in section. Slightly curved. Possible part of a blade. Corroded.

**Piece of Iron** (E2444:510:8) *Fe.* D. 124.5 mm, Th. 4.7 mm. Incomplete. Flat rounded in shape. Irregular edges. Corroded.

**Iron Object** (E2444:78/89:24) *Fe.* L. 49.4 mm, W. 18.3 mm, Th. 7.8 mm. Incomplete. Short iron bar. Rectangular-stretched in section. Possible part of a blade. Very corroded.
Iron Object (E2444:125:1) Fe. L. 93.1 mm, W. 35.4 mm, Th. 3 mm. Incomplete. Slate bent at a right-angle. Rectangular in shape. Irregular-edged hole present at one end. Probable support/cover for a tool. Corroded.

Iron Object (E2444:178:1) Fe. L. 50 mm, W. 23.5 mm, Th. 5.6 mm. Incomplete. Probable final part of a tool. Short hollow bar widening to a flat paw-shaped end. Wavy edge. Corroded.

Iron Object (E2444:178:4) Fe. L. 40.02 mm, W. 7.4 mm, Th. 3.5 mm. Incomplete. Small bar. Rectangular-stretched in section. Bent and twisted. Very corroded.

Iron Object (E2444:179:2) Fe. L. 46 mm, Th. (in section) 7 mm. Incomplete. Rectangular in section. Broken piece of an iron object, probably a hook. Bent. Corroded.

Iron Object (E2444:185:7) Fe. L. 85.7 mm, W. 14.3 mm, Th. (in section) 6.2 mm. Complete. Flat loop-shaped object. Rectangular in section. Probably a sort of strap used either for belts or garments. Corroded.

Iron Object (E2444:510:4) Fe. L. 48.9 mm, W. 40.08 mm, D. (of stem) 10.06 mm. Complete. T-shaped iron object. Composed of a small tub boat bottom shaped and of a short stem (L. 25.8 mm.) circular in section. Probably it was a butt of some kind of tool or object (e.g. a rubber stamp). Corroded.

Iron Object (E2444:510:9) Fe. L. 79.1 mm, W. 70.08 mm, Th. 14 mm. Complete. L-shaped artefact. Circular in section as refers the long side, flat and rectangular on the short one. Three holes (probably for fastening nails/screws) present on both ends. Possible support used in carpentry. Corroded.

Copper Alloy

Finds from Souterrain

Iron

Nails

Nail (E2444:1122:2) Fe. L. 43 mm, Th. (of shank) 4.8 mm, D. (of head) 9.8 mm. Complete. Tiny iron nail. Shank straight. Shank square in section. Flat circular head. Corroded.

Nail (E2444:1230:8) Fe. L. 43.1 mm, Th. (of shank) 4.6 mm, W. (of head) 7 mm. Complete. Shank straight. Shank square in section. Flat square head. Corroded.

Other Objects

Pin (E2444:1221:1) Fe. L. 27.6 mm, Th. (of shank) 0.8 mm, D. (of head) 1.9 mm. Complete. Tiny shroud pin. Shank bent at a right angle and almost broken in two parts. Flat circular head. Corroded.

Lock (E2444:1122:1) Fe. D. 43.1 mm, Th. 11.4 mm. Complete. Modern lock. Rounded in shape. Embroided with the words “SECURE LEVER LOCK”. Key hole situated on the lower part of the lock. Corroded.

Door Lock (E2444:1230:12) Fe. L. 101.4 mm, W. 95.7 mm, Th. 21.5 mm. Complete. Door lock. Rectangular in shape with four hanging holes for fastening it, one at each corner. Key hole situated on the upper part of the lock. Corroded.

Horseshoe (E2444:1230:9) Fe. L. 121.1 mm, W. 88.7 mm, Th. 9.4 mm. Complete. Trimmed with a continue line following the profile. Bent at a right angle on both ends. Corroded.


Iron Bar (E2444:1122:4) Fe. L. 63.4 mm, W. 10.02 mm, Th. 3.7 mm. Incomplete. Strip broken in two pieces. Severely bent and partially twisted. Very corroded.

**Tool** (E2444:1230:13) *Fe.* L. 131 mm, W. 73.9 mm, Th. 26.2 mm. Complete. Probable part of a ploughing tool (wooden handle missing). Beak-shaped, with a sharp nook on the lower side. Elliptical in section. Corroded.

**Tool** (E2444:1230:14) *Fe.* L. 233 mm, Th. 22.5 mm. Complete. Stake or picket. Square in section. Flat on the top, peaky toward the bottom. Corroded.

**Tool** (E2444:1230:53) *Fe.* L. 189.1 mm, Th. 12.9 mm, W. (of bolt) 27.1 mm. Incomplete. Iron bar, square in section. Slightly curved at one end, with a square bolt hanged on the other one. Corroded.

**Iron Object** (E2444:1122:3) *Fe.* L. 50.02 mm, W. 8.9 mm, Th. 4.5 mm. Incomplete. Small bar. Rectangular in shape. Slightly curved. Very corroded.


**Iron Object** (E2444:1230:5) *Fe.* D. 72.2 mm, W. 34.7 mm, Th. 29 mm. Complete. Composed by an arrow-shaped piece of iron stuck to an elliptical-in-section ring. Probable used for fastening/hanging tools. Corroded.

**Iron Fragment** (E2444:1121:2) *Fe.* L. 11.5 mm, W. 10.01 mm, Th. 0.8 mm. Incomplete. Tiny fragment of iron. Rectangular in shape. Very corroded.

**Iron Fragment** (E2444:1122:3) *Fe.* L. 34.3 mm, W. 22.7 mm, Th. 2.4 mm. Incomplete. Fragment of iron. Irregular-shaped. Very corroded.

**Iron Fragments** (E2444:1249:3) *Fe.* Average L. 50.5 mm, average W. 30.7 mm, Th. 3.8 mm. Incomplete. Group of seven fragments of iron minimum. Irregular-shaped. Very corroded.

**Copper alloy**

**Hair comb?** (E2444:1221:1) *Cu. alloy.* L. 75.8 mm, W. 140 mm, D. (of hold) 3.5 mm. Complete but with several teeth missing. Probable hair comb, arch-shaped. Teeth curved as well. Hold circular in section. Corroded.

**Rings** (E2444:1230:6) *Cu. alloy.* Average D. 53.7 mm, average Th. (in section) 5.45 mm. Two rings, one of which with a small hanging hook. Both complete. Slightly corroded.
Object (E2444:1230:3) Cu. alloy. D. 68.8 mm, Th. 9.7 mm. Complete. Rounded trimmed disc. Hollow in the middle, with a flower decoration carved in. Probable part of a furnishing piece. Corroded.

Tin


Finds from other contexts

Iron

Nails

Nails (E2444:78:1) Fe. Average L. 25.2 mm, average Th. (of shank) 4.9 mm, average D. (of head) 9 mm. Group of fifteen nails associated with wood. Shanks rectangular in section. Flat circular heads. Corroded.


Nail (E2444:814:1) Fe. L. 51.4 mm, Th. (of shank) 5.3 mm, D. (of head) 12.8 mm. Complete. Shank rectangular in section. Flat circular head. Corroded. Comparative example in Scully (1997a, 166, Fig. 74:26).

Nail Head (E2444:935:1) Fe. L. 13.9 mm, D. (of shank) 8 mm, D. (of head) 15.4 mm. First part of shank present. Shank circular in section. Flat circular head. Corroded. Cfr. Scully (1997a, 166, Fig. 74:20).

Nail (E2444:1198:1) Fe. L. 21.4 mm, Th. (of shank) 4.8 mm, W. (of head) 7.46 mm. Complete. Shank rectangular in section. Slightly bent. Flat rectangular head. Corroded. Cfr. Scully (1997a, 166, Fig. 74:2).

Other Objects

Iron


Piece of Iron (E2444:275:1) Fe. L. 58.5 mm, W. 52 mm, Th. 8.5 mm. Incomplete. Probable part of either a bowl or a crucible. Surface slightly curved. Irregular in shape. Corroded.

Copper Alloy

Fragments (E2444:1121:2) Cu.alloy Maximum L. 6.2 mm, maximum W. 5.5 mm. Incomplete. Tiny fragments of copper alloy. Irregular in shape. Corroded.

Bibliographic References


Websites

http://www.members.shaw.ca/cartridge-corner/shotgun.htm
http://www.vcoins.com
http://www.irishcoinage.com
http://www.medievalcoins.50g.com
Appendix 15: Post-medieval and modern pottery

By Sara Camplese

A total of 287 sherds of pottery, 15 ceramic objects and 2 tile fragments were recovered on the site. They have all to be considered modern, none of them being dated earlier than the advanced 18th Century. Practically all the pottery sherds present in the assemblage is tableware. The pottery listed as from C.0 was recovered during the testing (Phase 1) and then amalgamated into the post-excavation register.

Table 1. List of pottery by context

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<th>Context</th>
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</tr>
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**Table 2. List of pottery by type**

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<tr>
<td>Tiles</td>
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<td>Modern</td>
</tr>
</tbody>
</table>
**Black Glazed ware**

Black wares were produced in North Wales, in Lancashire and in parts of Ireland in the 18th and 19th centuries (McCutcheon 2003). The production of black glazed storage and food processing vessels started during the late 16th to 17th centuries and continued into the 20th century. At first they were imported to Ireland, but by the middle of the 18th century, some were locally produced in parts of Ireland (Meenan 1997). The fabric is orange/dark red clay, of a less highly fired type red earthenware. The glaze is rich in iron and looks glossy and thick. The forms present belong to a table ware range of vessels that can be glazed internally or externally, depending on the use.

**Glazed Red Earthenware**

The sherds have a hard-fired, fine fabric that is orange/red, buff or brown in colour without any particular inclusions. The different range of colours of the clay simply depends on the variation of firing conditions. The pottery is usually glazed on the inner surface and present no other decorations. The nuance of the glaze changes from a light yellow to an opaque green. Most of the sherds belong to open vessels, like bowls (of various size), plates and pancheons. This type of wares, also known as ‘brownwares’ were made widely in Britain and Ireland from the late 17th to 19th century (Cfr. Clearly 1987, 127).

**Unglazed Red Earthenware**

This class presents the same fabric and forms of Glazed Red Earthenware (above) but without the glaze. Due to the small size of the sherds found at Mackey ringfort, it is difficult to determine whether the absence of glaze is due to gaps that occurred during the glazing process, or to the fact that the vessels were not intended to be glazed.

**Pearlware**

Pearlware pottery developed from popular cream-coloured earthenware in the last decades of the 18th century. Although the fabric and the range of forms of both wares are similar, the lead glaze used for the creamware is whiter, due to the addition of small amounts of cobalt blue (Gahan 1997).

**Shell-edged ware**

The shell-edged ware is a type of pearlware produced in the same centres in Britain already producing the former one, together with the cream-coloured earthenware. The vessels have moulded edges covered with an all-over clear lead glaze with either cobalt blue or copper green glazing at the edges (ibid). Only two rim sherds from this class were identified within the assemblage; they both belonged to plates.
Prattware
Also known as “Creamware”, this cream-coloured earthenware was created about 1750 in Staffordshire, England. It was popular for domestic use until the 1820’s (Cfr. http://www.en.wikipedia.org). A clear lead glaze was applied to vessels made from clay with calcinated flint, resulting in the characteristic cream colour (Gahan and Twohig 1997, 151). The colour of the glaze used can change. One body sherd of probable prattware were found on site.

Transfer printed ware
Transfer printed ware is an earthenware decorated prior to firing. This technique developed during the later stages of the 18th century and then was perfected in the early 19th century. During the process the pattern is transferred from copper plates onto the vessels by means of specially treated tissue paper. Once transferred the paper could be removed by washing. The vessel then was glazed and fired.

Initially, cobalt blue was used in all transfers, being the only colour capable of whitstanding the necessary firing temperatures and it always remained the most popular colour. However, during the 19th Century other colours were used extensively most notably black and dark brown. Pearlware vessels were most commonly used for transfer printing. The influence of Chinese porcelain is evident in much of the decoration (ibid, 156 – 158).

Sherds of transfer printed ware represent the largest amount of pottery in the assemblage from Mackney ringfort. Ninety-seven sherds were discovered, mainly decorated in blue and dark brown but occasionally in green and red too. The sherds of transfer printed wares from Mackney ringfort that were recovered from the souterrain are discussed in more detail below.

Stoneware
This class of clay and ceramic is distinguished by its firing and maturation temperature (from ca.1200°C to 1315°C), which is higher than for the earthenware pottery and makes the stoneware recipients totally waterproof. Stoneware is usually grey or brownish in colour and is normally covered by an opaque glaze.

Unidentified pottery
A group of nine sherds from various contexts remains unidentified as it is not possible to assign them to any particular type. They can be considered modern in date anyway.
Pottery from the souterrain

Several ceramic objects come from a dark sandy layer in the souterrain (C.1230). These were small ceramic pots and they were the only ceramic finds from the ringfort that were included in a catalogue, as they were deemed the most significant finds from the site.

The pottery had a stoneware fabric, white or cream tin glaze and – when present – transfer-printed decoration. The group comprised seven small pots (only two of which are complete) for food pastes or ointments (Plate 17), six salt bottles caps (Plate 18), and a cylindrical-shaped container. A ceramic door knob was also found, and it will be included into the following catalogue (Plate 19).

Transfer-printed pot/pot lids had their heyday during the Victorian period, from the 1840s to the early 1900s. The English Staffordshire potteries made ceramic containers with decorative lids for bear’s grease, shrimp or meat paste, cold cream, ointments and toothpaste. Printed advertising and pictures of historical events, portraits of famous people, or scenic views were designed in black and white or color. Reproductions have been made.

The design of these pots made you believe that the recess for the toothpaste or ointment was the size of the container itself. Actually the upper lid of the container always had a large overhanging lip which gave an illusion of enlarged size. The lower section of the pot was usually thickly walled with a small product recess. The result was that the public bought a very large pot with only a small amount of product inside. Where possible to track their origin, the containers found in Mackney ringfort were produced in England (mainly London) and Dublin, and afterwards exported to the Irish west coast.

Catalogue

Pot/Pot lids/Bottle caps


Pot Lid (A014/4.16:1230:24). D. 68.3 mm. Complete. Glazed ware with a transfer printed decoration on the top: “Cracroft’s Areca Nut Toothpaste prepared from the cincalese recipe, warranted genuine (Price 1s & 2s6d) – John Pepper & Co. Limited, Bedford Laboratory, London"
—Sold by all Chemists”. An advert for the sulpholine soap is also present on the inside of the lid. Dating: Late 19th Century.


**Bottle Caps** (A014/4.16:1230:21). D. 47.8 mm. Complete. Group of six caps all of same size and decoration. Glazed ware with a transfer printed mark on the top, showing a snake on a tree trunk and the wording: “Searcy’s Oriental Salt – Trade Mark”. A marked number (IV) is also present on the inside of the lids. Probable dating: Late 19th/20th Century.

**Other Objects**


**Bibliographic References**

pipeline (1981-82). Cork Archaeological Studies No.1, Department of Archaeology University College Cork.


Websites

http://www.wikipedia.org
Appendix 16: Clay pipes

By Sara Camplese

The clay pipes from Mackney ringfort were represented by ten stem fragments and nine bowls. The dateable pieces all date from the 18th to the early 20th centuries.

Stems

Stem (E2444:125:8) L. 61 mm, D. 5.9 mm. Incomplete.

Stem (E2444:125:7) L. 49.2 mm, D. 7.1 mm. Incomplete.


Stem (E2444:815:5) L. 59.8 mm, D. 9.2 mm. Incomplete.

Stem (E2444:815:6) L. 32.1 mm, D. 6.7 mm. Incomplete.

Stem (E2444:125:6) L. 63.8 mm, D. 8.2 mm. Incomplete. Spur present. Stem decorated with a series of rouletted bands. Similar to examples illustrated in Lane (2003, 249, Figs. 4.3.1:15&17) and Gowen (1978).

Stem (E2444:1:7) L. 39.9 mm, D. 8.5 mm. Incomplete.

Stem (E2444:1:32) L. 35.3 mm, D. 7.9 mm. Incomplete.

Stem (E2444:1:31) L. 27.1 mm, D. 12.3 mm. Written on both sides, unreadible. Incomplete.

Stem (E2444:0:27) L. 38.9 mm, D. 10.03 mm. Written on both sides: “KNOCK...-...XEY...”. Incomplete. Recovered from Testing.

Bowls*

**Bowl** (E2444:125:9) L. 51.7 mm, D. 26.1 mm. Complete but slightly damaged. Spur broken. Bulbous, with rouletting on the rim. On the back of the bowl a “Crowned L” in a circular beaded frame is present. Irish copy of the Dutch “Crowned L” pipe. This kind of stamp seems to have been very popular with Irish makers in the 19th century. Similar to example illustrated in Norton (1997, 184, Fig. 87:9). Dating: c.1850-1900.

**Bowl** (E2444:187:2) L. 44.7 mm. Incomplete. Spur present. Elongated bowl with milling at rim. Probable dating: 18th century.

**Bowl** (E2444:1249:2) L. 44.3 mm, D. (of stem) 8.4 mm. Incomplete. Part of the stem present. Small spur with a tiny decoration presents on both sides, possibly representing a shamrock. What seems to be an all-over design of foliage is present on the back of the bowl. Probable dating (according to shape and decoration): Late 19th century.

**Bowl** (E2444:1230:2) L. 68.8 mm, D. 29.1 mm Complete. Part of stem present. Slightly bulbous, not quite at right angles to stem; rounded bottom to bowl, without spur or pedestal. Oval stamp above stem “Ben Nevis/ Cutty”. Similar to a bowl found in Gardenhill, Co.Limerick and conserved in the Limerick City Museum (Museum record details: 34483). Comparative example in Lane (1997, 373, Fig.12:2:33). Dating: early 20th century, Scotland.


**Bowl** (E2444:1:29) L. 41.8 mm, D. 23.2 mm. Incomplete. Spur absent. Small plain bowl slightly rouletted on the rim. Similar to an example illustrated in Norton (1997, 184, Fig. 87:1, pag.184). Dating: Late 19th Century.

**Bowl** (E2444:1:30) L. 35.1 mm. Incomplete. Spur present. With a “Milkmaid” stamp (in use from c. 1600-1940) on the heel, and what seems to be the arms of Gouda on both sides of the spur. Dutch. Comparative example, as regards shape and decoration, in Norton (1997, 184, Figs. 86:7 & 12). Probable dating: 18th century.


* The diameter considered is the maximum diameter of the bowl. When the bowl lip is present the diameter is taken on the rim of the bowl.
Bibliographic References


Appendix 17: Glass

By Sara Camplese

A total of 154 glass fragments/objects were found at Mackney ringfort. The examples listed as from topsoil (C.0) were found during archaeological testing and these were added to the glass finds from excavation during post-exavation.

Table 1. Glass by context

<table>
<thead>
<tr>
<th>Context No.</th>
<th>Description</th>
<th>No. of pieces</th>
<th>Dating</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (Topsoil)</td>
<td>Complete Bottle</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bottle base</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Bottle fragments</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unidentified Glass fragments</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Unidentified fragments</td>
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<td></td>
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<tr>
<td>27</td>
<td>Unidentified fragments</td>
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<tr>
<td>82</td>
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<td>125</td>
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</tr>
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<td>126</td>
<td>Unidentified fragments</td>
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</tr>
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<td>185</td>
<td>Complete Bottle</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Unidentified fragments</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Bottle fragments</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>219</td>
<td>Bottle base fragments</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>510</td>
<td>Unidentified fragments</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>512</td>
<td>Unidentified fragments</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>1113</td>
<td>Unidentified fragment</td>
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<td>1123</td>
<td>Bottle fragments</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>1230</td>
<td>Window Fragments</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ink (bottle) container</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bottle caps</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bottle</td>
<td>30</td>
<td></td>
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Table 2. Glass by type

<table>
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<th>Description</th>
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<th>Dating</th>
</tr>
</thead>
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<tr>
<td>Complete Bottles</td>
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<td></td>
</tr>
<tr>
<td>Bottle Caps</td>
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<td></td>
</tr>
<tr>
<td>Bottle Base</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Bottle Fragments</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>Window Fragments</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Ink (bottle) containers</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Unidentified fragments</td>
<td>84</td>
<td></td>
</tr>
</tbody>
</table>

A total of thirty-four bottles were discovered from Mackney amongst the various fragments recovered from both the topsoil and the souterrain. All of these dated from between
the late 19th century and the first half of the 20th century. These are described separately in the catalogue below.

**Glass bottles from Topsoil**
A total of four bottles were recovered from topsoil; two of them (E2444:0:34 and E2444:1:20) probably were used for water storing, the remaining two (E2444:0:28 and E2444:0:38) were destined to medicines.

**Glass from Souterrain**
A total of 32 glass bottles and 2 bottle caps were recovered from C.1230, which consists in a dark fill in the Souterrain Area. According to their marks and shape they all can be dated from the second half of 19th Century to the first decades of the 20th Century.

**Catalogue**

**Topsoil**


**Bottle Base** (E2444:0:38). D. 56 mm. Incomplete and chipped on the edge. Rounded in shape. Embossed with the mark “MVF FCC” and the numbers “2 – 664”.

**Bottle** (E2444:0:28). H. 135.8 mm, W. 45.7 mm. Incomplete (neck damaged). Rectangular-shaped. Clear glass. Embossed on the front: “CALIFORNIA FIG SYRUP CO. – STERLING PRODUCTS/INC – SUCCESSOR”; and on both lateral sides: “CALIFIG”. This is the registered mark for a laxative syrup from London. It was quite common as a medicine in the late 19th century and is still in use nowadays.

**Bottle** (E2444:0:34). H. 201 mm, D. 82.9 mm. Complete. Globular prolonged body, stocky neck. Opaque clear blue glass. Originally it was probably covered by a glazing polish. Possible water bottle.
**Souterrain**


Bottles (E2444:1230:44). H. between 38.5 mm. and 71 mm, D. between 19mm. and 23mm. Group of five complete small bottles. Cylindrical in shape with short neck and flat brim. Clear glass. Medicine or perfume containers.


**Bottle Caps** (E2444:1230:17). D. 34.4 mm and 46.1 mm. Complete. Two caps of different size. Clear glass, originally it was probably covered by a glazing polish. The smaller one is embossed on the top with a latin cross and a bay laurel crown, surronded by the words: “LAMPOUGHS TRADE MARK”. Most likely the bottle contained pyretic saline. Probable dating: from the second half of 19th century. (Cfr. [http://www.antiquebottles.co.za/Rarity.htm](http://www.antiquebottles.co.za/Rarity.htm))


**Websites**

- [http://www.sportingcollectibles.com](http://www.sportingcollectibles.com)
- [http://www.antiquebottles.com](http://www.antiquebottles.com)
- [http://www.bottlebooks.com](http://www.bottlebooks.com)
- [http://www.wikipedia.com](http://www.wikipedia.com)
- [http://www.limerickcorp.ie](http://www.limerickcorp.ie)
Appendix 18: Textiles

By Elizabeth Wincott Heckett

Tiny fragments of textiles, mostly attached to small, thin metal pins were found with twenty-one of the 143 buried bodies from the cillin burial site. The cloth scraps are extremely fragile, and have survived because they were in close contact with the metal pins. These last are made from copper alloy and are between 17 and circa 31 mm long. There may be three pin types represented in the burials; the shortest at 17 mm, the next size at 23 mm, and the longest circa 31 mm.

It seems that perhaps two types of cloth were used as shrouds or winding sheets. Pieces of good quality linen cloth attached to the pins were found with eight skeletal remains. Linen fibres and threads were found with a further seven bodies. The colours of the cloth now range from a discoloured creamy white to a yellowish brown, and the linen survived remarkably well. The type is a balanced tabby weave cloth, using Z/Z threads ranging between 20 x 20, 30 x 30 and 30 x 40 threads to the centimetre.

There is also an extremely deteriorated cloth type that is almost black which is present in all these finds. It is difficult to identify the fibre, and impossible to identify the weave since the threads lying in one direction have survived whereas none of the second system that should lie across them, are apparent. The material is coarse and dense in appearance, perhaps made from wool although it is not possible to be definite on the type of fibre. There has been some kind of very dark coloured heavy additional treatment, or an added substance. There may be a residue from the bodies that has permeated the cloth. It is also possible that a substance such as bitumen was added. Bitumen has been used since antiquity in connection with burials for its water-proofing qualities. A male corpse, c 1300 AD excavated at St. Bee’s Priory, Cumbria, England had been wrapped in two rectangular linen shrouds. Each of these had been ‘heavily impregnated with a black, bituminous substance.’ Since the body was contained in a lead capsule-like coffin and an outer wooden coffin the bituminous substance was in one area ‘tacky, like soft tar’ and in another ‘thick and treacly’ (Glover 1990, 51). Clearly the different conditions of the cloths’ survival had prevented the bitumen from totally drying out as may have happened at Mackney.

Bitumen is found in the carboniferous North West Irish Basin in the northern counties of Ireland and in Northern Ireland (Parnell and Monson 1990, 1011-1022). Peat can also be enhanced through liquefaction to be turned into bitumen (Parnell, Monson and Buckman 1992, 449-464). The use of tar and pitch in caulking, and thereby waterproofing wooden ships certainly dates back to the Viking Age (Wincott Heckett forthcoming).

There are also the remains of what seem to be human hairs caught in the cloths and thin paper-like remains, perhaps of human skin. These can be seen on 78/89:52, 78/89:59 perhaps 91:1.
The analysis of the skeletons recovered from the ring-fort has shown that 81% of the burials were of infants aged up to one year. Some of the skeletons are associated with both types of cloth, and so presumably there were inner and outer shrouds or winding sheets. There is no way of knowing the shape or dimensions of the shrouds but since so many of burials were of babies, perhaps the good quality linen represents the swaddling bands widely used for infants at the time. Obviously a smaller length of cloth than that for an adult would be needed, so the linen would be suitable as an inner wrapping. The small copper pins that occur so generally with the textile fragments have been recovered from the head area in 13 cases. (No textile remains survived in association with the pins found with another skeleton, #137). It appears that there was copper alloy staining on other skeletons that would represent further pins, and so also shroud material. It may have been the custom to wrap the infants in linen, pinning the cloth in place, and then wrapping again with the coarser, blackened, possibly wool cloth. It may also be that the fine linen found pinned on the heads of seven of the child graves at Mackney had been made into caps. This custom is illustrated on the sculptured images of two deceased infant children of wealthy parents. They are portrayed in a late 16th century Danish tombstone laid out in swaddling bands with small caps on their heads (Kruse et al 1988, 43).

It is possible that the use of the outer cloth (perhaps impregnated with tarry or bituminous substances) is linked to the specific situation of the infants buried there. If these children in the cillin were in some sense ‘outcasts’ in contemporary society, there may have been a particular reason for the practice. For example, in parts of rural south-western France it used to be the accepted practice to place a piece of lead into the grave of an infant who was ‘outside’ the local society (pers. comm. Mme Claire Gérentet de Saluneaux, Lyon). Alternatively the community may have been making a practical choice that was more sanitary or acceptable in circumstances where coffins were not being used.

The rural burial practices of the seventeenth century may have drawn largely on materials used in daily life rather than using a suite of garments and cloths specifically designed for burials. It is argued that, for example, coffins were made with handles and nails used generally in domestic carpentry, or included lead that was used in the plumbing trade (Mytum, 2004). This may well have also been true for the textiles used at Mackney so it is relevant to look for information on the cloths that were in use towards the end of the seventeenth century. Some is given in John Dunton’s letters on his travels in Ireland 1798 (Rawlinson Manuscripts [Rawl. D. 71] Bodleian Library, Oxford). In Iar-Connacht the London bookseller recounts how he stayed overnight enjoying the hospitality of the locality, and had as bedclothes ‘two verie large and white and soft bundles of woollen by them called Breadeen, thinner than their friezes and thicker than our flannel’ (MacLysaght 1969, 333). It is also clear from Dunton’s account that women were still wrapping their heads in long lengths of white linen as had been reported in the sixteenth century. He records that, on this same occasion, his generous hostess took off her head-dress and unwrapped it into a length of ‘two to three yards’ that was more than ample for a table-cloth for the traveller’s evening meal (ibid, 332).
On another excursion Dunton stayed with ‘an Irish gentleman’ whose mother was dying, and he was asked to remain in the house. After the lady had died, the corpse was ‘washed and stretched out’ and then placed ‘without any coffin but wrapped in a white sheet’ in a Great Barn where the wake ensued (ibid 349). The white sheet would surely at that time be made of linen. All these textiles could have been used as winding sheets or shrouds.

**The Pins**

An interesting comparison for the Mackney pins comes from a large house dated to the 1660s excavated at Drumlummin, Co. Tipperary, together with the defensive ditch of a castle and field systems (Cleary 1987 116-145). Nine bronze stick pins 17-39 mm long with stem diameters of less than 1mm and with rounded dome heads, were found in Rooms II and IV, and Hearth site C-D of the house. These were the living rooms of the substantial family living there. Like the Mackney pins, those from Drumlummin may also be of several types with different uses. It is felt that the pins are not large enough to be decorative and so may well have been an accessory for tailoring (ibid 136). However it is likely that these pins were also used to keep in place items of dress like cuffs, collars, sleeves and head-coverings.

Another site in Ireland where metal pins were found was an Anglo-Norman ditch in Upper Bridge Street, Dublin. In the late sixteenth and early seventeenth centuries (1586-1635) this ditch was used for rubbish disposal from various businesses including a tailor’s workshop. A mass of congealed metal pins were found as well as a single pin lying in with two pieces of silk (92E109:621:31A). It seems likely that this type of pin was specifically used for tailoring and dress making (Wincott Heckett 2005, 108).

In the later sixteenth century and seventeenth century a number of different types of pins were made. They came in several shapes and sizes, and served many purposes including fixing clothes and head-coverings in place. Underlining their importance it seems that surprisingly large numbers of pins were needed, particularly by women. For example, the accounts of Elizabeth I record that at the time of her coronation she bought from her Pinner, Robert Careles ‘xxij [24,000] pynnes of diverse sortes.’ In 1565 she ordered similar numbers of ‘great farthingale pins,’ ‘middle farthingale pins,’ ‘great velvet pins,’ ‘small velvet pins’ and ‘small head pins.’ The farthingale pins were used to pin the pleats on the farthingale in place, the great velvet pins are believed to have been long fine brass pins that would not damage velvet cloth. The small velvet pins may have also been used to pin the cuffs of sleeves or neck ruffs into place while the small head pins could well have been used to fix veils and coifs (Arnold 1988, 218-219). Pinning clothes in place must have continued in Ireland well into the seventeenth and even early eighteenth century, particularly since, as already noted, the traditional female head-covering of many lengths of white linen persisted in country areas during that time. It must have taken quite a number of pins to keep these head-dresses in place.
When Mary, Queen of Scots was imprisoned on Lochleven in 1567 she regularly asked for, and was sent necessary items by her chamberlain. Requests for pins occur very regularly as well as such things as embroidery silks, clothes, soap and food (Swain 1973, 55-56).

The importance of pins in earlier times may surprise our twenty-first century society where their household use has declined dramatically. The phrase ‘pin-money’ may still be vaguely understood but the underlying meaning is probably not generally known that it was money for necessary personal expenses given by husbands to their wives. The slender pins from the Mackney burial site are a reminder of the time when they were used widely in every day life.

The textile remains from the cillin at Mackney are important since there are so few similar finds in Ireland. The exceptional results can bring forward the discussion of social customs and burial practices in the seventeenth and early eighteenth centuries. It is often the case that only the clothes of the wealthy have survived, so that we know far less about those of the majority of the population. The understanding that these small children were wrapped in, or were wearing good quality linen cloth when they were buried must suggest concern and sensitivity on the part of those who dressed them for this final parting.

Methods of analysis and conservation

Before analysis the textiles were examined under magnification of ×5 and x15 to ascertain levels of robustness. The extreme fragility of the textiles made it impossible to wash them, and they required very careful handling to avoid damage.

A digital photographic record of the textiles and pins was made. The textiles numbered as 78/89:15, 78/89:18, 78/89:27, 78/89:31, 78/89:33, 78/89:34, 78/89:35, 78/89:36, 78/89:46, 78/89:49, 78/89:52, 78/89:53, 78/89:59 (area between 7 and 8), 91:1, 91:2, 91:3 (area between 7 and 9), 521:2 (area SE Quad), 848:1 (area 12), 1237:2 (area between 7 and 8), 1249:1 (souterrain [NS Chamber])

Since the small fragments of cloth and the pins are so delicate and the minimum of handling should take place, the best way of storing them appeared to be in lidded and compartmented acrylic boxes, where each set of items was loosely wrapped in acid free paper. Each compartment is appropriately labelled.

Catalogue

Technical details listed in the catalogue are as follows: the fibre used and the weave are listed first followed by the dimensions of the textile. In the analysis of these textiles the warp and weft cannot be differentiated since the remains are so small. The direction and level of tension of spin, and measurements of yarn diameter, where they can be measured, are given together with the densities of threads per cm. Colour grades according to the Munsell Color
Charts are also listed with the verbal description first and then the grades for hue, value and chroma.

**06E2444.78:4.** 4 pieces of coarse blackish material; linen cloth visible on a). 8 copper alloy pin fragments representing 4 pins associated with these pieces. The cloth on a) is woven in a balanced tabby weave, 10 x 50 mm dimensions, linen, s/s spin, 30-40 x 30-40 threads per cm, diameter of threads 0.20 x 0.20, 10YR7/3 very pale brown. Dimensions of other pieces: b) 10 x 5 mm, c) 15 x 60 mm, d) 10 x 5. 10YR 4/1 dark grey, 3/1 very dark gray, 5/3 brown. Associated with skeleton #12 where one pin was on the right side of the head (cranium), another one above the cranium on the left, the third beside the right upper arm (humerus), the last beside the outer lower leg (fibula).

**78/89:15.** Textile, 33 x 20 mm, associated with skeleton #93. One side (front?) of a single piece is covered with coarse blackish material, and has remains of two parallel threads visible. These are remnants of cloth. On the reverse side part of copper alloy pin can be seen at thinner end. There is a small amount of a green metallic residue on the material, and a narrow indentation in material as is usual with the other pins. There is a further, wider indentation in the left-hand area with an imprint of a scrap of cloth like the good quality linen seen on some other pins. This indentation (dimensions 11 x 13 mm) may well have been filled with linen cloth since there is a scrap of extremely fine flax fibres, circa 1 x 1 mm, 10YR7/3 very pale brown, visible. There are similar remains of linen at the right-hand upper side. The black area has residual wool threads (10YR 2/1, black) showing up as fuzzy dots encased in a gritty, sandy residue. There is a blackish thread, perhaps wool sticking out from the right-hand side of the shroud fragment, at its widest part. Associated with skeleton #93, a large quantity of material was recovered, especially on the right shoulder and arm, the pelvis and the legs, together with the five pins surrounding the body. (See also 78/79:33 below).

**78/89:18.** 3 complete and 2 fragments of copper alloy pins. Pin a) (24 x 1 mm) has coarse, blackish shroud material (10YR 3/2 very dark greyish brown) along the shaft, linen threads 08 x 5 mm, and also possible human skin and hair remains. Pin b) (24 x 1 mm) has a small piece of earth and perhaps a thread or a root attached (17 x 6 mm). Pin c) 17 x 1 mm. Pin fragments 15 x 1 mm, 6 x 1 mm, 6 x 1 mm (with head). Blackened cloth on pin a) is 10YR 3/2 very dark grayish brown, on pin b) 10YR 5/2 grayish brown. Associated with skeleton #72, with shroud material and pin fragments on the top of the head (cranium), right side, and generally stuck to the bones.

**78/89:27.** 3 complete copper alloy pins and 2 fragments. Linen cloth, 18 x 4 mm dimensions, clinging onto and round the full length of one pin. Cloth has 30 x 30 threads to the centimetre, indicative of a good quality cloth. Thread diameter is circa 0.33 mm, 10YR 8/2 white and 8/3 very pale brown. There is also another piece (22 x 6 mm) of the same quality.
with a layer of coarse, blackish, broken-down shroud material, 10YR 2/2 very dark brown and 2/1 black; and short clumps of human hair. The pin is 23mm long, diameter 1mm, pin head rounded, and added onto the pin. Associated with skeleton # 100 with the shroud material and pins surrounding the head (cranium).

**78/89:31.** 1 complete copper alloy pin and 1 broken in 2 pieces. Complete pin covered in linen cloth, dimensions 32 x 10 mm. Pin-head 3 x 9 mm. Also remains of coarse, blackish, broken-down shroud material with pin, and further linen fragment and some human hairs. Associated with skeleton # 66, with pin fragment and shroud material lying on top of the head (cranium).

**78/89:33.** 2 complete copper alloy pins and 1 fragment: pin a) 29 mm length, with another pin fragment lying parallel to it. Both pins lying on greatly deteriorated linen cloth (Z spun thread, 10 YR 5/8 yellowish brown) underneath that there is the coarse, blackish broken down material (10 YR 3/2 very dark greyish brown, 2/1 black). Pin b) Length to head *circa* 29 mm and covered in coarse, blackish broken down material (10 YR 3/2 very dark greyish brown, 2/1 black)). Associated with skeleton # 93 (See 78/89:15 above).

**78/89:34.** 1 complete copper alloy pin (*circa* 22 mm long), pushed into tabby weave linen cloth, dimensions 18 x 15 mm, Z/Z spin, 20 x 20 density of threads per cm, 1 x 0.5 mm thread diameters (10 YR 6/2, 6/6 brownish yellow, 5/3 brown and 4/6 dark yellowish brown). The cloth covers the pin on both sides. Another linen fragment of the same type is 25 x 19 mm, part of a pin is visible having been pushed through the cloth. Other fragments of the same linen cloth are 21 x 18 mm, 10 x 7 mm, 10 x 15 mm (with pin fragment attached, 5 x 9 mm, 15 x12 (Z-plied thread *circa* 0.65 diameter). The linen cloth is of good quality. There were also the remains of the blackish coarse shroud material (10 YR 3/2 very dark greyish brown, 2/1 black). There is a small piece of what may be part of a fern leaf, and perhaps part of a tree leaf. Associated with skeleton # 96. Here remains of shroud material lay over the chest, underneath the cranium, scapulae and feet. 6 pins were also recovered, respectively on the top of the head (cranium) the pelvis, the lower part of the leg (left tibia and fibula), the right foot and the third lower right rib (x 2).

**78/89:35.** 6 tiny fragments of material made up of coagulated strands of strands of coarse, blackish material (10 YR 3/2 very dark greyish brown) and earth, largest 12 x 8 mm. Two pieces show spots of metallic green residue from pins. In both cases there are indentations in the material, presumably from pins. Associated with skeleton # 144 where remains of shroud material were lying on the head (cranium) though no stains were left by the contact with eventual copper alloy pins.
78/89:36. 2 complete copper alloy pins and material associated with skeleton # 136 with the shroud material lying with the pins below the jaw (mandible).

78/89:46. 2 copper alloy pins, 1 complete, 28 mm long, round pin-head 2 x 2 mm, 1 broken. Pin b) 13 mm long including head, pin b) 9 mm, pin-head 1.6 x 1.6 mm. The complete pin has a lump of coarse, blackish material (10 YR 3/2 very dark greyish brown) attached, with what seem to be human hairs in it; the material covers 15 mm of the pin. Associated with skeleton # 120 where the materials and pins lay around the head (cranium).

78/89:49. 1 complete copper alloy pin, length 26 mm, point cannot be seen 20 mm is covered by coarse, blackish material (10 YR 3/2 very dark greyish brown, 2/1 black). There is a tuft of human hairs and scraps of linen threads lying on the blackish material. Associated with skeleton # 110 with the shroud material and pin lying on the top of the head (cranium).

78/89:52. 1 tiny piece of coarse, blackish material, 10 x 11 mm, (10 YR 3/2 very dark greyish brown) human hairs, sandy earth. Associated with skeleton # 110 with shroud material and pin lying on the top of the head (cranium).

78/89:53. 1 piece of copper alloy pin. 5 tiny fragments of coarse blackish material, largest 15 x 10 mm. 1 piece, 10 x 10 mm (10 YR 3/2 very dark greyish brown), incorporates some linen threads at one side and part of a pin. Associated with skeleton # 105 with shroud material and pins lying on the head (cranium), top of right arm, rib cage and backbone (vertebrae).

78/89:59. Copper alloy pin fragments, length 25 mm (5 Y 6/1 grey) passed through coarse, blackish material (10 YR 3/2 very dark greyish brown) with human hairs. The head of the pin was not visible but the point is. 1 Z-spun fragment of thread, perhaps linen, can be seen close to the uppermost part of the pin. All these are lying on a very thin paper-like layer (10 YR 6/4 light yellowish brown) that is not a textile; could it be skin? Associated with skeleton # 141 with shroud material and pin fragment lying on the head (cranium).

91:1. 3 pieces blackish material, the largest 15 x 10 mm seems to have copper alloy pin fragment embedded. 1 piece of 13 x 7 mm dimensions also includes a pin fragment on top of the coarse blackish material (10 YR 3/2 very dark greyish brown). 4 mm are visible, including the pin-head (1 x 1 mm).

91:2. 1 complete copper alloy pin and textile associated with skeleton # 16, being located above the right part of the collarbone (clavicle).

91:3. 1 complete copper alloy pin with impression of textile on top of blackish material (10 YR 3/2 very dark greyish brown, 2/1 black). It is likely that the pin was pushed through the
blackish material that is on both sides of the pin in two places. The length of the piece is 32 mm (2 areas of blackish material with a small section of pin shaft showing between). Since the pin-point is not clearly visible, the pin length may be 31 mm, width both towards point and below pin-head is 1 mm, pin-head 2 x 2 mm. There is 1 small piece of sandy grit, 5.5 x 4 mm, with an impression of a textile and a few linen? fibres. Associated with skeleton # 86, where shroud material was recovered from around the head (cranium); on the left side and above the jaw (mandible).

**521:2.** 1 complete copper alloy pin with well preserved linen cloth attached. It is a balanced tabby weave, 30 x 20 threads per cm, S/S spun. 10YR 8/2 white, 3/3 dark brown. The coarse blackish material is also attached to the pin. Associated with skeleton # 38 where pin fragment and shroud material were located on the frontal part of the head (cranium).

**848:1.** 1 complete copper alloy pin found with 2 pieces coarse blackish material (10 YR 3/2 very dark greyish brown). Piece a) has single linen threads attached to blackish material, dimensions 14 x 7 mm. Associated with skeleton # 44, being located around the jaw (mandible) area and at the rear of the head (cranium).

**1237:2.** 4 fragments of copper alloy pins, pin a) pin-head and 7 mm long piece, diameter 0.8 mm, pin-head 1.7mm x 1.5, curved indentation in head. Part of pin b) is pushed through coarse, blackish cloth, length 20 mm, diameter 0.8 mm, tapering to point. There is some of the good quality linen (20 x 20 threads cm, thread diameter circa 0.35 mm, 10 YR 5/3 brown, 2/1 black)) behind the pin, and also some of the coarse, blackish material (10 YR 3/2 very dark greyish brown, ). In this example the pin is not pushed through the linen cloth as it is with 78/89:27 and78/89:31. Pin b) pin-head 2 x 2 mm, shaft 2mm. Pin c) 18 mm long, diameter 0.8 mm, part of pin b). Pin d) 7 mm long, diameter 1 mm, part of head remaining. Associated with skeleton # 95.

**1249:1.** 5 pieces of coarse blackish material, largest 20 x 35 mm, possibly single threads with a loose Z spin, 0.5 mm diameter, perhaps S-plied, 1 mm diameter. Only one system has survived.

**Notes**

1 A definition of a shroud is that it was usually a long linen sheet that at one time had been dipped in melted wax (Latin *cera*) and so was known as ‘cercloth’, ‘serecloth’ and ‘cerements’. By the nineteenth century in England shrouds had become shaped backless body coverings with sleeves, and were used with winding sheets, and sometimes other personal garments. (Janaway 1990, 36-40). A winding sheet is a length of cloth in which the corpse is wrapped.
**Glossary**

BALANCED WEAVE: a weave in which the warp and weft systems have the same, or much the same number of threads to the centimetre

PLY (to), PLIED: to double and twist already spun threads together to make a single, thicker yarn. The direction of the twist is usually opposite to that of the spinning.

SELVEDGES: the two lengthwise edges of a textile closed by weft loops.

They may have warp ends and/or a binding different from the body of the textile.

SPIN (to): to twist together fibres, other than silk filaments, into a continuous thread.

S/S, Z/Z: terminology to denote both warp and weft having been spun or twisted in the same direction. Cf: S-SPIN and Z-SPIN.

S-TWIST or S-SPIN: definition of twist or spin using convention of following the direction of the central bar of the letter S thus denoting an anti-clockwise direction of the yarn.

WARP: the system of threads which runs from top to bottom of the loom.

WEFT: the system of threads which runs from side to side of the loom.

SYSTEM: either the warp ends or the weft picks in a weave.

TABBY: a basic plain weave, each pick passes under one warp end, over one in the weft system.

Z-SPIN or Z-TWIST: the definition of twist or spin denoting a clock-wise direction to the yarn as would be shown on the central bar of the letter Z.

**References**


Wincott Heckett, E. 2003, ‘The Apparel oft Proclaims the Man’: Late Sixteenth and Early Seventeenth-Century Textiles from Bridge Street Upper Dublin’ in (eds) Pritchard F. and