SUPPLEMENTARY MATERIALS

Knobb's Farm, Cambridgeshire: Site Development, Burials Catalogue and Specialist Reports

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SECTION 1: PROJECT BACKGROUND

By ROB WISEMAN

INTRODUCTION

Archaeological work at Somersham Quarry, Knobb's Farm, Cambridgeshire was carried out by the Cambridgeshire Archaeological Unit (CAU) between 1996 and 2010. The works included an assessment of aerial photographs, fieldwalking, four phases of evaluation by trial trenching, and four phases of targeted excavation. The main article details findings from the three Late Roman cemeteries. These Supplementary Materials detail the site's chronology of the Late Iron Age and Roman periods, and presents all of the specialist reports long with a detailed cemetery catalogue. The site's prehistoric archaeology down to the Middle Iron Age (MIA) is presented separately[1].

The Somersham Quarry at Knobb's Farm lies 1–2 kilometres to the northeast of the village of Somersham, Cambridgeshire (Figure S1.1). Excavations targeted two areas: the Northern Area of 4.21 ha. and the Southern Area of 7.27 ha.

ARCHAEOLOGICAL PROGRAM: 2000–2010

Long before the present investigations by the CAU, there had also been rescue excavations during previous eras of quarrying in the 1920s, 1970s and 1980s[2]. The CAU's own work began with a review of aerial photographs in 1996[3]. Fieldwork at Knobb's Farm took place between 2004 and 2010. Table T1.1 summarises the quarry phases, areas investigated, archaeological work undertaken, and the grey literature reports produced by the CAU at each stage.

phase	*hectares*	*investigation*	*fieldwork*	*reference*	*CAU Report*
1	5.0	field-walking, test pits & trenching	2000	Masser 2000	384
2, 3, 4	10.2	field-walking	2000	Conneller 2000	405
2, 3	4.5	trenching	2001	Hatherley 2001	445
4	4.05	evaluation	2003	Wills 2003	491
4	0.24	excavation (south)	2004	Wills 2004b	632
5	4.05	field-walking	2004	Wills 2004a	616
5	4.0	trenching	2006	Slater 2006	756
5A	4.0	trenching	2004	Wills 2004c	651
5A	1.07	excavation (south)	2008	Armour & Morley 2009	961
5B	0.32	excavation (south)	2007	Armour 2008	815
5B2	1.83	excavation (south)	2009	Collins 2010	923
7A	2.87	excavation (north)	2009–10	Collins 2011	986
7B	1.34	excavation (north)	2010	Collins 2011	986

[1] Wiseman 2020.
[2] Tebbutt 1929, Salway *et al.* 1970, French & Wait 1988.
[3] Palmer and Cox 1996.

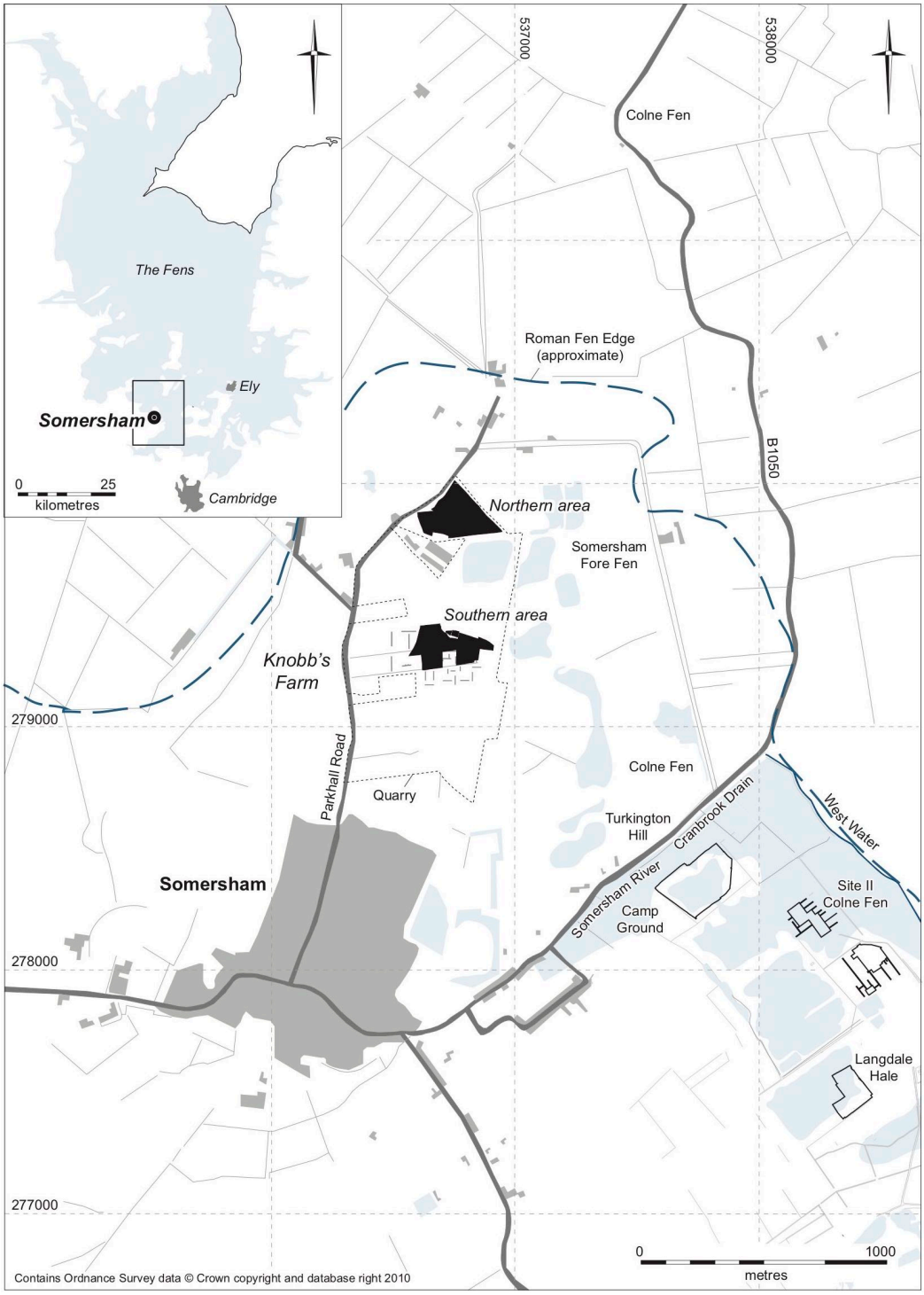


Figure S1.1 Site location and nearby excavations

Note on terminology and abbreviations

Context numbers are referred to in bracketed type, e.g. [001], for both cuts and fills. Feature numbers are referred to in the text by the prefix F. Where linear features continued between different phases of excavation, they were given separate feature numbers: both are given in the text below. The following terms and contractions are used:

MBA	Middle Bronze Age	c.1600–1150 BC
LBA	Late Bronze Age	c.1150–800 BC
ErIA	Earliest Iron Age	c.800–600 BC
EIA	Early Iron Age	c.800–400 BC
MIA	Middle Iron Age	c.400–100 BC
LIA	Late Iron Age	c.100BC–43AD
RB	Romano-British	mid-first century AD
	Early Roman	mid-first century to mid-second century AD
	Middle Roman	mid-second to mid-third centuries AD
	Late Roman	mid-third to early fifth centuries AD

Concordance of feature names

As the site was dug in a number of phases over a decade, a variety of naming conventions was used. These have been rationalised in this document and the main article. The following names replace those used in the grey literature reports:

Name used here	*Excavation area*	*Name in grey literature*	*CAU Report*
Building I	Southern	Building I	Armour 2008 (rep. 815)
Building II	Southern	Building II	Armour 2008 (rep. 815)
Building III	Southern	Structure 6	Collins 2010 (rep. 923)
Building IV	Southern	Beamslot F.1064	Collins 2010 (rep. 923)
Structure V	Southern	Structure 4	Collins 2010 (rep. 923)
Field A	Southern	—	—
Field B	Southern	Enclosure A	Armour 2008 (rep. 815)
Field C	Southern	Enclosure F	Armour & Morley 2008 (rep. 961)
Field D	Southern	Enclosure B	Armour 2008 (rep. 815)
Field E	Southern	Enclosures C & D	Armour 2008 (rep. 815)
Field F	Southern	—	—
Field G	Southern	Enclosure E	Armour 2008 (rep. 815)

GEOLOGY AND LANDSCAPE

The Somersham Quarry is dug into First and Second Terrace River Gravels, which lie on the former northward course of the River Great Ouse. The bulk of the gravels were laid down during cold periods following the Anglian glaciation. The First and Second terraces in the Ouse-Cam River system represent later phases of terrace formation. They overlie mudstones of the West Walton and Ampthill Clay formation, which lie at c. –4 OD.

The Quarry site slopes almost imperceptibly from a low gravel ridge at c. 7.5 OD on Parkhall Road to the west of the quarry, to 0.5 OD on the quarry's eastern boundary.

The site lies approximately one kilometre northeast of the Somersham River. The River used to flow to the north—the Chatteris Road follows its former course—but now it now flows southeast, turning at Copen's Corner towards Earith to the Old Bedford River via the Colne Ditch. (The Ditch is believed to be part of the Roman Car Dyke system.) Together, the Somersham River and Colne Drain are referred to as the Cranbrook or Cranbrook Drain.

Somersham, to the southwest, is situated on the higher gravels. To the west, the land rises slowly to where the bedrock is capped with glacial till. To the north, east and south, the site is bounded by the quarry and former gravel pits, and beyond them are the lower farmlands of Colne Fen, Chatteris Fen and Somersham High North Fen. To the north and east lie the Fens.

Throughout the Mesolithic and earlier Neolithic, the gravel terraces along the Great Ouse would have been dry land. Fen began to form north of the site during the third millennium BC, before a major marine incursion in the earlier Bronze Age saw marine clays deposited in a bay between Somersham, Sutton and Aldreth on the Isle of Ely. The marine expansion reached a peak in the area during the Middle Bronze Age, between c.3600 BP and c.3200 BP. Freshwater fen expanded once again in the later Bronze Age and Early Iron Age. During the LIA and Roman periods, the site would have lain on a small peninsula, bounded by the fens to the west, north and east, and the Somersham Rover to the southeast. Deposition of alluvium at Somersham in the Late Iron Age/Early Roman period indicates difficulties in the Great Ouse's drainage further to the north where it entered the sea. As the river silted, its course eventually diverted eastwards to the River Cam[4].

ARCHAEOLOGICAL BACKGROUND IN DETAIL

Intensive quarrying along the Great Ouse River Terrace gravels has resulted in extensive archaeological excavations in the arear around Knobb's Farm[5].

Palaeolithic and Mesolithic

The Great Ouse gravel terraces contain redeposited Palaeolithic artefacts, with finds recorded from Haddenham, Earith, Over, Fen Drayton and Barleycroft Farm[6]. Quarrying in Colne Fen, immediately south of Knobb's Farm, recovered at least one Palaeolithic hand axe[7].

A substantial Mesolithic flint scatter covering some four hectares was discovered at TL 357 808, two kilometres northwest of Knobb's Farm[8].

Neolithic

During the Neolithic, the wider area saw low-level use, mostly indicated by flint scatters which have been found during fieldwalking. In Colne Fen to the south of Knobb's Farm, most of these scatters lie between the 2m and 3m OD contours, running parallel to the Somersham River[9]. Another small Neolithic flint scatter[10] was found to the northwest of the site at TL 359 808, also at 2m OD. Excavations at the Camp Ground site south of Knobb's Farm found sherds from three

4 Waller 1994: 156–183, particularly pp. 180–181 for Somersham. Also Evans and Hodder 2006, chapter 2, on the stratigraphic sequence at Haddenham.
5 Evans, Appleby *et al.* 2013; Evans, Brudenell *et al.* 2013.
6 Evans, Brudenell *et al.* 2013: 37–38.
7 Hall 1996: 50.
8 Hall 1996: 50; Hall 1992: 156 fig. 87 for the wider region.
9 Evans, Brudenell *et al.* 2013: 59–71.
10 Hall 1996: 50.

highly-decorated Grooved Ware vessels in one pit, while excavations on the Langdale Hale site further south recovered sherds of Fengate Ware and Peterborough Ware in an isolated pit[11].

Bronze Age

Activity in the area increased during the Bronze Age. A number of Late Neolithic and Early Bronze Age ground stone axes have been found on the area around the Quarry[12]. A Beaker-period Handled Food Vessel was reportedly found at Somersham[13].

Fieldwalking of 10.24 ha. during evaluation of Phases 2, 3 and 4 of the Quarry site recovered worked and burnt flint, interpreted as Beaker occupation[14]. However, trial trenches excavated across the area failed to find any cut features from which the flint might have originated[15].

Aerial photographs record four (or possibly five) ring ditches immediately to the east of the Quarry[16], and geophysical surveys have identified another to the south at TL 376 781[17]. One ring ditch was excavated in Colne Fen, revealing a central EBA inhumation and MBA secondary burials in the ditch[18]. Another significant ring ditch at The Holme, c.3 kilometres south of the Southern Area, produced 32 MBA cremation burials[19]. Other smaller ring ditches were excavated elsewhere in Colne Fen[20]. Two Late Bronze Age urns were found together off Parkhall Road in 1876, just west of the site, although records do not indicate whether they held human remains[21].

The remains of a Late Bronze Age/Early Iron Age settlement were excavated on Parkhall Road in the centre of Somersham[22]. Extensive evidence for the domestic nature of the site was recovered from ditches and structures. No evidence was recovered for the continuation of this settlement into the early Roman period. Before the CAU's investigations, Bronze Age pits had been observed in the Quarry[23].

Excavations at Colne Fen, south of Knobb's Farm, identified several Bronze Age settlements: at least six post-built roundhouses and two four-post granaries at The Holme, while Rhee Lakeside South produced evidence for five post-built roundhouses, four four-poster settings and one six-poster[24]. To the northwest of these, excavations at Site V produced several dozen small pits and postholes, including a number in a rectangular layout. Each of these settlements was also associated with field systems: the closest to the Knobb's Farm excavations were the field systems at the Camp Ground site[25], with a much more substantial system around three kilometres to the south at Rhee Lakeside South and The Holme[26]. A potential later Bronze Age field system covering both the Northern and Southern Area in the Quarry was uncovered during the current investigations, and is reported separately[27].

11 Evans, Brudenell *et al.* 2013: 65–69.
12 Cambridgeshire Historic Environment Record 01750, 01848, 03605 and 03733.
13 Clark 1970: 417, no. 1086.
14 Conneller 2000.
15 Hatherley 2001, Wills 2004a.
16 Palmer and Cox 1996.
17 Evans, Appleby *et al.* 2013: 448–449, fig. 4.61.
18 Evans, Brudenell *et al.* 2013: 71–83.
19 Evans, Brudenell *et al.* 2013: 115–128.
20 Evans, Brudenell *et al.* 2013: 89–90.
21 Cambridgeshire Historic Environment Record 01344.
22 Roberts 2002.
23 Lisboa 2000.
24 Evans, Brudenell *et al.* 2013: 96–113, 128–133.
25 Evans, Brudenell *et al.* 2013: 83–88.
26 Evans, Brudenell *et al.* 2013: 93–151.
27 Wiseman 2020.

Bronze Age metalwork has proved uncommon in the area, with just one MBA palstave found immediately east of the site[28], along with three bronze awls recovered in excavations at Colne Fen[29].

Iron Age

Three roundhouses, three four-post granaries, wells, around a hundred pits dating to the EIA and MIA were found during the current investigations at Knobb's Farm. They are reported separately[30]. An excavation on Parkhall Road, in the centre of Somersham, identified a roundhouse and several post-built structures together with pits, gullies and ditches all dating to the EIA–MIA[31].

To the south of the Southern Excavation Area, excavations at the Camp Ground site and Sites I and IV at Colne Fen uncovered a number of Late Iron Age enclosures. The Camp Ground remains were heavily truncated by later Roman occupation, but a large oval enclosure marked by large ditches, surrounded by a number of smaller rectangular enclosures and individual house compounds did survive, along with a cluster of large pits[32]. Site I produced a number of separate compounds showing several occupation phases. Each compound enclosed 1–3 roundhouses, marked by ring gullies and postholes, as well as numerous pits and four-post structures[33]. Site IV by contrast was far less 'compartmentalised', with twenty roundhouses enclosed by substantial enclosure ditches[34]. Unfortunately, this site was severely plough-damaged and produced only a very small material assemblage.

Roman

An assessment of aerial photographs covering the area round Knobb's Farm revealed a large area of probable trackways and a rectilinear field systems[35]. This appears to have been centred on an area immediately to the east of the excavation area (unfortunately, quarried away in the 1960s). This was presumably the core of a settlement. It would have lain at the centre of the 'peninsula', bounded by fen to the east, west and north. Its position, and the radiating pattern of trackways and fields suggests a single estate covering the entire the peninsula, farming an area of maybe three hundred hectares.

Chance finds of pottery, tile and worked stone at Turkington Hill, one kilometre southeast of the Southern Area, may indicate the presence of a substantial Romano-British building. Finds made in the early twentieth century included Barnack building stone, a hypocaust and roof tile[36].

Immediately south of Turkington Hill, across the Somersham River, lay the extensive settlement at the Camp Ground. This site, covering at least 5.4 hectares, was known to antiquarians through its earthworks. It was excavated in 2000 and 2001, revealing a small Romano-British town overlying the remnants of an Iron Age settlement. The town was established around AD 120 and seems to have been split into two areas: one occupied by official buildings and another representing private ownership, with the two divided by a formal roadway. The site was in use until at least the end of the Roman period[37].

28 Cambridgeshire Historic Environment Record 16692.
29 Evans *et al.* 2013a: 85.
30 Wiseman 2020.
31 Roberts 2002.
32 Evans, Brudenell *et al.* 2013: 172–177.
33 Evans, Brudenell *et al.* 2013: 153–162.
34 Evans, Brudenell *et al.* 2013: 164–172.
35 Palmer and Cox 1996.
36 Tebbutt 1929: 312.
37 Evans, Appleby *et al.* 2013b: 179–298.

A road ran southwards from the Camp Ground settlement to Langdale Hale, three kilometres south of Knobb's Farm. Excavations there uncovered an early post-Conquest farmstead, founded AD 50–70 and abandoned by approximately AD 325. The farm complex comprised two series of enclosures in linear strips aligned along both sides of the roadway. These contained buildings and light industrial areas which were probably associated with bulk grain processing.

The aerial photographic evidence suggests that there are a number of these Romano-British settlements strung along a main northwest–southeast axis represented by the roadway. This road ran parallel to the fen edge, linking together the settlements and farmsteads, and perhaps formalised a route originally linking Iron Age settlements.

North of the site, in the fens, several Roman coin hoards have been found. The first found in 1731, c.1.5km north of the Quarry, comprised two urns: one containing 'several' coins and the other sixty. The second hoard, found at the former ferry site on the Chatteris Road 4.5km to the north of the site, contained a thousand coins dating to Constantinian period, mostly minted under Constans and Magnentius[38].

Medieval

After the Roman period, the area around Knobb's farm was abandoned to agriculture throughout the Middle Ages. To the south and west of the Southern Area, aerial photographs show the remains of medieval ridge and furrow agriculture: the common fields of medieval Somersham. Evaluation trenches in Phase 1 of the Quarry also uncovered the remains of several furrows[39]. These were on an east-west alignment which corresponded to the known medieval remains.

The excavations at Parkhall Road in the centre of Somersham found evidence for possible medieval gravel quarrying[40].

Post-medieval

The course of a disused railway line runs approximately north-south immediately to the east of the excavation areas. Post-medieval quarrying, probably associated with the railway construction, was discovered during the evaluation of Phases 2 and 3 of the Quarry.

[38] Salway *et al.* 1970: 195.
[39] Masser 2000.
[40] Roberts 2002.

SECTION 2: EXCAVATIONS IN THE NORTHERN AREA

By ROB WISEMAN

The Northern Area lay approximately 400 metres north of the Southern Area. Figure S2.1 shows the overall plan. The Area measured 4.21 ha. in total.

LATE IRON AGE/EARLY ROMAN

During the Middle Bronze Age, there had been a rectilinear field system covering the Northern Area[41]. Elements of the field boundaries had been re-used in a subsequent EIA–MIA settlement, featuring three roundhouses, several rectangular enclosures, and a scattering of wells and pits. These all went out of use in the mid-third century BC. The Late Iron Age and Roman features found in the Northern Area were all on entirely new alignments and showed no connection with previous uses of the land. Only a few finds from the LIA/Romano-British period were recovered. The undated features in the northern area have been tentatively placed within the LIA/Early Roman period based on similarities in their form and alignment.

Trackways

In the centre of the Northern Area were a number of parallel ditches and ditch segments forming a trackway which curved from northwest-southeast to northeast-southwest. They joined another shorter trackway running almost east–west at an acute angle. The larger trackway averaged 4.2–4.75m wide and was flanked by two ditches: F.1330, F,1340, F.1354, F.1362, F.1239 and F.1439 on the eastern side, and F.1351, F.1355, 1360, F.1364 and F.1438 on the west. The ditches averaged 0.85m wide and 0.30m deep, with similar profiles along their length, and containing similar dark silty fills. The shorter east–west trackway had a similar wide averaging between 4.2m and 4.75m wide. It's flanking ditches, F.1453 and F.1456, had much the same size, profile, and dark fills as the larger trackway, clearly indicating that both were contemporary.

On the southern boundary of the excavation area was a third trackway running east–west. It was demarcated by ditches F.1300 and F.1377. A rectangular field appears to have been laid out to the north of it, comprising:

- segmented east–west ditches F.1375, F.1378, F.1379, F.1386 and F.1388
- north–south aligned ditches F.1401 and F.1394. These terminated in a large posthole, F.1393, which might have been suitable for a gatepost.

None of the trackway or field ditches produced any datable material, apart from a residual MIA sherd from F.1453. However, the trackways plainly cut the earlier MIA ditches and roundhouses. Also, they do correspond with cropmarks like the Roman archaeology to the south (unlike most of the prehistoric archaeology in the Northern Area).

Possibly contemporary with the trackways was the north–south orientated ditch F.1440, in the northern part of the excavation area. While it produced no datable finds, it was almost perpendicular to the east–west trackway, and came to an end immediately beside it. It measured 1.0m wide and 0.2–0.3m deep and had similar fills.

41 Wiseman 2020.

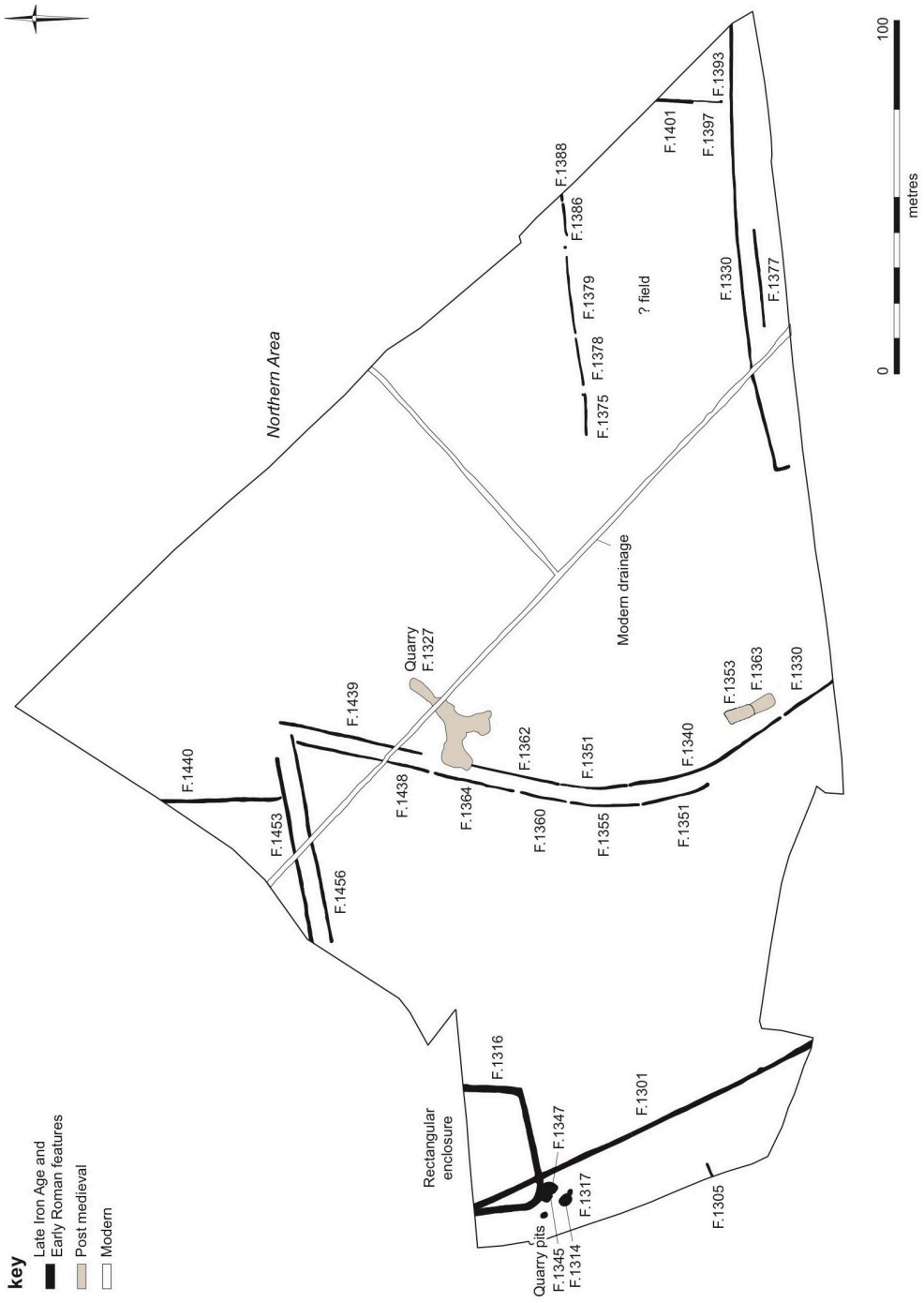


Figure S2.1 Plan of the Northern Area

Quarry Pits

The only features in the Northern Area to produce pottery dating to the LIA/Early Roman phase were a number of quarry pits on the western edge of the site. These pits included F.1314, F.1317, F.1347 and F.1345. These varied in size but were generally large: F.1314 for example was 4.3m long, 3m wide and 1.18m deep. Despite their size, very few finds were recovered. This, and the fact that most appeared to have been deliberately backfilled shortly after being dug, suggests they were probably quarry pits.

Rectangular enclosure

The quarry pits were cut by substantial ditch, F.1316, forming three sides of a rectangular enclosure. The ditch averaged 1.75m wide and 1m deep, and had very steep sides and a broad, slightly-rounded base. Its lower fills suggested that it had silted up gradually before the upper half was deliberately backfilled. The ditch produced almost no dating evidence, apart from a copper-alloy triple-looped finger ring (SF.180) recovered from its upper fill (see Section 11: Metalwork, for details). The ring is of a type seen in other Late Iron Age/Early Roman contexts in the region[42]. Environmental samples were essentially sterile (see Section 9: Environmental Remains).

Ditches

Ditch F.1301 crossed the excavation area running northwest–southeast and cut the enclosure ditch, F.1316. It had very steep sides, a broad, slightly-rounded base and averaged 1.5m wide and 0.7m deep. This ditch produced no dating evidence. Although it post-dated the large rectangular enclosure, it has been assigned to the early Roman phase as its profile and fills were very similar to F.1316.

By far the largest number of dateable pot sherds from this period came from a small, shallow ditch, F.1305. It lay on the western edge of the site, and only 4.2m long lay within the excavation area. It was set at ninety degrees to ditch F.1301, and clearly cut a part of the abandoned MBA field system (ditch F.1308). The pottery from the fill consisted of thirteen sherds from a single vessel, dating broadly to the LIA/ER period.

POST-MEDIEVAL/MODERN

No medieval features or finds were uncovered in the Northern Area. A small number of post-medieval/modern ditches and field drains were identified, including a substantial modern drainage ditch which crossed the whole area running northwest–southeast alignment. A further large drainage ditch as well as smaller field drains extended from it on northeast–southwest orientations.

In the centre of the Northern Area was a series of large, irregularly-shaped shallow excavations, F.1327: probably quarry pits. They contained late post-medieval pottery and animal bone. They truncated the Roman trackway ditch F.1362 but were themselves cut by the modern drainage ditch. Towards the southern edge the excavation area were two further post-medieval quarry pits, F.1353 and F.1363, although these were rectangular in shape and more substantial in depth than the other possible quarry pits.

[42] Similar rings were recovered from excavations at Babraham Research Campus, Cambridgeshire (Timberlake *et al.* 2007)

SECTION 3: EXCAVATIONS IN THE SOUTHERN AREA

By ROB WISEMAN

The Southern Area lay 400 metres to the south of the Northern Area. Figure S3.1 shows the overall plan of the site. The Area measured 7.27 ha. in total.

LATE IRON AGE

In the late EIA and early MIA, the Southern Area had seen small-scale farming and settlement activity, in the form of a roundhouse, several four post structures, wells, and numerous pits[43]. This settlement had been abandoned, probably by the mid-third century BC, and the site remained unoccupied for several hundred years. Later developments in the LIA showed no relationship to the earlier land use or alignments. LIA activity in the Southern Area was focussed on an enclosure at the eastern end of the excavation (Figure S3.2). This enclosure may represent the outer edge of settlement that lay further to the east, outside the excavation area. Evidence for activity in this phase comprised a large enclosure ditch and a number of pits within the boundary.

Enclosure ditch

The boundary of the enclosure was marked by a series of meandering ditches, F. 122, F.123, and F.153. They wandered loosely northwest to southeast, extending beyond the excavation's northern and eastern boundaries.

The earliest part of the boundary was ditch F.153, which produced a single sherd of LIA pottery. Its pale fill suggested that it had filled naturally, away from domestic activity. It abutted ditch F.123, which had a similar pale fill but produced no finds. Probably contemporary with both was F.161. It was a very small ditch or gully, suggesting some kind of internal division rather than a major boundary ditch. It produced a single sherd of LIA pottery. Its terminal opposed the end of F.123, leaving a gap of about four metres.

The outer boundary ditches F.153 and F.123 were later recut by a single ditch, F.122. It varied considerably in size, from 0.5m to 1.5m wide and 0.34m to 0.65m deep. Most of the pottery recovered from this feature was small and abraded. However, four large sherds from one Belgic wheel-made jar were recorded. The pottery had evidence for erosion caused by cooking, suggesting domestic activity in the vicinity. Boundary ditch F.122 was probably still visible at the start of the Roman phase, as it appears to have provided the terminus for F.151, a mid-first-century AD ditch. F.122 was also incorporated into F. 143, which was a mid-to-late first-century Roman ditch.

Two other linear features within the enclosure, and contemporary with it, were:

- F.133: a shallow ditch which extended beyond the eastern edge of the excavation area. It produced two fragments of LIA pottery. With only 3.5m exposed, its function was unclear.
- F.155: the end of another shallow ditch on the northern edge of the excavation area. It produced a small abraded fragment of LIA pottery.

Two environmental samples were taken from LIA ditches: boundary ditch F.122 (which proved sterile) and the minor internal gully, F.161. The latter produced two indeterminate cereal grains and one piece of chaff from spelt or emmer wheat (*Triticum spelta/dicoccum*). This provides some small evidence for crop processing within the enclosure, although probably at a distance from this

[43] Wiseman 2020.

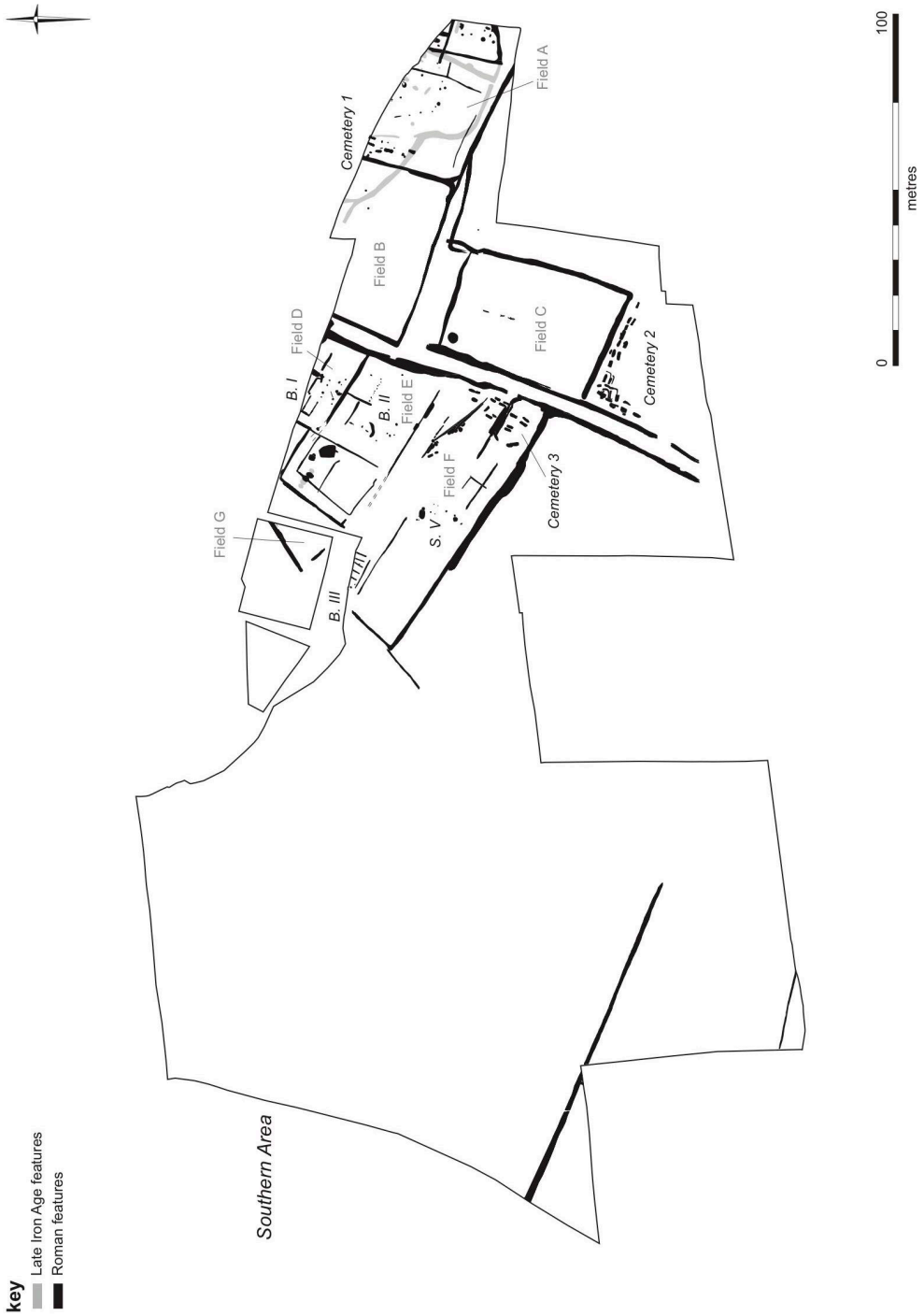


Figure S3.1 Plan of the Southern Area

Figure S3.2 Late Iron Age enclosure and early Romano-British activity

part of the site. This sample also produced a vetch or wild pea seed (*Vicia.Lathyrus* sp.), and oat or brome grass (*Avena/Bromus* sp.). Both come from taxa that could be arable weeds. (See Section 9: Environmental Remains.)

Pits

Inside and immediately around the enclosure ditch were forty pits, postholes and other small discrete features. Five contained one or two fragments of LIA pottery, seven produced small amounts of Romano-British pottery, and the remainder contained no dateable remains. The first five[44] have all been assigned to the LIA, the remainder to broadly the Roman period. Pit F.126 has also been assigned to the LIA phase, even though it contained no finds, as it was cut was cut by the boundary ditch F.122. There is no clear organisation to these pits. The small number of finds recovered does, however, suggest that they were not being used to dispose of domestic rubbish from nearby.

Two other pits at some distance from the enclosure, F.1221 and F.1222, also produced LIA pottery, but nothing later in date. Pit F.1024 produced LIA pottery as well as animal bone and burnt clay.

EARLIEST ROMAN: MID-FIRST CENTURY AD

Roman pottery dating the mid-first century AD was found in the fills of LIA boundary ditch F.122, indicating that Roman material culture was being adopted by people who otherwise maintained their traditional settlement system. In this phase, the LIA enclosure appears to have been subdivided by a large straight ditch, F.125, running north-northeast to south-southwest. There was no sign of a terminus where it intersected with F.122, indicating that the two ditches were in use at the same time. F.125 was, however, noticeably larger the enclosing ditch, measuring c.1.25–1.50m wide and 0.50–0.85m deep. It produced a number of mid-first-century Roman wares. Immediately to the east was the terminus of another ditch, F.144, which extended northwards out of the excavation area. It was parallel to F.125 and also produced two fragments of contemporary Roman pottery, suggesting that both ditches were part of the one system.

Extended off the western side of ditch F.125 were two rectangular enclosures, demarcated by small gullies, F.138, measuring c.0.5m wide and 0.25m deep. Each enclosure was c.4m wide and c.10m long. Although three large pieces of mid-first-century pottery were found in the fills, the lack of any internal features within these enclosures suggests that the gullies probably demarcated animal holding pens rather than buildings of some kind. Also, the southern gully stopped c.1.8m short of the main enclosure ditch, leaving a gap which might suggest the presence of a gate.

Some of the otherwise unphased pits and postholes in the area may also belong to this period, although not one discrete feature in this part of the site produced pottery dating to the mid-first century.

Little change in land use appears to have occurred in this period. A sample taken from the internal dividing ditch, F.125 contained a grain of spelt or emmer wheat (*Triticum spelta/dicoccum*) along with another indeterminate cereal grain. There was also a piece of chaff from a hulled wheat (*Triticum* sp. glume base), along with a seed of black nightshade (*Solanum nigrum* L.), a weed species. Together, these suggest low-level crop-processing in the area. (See Section 9: Environmental Remains.)

[44] Pits F.109, F.113, F.155, F.175, and F.178

EARLY ROMAN: LATE-FIRST CENTURY TO MID-SECOND CENTURY AD

The later first century AD saw a wholesale reorganisation of the landscape (Figure S3.3). Within the Southern Area, the LIA enclosure was overwritten with a much larger system of rectangular fields organised around a trackway. The result was a field system with at least six fields or paddocks (Fields A–F) on much the same orientation. The trackway and field system can be traced beyond the excavation area in aerial photographs, and forms part of a network that extended over at least two hundred hectares, centred c.200m to the east of the excavation area.

Set in and around the former LIA enclosure were ten cremation burials, with two more further west, and with evidence for at least one more in the backfill of a fourth-century grave. These were dispersed over c.55m, and did not form a tightly clustered cemetery.

Field system

The field system was organised around a trackway, around five metres wide, which ran nearly 120m south-southwest to north-northwest. It was visible in cropmarks extended a further 75m northward, where it met joined another track running east–west. This trackway was flanked by two ditches: F.900/F.1018/F.1213/F.720 on the western side, and F.902/F.904/F.1037/F.702 on the east. The northern section of the trackway appears to have had a complicated history, with F.720 on the western side apparently recutting two other ditches, F.730 and F.731, while on the east, F.702 almost entirely truncated an older ditch, F.716.

To the east were two large rectangular paddocks (Fields A and B) which overlay the former LIA enclosure—indeed, one of the new field ditches, F.103, cut across the former enclosure's boundary. In Field A, the easternmost end of the LIA boundary appears to have been recut or incorporated into the new field system as ditch F.143, with one arm parallel to F.103, 35m to the west. There appear to have been some minor modifications to the layout of these two fields. Field A originally appears to have been reached by a short droveway off the main trackway formed by ditches F.101 and F.702 and possibly the otherwise-undated F.104. This was subsequently simplified with F.110 extending F.702, and cutting off the short droveway.

To the south of these two fields was another rectangular enclosure, Field C, east of the trackway. It measured c.32m by c.44m. It was bounded by the trackway ditch F.1062 on its northern side, and F.906 on the east and south. At the southwest corner of the field, F.906 stopped one metre short of the trackway ditch, F.904, leaving enough space for a gate or small entranceway.

To the west of the trackway were three fields of similar size: Fields D–F. The southernmost, Field F, was bounded by the large ditch F.1088, which extended c.75m northwest from the main trackway. Its western end was unclear, as the ditch was recut by the later one, F.1100. There was an entranceway into this field from the trackway (between F.1018 and F.900), although it appears to have been remodelled several times. In the earliest phase, a shallow ditch, F.1009 extended northwest from the entrance for around 20m. There was a small gap between this and the trackway ditches. This gap was subsequently removed when gully F.1008 was dug, joining the field divider to the trackway, possibly creating a small enclosure within Field F.

The northern edge of Field F, thirty metres from the southern boundary, appears to have been the small, otherwise-undated ditch, F.1240. There was a small gap between this ditch and the trackway, allowing access into Field E. Another 23 metres to the north of this was another very similar ditch, F.723, creating Field D. How this field was accessed is unclear: F.723 ran all the way to trackway ditch F.731 and was truncated by it. Both F.1240 and F.723 were very small ditches, and suggest internal divisions within the larger field.

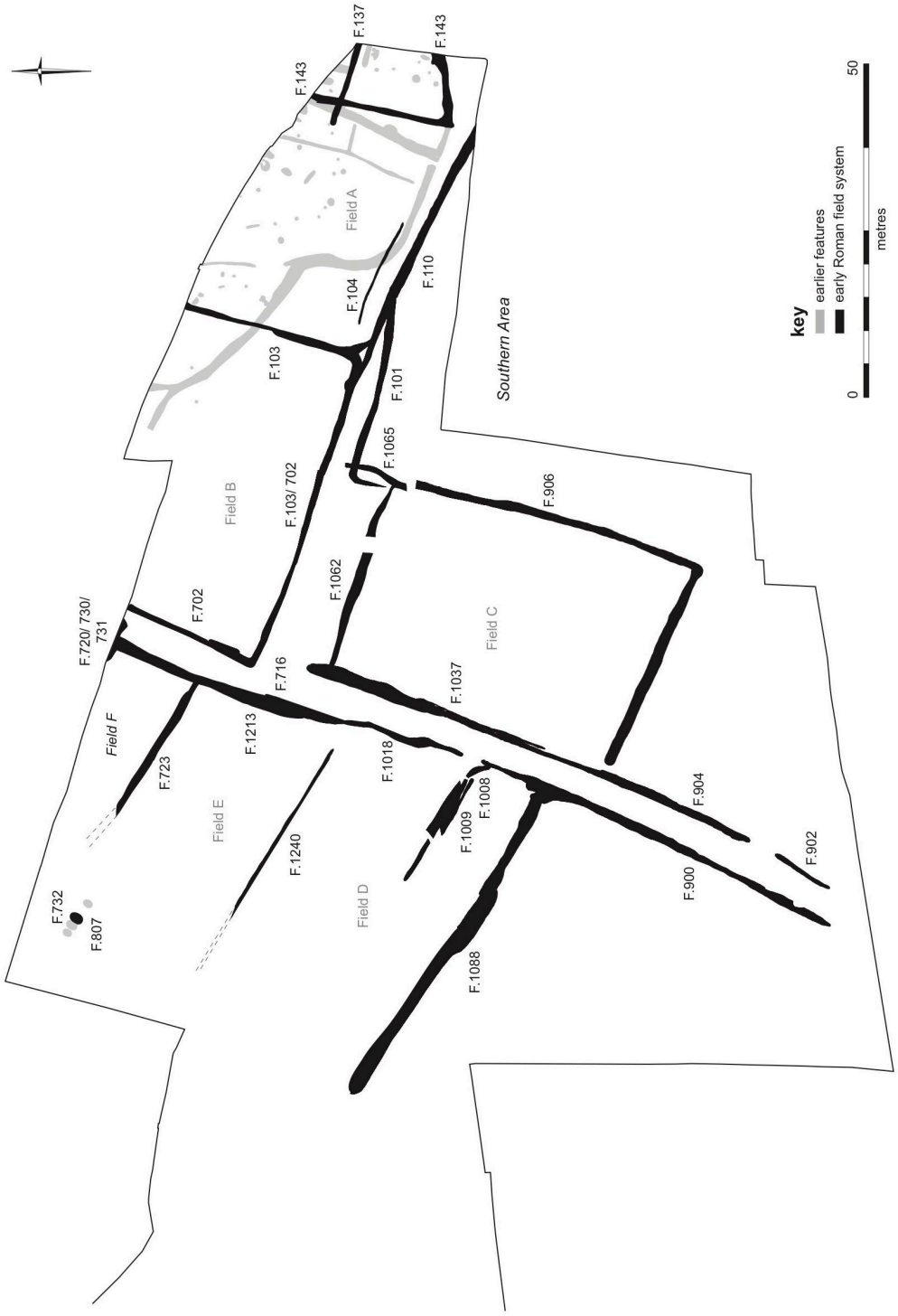


Figure S3.3 Plan of the Early Roman field system

Elsewhere, in the southwestern corner of the Southern Area, a large ditch, F.908/F.1107, was dug in this phase. It contained pottery dating to the Early and Middle Roman periods, as well as residual prehistoric material (presumably from pits truncated when it was dug). Within the excavation area, it ran approximately one hundred metres northwest–southeast, and lay at almost exactly ninety degrees to the trackway (even though the excavation showed that the two did not actually meet).

Trenches dug during the evaluation phase showed no evidence for any continuation of the field system to the south.

The amount of pottery in these ditches was less than 4% of the total Roman assemblage, implying that the field system was far from the places where pottery was being used in this phase, and suggests that the field system was entirely agricultural at this time. Most of the pottery was abraded, and only a few small sherds were recovered from any one context. Such small quantities indicate that these features were not used for rubbish deposition and it is possible that they are the result of field manuring. The exception was the deposition of six near-complete pots in F.110. All were coarsewares of types commonly produced until the third century AD. As coarsewares were not often traded over long distance, these pots were presumably made locally. The vessels were representative of a relatively low status rural site. (See Section 7: Pottery for a discussion.)

The environmental samples which could be dated to this phase suggest that there was very limited crop processing in this area after the field system was established. The only evidence for cereals was a single indeterminate cereal grain found in a sample from field boundary F.110 south of the LIA enclosure. Field boundary ditch F.143, which recut the former enclosure's boundary ditch, produced one seed of great fen sedge (*Cladium mariscus* (L.) Pohl), while ditch F. 101 to the southwest, produced a scrap of charred leaf of the same species, as well as one seed of brome grass (*Bromus* sp.). It is possible that the sedge was used as thatch or kindling, although there is no evidence for a structure or domestic immediately around this part of the site. All other samples taken from the new field boundary ditches were sterile apart from small amounts of charcoal. (See Section 9: Environmental Remains.)

Well

In the MIA, a series of wells had been dug close to the excavation's northern edge. These fell into disrepair after the site was abandoned in the third century BC. While it is possible they may have been used in the LIA, they were certainly recut in the Roman period. The first of the new wells, F.807, was dug a depth of 1.85m. The upper half was a conical pit, and the lower a cylindrical shaft. The shaft appeared to have been reveted with wooden stakes, perhaps with a wattle infill. This lining preserved the vertical sides of the well shaft and left a sharply defined interface clearly seen in section (Figure S3.4). Unfortunately, no finds were recovered from this well which might have dated its excavation. It seems to have fallen into a state of disrepair after some time, perhaps through a gradual accumulation of soil through erosion of the upper sides and wind-blown particles. Once the shaft was choked beyond use, the feature was re-cut by a second well, F.732.

This second well had a similar conical-and-cylindrical structure to its predecessor. And, like it, F732 appears to have filled naturally, as the stratigraphy showed water-lain silts. Environmental samples from the well produced little charcoal, grain or wild grass seed, suggesting that that the well was kept clear of any charred waste. Some dried waterlogged seeds were also seen during sorting. On top of these layers was thrown in a half-complete Horningsea greyware jar. It dated to the mid-to-late first century AD, and contained the remains of at least seventeen fish, including 34 bones and scales, probably from the carp family. Fishbones were also recovered from environmental samples of this fill.

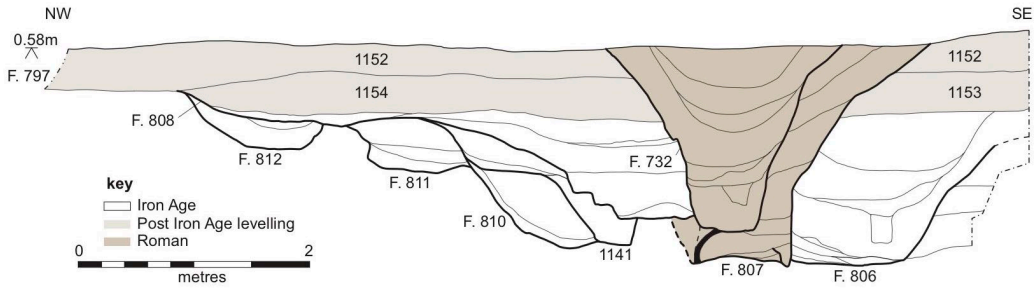


Figure S3.4 Section of the Early Roman wells F.732 and F.807

The upper conical part of well F.732 appears to have been deliberately backfilled in the several phases. In the first deposit, [880] produced 26 pottery sherds dating to the first–second century AD, along with four animal bones. The pottery included 11 sherds (837g) from a black-slipped ovoid narrow-mouth beaker, dating from the mid-first–second century AD. Another 14 sherds from this fill came from a sandy greyware jar (285g). Next, layer [879] contained nine sherds (482g) of similar date from a cupped whiteware ring-neck flagon (possibly produced in Verulamium). And finally [878] contained 15 potsherds (145g) dating to the second to fourth centuries AD. These included one sherd from a Nene Valley whiteware *mortaria*, along with two Horningsea greyware vessels. The topmost fill, [877], produced a single sherd of post-medieval pottery.

The presence of near-complete vessels in two of the fills, [880] and [1103] is not uncommon in large Roman pits and wells, although it does contrast with the more-common small abraded sherds found elsewhere on the site.

Well F.732 appears to have been replaced in the second century AD by a larger rectangular tank, F.739, positioned five metres to the southeast. This is described in the next phase below.

Three metres to the east of F.732 was a pair of pits of uncertain date and function: F.770 was sub-rectangular, extensive but shallow (0.29m), whilst F.771 was circular, smaller but deeper (0.52m), and produced one worked flint.

Pits and postholes

As noted above, there were a number of pits and postholes around the LIA enclosure which were assigned to the Early Roman phase. They can loosely be divided into twenty postholes[45] (mostly under 0.5m diameter with steep sides) and eight small pits[46] (with diameters 0.7–1.5m and a bowl-shaped). They formed no coherent pattern. Apart from one dump of six near-complete vessels, most only produced only abraded sherds: five pits and one posthole contained one or two sherds of pottery dating to the late first century AD[47]. As this part of the site produced no sherds dating to the second century, it has to be assumed that this area went out of use shortly after the field system was established.

[45] Undated postholes assigned to the late first century AD: F.100, F.108, F.114, F.118, F.119, F.120, F.127, F.129, F.130, F.131, F.132, F.134, F.139, F.141, F.148, F.149, F.157, F.158, F.159, F.160.

[46] Undated pits assigned to the late first century AD: F.105, F.106, F.107, F.115, F.121, F.128, F.156, F.168.

[47] Pits with late first century AD Roman pottery: F.116, F.124, F.135, F.154, F.171; posthole F.117.

EARLY ROMAN CREMATION BURIALS: MID-TO-LATE FIRST CENTURY AD

The first cemetery plot in the Southern Area consisted of ten cremation burials (Figure S3.5). Five urns containing cremated remains could all be dated to the mid-to-late first century AD. No datable finds were recovered with the un-urned cremations, but they are presumed to have been buried around the same time, given their proximity. Details of the cremated remains, urns and other pottery are described in Section 4: Cremated Human Bone.

The cremation burials were strung out over approximately fifty metres. At the eastern end were two in urns (F.140 and 146). Another three urned burials (F.150, F.173, F.174) were roughly in the centre of the group, in the same location as the fourth-century inhumation Cemetery 1. The five un-urned cremation burials (F.111, F.112, F.180, F.181, F.182) were not clustered in the way the urned cremation burials were, although the last three were in a line. The backfill of the fourth century grave F.165 also contained a small amount of cremated bone, suggesting the grave had truncated another cremation burial.

Fifty metres to the west of the other cremations was F.707: another cremation burial with a beaker. Unfortunately, the burial had been damaged by ploughing, and it was not clear whether the bone had been interred in either of the two vessels, both of which survived only as sherds. The pottery dated to the late first or early second centuries AD. The burial was sealed by a Ditch F. 723, which also dated to the late first century to mid-second century AD, and so was probably contemporary with the other cremations.

In total, six of the twelve cremations had been placed in urns and the remainder were unurned. The urns were all of locally-made sandy wares. One (F.150) had a lead plug—a common type of repair to Roman pots.

Unfortunately, all of the burials had been truncated by ploughing, damaging all of the gravegoods and greatly curtailing the analysis possible on the human remains. All the cremation burials were poorly furnished by local and national standards. In Cambridgeshire and Peterborough, 69 of the 85 well-recorded cremations had been placed in urns (81%), compared with just six of the twelve at Knobb's Farm (50%). The number of gravegoods was also very low, with just two small beakers (F.174 and F.707). By contrast, half of the local cremations were accompanied by gravegoods; mostly one object (usually a pot), but 15% had multiple objects.

The pottery urns used in Cemetery 1 and F.707 were dated to the mid-to-late first century, and this is broadly consistent with the late first century radiocarbon date for F.150 (See Section 13: Scientific Dating for details). These dates are typical of Roman rural cemeteries: locally, cremation accounts for two-thirds of all burials in the first and second centuries AD, and it was the dominant burial rite in the East of England until the third century[48]. There were just three other cremations in the region securely dated to the third and fourth centuries AD. This also suggests that, despite the lack of dating evidence, that the otherwise undated cremation F.1103 in Cemetery 3 belonged to the same period as the other cremations.

MIDDLE ROMAN: MID-SECOND TO MID-THIRD CENTURIES AD

In this phase (Figure S3.6), activity shifted from the eastern part of the site to the north-central area, where a number of buildings were erected. The field system was also recut and a number of smaller enclosures established close to the buildings. The focus of activity appears to have been on grain production, with evidence for a large granary or barn (Building III), corn dryers, flues with

[48] Smith *et al.* 2018: 216–226; c.f. Philpott 1991: 53

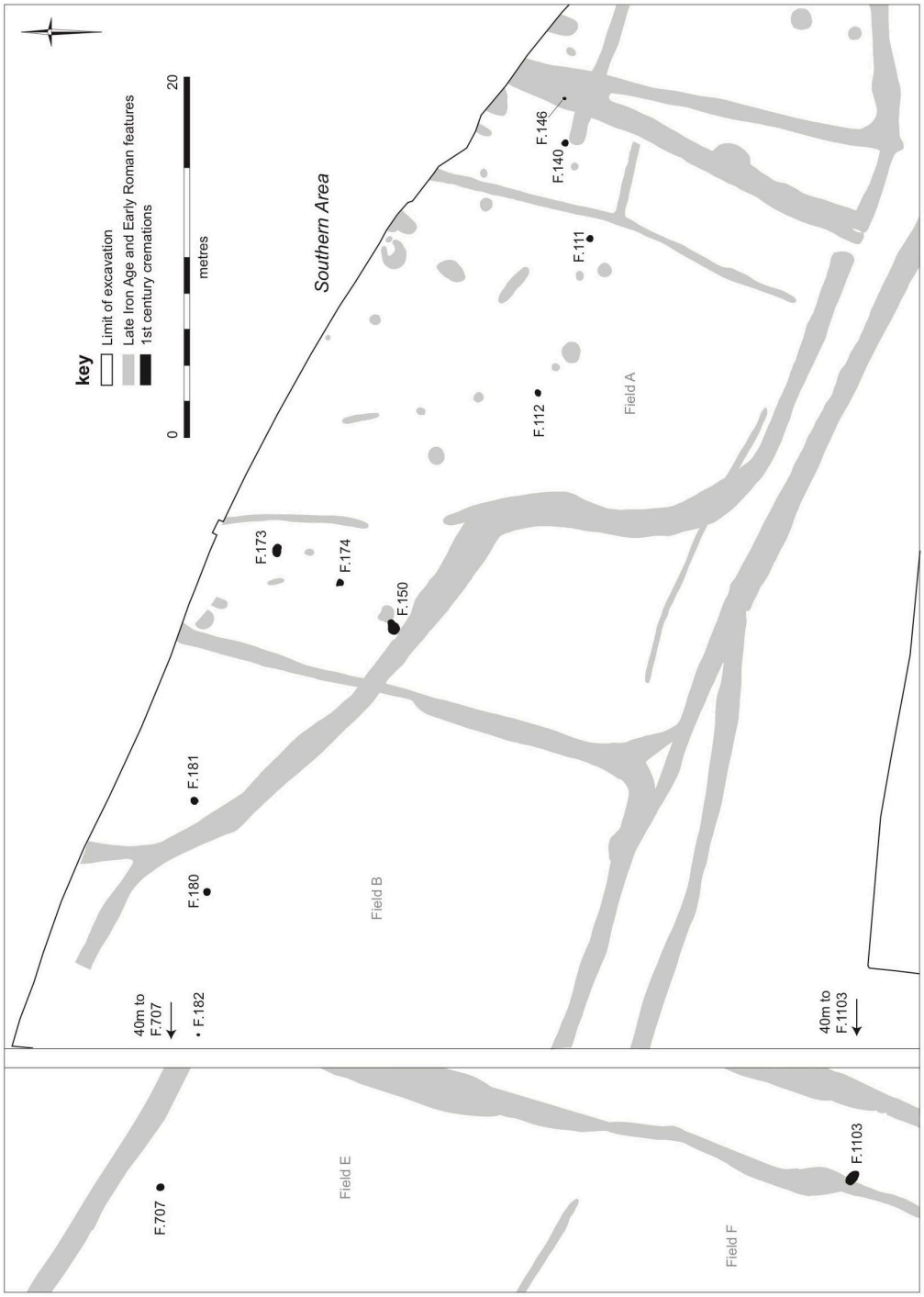


Figure S3.5 Plan of the Early Roman cremation burials

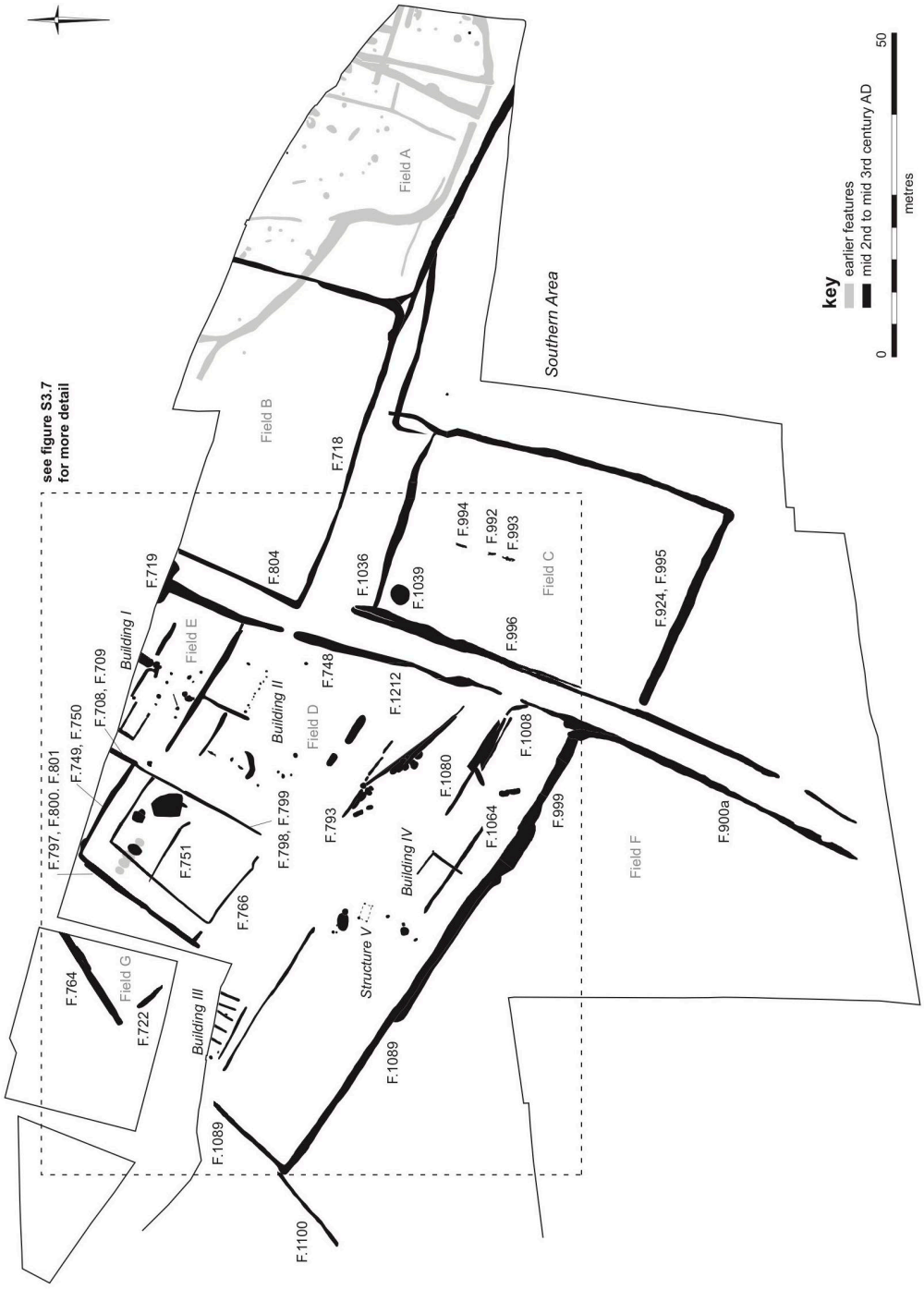


Figure S3.6 Plan of the Middle Roman features

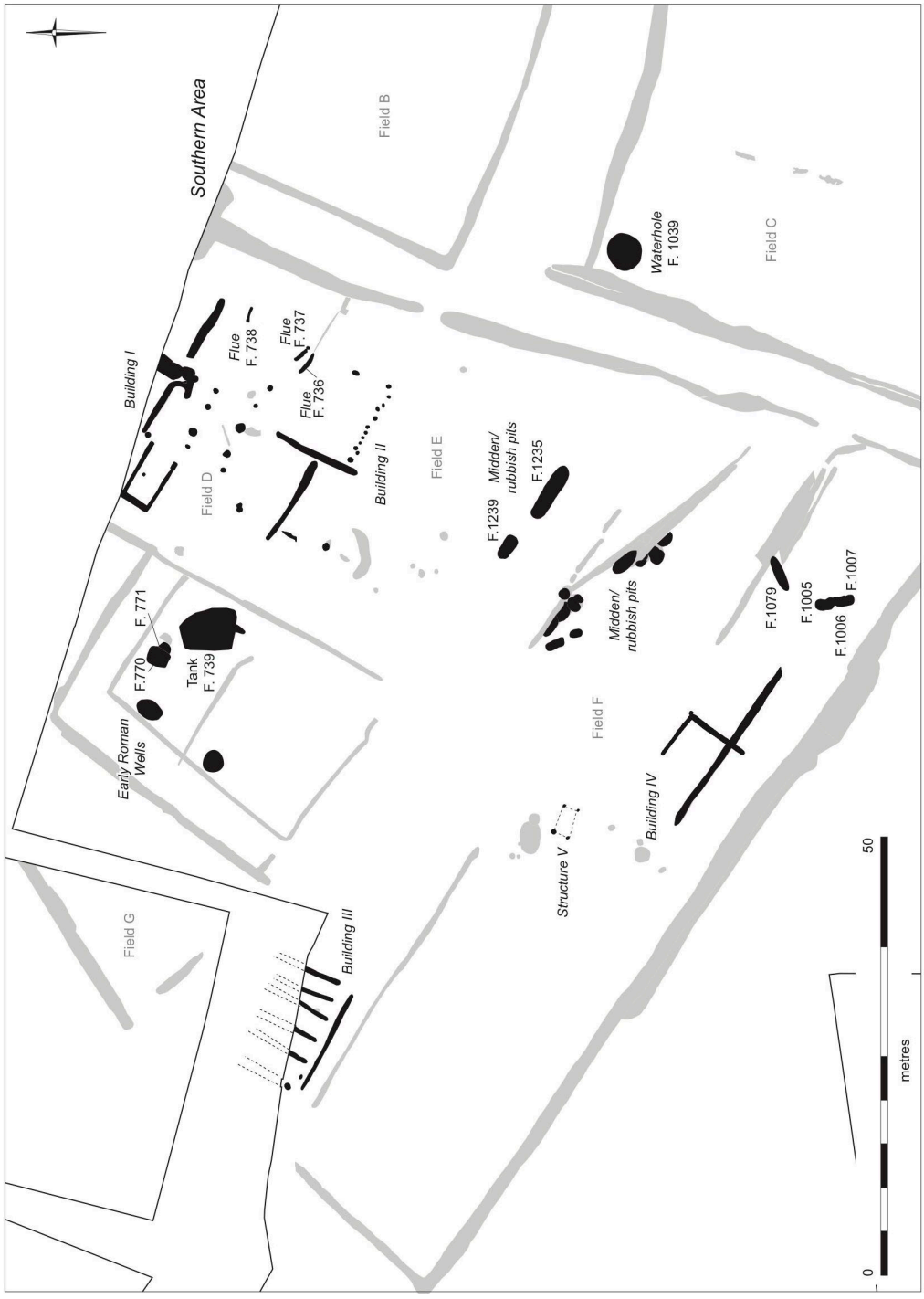


Figure S3.7 Plan of the Middle Roman buildings, structures, wells, waterholes and key features associated with cereal processing

evidence for crop processing remains, and several large dumps of chaff and crop weed species (Figure S3.7). This phase marked the peak of Roman activity on the site, producing the bulk of Roman pottery, as well as a large animal bone assemblage.

Field system

The main parts of the field system appear to have been re-dug sometime around the mid-second century AD.

- In Field B, ditch 702 was recut by F.804 on its northern arm and F.718 on its east–west arm
- In Field C, the northern part of trackway ditch F.904 was recut by the shallower F.996, while the northern part of the same ditch, F.1037, was re-cut by the smaller F.1036. At the same time, the east–west part of ditch F.906 was re-cut by F.924, and later by F.995. Significantly, the recut ditch F.924 joined the trackway ditches, closing the small entrance in the southwestern corner of the field. This field may also may have been subdivided at this time: three short linear features (F.992, F.993, F.994) were found in a row in the centre of the field, running north-northeast to south-southwest parallel to the trackway. Each was about 2.0m long, 0.4m wide and 0.1m deep. They appeared to be the product of bioturbation, which suggests they may have originally been a hedge.
- On the western side of the trackway in Field D, ditch F.720 was re-cut by ditches F.719 and F.748, creating a new entrance into Field E.
- In Field E, trackway ditch F.1213 was recut by the smaller F.1212, and the southern boundary ditch F.1004/F.1003/F.1088 was recut by the much longer F.999/F.1089.
- Finally, to the south of Field F, the main trackway ditch F.900a was recut by F.900b.

The western end to Field F also became apparent at this time, with ditches F.1089 and F.1100 dug at ninety degrees to the southern boundary ditch, F.1089, forming a T-junction.

Finally, a new enclosure, Field G, was established at the western end of the field system. Its western boundary was on a different alignment to the rest of the system, but its fills produced six pottery sherds dating to this phase. This field was bounded by ditch F.764 running northeast–southwest, and a short segment of ditch, F.722, running at ninety degrees to it. The latter had been heavily truncated by animal burrowing and ploughing. A short segment of F.764 was recut by F.781.

At the same time as these ditches were being dug, the internal ditches which had formerly separated Fields D, E and F (F.728 and F.1249) appear to have silted up, as hearths and midden pits were dug into them in this phase. The space within these former fields became subdivided by buildings, smaller enclosures, and several possible drainage gullies. It is not possible to establish the exact sequence in which all of these occurred, but the number of re-cuttings and changes to the layout indicates the high level of activity in this part of the site during the mid-second to mid-third centuries AD.

Strikingly, there did not appear to be any reorganisation of Fields A or B, other than a small segment of trackway ditch, F.804. (Curiously, the northern terminal of this ditch segment also had a posthole, F.805, dug into it in this phase). The lack of activity in these fields where earlier Roman activity was concentrated points to the shift of activity to the west, into Fields D and E.

Buildings I–IV and Structure V

A number of structures were built in Fields D–F in this phase (Figures S3.7 and S3.8).

Building I in Field D appears to have had several rooms, and was probably built in several stages. The earliest consisted of three beamslots (F.711, F.712, F.713) laid out to form three sides

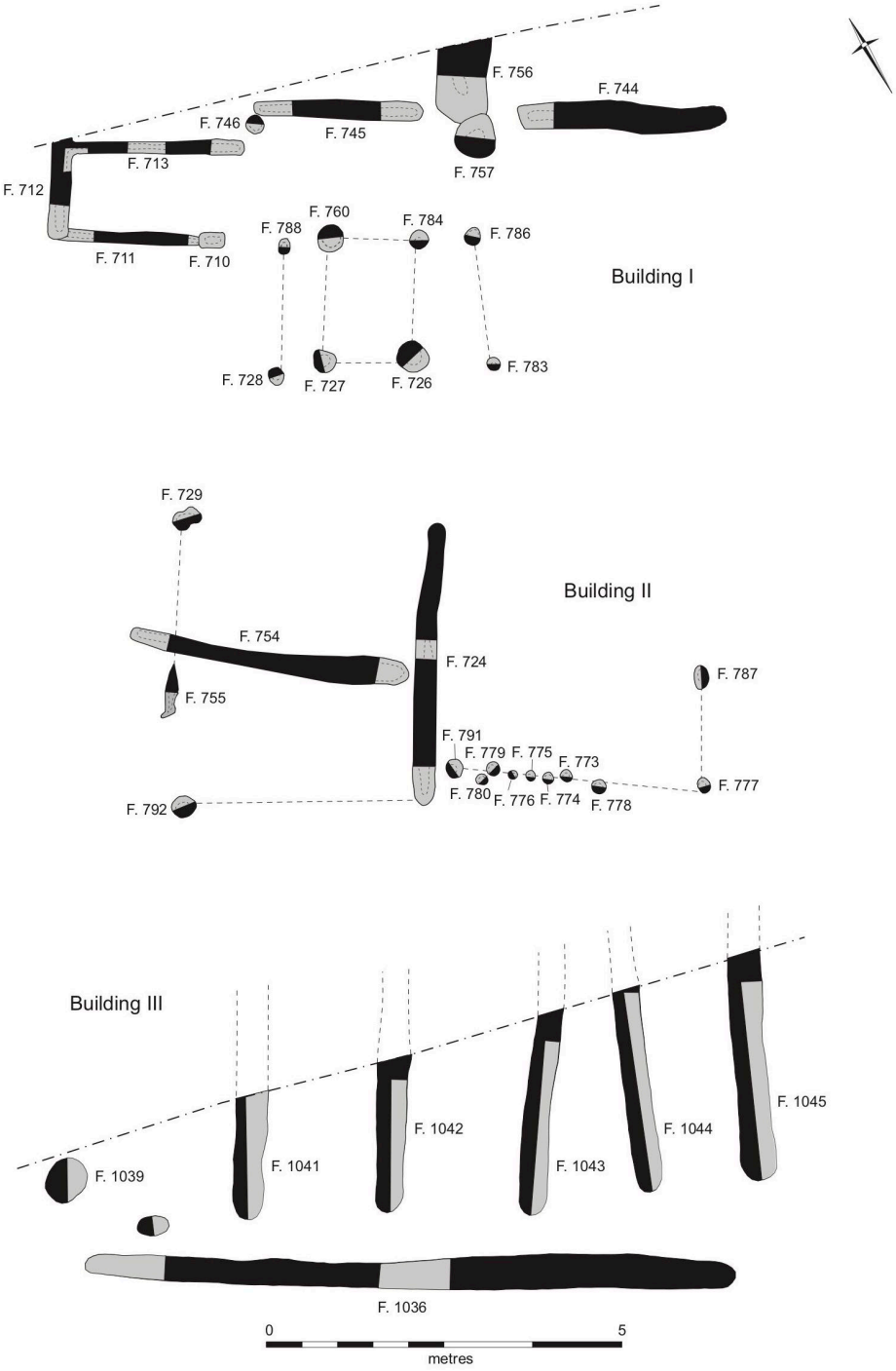


Figure S3.8 Plans of Buildings I, II and III

of a room, c. 5m long and 2.5m wide, with a rectangular posthole at the end of the southern wall. The fills produce a single sherd of coarse sandy greyware, dating from the mid-first to second centuries AD.

Immediately to the east, and on the same alignment, were two substantial beamslots in a line (F.744 and F.745), creating a wall c.13m long. Each slot was large at 0.6m wide and c.0.3m deep, suggesting a substantial log base and, by inference, a large wall. Between the two beamslots was a gap of 2.4m, in which was a large posthole and postpipe (F.757), as well as a wide shallow gully (F.756) running northwards beyond the excavation's extent. The gully might have been a wide foundation trench, but it had been heavily truncated by ploughing, limiting any interpretation. Together, these features suggest a large structure might have stood to the north of the excavation limits.

Between the beamslots and ditch F.723 (which previously formed the southern boundary of Field D), there were nine postholes in two lines, c.6m long and c.3.5m wide[49]. They appear to have formed either a separate wing or ancillary structure. The central four postholes (F.726, F.727, F.760, F.784) were large (c.0.7m wide and 0.3–0.5m deep). Two contained blue clay padding or packing, and F.726 contained a broken quern used as a post-pad. The remainder of the postholes were all smaller and had been truncated by ploughing. The existence of one posthole, F.782, to the east suggests the building may have continued some distance further, but evidence for it has been lost to ploughing. Unfortunately, none of the postholes produced any pottery.

Building II lay immediately to the south of the silted-up ditch F.723. It consisted of two beamslots (F.724 and F.754), each c.8m long, set at right angles in a T-shape, creating two rooms. Postholes F.729 and F.792 marked the other corners of the rooms. To the east of the beamslots, there were thirteen postholes[50] which marked an additional structure built of earth-fast posts, marking two additional walls, including a cornerpost (F.777). Altogether, the complete structure would have been c.14m long and 8m wide.

On the western wall of Building II was F.755, which might have been a flue or hearth. It had an elongated shape and a charcoal-rich fill. Unfortunately, it was severely plough-damaged, and the ploughing had dragged much of the fill into the surrounding natural geology. Because of the potential contamination, no environmental samples were taken from this otherwise promising feature. Pottery recovered from one of the beamslots and two of the postholes suggests a mid-second to mid-third century AD date, making it broadly contemporary with Building I. Amongst the finds in Beamslot F.724 was a sherd of Mancetter Hartshill ware which was only produced in the second century AD. Also, some of the postholes had a similar blue clay packing as in Building I, suggesting a similar construction method and date.

Building III lay in the northwestern corner of Field F. It was only partially excavated, as its northern part ran beyond the excavation's edge. It consisted of five parallel beam slots: F.1141, F.1142, F.1143, F.1144, and F.1145. These were positioned 1.25–1.75m apart, orientated northeast–southwest. The beamslots measured 0.3–0.4m wide and up to 0.25m deep, and each had very steep sides and a flat base. A small quantity of residual Early Roman pottery, burnt tile and animal bone was recovered. Because no close date for this structure was possible, and it has been assigned to this phase on the basis of its alignment with the field system and the general increase in activity elsewhere in this part of the site.

[49] Postholes F.726, F.727, F.728, F.760, F.782, F.783, F.784, F.786, and F.788.

[50] The western corners of the building were marked by Postholes F.792 and F.792. Part of the southern wall was formed of postholes F.773, F.774, F.775, F.776, F.778, F.779, F.780, F.791. The Eastern wall was marked by F.777 and F.787.

On the southwest end of the beamslots were two shallow gullies, both c. 0.35m wide and up to 0.07m deep. The first, F.1336, lay immediately across the ends of the beamslots, although slightly longer than their span. The second gully, F.1102, was parallel to it and 1.2m to the south, but it was shallower and much longer. The interpretation here is that the first ditch was probably an eaves gully, while the second was intended for drainage.

Structurally, the beamslots appear very similar to those excavated at Camp Ground site, 1.4 kilometres to the southeast, where fourteen beamslot buildings were excavated[51]. They typically had four to seven beamslots, compared with the five excavated at Knobb's Farm. The major versions at the Camp Ground were interpreted as granaries, positioned close to the waterway for ease of transport[52]. A much larger beamslot structure measuring 20m × 20m was excavated at Waterbeach[53]. It contained at least fourteen beamslots. The buildings was positioned 50m from the River Cam, and 200m from the River's junction with the Old Tillage dyke, suggesting this structure was a warehouse. Further afield, a similar building found on the Southwark waterfront, where it was interpreted as a warehouse[54]. Rickman's study of Roman military granaries (*horrea*) in Britain[55] gives several examples of beamslot structures at Richborough and Fishbourne (England), and Fendoch and Inchtithil (Scotland). In each case, beams were laid along the length of the building, and provided a base for posts. Reviewing all of the British military *horrea* then known, Rickman proposed a standard width of 20 feet or just over 6m, with a few examples up to 30 feet (9m) wide. He suggested they were typically three times longer than their width. The five beamslots at Knobb's Farm measure c.7.5m in width. It is not possible to estimate the length of the structure, as it runs beyond the edge of the excavated area, but it cannot have been more than 10m long, so plainly it does not fit the dimensions of Rickman's military granaries.

An environmental sample from one of the beamslots (F.1141) produced just two cereal grains, 5–6 wild plant seeds and very little charcoal—all of which was probably not in situ (see Section 9: Environmental Remains). This small assemblage does not negate an interpretation as a granary: it would be unusual to find burnt plant remains in foundation trenches of a grain store unless it had burnt down.

Building IV lay around 30m to the south, in Field F. It consisted of just two beamslots, F.1064, set at 90 degrees, along with a small posthole at the corner where they joined[56]. The long axis was aligned with the main boundary ditch, F.1089, just to the south, and would have created a room c.6m by 4m. The fills produced only a single sherd of mid-first to second century AD pottery, but as this structure overlay a small silted-up gully (F.1063) which produced second-to-fourth century pottery, this single find is presumably residual. With so little material recovered from this structure, it is not possible to suggest what its function might have been.

Structure V lay in the middle of Field F. It was made up of four small postholes[57], arranged in a loose rectangle 2.75m long and 1.75m wide. The fills produced a single sherd of pottery dating to the second–fourth centuries AD. The slight nature of the postholes and lack of finds suggests an insubstantial structure. Immediately beside it was a large, shallow pit, F.1051, which contained the remains of several Roman quern stones. There were a number of other contemporary postholes and pits around this structure[58], presumably also related to crop storage and processing. Environmental

51 Evans, Appleby *et al.* 2013: 236–275.
52 Notably Structures 24 & 26, Evans, Appleby *et al.* 2013: 240 and 242.
53 Evans, Macaulay & Mills 2017: 27–28.
54 Brigham, Goodburn & Tyers 1995.
55 Rickman 1971: 215–238.
56 Beamslots F.1064, posthole F.1224.
57 Postholes F.1053, F.1054, F.1055 and F.1056.
58 Postholes F.1048, F.1049, Pit 1052.

samples from pits F.1057 and F.1225 produced results suggesting that that crops might have been processed in the area (see Section 9: Environmental Remains for details).

Further evidence for building in the vicinity comes from the Roman tile found in a number of middens and pits close to the buildings. These included a number of tegula roof tiles and large floor tiles. They were all found alongside pottery deposited in the mid/late-second century or early third century. This gives a broad date for the demolition of this structure, which also coincides with the end of Building I (discussed below).

Enclosures

To the west of Buildings I and II, a number of shallow enclosure ditches or gullies were dug and re-dug[59]. Two interconnecting rectangular enclosures were dug around the former Early Roman wells described earlier, and might originally have been intended to enclose it. Together, these enclosures measured 24m long and 18m wide. The northern side followed the line of the ditch which had previously separated Fields D and E. Curiously, the boundaries all appeared to have been created as either beam slots or post-trenches. The predominant profile was of a flat or nearly flat base and steep straight sides, but in places the profile was of deep convex sides leading to narrow slots. A section through F.751 appeared to indicate that a beam had been extracted and a charcoal-rich deposit had accumulated in its place. The narrow post-trenches were seen to the south and north of the enclosure in features F.767 and F.766. The regularity and spatial arrangement of these features suggested a space enclosed by fences, hurdles or palisades. Only two slots produced finds and these were of animal bone; no datable evidence was collected.

These two small enclosures were in turn were enclosed by larger ditches dug around 4m outside, on their northern and western sides[60]. These ditches all appear to have been recut at least once. They might have formed a small droveway, except they appear to have been blocked from the outset by gully F.709. An environmental sample from ditch F.797 produced by far the largest plant assemblage of the phase. Most of the identified grains and chaff were of spelt wheat (*Triticum spelta*). The large number of wild seeds were typical of crop weeds in Cambridgeshire, and indicate that the source of crops was local, rather than distant. This assemblage appears to represent the later stages of crop processing: threshing had certainly occurred, and the large wild seeds recovered suggest the final stages of hand sorting of grain. The waste must have been dumped rather than burnt, as there was almost no charcoal found in the sample (see Section 9: Environmental Remains for details).

Within these enclosures were several large pits around 1.3–2m in width (F.769, F.770, F.771). They produced with few finds and had no obvious function. Also in the enclosures was a large rectangular ‘tank’ which might have replaced the well. This is described in more detail below. The tank and the nearby pit, F.743, produced fifty bones and bone fragments from foxes (see Section 8: Faunal Remains).

At the southern end of Field F, a ditch 20m long was dug at ninety degrees to the trackway, F.1080, immediately beside the southern entrance to this Field. Initially, there appears to have been a gap of c.3m left between the trackway and the ditch, to allow access to the southern corner of Field F, but this was later closed by a small curvilinear ditch F.1008. This created a small enclosure, roughly 9m wide at the southern end of Field F. Its function is unclear, but it may be related to the small structure Building IV, which lay to the west of it.

[59] Gullies F.751, F.753, F.753, F.766, F.767, F.798, and F.799.
[60] Ditches F.708, F.709, F.749, F.750, F.797, F.800, and F.801, as well as gully F.765.

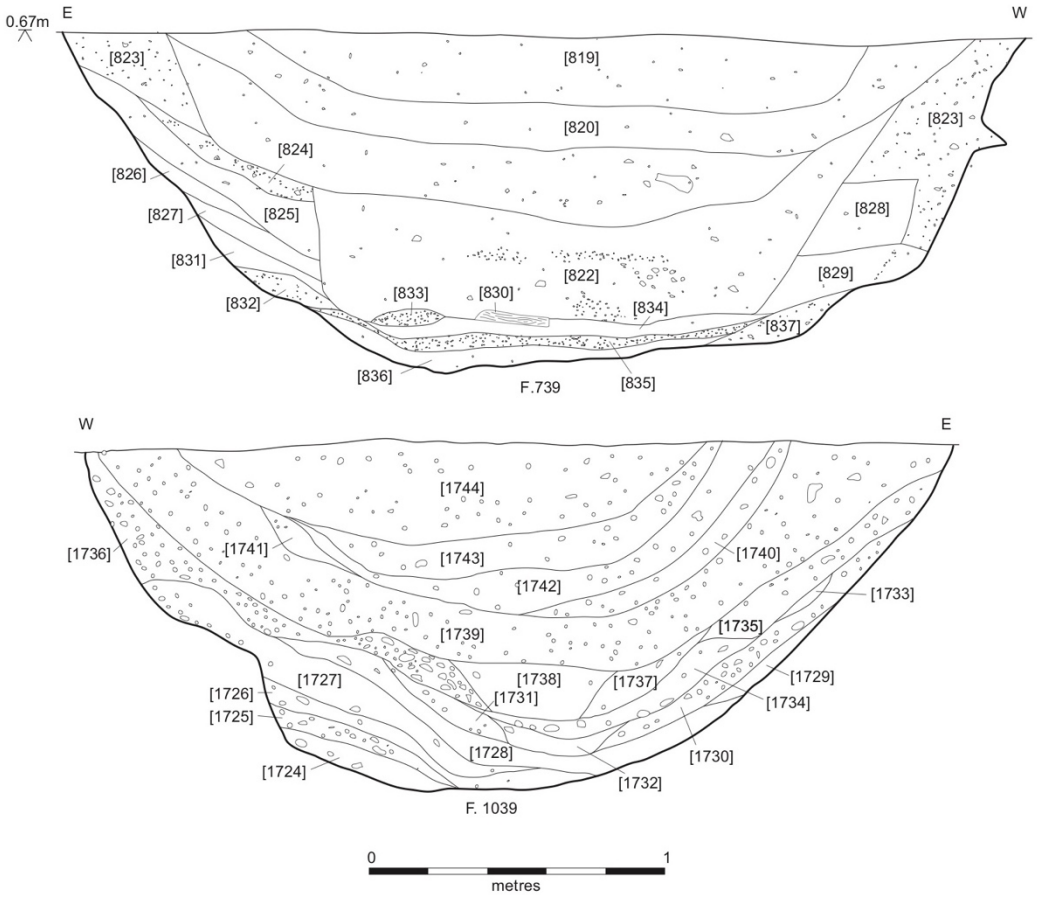


Figure S3.9 Section of Tank F.739 and Waterhole F.1039

Wells

Within the enclosures, a large well or tank, F.739, appears to have been dug following the backfilling of Early Roman Well F.732. This new well was sub-rectangular in plan, measuring 5.00m long, 3.3m wide and 1.2m deep (Figure S3.9). It had moderately steep sides but a flat base. It appears to have been lined with timber planks, and then backfilled to hold the planks in place. One waterlogged oak plank was found at the base of the tank. The backfilled layers, [823]–[837], produced just 18 pottery sherds most dating from the first to third centuries AD, with a three dating to the first and second centuries—approximately the right date to replace the previous well. Sometime later, the tank was deliberately backfilled, with four layers apparent: [819], [820], [821] and [822]. Despite their bulk, they produced only eleven sherds of pottery, all dating to the second to fourth centuries AD. However, the initial two backfilling layers, [821] and [822], contained a large amount of animal bone: a total of 264 pieces weighing c.8kgm and, as noted above, including a surprisingly large proportion of fox (see Section 8: Faunal remains).

In the northeast corner of Field C there was another large pit or well, F.1039. It was near circular, measuring 3.3 × 3.0m in plan and 1.2m deep, with steep sides (Figure S3.9). It contained 21 fills, [1724]–[1744]: the lower appeared to be the result of natural silting and slumping, but the later fills appeared more deliberate. Fill [1739]—probably the first of the deliberate fills—produced 102 sherds of pottery, of mixed types and dates, deposited in the second century AD (probably the latter half). An environmental sample from this same fill produced one broken cereal grain, four chaff fragments and two wild grass seeds. This probably represents stray cereal processing waste, but the quantity involved suggests that it was not intentionally discarded into the well. There was no sign of waterlogged plant remains in this waterhole.

Flues

In the southern corner of Field F, close to Building IV, were three intercutting pits: F.1005, F.1006 and F.1007. Together the three appeared to create an industrial hearth/corn dryer.

- F.1007 was sub-circular in plan, measuring 1.20m in diameter by 0.80m wide and 0.10m deep. It was truncated by F.1006 to its north, had shallow concave sides leading to a flat base. It had two fills, which produced one potsherd.
- F.1006 was 'dog-bone-shaped' in plan measuring 1.10m in diameter by 0.60m wide and 0.10m in depth. It had shallow straight sides leading to a flat base. Its fill consisted mostly of blue clay. It produced some charcoal but no finds.
- F.1005 was 'egg-shaped' in plan measuring 1.60m long, 0.85m wide and 0.10m deep. Much burning was evident in its two of its three fills, including patches of burnt clay and flint. Environmental samples were dominated by cereal chaff, principally of spelt wheat (*Triticum spelta*) and emmer/spelt wheat (*Triticum dicoccum/spelta*). The few cereal grains recovered were quite puffed, and most were only identifiable as wheat (*Triticum* sp.), with just one grain of barley. There was also a limited range of wild seeds: mostly brome or oats (*Bromus/Avena* sp.), curled dock (*Rumex* c.f. *crispus*) and scentless mayweed (*Tripleurospermum inodorum).* Individual seeds of a small daisy family type (Asteraceae indet.) and great fen sedge (*Cladium mariscus*) were also recovered. (See Section 9: Environmental Remains for details). The three fills of this feature also produced two fragments of quern stone and one potsherd.

Almost certainly related to this structure were the deposits recovered in ditch F.1008, ten metres to the east. Environmental samples taken from its two fills were rich in spelt wheat chaff. The small amount of charred grain mirrored the chaff species. A few barley grains and chaff fragments were also found, as well as one piece of chaff from bread wheat (*Triticum aestivum*) and one flax seed (*Linum usitatissimum*). Wild seed species were present in much lower quantities, but were very similar to those recovered from the corn dryer.

The silted up ditch between Fields D and E had two hearths or flues dug into the top of it (F.736, F.737), with one more 5.5m to the northeast (F.738). All three had a similar elongated shape and same dimensions (1.4–2.0m long, 0.35–0.4m wide). All had evidence of in situ burning and they contained large amounts of charcoal. Only F.736 produced datable finds: three potsherds, all probably residual from the underlying ditch: the latest dated to the mid-late first century AD. Environmental samples taken from the primary fills showed they were heavily impregnated with residual waste from crop processing activities: mostly wild seeds and some charcoal, but F.737 also produced cereal grains as well (spelt or emmer where identifiable). No chaff was recovered. These three flues appear to have been used as corn dryers, and subsequently for disposing of crop residues. (See Section 9: Environmental Remains for details).

Many similar 'cigar-shaped' burnt flues with similar chaff-rich ash were excavated at Langdale Hale site, three kilometres to the south[61]. There, the flues spanned the mid-to-later phases of settlement (AD 120–410) and represented large-scale crop processing. The evidence at Knobb's Farm suggests crop processing activities, but at a less intense level than at Langdale Hale.

Middens and rubbish pits

The small ditch which formerly lay between Fields E and F had partially silted up by this phase, and two large midden pits were dug into it: F.1235 and F.1239. The first of these had the single largest pottery assemblage of all features in the excavation. A total of 485 pot sherds were recovered (c.9kg). Most of it had a broad production date of the second to fourth centuries AD, but the lack of any definite third century vessels suggests a date the toward start of this range, and that the midden was only used for a short period. The sherds included a number of fine wares, notably a Nene Valley beaker with a hunting scene, dating from the late-second to early-third centuries AD (see Section 7: Pottery for details). This midden also contained a very large plant assemblage that appeared to have built up over several crop processing events. Hulled barley, bread wheat, spelt wheat and possibly emmer wheat and oats were cleaned and consumed on site. (See Section 9: Environmental Remains for details).

Seven to ten metres to the south of the midden pits there was a group of intercutting pits[62]. These varied considerably in size, measuring c.0.8–2.2m long, c.0.4–1.2m wide and c.0.1–0.55m deep. The fills were, however, all similar dark grey sandy silt, like the two midden pits. They contained pottery dating mostly to the mid-second to third centuries AD. The pits are interpreted as primarily rubbish or midden pits.

These midden pits were intercut with several shallow gullies. All were small, measuring c.0.45 wide and c.0.15m deep. The earlier four[63] were aligned parallel to F.1240: the former boundary ditch between Fields D and E, six metres to the north. The later two[64] were at an angle to them and the entire field system, running northwest–southeast. These gullies might have been dug for drainage, to keep rubbish from flowing into the buildings to the north in wet periods.

Further south, a rectangular pit, F.1078, was dug over the small enclosure ditch F.1079, close to the corn dryer. It contained 40 pottery sherds, made up of a mix of first–second century pottery from the underlying ditch, and second–third century sherds, along with a piece of tegula. Like the other pits in Field F, this is interpreted as a rubbish pit.

The end of settlement activity

Roman activity ceased on the site in the third century. While much of the pottery recovered was characteristic of the second to fourth centuries AD, the lack of many sherds dating from the later third or fourth centuries AD suggests the site had gone out of use by mid-third century AD. There are a number of deposits on the site which all share a common date of the earlier third century:

- Pottery and animal bone were dumped in one of the beamslots of Build I, suggesting that the building had either rotted or been removed by that time. The fifty pottery sherds were all essentially domestic in nature, with none dating specifically to the third century AD (indeed, there were several pieces of samian specific to the second century, which suggests a date not later than the early third century).

[61] Evans, Appleby *et al.* 2013: 63–66, 149–159

[62] Intercutting midden pits F.1111, F.1124, F.1125, F.1126, F.1127, F.1128, F.1129, F.1130, F.1224, F.1225. F.1243, F.1244, F.1245, F.1246, and F.1247

[63] Earlier gullies intercutting midden pits: F.1241, F.1242, F.1243, and F.1244

[64] Later gullies intercutting midden pits: F.1112 and F.1131

- Both terminals of the entranceway into Field E. On the northern side, F.719 produced an assemblage of 144 potsherds (1.6kg) which included Nene Valley colour-coated wares, pushing the date of the assemblage into the third to fouth centuries AD. On the southern side of the entranceway, F.748 contained 81 sherds (1.3kg) which were dated more generally to the second to fourth centuries AD.
- With just two exceptions, none of the features which contain tegula roof tile or floor tile contained any pottery dating specifically to the third or fourth centuries AD, suggesting that the buildings involved had been dismantled at the end of the second century or the start of the third.

The only activity of note afterwards in the Southern Area was the creation of three burial plots at the edge of the now-defunct field system.

LATER ROMAN INHUMATION CEMETERIES: FOURTH CENTURY AD

The final phase of Roman activity on the site consisted of three cemeteries on the southern edge of the presumed settlement. Cemetery 1 lay in the former Field A, Cemetery 2 to the south of Field C, and Cemetery 3 in Field F (Figure S3.10). A total of 52 inhumation burials were excavated.

All of the individual burials are catalogued in Section 6. Section 5 summarises burial patterns, demography, trauma, skeletal pathology, and other traits.

Dating

Despite the poor bone preservation in the sandy gravel soils, radiocarbon dates were obtained from two nearly-adjacent skeletons in Cemetery 3: F.1095 and F.1098. On the assumption that they were buried at about the same date, the combined probability distributions return a date of 260–275 cal. AD (9.2%) or 325–395 cal. AD (86.2%), peaking at 340–380 cal. AD. (See Section 13: Scientific Dating for details).

Almost all of the pottery vessels deposited in the graves dated to the mid-third or fourth centuries, other than the Colchester colour-coated beaker in F.164 (Cemetery 1) which dates to the mid-second to third centuries (See Table 7 in the main article). The Horningsea greyware jar found in F.944 (Cemetery 3) was of a long-lived type which was produced between the second and fourth centuries AD.

The type of bone comb found in F.1097 (Cemetery 3) was in use from 350–360 AD through to the end of Roman occupation (See Section 11: Bone Comb for details).

Together, this implies that the three cemeteries were in use in the fourth century AD. The uniformity of gravegoods, and the high number of decapitation and prone burials in all three plots suggests they might have been in use simultaneously.

Inhumation Cemetery 1

Inhumation Cemetery 1 (Figure S3.11) overlay the first-century cremation plot in Field A. It contained eleven inhumations in eight graves. The northern boundary of the cemetery was not identified in excavation and it is possible that further remains were interred outside the excavated area. With the exception of a single infant burial, the graves were all aligned with the first-century ditch, F.103, immediately to the west of the burial plot. The southern boundary of the cemetery coincided with the silted up Early Roman ditch F.122, into which grave F.152 had been dug (a common practice in Roman Britain). Two of the graves, F.164 and F.165, had been re-opened to inter a second body.

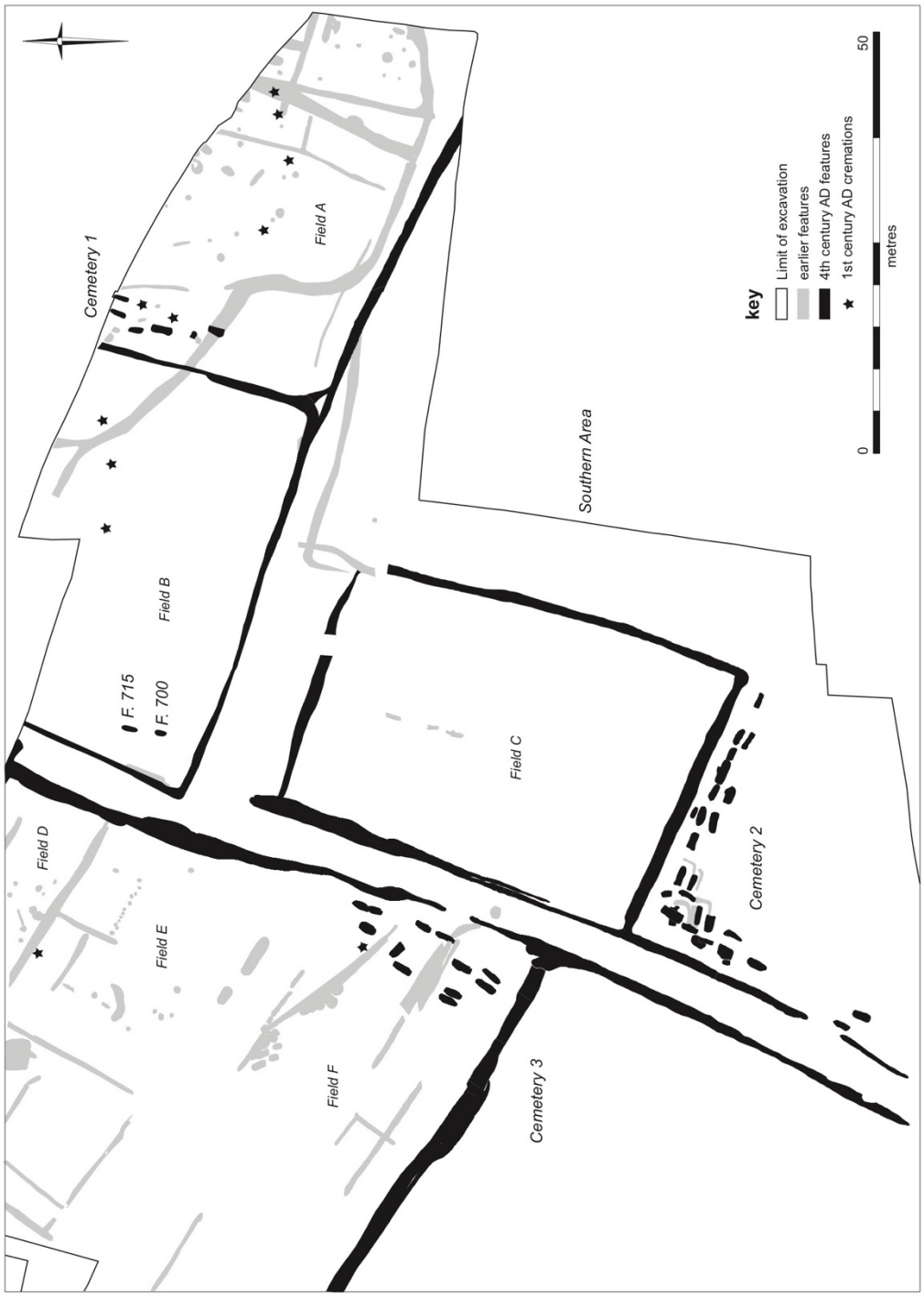
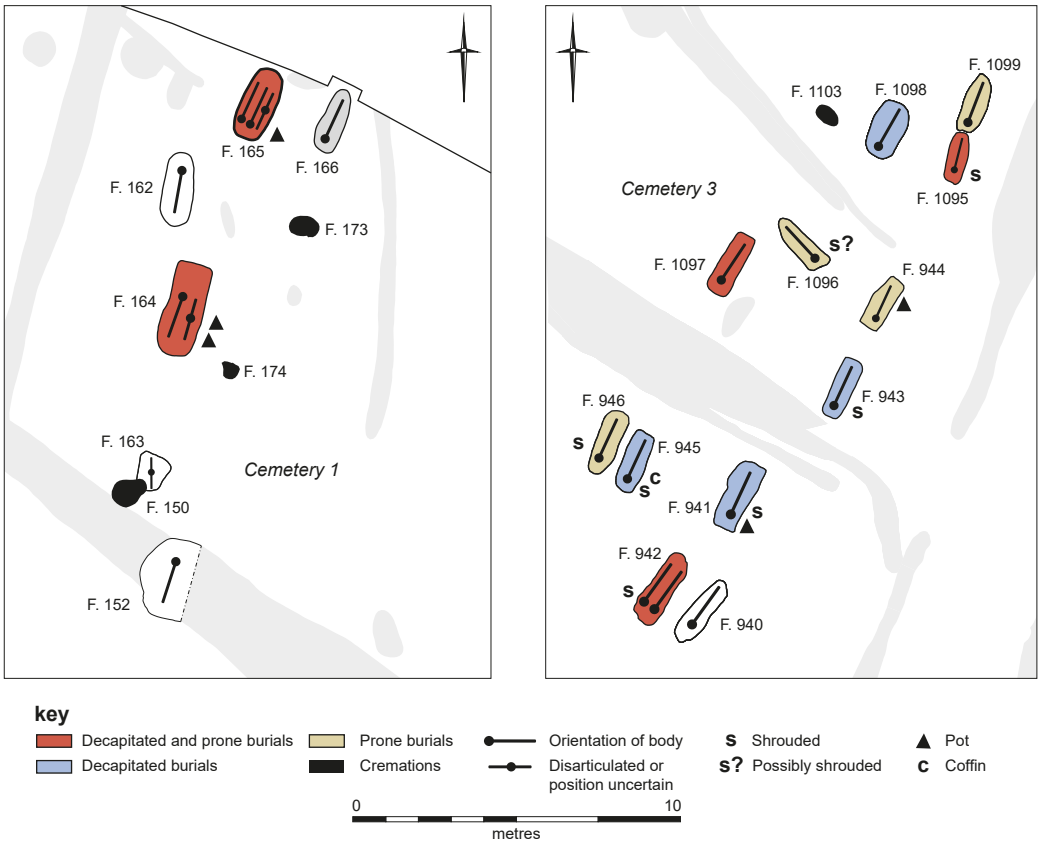


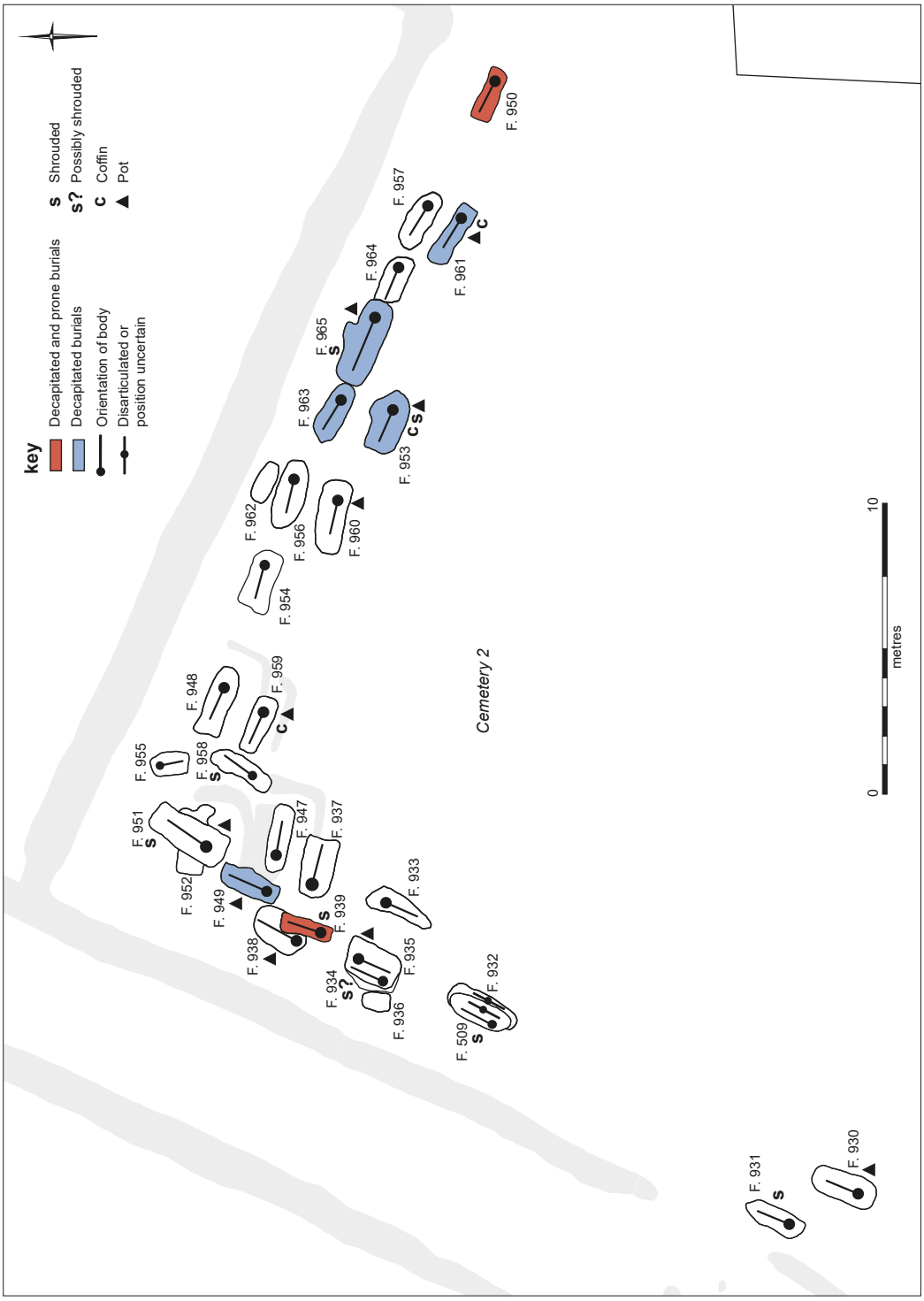
Figure S3.10 Plan of the three Late Roman cemeteries



Around fifty metres to the west of Cemetery 1 were two otherwise isolated inhumation burials in the adjoining Field B (F.700 and F.715). These have been catalogued with bodies in Cemetery 1. Both were aligned with the trackway, with F.700 approximately 2.5m north of F.715. Both had originally been interred just below the level of the subsoil and had suffered considerably from truncation and compression: less than half the original length of each burial survived. This degradation was made worse by the acidic nature of the natural sand and gravel into which they had been placed, and consequently the condition of the bone was very poor.

The graves in Cemetery 1 were generally rectangular or sub-rectangular, and the fills a greyish silt/clay, though with inclusions of sand and occasional pebbles and gravels. That sandy acidic soils meant that bone quality was highly variable, but generally moderate to poor. Of the eight skeletons where the position of the body could be determined, four had been buried prone, and three were decapitated.

Two of the graves contained gravegoods. F.164, which contained two skeletons, had two miniature beakers—one Nene Valley colour-coated, the other Colchester colour-coated—as well as a necklace of 30 cannel coal beads. The articulated skeleton in F.165 was buried with a miniature shell-tempered jar, probably locally-made.


key
Decapitated and prone burials
Decapitated burials
Orientation of body
Disarticulated or position uncertain
s Shrouded
s? Possibly shrouded
c Coffin
Pot
F. 950
F. 957
F. 964
F. 965
F. 963
F. 961
F. 962
F. 956
F. 960
F. 954
F. 953
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F. 937
F. 952
F. 949
F. 933
F. 939
F. 938
F. 935
F. 934
F. 936
F. 932
F. 509
Cemetery 2
F. 931
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metres

Inhumation Cemetery 2

Inhumation Cemetery 2 (Figure S3.12) contained 27 inhumations in thirty graves. It showed at least two and probably three phases of burials, differentiated by stratigraphy, burial furnishings and the orientation of graves. The bulk had been interred in rectangular or sub-rectangular graves, orientated parallel to the field boundaries or adjoining trackway. The sandy, gravelly acidic soil meant that the bone quality was generally poor, with some bodies represented by little more than soil stains. A number had also been severely truncated by ploughing. Seven of the bodies had been decapitated, and two were also buried prone.

Of note are the number of gravegoods in the cemetery: ten pottery vessels were included in graves. Eight of these were Nene Valley wares; the other two were local shell-tempered wares. Six were beakers of some form (five of them miniature or small), two were miniature flagons and two were miniature jars. Particularly remarkable is the miniature face pot flagon deposited in F.965.

Nails were found in twelve graves in Cemetery 2. However, only three of these contained nails in any number, presumably indicating burial in a coffin: F. 959 (129 nail fragments), F.961 (80 fragments) and F.953 (26 fragments). All the other graves had less than six nail fragments. These have been interpreted as residual objects—some of them possibly from the completely disturbed grave F.952 (the earliest inhumation in the cemetery).

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The first burials in Inhumation Cemetery 2 were positioned in the northwest corner of the field, framed by ditches F.904 and F.906. The initial burials comprised F.937, F.947, F.948, F.952 (empty and truncated), and F.959. One (F.959) had been buried in a coffin—other graves contained 1–5 nails, but these are interpreted as residual.

Four of these graves were demarcated by shallow L-shaped gullies on the south and east sides of the graves (F.947, F.948, F.952, F.959). These have no parallels in the local area, although they may be a minor variation on the small rectangular gullies occasionally found around inhumation burials across southern Britain[65]. Because of truncation by ploughing, all of these gullies were small and shallow, measuring only 0.3–0.54 wide and 0.05–0.2m deep. These gullies appear too wide to be bedding for reveting planks, and there was no sign of corner posts (unlike cremation cremation 'barrowlets' in the Vale of Pickering[66]). That they were L-shaped, rather than surrounding the graves, suggests they had no structural function. As all four are burials are in the corner of the field, the gullies might have been positioned to 'contain' the burials from the open field, or else 'complete the circle' of the ditch enclosing these burials. They might also have been a source of soil to enlarge the size of the grave mounds. Allowing for 0.15–0.3m of truncation, they might have produced 0.7–1.5m^3 of soil, which could have helped increase the size and height of the grave mound.

All of the burials in this first group were orientated east-southeast to west-northwest, although the position of the heads varied.

The overlap of graves and gullies suggests the following order in burial: F.952 was buried first in the corner of the field, followed by F.947 to the south of it and F.948 to the east. Finally, F.959 was buried south of F.948, cutting its gully, while F.937 was placed south of F.947, also encroaching on its gully.

— —

The first group of burials was succeeded by ten further inhumations to the east: from west to east, F.954, F962 (empty grave), F.956, F.960, F.963, F.953, F.965, F.964, F.957, F.961, and F.950. Apart from the first, F.954, which had been buried in a peculiar 'banana pose', they were all on the

[65] For example, Booth 2017
[66] May & Powlesland 2010

same alignment as the first burials, although this may simply because they too were positioned parallel to field boundary ditch F.906, immediately to the north. All of these burials had their heads to the east, other than F.954 (which may belong to the initial group, or be transitional between them). Two of the burials, F.961 and F.953, were interred in coffins; three others (F.954, F.956, and F.962) contained 1–5 nails. There was no stratigraphic relationship between any of these graves, although the layout of the burials suggests that they were placed successively along the line of ditch F.906, from west to east.

Particularly striking in this phase is the cluster of five bodies which had all been decapitated (F.950, F.953, F.961, F.963, F.965); the last in the sequence (F.950) had also been buried prone. These do not appear to be a marginalised or segregated group, as they are still mixed in with other 'regular' burials. Moreover, three of them, along with F.960, were buried with pottery vessels: two local miniature jars (F.960 and F.961), a miniature Nene Valley beaker (F.953) and the Nene Valley face neck flagon illustrated in the main article (F.965). And, as noted above, F.961 had also been buried in a coffin.

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Stratigraphically, the last burials to be interred in Cemetery 2 were orientated at ninety degrees to the previous inhumations, and all lay parallel to trackway ditch F.904/F.902. They comprised, from south to north, F.930, F.931, F.932 (disturbed), F.509, F.933, F.934 (truncated and empty), F.935 (double burial), F.938 (truncated), F.939, F.949, F.951, F.958 and F.955. All but three (F.933, F.935 and F.955) were laid out with their heads to the south. The body in F.930 lay extended on its side along the eastern edge of the grave. The body in F.932 had been disturbed when the grave was reinserted to bury F.509, and the bones from the original interment were pushed aside into two groups on the eastern edge of the grave (recorded separately as Skeletons 1306 and 1307). The double burial in F.935 lay directly over the empty grave F.934. And finally, the grave of F.939 largely truncated the burial in F.938, leaving only the feet and lower legs. The level of truncation and re-opening of graves suggests this final phase of Cemetery 2 had lasted some time.

Two of the bodies in this phase, F.939 and F.949, had been decapitated; the former had also been buried prone. One of the bodies, F.958, had her hands wrapped tightly around her chest, with her knees together and her ankles crossed, suggesting she had been buried in a shroud.

Five of the bodies had been buried with a pottery vessel—all of them miniatures. These comprised four Nene Valley miniature beakers (F.930, F.935, F.949 and F.951), and one Nene Valley miniature flagon with a hole bored in the side (F.938).

Inhumation Cemetery 3

Inhumation Cemetery 3 contained thirteen inhumations in twelve graves (Figure S3.11). It lay to the east of the trackway, with all of the inhumation burials other than F.1096 orientated parallel to the trackway ditches F.900 and F.1003. Ditch F.1003 appears to have formed the southern boundary to the cemetery. Burial F.943 was positioned across the small ditch F.1007, suggesting this internal division of Field F had gone out of use by the time the cemetery was created. There is no stratigraphic arrangement of graves within the cemetery, although F. 942 did contain a double burial, with one body above the other.

Cremation F.1103 was buried a metre from inhumation F.1096, although as discussed above, it probably belongs to the Early Roman phase, with the other cremation burials.

The graves were generally very shallow, and consequently most of the skeletons suffered some level of truncation by ploughing: only F.1097 was deep enough to avoid damage.

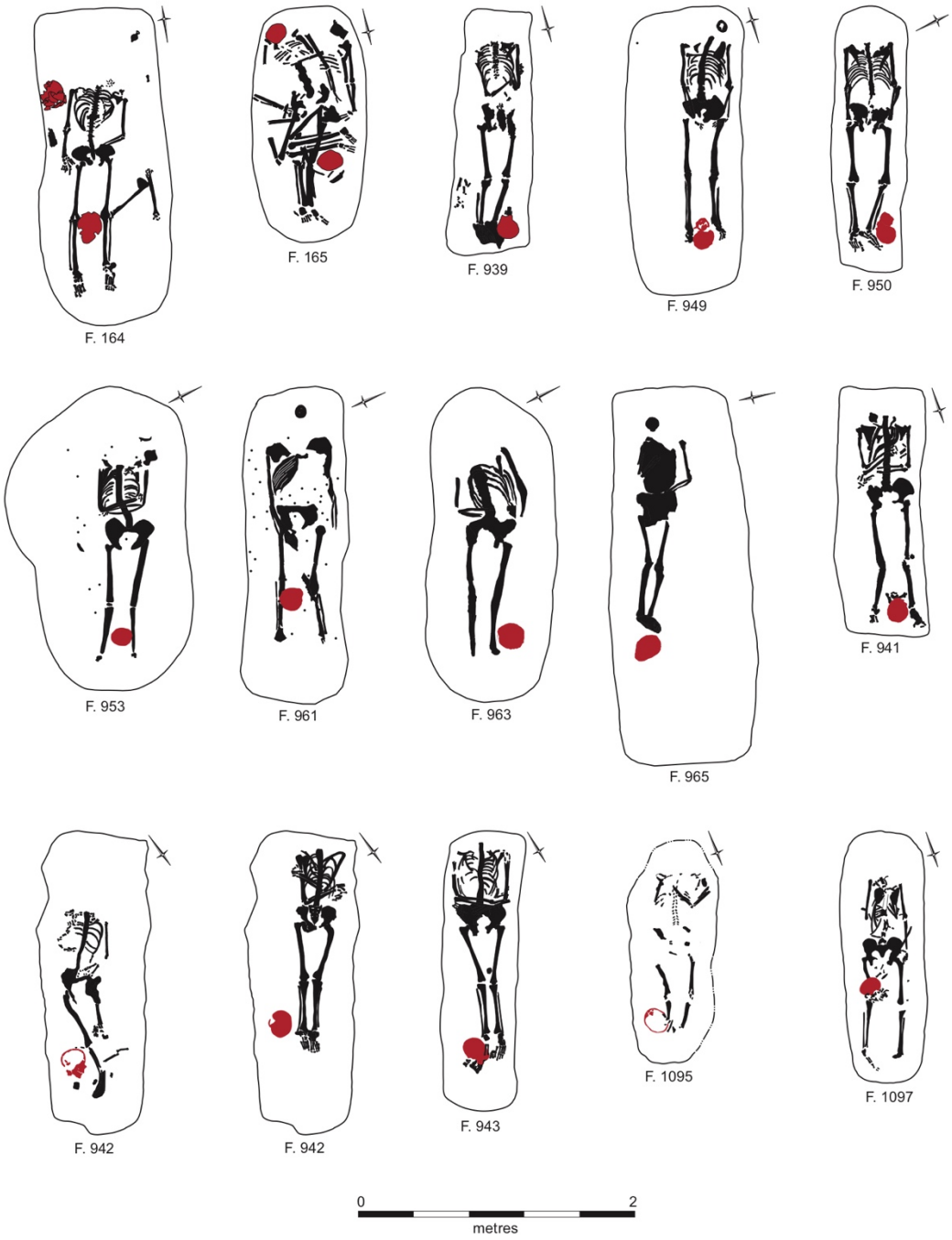


Figure 3.13 Position of decapitated heads in relation to the excavated skeletons

Plate 1: Cemetery 3 under excavation, viewed from the north, with F1098, F.1099 and F.1095 in the foreground, and F.943, F.994, F.1096, and F.1097 at the top.

A potential box burial with a lid was found in F.945. Two paler bands of soil, c.10cm wide, were found along each side of the body, and there also appeared to be a similar pale capping layer over the skeleton. No staining was found beneath the body however. A single iron nail was recovered from the foot of this grave, which suggests the feature was not a coffin but a wooden framework assembled in the grave.

Also of note were the six burials with the arms folded tightly across the abdomen or chest, with knees and ankles drawn together, suggesting they had been buried in a shroud (F.942 [Sk.1338 and Sk.1352], F.943, F.945, F.946, F.1096).

Gravegoods were more limited in this cemetery than the other two. Two graves contained miniature vessels: F.941 contained a miniature Nene Valley flagon and F.944 contained a miniature Horningsea jar, both dating to the second to fourth centuries AD. Burial F.1097 contained a bone comb in three pieces, recovered from different places within the grave. The woman in the grave had been decapitated, partially defleshed, and buried face down, so presumably breaking the comb had also been deliberately broken.

MEDIEVAL, POST-MEDIEVAL AND MODERN FEATURES

As noted in the background to the excavations at Knobb's Farm, once the Roman settlements went out of use, the area lapsed into agriculture. To the south of the excavation area, medieval ridge and furrow is visible as cropmarks: the fields of medieval Somersham.

No medieval activity was identified in the Southern Excavation Area, but there were two post-medieval ditches in the northeastern corner of the Southern Area (F.176 and F.179). These may have been the remains of quarry pits associated with the construction of the railway, although given the distance from the disused railway (now the quarry's haul road), this is unlikely. It is more likely that they are the remains of a backfilled boundary ditch.

In the western half of the Southern Area, there was a large modern ditch, which was still partially open at the time of the excavation. It ran almost east–west for 125m before sharply turning north-northeast and continuing beyond the northern limit of the excavation area. This substantial feature also had several smaller field drains feeding into it. The only other modern features two small parallel gullies, F.703/F.1076 and F.705/F.1075 located towards the eastern end of the site and cut Roman ditch F.1062. They might have been modern plough scars.

SECTION 4: CREMATED HUMAN BONE

By BENJAMIN NEIL and NATASHA DODWELL

A total of twelve cremation burials were excavated at Knobb's Farm: ten in Cemetery 1 (Fields A and B), one urned cremation in Field E (F.707), and an un-urned cremation in Field F (F.1103) amongst the later inhumation burials of Cemetery 3 (though unlikely related to them). Details of each are summarized in Table T4.1.

The soil from each feature was initially processed through a 1mm nylon mesh over a 90 litre floatation tank. The subsequent residues were then processed through a set of three tiered Endecotte sieves at 10mm, 5mm and 2mm, then sorted for bone and bagged according to the following fraction size: >10mm, 5–10mm 2–5mm and <2mm. The residue was passed through set of three tiered Endecotte sieves at 10mm, 5mm and 2mm. Bone from the fraction >5mm was analysed. The smaller fractions remained unsorted and was scanned for identifiable elements.

Analysis was limited to the largest urned cremation burial F.150 (below). The remainder were assessed for:

- age, estimated by broad developmental, dimensional and degenerative characteristics,
- sex, based on identifiable sexually dimorphic elements, and
- oxidation, identified according to criteria outlined by Buikstra et al. (1994).

Six individuals (F.140, F.165, F.173, F.174, F.707 and F.1103) were assessed within the adult age bracket (see Table T4.1). Four, (F.111, F.112, F.146 and F.182) were assessed as having developmental characteristics of either sub-adult or young adult age. The remaining two individuals (F.180 and F.181) were assessed as a possible adult and indeterminate respectively. All but F.150 (described below) and F.173 were sexed as indeterminate. F.173 was sexed as a possible female.

The cremains (from F.111, F.112, F.140, F.146, F.165, F.173, F.174, F.180, F.181, F.182, F.707 and F.1103) had been fully oxidised, characterised by a white hue to the bone. This hallmark is the result of a heat-induced loss of water and organic material. A small percentage of fragments from F.111, F.150, F.165, F.173 and F.1103 had areas of dark-mid blue grey on the bone surface. This suggests that some bone elements were shielded by soft tissue and/or another external structure within the pyre. This is also correlated with heat flux and the duration of the body within the fire, where factors such as fuel and oxygen availability and duration come into play. That most of the cremains from all the features were fully oxidised suggests consistent pyre environments and temperatures of +600°C during the cremation processes.

Apart from F.150, all the burials had been truncated. Half of these contained less than 50g of cremated bone.

Cremation F.150

Age was estimated by the method outlined by Brooks & Suchey[67] as well as broad developmental, dimensional and degenerative characteristics. Sex was estimated using metric data outlined by France[68]. The level of oxidation and thermal alteration was recorded, the latter according to criteria outlined by McKinley[69]. Each fraction was measured for volume using graduated borosilicate beakers and weighed using a 500g x 0.01g digital scale. This allowed the calculation of a

[67] Brooks & Suchey 1990
[68] France 1998
[69] McKinley 2004: 9-13

fragmentation index (FI)[70]. Bone dimension was measured using a 150mm digital sliding calliper (with a resolution of 0.01mm and accuracy of ± 0.02mm).

Of the 1417g present in this cremation, 400g (132 fragments) could be identified to element and a further 356g (149 fragments) was assigned to bone type. All major axial and appendicular regions of the body were present. Of the identified elements, 78% by weight were from the skull (57 fragments, 154g), femur (4 fragments, 67g), vertebrae (22 fragments 49g), pelvis (8 fragments, 24g), and ribs (8 fragments, 20g). Of the non-identifiable fragments, 82 (269g) were diaphyseal bone, 27 (46g) epiphyseal, and 40 (41g) trabecular. There was no duplication of identified element, suggesting a single individual.

Measurement of the radial head suggested the individual was a female, as did the morphology of the mastoid process. The degeneration of the pubic symphysis implied an old middle adult, as did moderate spondylophytes around lower vertebrae fragments. The tibia presented a likely syndesmosis avulsion injury, such as a high ankle sprain. Clinically, injuries to the distal tibiofibular syndesmosis occur in around 1–18% of all ankle sprains and up to 23% of all ankle fractures; if left untreated, it can lead to chronic instability and post-traumatic ankle arthritis[71].

Like the other cremations, approximately 99% of the bone had been fully oxidised. The bone underwent a range of thermal alterations, characterised by transverse and curved cracking and delamination; this was a result from consistent exposure of the body to heat, which caused collagen-apatite links within the bone to shrink. A fragmentation index of 0.66 indicates minimal post cremation agency, which correlates with the high rate of bone element identification. The range of identified elements and bone type suggests that the whole body of a single individual was cremated. This cremation exceeds the range of an average British archaeological cremation (600–900g)[72]. In relation to the weight of an average modern adult cremation[73] (2016.4g), it represents around 70% of an individual.

[70] Harvig & Lynnerup 2013
[71] Rammelt & Obruba 2015
[72] McKinley 2013
[73] McKinley 1993

Table T4.1: Details of cremated human remains and gravegoods.

Skeleton	*Pit depth (m)*	*Weight (g)*	*Largest fragment*	*Sex*	*Age*	*Urn*	*Notes*
F.111	0.08	10	12	Indet.	Sub-adult /adult	No	No finds
F.112	0.10	9	25	Indet.	Sub-adult /adult	No	No finds
F.140	indet.	190	57	Indet.	Adult	Yes	*Urn*: coarse sandy grey ware jar
F.146	0.02	13	23	Indet.	Sub-adult /adult	Yes	*Urn*: grey ware jar
F.150	0.25	1417	81	F?	Adult	Yes	*Urn*: medium-sized coarse sandy grey ware jar. *Other*: four similar pottery sherds.
F.165	n.a.	88	50	Indet.	Adult	No	Found disturbed in the grave fill of inhumation F.165
F.173	0.07	410	63	F?	Adult	Yes	*Urn*: coarse sandy grey ware jar
F.174	0.09	258	71	Indet.	Adult	Yes	*Urn*: oxidised sandy ware jar with grey core. *Other*: small beaker/urn with pedestal base.
F.180	0.20	193	49	Indet.	Adult?	No	No finds
F.181	0.12	30	37	Indet.	Indet.	No	2 nail fragments (minimum 1 nail).
F.182	0.05	6	30	Indet.	Sub-adult /adult	No	No finds
F.707	0.24	262	41	Indet.	Adult	Yes	*Urn*: shell-tempered jar. *Other*: Black-slipped beaker with pedestal base.
F.1103	0.24	46	30	Indet.	Adult	No	No finds

Sex determinations:

- F? = possibly female (the analyst does not have confidence in the determination, but feels the available evidence hints at the stated sex)
- Indet. = indeterminate (the remains have been analysed, but lack sufficient diagnostic morphology to determine sex).

Plate 2: Excavation of F.944 underway, with F.943 in the background.

SECTION 5: INHUMATION BURIALS: GENERAL DISCUSSION

By BENJAMIN NEIL

INTRODUCTION

A total of 52 individuals dating to the Late Roman period were excavated at Knobb's Farm. The analysis of them in this section is organised under the following headings:

- preservation and taphonomy
- burial position
- grave orientation
- demography
- trauma
- skeletal pathology, including metabolic and endocrine disorders, inflammation, osteomata and impingements
- age-related degeneration
- developmental disorders and other skeletal traits, and
- oral pathology.

The following section provides a catalogue of the individual inhumation burials.

PRESERVATION AND TAPHONOMY

The fragmentation of this assemblage was considerable. Skeletal fragmentation rated using the author's own four-point scale. Only six individuals were scored with low to medium levels of fragmentation. The remaining forty-six individuals scored with high to very high levels and was particularly noticeable in Cemetery 2. There were several causes of this fragmentation. In general terms there was a positive correlation between greater grave depth below the plough soil and increased skeletal survival. Many of the inhumations in Cemetery Two were shallow thus unsurprisingly had low skeletal representation. Nine individuals were recorded as being truncated; of those, seven had a very high level of fragmentation. The bodies at Knobb's Farm had generally been buried in sandy gravel soils, which have a high hydraulic conductivity; meaning that water will drain away quickly from around a skeleton[74]. However, cyclical wetting and drying as well as freezing and thawing regimes cause bones to swell and shrink. This sets up physical strains which result in radial cracking, flaking, and spalling of the bone[75].

There was rarely any uniformity in the preservation of each inhumation, where different zones and elements of each skeleton had a different grade of alteration. In seven of the inhumations this variance consisted two or more steps in preservation grade. However, the preservation of thirteen individuals scored between 1–2 (good to moderate). Eight individuals scored between 2–3 (moderate), twelve scored between 3–4 (moderate to poor) and twelve scored between 4–5+ (poor).

Eleven individuals across Cemetery Two (F.938, F.948, F.949, F.950, F.951, F.953, F.956, F.959, F.965) and Cemetery Three (F.1096 and F.1097) were recorded with distinct, diagenetic signatures where delamination of the bone cortex, rounded fracture margins and chalky textures

[74] Nielsen-Marsh *et al.* 2000.
[75] Kendall *et al.* 2018.

were evident. Bone in sand and gravel soils are also prone to leaching, which will expose demineralised collagen to potential microbial deterioration[76], leading to the eventual destruction of the tissue given enough time. Since well-drained soils tend to be acidic and well-aerated, both chemical and microbial action can be rapid[77]. However, this also depends on depth of burial, temperature and body covering[78] such as shrouding. However, the condition of these eleven individuals suggests that they were not significant factors in retarding decomposition.

Twenty of the fifty-two individuals were recorded to have fine 'sandpaper' like concretions over the endocranial and articulating surfaces. These specific anatomical locations require some consideration. Water needs to be present for concretions to develop. However, it does not seem that water was ubiquitous all of the time as we would otherwise see concretions on all bone surfaces. Rather, after rainfall the capillary action of water into the skull and narrow spaced diarthrodial regions would have had the potential to persist due to the protected convex nature of the former and surface tension within the greater surface areas of the latter. This persistence of a wet environment in these locations would have allowed time for concretions to develop.

Eighteen individuals had some form of salient staining to the bone: sixteen took the form of a dark grey mottling and the remainder, a dark brown and orangey red. These dark grey and brown colours indicate anoxic episodes of iron oxides such as reduced manganese[79]. These coatings have diagenetic implications, where for example manganese oxidizing bacteria can generate considerable acidity,[80] which has the potential to dissolve the organic and mineral components the bone.

BURIAL POSITION

Position of inhumation burials

The physicality of the corpse within an inhumation has important implications for understanding the theatre of Romano-British ritual and the significance placed on the presentation of the body in its final resting place. As discussed in the article, the prone position is a regular feature of late Romano-British interments in rural cemeteries, which may relate to a need for social and /or sexual differentiation.

Table T5.1 summarises the burial positions of the 52 inhumations across the three cemeteries. Across the three cemeteries, twenty-six individuals were interred in a supine position, fourteen prone, two on their side with ten indeterminate.

	Supine	*Prone*	*On side*	*Indet.*	*Total*
Female	4	9	0	2	15
Male	14	4	1	2	21
Sex indet.	8	1	1	6	16
Total	26	14	2	10	52

Table T5.1: burial position

[76] Child 1995; Jans *et al.* 2002.
[77] Kibblewhite *et al.* 2015; Kendall *et al.* 2018.
[78] Junkins and Carter 2017.
[79] Dupras & Schultz 2014: 336; Schaetzl & Anderson 2005: 16
[80] Northup & Lavoie 2001

Upper and lower limbs were in a variety of positions. These are summarised in Table T5.2, where they could be determined. In most instances, the left and right upper limbs were treated differently, hence the figures totalling to more than the number of individuals. Of the supine burials, seventeen had variable upper limb placement over the body and twenty-four had determinable lower limb position. Of the prone burials, twelve had a variable upper limb placement beneath the body and twelve had determinable lower limb position.

Based on the drawn position of the upper limbs and lower limbs, nine individuals could be interpreted as being shrouded; of these, six were female, two were male and the sex of one could not be determined.

	Supine (n=26)	*Prone (n=14)*
Upper limb positions		
one or both hands on the pelvis	9	5
One or both hands on the thorax	5	6
One or both hands on abdomen	5	2
One or both hands on hips or thighs	2	3
Upper limbs tight against the sides	0	1
Upper limb position not determined	9	2
Lower limb positions		
Lower limbs drawn together	9	5
Lower limbs straight	15	7
Lower limbs crossed or stacked	2	1
Lower limb position not determined	2	2

Table T5.2: position of upper limbs and lower limbs of supine and prone burials

Position of decapitated bodies

Seventeen individuals had been decapitated. Eleven had been buried supine (F.700, F.941, F.942 [Sk. 1338 and Sk.1352], F.943, F.949, F.953, F.961, F.965, F.1098) and six prone (F.164, F.165, F.939, F.950, F.1095, F.1097). Of those buried supine, at least five had one hand over the pelvis, three with at least one hand over the thorax, one with the hands over the hip and thigh and one with both hands over the abdomen. Of the six prone, one had at least one hand under the pelvis, three with at least one hand under the thorax and one with both hands under the hips. This confers no appreciable deviation in placement from the non-decapitated individuals.

The skulls of all but on individual (F.1098) were present. While the decapitated heads had been placed in a variety of locations within graves, they were all consistently within the region of the lower limbs. Table T3.3 shows where heads were placed beside, on, or between the lower limbs.

	between lower limbs	*outside lower limbs*	*on lower limbs*
Location			
pelvis	0	0	0
femur	0	0	0
knees	2	1	1
tibia/fibula	1	1	0
ankles/feet	3	6	0
beyond the feet	1	0	0

	between lower limbs	*outside lower limbs*	*on lower limbs*
Sex			
female	3	3	1
male	3	5	0
indeterminate	1	0	0

Table T5.3: location of decapitated heads

GRAVE ORIENTATION

Across all three cemeteries, the burials had been placed parallel to boundary ditches, which were orientated either SSW–NNE or ESE–WNW. Thus, the greatest trend in burial orientation was

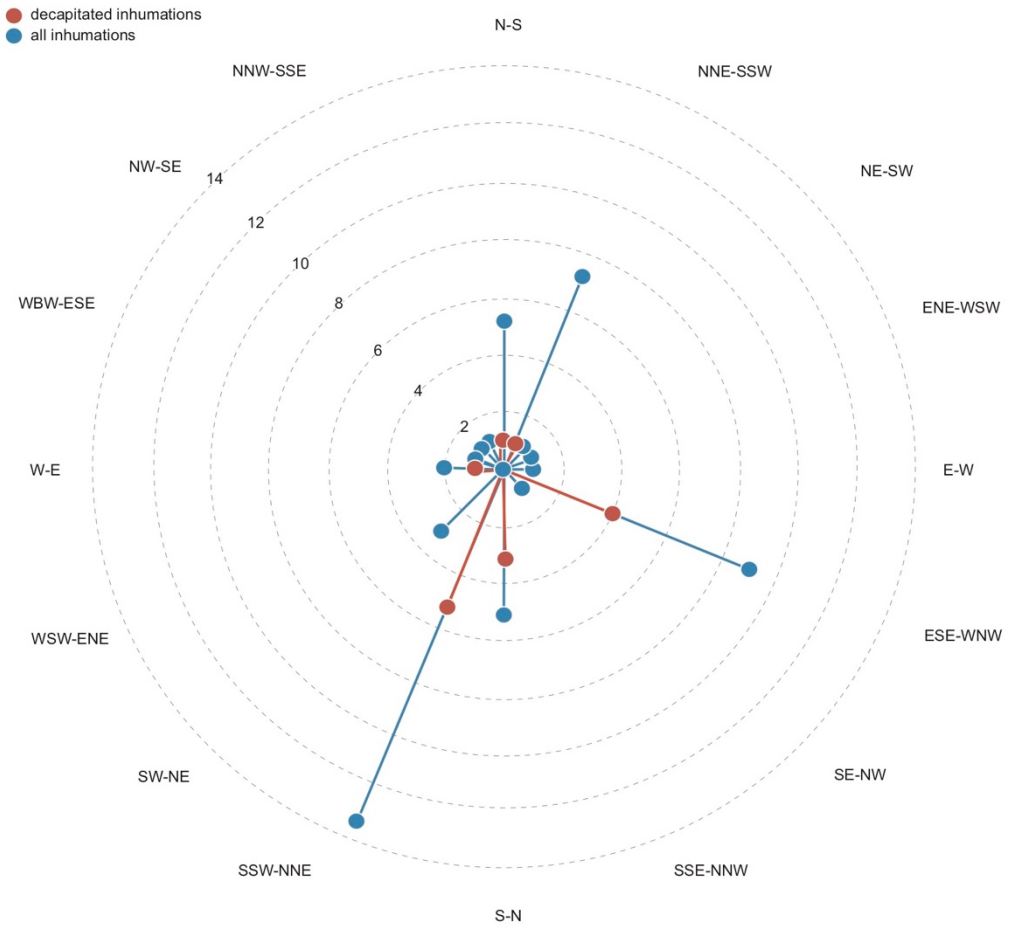


Figure S5.1 Orientation of the Late Roman inhumation burials

aligned to the former at thirteen inhumations, followed by nine inhumations aligned to the latter. Figure S5.1. illustrates all grave orientations, with the position of the head indicated.

Head orientation

The most frequent orientation of the decapitated head was face down at seven individuals (five male, two female). At three individuals each, the next common position was the placement on the left side (two male, one indeterminate) and vertically (all female). Two heads were placed upside down (one male, one female), one on its right side (female) and one head was missing altogether.

DEMOGRAPHY

Age and sex: all burials

Where the sex could be determined, there were fifteen females and twenty-one males; the remaining sixteen individuals were assessed for sex but lacked sufficient diagnostic criteria.

Table T4.4 shows the breakdown of age categories, broken down by sex.

age categories	*approx. ages*	*female*	*male*	*indet.*	*total*
infant	0–4	1	1	0	2
juvenile	5–12	0	1	0	1
sub-adult	13–18	0	0	1	1
total: all sub-adults and children		**1**	**2**	**1**	**4**
adult?	18+	0	0	1	1
adult	18+	0	1	9	10
young adult	18–25	1	2	3	6
middle adult	26–45	4	2	1	7
young middle adult	26–35	2	3	1	6
old middle adult	36–45	2	5	0	7
subtotal: all middle adults	*26–45*	*8*	*11*	*2*	*21*
mature adult	45+	5	6	0	11
total: all adults		**14**	**19**	**15**	**48**

Table T5.4: age category and sex of inhumations

Age and sex: decapitated individuals

Only adults were decapitated at Knobb's farm. Table T5.5 shows the breakdown by age, sex and burial position.

age categories	*approx. ages*	*female*	*male*	*total*
Supine burials				
adult	18+	0	1	1
young adult	18–25	0	0	0
middle adult	26–45	0	1	1
young middle adult	26–35	1	3	4
old middle adult	36–45	1	3	4
subtotal: all middle adults	*26–45*	*2*	*7*	*9*
mature adult	45+	1	0	1
total: supine burials	**18+**	**3**	**8**	**11**
Prone burials				
adult	18+	0	0	0
young adult	18–25	1	0	1
middle adult	26–45	0	0	0
young middle adult	26–35	0	0	0
old middle adult	36–45	2	0	2
subtotal: all middle adults	*26–45*	*2*	*0*	*2*
mature adult	45+	2	1	3
total: prone burials	**18+**	**5**	**1**	**6**

Table T5.5: age category and sex of decapitated inhumations

HEALTH IN ROMAN THOUGHT

The health status of this assemblage reflects this community's environment and the impact it had on the individual. The general picture for these individuals portrays an active lifestyle, though marred by dietary disorders and poor oral hygiene. However, many of the conditions presented osteologically can still be evidenced in modern populations, particularly in respect to interpersonal violence, oral health and extreme physical activities. This tends to imply This imply that they were in relatively good health with strong immune systems that were able to mitigate, for a period, the detrimental effects of their condition(s).

During the Romano-British period, incidences of poor health (such as trauma resulting from interpersonal violence and dental disease) appear to increase upon British Iron Age instances[81]. Knobb's Farm is concordant with this escalation. One striking example of Iron Age interpersonal violence in Cambridgeshire comes from Trumpington Meadows where a male individual survived significant sword trauma to the front of the head[82].

Aside from the cross-era statistical increase in poor health, there was also an increase in the documented knowledge of anatomy, health (including nutrition), disease and treatment. This is

[81] Based on studies conducted by Roberts and Cox 2003 and Rohnbogner in Smith *et al.* 2018.
[82] Dodwell & Neil 2018.

evidenced by the writings of Greek and Roman physicians and encyclopaedists such as Hippocrates, Soranus of Ephesus (*Gynaecology*), Galen (*Method of Medicine*), Aulus Cornelius Celsus (*De Medicina*) and Pliny (*Pharmacopoeia*). Whether this knowledge reached Britain in any meaningful way is unknown. However, Rome's efficient military health care system meant that all Roman armies were accompanied by doctors, known as *milites medici* who tended to wounds and looked after the general health of the soldiers. Some of these soldiers (*immunes*) were also given first aid training[83]. The presence of these personnel in Britain is evidenced by the Stanway instrumentarium[84].

To hypothesise a context under which ill-health in Roman Britain was treated, we must first acknowledge that modern attitudes towards health and disease developed from the revolution of germ theory. This cannot be applied to the cultural cosmology of this past community. Despite the above medical treatises, most Roman practitioners learnt their trade through apprenticeship, where their skill was more akin to a craftsman[85]. Those Roman doctors seeking greater understanding of ill health (beyond the empirical Hippocratic rationale) turned to the theoretical framework of understanding dreams[86] and the balance of 'Humours'[87] (an expansion of a miasmatic theory). Any imbalance of these Humours was treated with herbs[88]. One cannot dismiss supernatural acquiescence to ill health in Romano-British society, but if any of this Roman medical knowledge filtered into Romano-British culture we could expect to see greater survival rates.

TRAUMA

In total, fourteen out of the fifty-two individuals had some form of skeletal trauma. The locations could be divided broadly into:

- four individuals with cranial trauma
- four with axial trauma
- eight with appendicular trauma.

Demographically, trauma was split over six females and eight males. Half of the individuals with trauma were in the mature age bracket.

Decapitation and interpersonal violence

Instances of decapitation appear to increase in the later Romano-British period[89] over earlier prevalence. The seventeen decapitated individuals support this observation of an increasing tendency.

Whatever the agent of decapitation, the poor preservation and high fragmentation of this assemblage appears to have mostly precluded salient marks relating to this activity. However, two females bore direct, and/or inferred evidence of traumatic injuries indicated by the action of a heavy blade. For a full description and illustration, see F.164 [Sk.320] and F.165 [Sk.324] in the catalogue below.

83 Cilliers & Retief 2006.
84 Jackson 1997.
85 Horstmanshoff 1990.
86 Holowchak 2001.
87 Horstmanshoff 1990.
88 Van Tellingen 2007.
89 Rohnbogner in Smith *et al.* 2018: 228; Harward *et al.* 2015: 94.

Osteologically, peri-mortem decapitation trauma is characterised by heavy bladed chop marks defined by clean edges with a broad, linear appearance; these marks, at times have striations caused by blades with defects on the cutting edge[90]. These marks are variably located on the occipital and cranial base, the mandible, mastoid process, cervical vertebrae, claviculae and the superior part of the scapulae and manubrium[91]. Post-mortem marks of decapitation are generally defined by multiple incised cuts, which relate to the removal of soft tissue; this permits disarticulation of the cranium from the post-cranial skeleton[92].

F.164 had the most convincing evidence of execution wherein the energy of a heavy blade sliced through the left mandible and two cervical vertebrae in oblique alignment. F.165 bore evidence of a heavy blade mark on the right clavicle. The angle of this mark suggests a steep oblique action directed from a left superior posterolateral direction. This would have certainly removed the head. However, that the mark terminated against the clavicle suggests the energy of the blade had dissipated at this point.

More disquieting are the multiple heavy bladed cut marks over the posterior and right side of the head of the male in F.943 [Sk.1343] and the right side of the head of the female in F.1097 [Sk.1883] (both detailed below in the catalogue). Neither had direct evidence for execution but these would have undoubtedly been brutal acts.

There were no obvious signs of defensive wounds to the upper limbs or hands of F.943, which suggests that his head was deliberately targeted, designed to quickly disorientate and incapacitate this male, in order to prevent retaliation[93]. The absence of any inflammatory reaction or osteogenic healing suggests this assault occurred peri-mortem.

F.1097 is the most extraordinary example of multiple blade traumata in this assemblage, with both heavy chop mark to the skull and fine cut marks to the post cranial skeleton. A glancing blow through the right mastoid process and suprameatal crest released two bone fragments that survived in situ; these were refitted to demonstrate the travel of a sharp, heavy blade from a posterosuperior direction, which terminated in the anterior aspect of the right mandibular notch. The angle of this chop mark suggests an action to remove the right ear of this individual. The absence of any inflammatory reaction or osteogenic healing suggests this occurred peri-mortem. The superior cut mark seen over the condylar neck of the right mandible can be characterised as a ‘V’ shaped kerf with steep walls; along with the shallower, inferior parallel mark, they appear to directly target the release of the temporomandibular ligament.

The fine postcranial cut marks (assessed under x10 magnification) were located over the superoposterior border of the left clavicle, the posterior surfaces of the left and right humeri the superoanterior surfaces of both radii and the posterior surface of the left femur (See Figure S6.7).

Although the magnification was enough to determine the location and general character of the incisions, a taphonomic process cannot be completely ruled out. However, experiments conclude that natural taphonomic agencies cause bone to develop a polish in abrasive sediments, with randomly oriented striations[94]. These marks were consistently parallel and orientated in the same direction, which supports a human derived agency.

It is reasonable to suggest a de-fleshing practice for these cut marks, but the motivation remains unknown. It is also complicated by a modern sensibility of acceptable funerary practice. There are examples of de-fleshed skulls in Roman contexts which have been interpreted for the purpose of

90 Tucker 2013: 217.
91 Tucker 2013: 222.
92 Tucker 2013: 229.
93 Powers 2005.
94 Olsen and Shipman 1988.

display. However, this can be reasonably ruled out in the case of Knobb's Farm as there was no evidence for any form of attachment such as perforations made by nails[95]. Looking at other periods and cultures, members of the Babenberg dynasty used de-fleshing in their funeral practices to reflect high status and preferential treatment[96].

Fractures

Four individuals showed evidence of healed fractures. Two individuals (F.165 and F.1099) had a broken finger, one individual with degeneration in the neck (F.944), and one individual with a fracture to the front of the head, (F.941).

F.941 [Sk.1337]. This female individual suffered a transverse fracture to the frontal sinus. Sclerotic bone formation within the sinus possibly indicated that the fracture was comminuted. These fractures are usually caused by anterior blunt force trauma, such as interpersonal violence, sports injuries, falls, and falling objects[97]. Although clinically uncommon[98], it can have serious complications if left untreated such as chronic sinusitis[99] as in this case with the presentation of a sclerotic mass, likely the result of a prolonged mucoperiosteal reaction, possibly caused by drainage disruption leading to retained secretions that became infected[100]. This person likely suffered considerable pain and a feeling of pressure between the eyes.

F.944 [sk.1346] This male individual had a possible healed fracture resulting in or from spondylosis of a probable cervical vertebra fragment. The superior endplate and anterior surface were spiculated, with sclerosed areas around the latter. The right side of the anterior body was irregularly contoured. It appears that the body fractured bilaterally at the pedicle junction and was displaced posteriorly between the superior articular facets. The intertubercular lamina were bilaterally absent. Where this region of the neck is naturally lordotic, this condition may have made the individual appear as if they were standing to attention. Symptoms include stiffness, a decreased range of motion, headaches and pain in the neck and extremities.

F.165 [sk.324] and F.1099 [sk.1889] both had healed fractures in the right hand. Although fragmented, the former was a probable 'Y' pattern fracture at the proximal end of the right first metacarpal[101]. This resulted in malfusion, causing an adducted deformity. The latter was a healed neck fracture of a right proximal phalanx with an adducted displacement of around 10°. Clinically, the proximal phalanx is the most commonly fractured of all the phalanges[102].

Five individuals were noted for probable avulsion fractures. This injury occurs at the site of where a tendon or ligament attaches to a bone. When an avulsion occurs, the tendon or ligament pulls off a piece of the bone. The avulsions identified relate to a 'clay digger's' fracture to the neck (F.152), a fracture to an elbow (F.942 [Sk. 1352]), a probable torn tendon in the right femur (F.946), a possible dislocation of the right hip (F.949), and trauma to the right femur (F.951).

F.152 [Sk.259] had an ununited fracture of a cervical spinous process from the lamina. Interspinous fusion was noted with the inferior vertebral counterpart, which can be considered as an adaptation by the body to limit translocation and instability. Hall referred to this as a 'clay-shoveler's' fracture[103], due to the high incidence of trauma resulting from clay sticking to labourers' shovels during the throwing motion. The biomechanical action requires the upward rotation of the scapula, which protracts the rhomboid minor muscle. This muscle originates at the spines of the

95 Boylston *et al.* 2000.
96 Crerar 2016.
97 Metzinger & Metzinger 2009.
98 Schultz *et al.* 2017.
99 Kim & Kim 2017.
100 Banica *et al.* 2013.
101 Haughton *et al.* 2012.
102 Haughton *et al.* 2012.
103 Hall 1940.

seventh cervical and first thoracic vertebrae and inserts at medial border of the scapula at the root of the spine[104]. Differentially, there are several causative mechanisms: a direct blow, indirect (such as the clay-shoveler's, which is the most likely in this instance) and stress-related, resulting from repetitive (normal) stress in abnormal bone[105]. Roberts & Cox[106] mention that this fracture first appears in the Roman period, which may indicate a shift in economic resourcing. The modern clinical prevalence in adults often results in those who practice sports that involve torsion movements of the upper spine[107]. The typical clinical presentation is abrupt, knife-sharp pain located around or between the shoulder blades occasionally accompanied by an audible crack.

F.942 [Sk.1352] had a partially healed avulsion fracture of the right elbow—specifically the lateral epicondyle of the humerus, which was likely a result from a fall onto an outstretched hand[108]. There were areas of non-union, suggesting that other avulsed fragments did not heal. Clinically, symptoms include severe pain and a sensation of instability[109].

F.946 [Sk.1354] had a probable sprain or avulsion of a hamstring muscle, with subsequent major enthesophyte formation and small areas of sclerosis of the short head origin of the biceps femoris. This is specifically located toward the top of the lateral supracondylar ridge[110]. The biceps femoris group is a major flexor of the lower leg. Clinically, avulsion injures mostly occur at the proximal end of the longhead counterpart[111], or at the distal insertions at the proximal heads of the tibia and fibula. The general cause of these injuries is due to hyperextension, which is painful, causing loss of function and mobility. However, the author cannot find specific clinical reference to a biceps femoris origin injury, so it is reasoned that valgus hyperextension was the likely cause[112].

F.949 [Sk.1363] had a healed, partially displaced avulsion fracture centred around the fovea capitis of the right femoral head, involving the ligamentum teres. Differentially, this may result from extreme external rotation of the femur, dislocation or dysplasia of the hip[113]. However, it likely that it resulted from repetitive hyperextension (from activities such as running) which would have placed an inordinate amount of stress on the ligament with subsequent failure[114].

F.951 [Sk.1369] had a probable adductor brevis/ longus avulsion injury. This was defined by an area of remodelling medially adjacent to the proximal apex of the linea aspera of the right femur. The area of healing included the outline of a resorbed cortical fragment, 25.92mm long and 9.06mm wide. While strains are common, avulsions at the insertion for this muscle are rare[115]. The modern clinical prevalence occurs in male athletes who undertake sports that involve rapid acceleration, pivoting and twisting activities[116]. Without radiography, the aetiology of the unusual proximal shaft geometry of the right femur is uncertain; it may relate to a possible healed long oblique fracture directed in a superomedial-inferolateral direction.

Other trauma

One other skeleton showed evidence of skeletal trauma: a cyst in the hip of F.1098.

A male individual (F.1098, [1886]) had a large posterosuperior supraacetabular cyst within the left pelvis. It was associated with smaller round and capillary cystic lesions that occurred on the lunate surface and supra-acetabular groove, ranging from 1.4 to 3.8mm diameter. The main cyst had a fluid capacity of 2.5ml. Cysts in this region can

104 Stone and Stone 1990.
105 Feldman & Astri 2001.
106 Roberts & Cox 2003: 390.
107 Posthuma de Boer *et al.* 2016.
108 Valencia *et al.* 2013.
109 Kobayashi *et al.* 2000.
110 Stone & Stone 1990.
111 See Domb *et al.* 2013; Lempainen *et al.* 2006.
112 See Valente *et al*. 2013.
113 Cerezal *et al.* 2010; O'Donnell *et al.* 2014
114 Guanche & Sikka 2005
115 Welton *et al.* 2019
116 Bharam *et al.* 2018

result from several disorders, such as trauma, avascular necrosis of the femoral head, osteoarthritis and dysplasia[117]. The acetabulum of this individual otherwise appeared normal with no indication of dysplasia, or osteoarthritis. However, the left femoral head of this individual did have a slight 'type B' cam impingement (discussed below). The likely mechanism of this cyst was a tear or separation of the labrum (a fibrocartilagenous extension of the acetabular rim)[118]. This was likely caused by an acute or chronic injury resulting from vigorous hip flexion and extension. Clinically, this is seen in relation to a variety of sports injuries, such as sprinting[119]. Synonymously, the mechanism of cyst development results from a loss of congruity between the femoral head and acetabulum, which causes increased intraarticular pressure[120]. This increased pressure forces synovial fluid through the tear via a one-way valve mechanism[121]. The acetabular labrum contains nerve endings, where clinically there is a presentation of acute hip and groin pain[122].

SKELETAL PATHOLOGY

Metabolic and endocrine disorders

Porotic hyperostosis was seen in nine individuals (F.165, F.166, F.941, F.942, F.950, F.961, F.1095, F.1096, F.1097) characterised by a porous or 'orange peel' texture to the surface of the cranium. In six individuals, the frontal bone was affected; three also had the condition on their parietal bones. Two individuals were affected on their parietal bones only, and one on their occipital bone. The demographic split was three females and six males with the greatest incidence in the mature age category (five individuals). The consensus on this condition relates to anaemia, though the aetiology is still debated. In response to a persistent anaemic state, the body steps up its production of red blood cells to the point where all red blood cell production centres are activated, which results in an expansion of the cranial diploë[123]. This manifestation may relate to parasitic infections borne from 'unsanitary' situations, which may in turn have led to persistent dysbiotic states. Generally, these parasites influence the absorption, transportation, and metabolism of iron by causing direct blood loss and in some cases consuming large amounts of vitamin B12 before it is absorbed by the gut[124]. The term 'unsanitary' however is contextual to help us understand the situational environment. It is likely that those affected were unaware that their food was not completely washed or cooked, let alone the knowledge that hand-washing could reduce instances of ill health.

Cribra orbitalia was noted in five individuals (F.166, F.950, F.941, F.945, F.1096) of which four had it in both orbits. Demographically, this condition was split over four females and one male. This condition has traditionally been synonymously interpreted with porotic hyperostosis due to the similarity in skeletal manifestation. Although an expression of anaemia, its cause is contested[125]—particularly in cases that present without the associated diploic expansion. This case was seen in two female individuals F. 939 [Sk.1330] and F.945 [Sk.1350]. Differentially, this could be attributed to, for example, endocrine disorders (particularly of the pituitary), chronic renal failure, or a hereditary condition such as thalassemia (discussed below).

[117] Yukata 2015; Mays 2005
[118] Mays 2005
[119] Ikeda *et al.* 2018
[120] Magee & Hinson 2000
[121] Yukata 2015
[122] Magee & Hinson 2000; Yukata 2015
[123] Larsen 2015: 31.
[124] See Walker *et al.* 2009; Mitchell 2017; Rothschild 2012; Darlan *et al.* 2018.
[125] Rivera & Lahr 2017.

Two probable/possible females (F.700 [Sk.701] and F.1095 [Sk.1910]) were noted for thick cranial tables (11.4mm and 9.6mm respectively). Diploic expansion was noted with porosity ranging between 0.5–2mm diameter. This could possibly be attributed to thalassemia. This is a heritable condition where genetic mutations cause the formation of red blood cells with reduced haemoglobin content[126].

One old middle adult female (F.1095 [Sk.1910]) was noted for the hyperostotic extracranial extension of possible frontal bone fragments. It was porotic and sclerotic, with the porosity coalescing in places ranging from 0.5–2mm diameter. The outer table was seen preserved in some fracture margins. Due to the small size of these fragments, a definitive attribution was not possible. However, in clinical cases, extracranial hyperostosis has been associated with adjacently occurring meningiomas[127]. Differentially, the external appearance of the outer table may be attributed to a taphonomic agency. If so, the extension may be due to hyperostosis frontalis interna (a condition characterised by a benign overgrowth of the inner table). Although there was no obvious characteristic of this condition (i.e. lobulation), it is seen most commonly in older females[128] with associated diabetes[129] and obesity.

Two individuals (F.164 [Sk.320] and F.944 [Sk.1346]) had slight microporosity over the palatine process, which is indicative of either minor trauma or a scorbutic episode (i.e. a deficiency in vitamin C). Both conditions result in bleeding and the formation of vascularised bone[130].

Although forty of the fifty-one individuals had cranial fragments, many were diminutively represented and taphonomically altered, which hindered the osteological analysis. It is therefore likely that the anaemic and dietary conditions discussed here may been under-identified. However, in a crude sense, we can interpret the above incidences as a possible indicators of socioeconomic pressure and stratification where differences between urban and rural communities resulted in greater dietary variability in the former location[131].

Inflammation

The old mid adult male in F.949 had evidence for a possible treponemal infection.

F.949 [Sk.1363] had fragments of sternal body and manubrium which were seen to be sclerosed, woven and spiculated with an absence of internal trabecular structure. Differentially, it is not osteomyelitis as there was an absence of necrosis, cloacae and evidence for sequestra[132]. It presents as advanced periostitis, which may be related to a treponemal infection such as syphilis (which commonly affects the sternum[133]). Although this disease most commonly presents in the skull, there were no signs of pathology, though its poor preservation may have precluded such indications.

Osteomata

Four individuals had button lesions (F.165, F.943, F.944, and F.949). Demographically this is represented by one female and three males in the middle to mature age bracket.

F.165 [Sk.324] had an endocranial lesion 9mm in diameter, approximately 22mm from left of the coronal suture adjacent to the midline of the frontal bone.

126 Lewis 2012.
127 Akutsu *et al.* 2004; Terstegge *et al.* 1994.
128 Western & Bekvalac 2017.
129 Andrews 1942.
130 Larsen 2015: 39.
131 Rohnbogner in Smith *et al.* 2018: 282.
132 Santos and Suby 2015.
133 Rogers and Waldron 1989.

F.944 [1346] had an endocranial lozenge-shaped lesion on the frontal bone. Measuring 9.18mm long and 4.40mm wide, it was located left of the superior apex of the frontal crest.

F.943 [1343] had a small, semi-circumscribed proliferation of bone on the lingual side of the right mandible near the alveolar margin of the second molar. Possibly related to the periodontal disease in the same location, a hamartoma cannot be ruled out on macroscopic investigation. Although rare, there are clinical instances of larger osteomas[134].

F.949 [1363] had a button lesion on the posterior surface of the right rib angle. If one were to follow the above epidemiology, this would be characterized as an osteoid osteoma. Clinically, osteoid osteomas are usually accompanied by nocturnal pain[135].

Osteomata, osteoid osteomata, and hamartomata are all benign tumours. They have a similar osteological presentation and can be hard to differentiate macroscopically. An osteoma, (sometimes referred to as a 'button osteoma' or 'button lesion' in paleopathological literature) is a slow-growing primary tumour, normally located on the ectocranial surface; it rarely presents on the inner table[136]. Multiple osteomata are not common where such cases are associated with the autosomal disorder 'Gardner syndrome'[137]. Typically, less than 10mm in diameter, these appear as well circumscribed 'ivory like' lamellar bone[138]. Osteoid osteomas are like button osteomata but are epidemiologically different; they are relatively common[139], occur post cranially[140], and variously described as being less than 20 or 15mm diameter. Hamartomas are characterized by a focal malformation of disorganized tissue[141], and generally of the same dimension as an osteoid osteoma, (though up to 60mm in soft tissues). They represent spontaneous growth disturbances within a circumscribed area which creates a local elevation, capped with lamellated bone[142]. To complicate the epidemiology of all three, Eshed *et al.*[143] suggest that button osteomata are a misnomer. Based on histological differentiation, they suggest 'button hamartoma'. However, in leiu of histology Giuffra *et al.*[144] refer to these tumours as button lesions.

Impingements

F.166 [327] and F.1098 [1886] were noted for plaque form defects on the anterior side of the femoral necks, which are concordant with femoroacetabular cam impingements (FAI). FAI are a pathomechanical alteration of the hip[145] and in this instance defined as type B cam impingements[146]. Both were male within the middle to mature age bracket. The condition has a variable aetiology. It is characterised as a contour abnormality at the femoral head-neck junction and has been attributed to an acquired developmental deformity[147] such as supraphysiologic motion or high impact trauma[148]. Both may play a role in hip instability[149], and can develop into osteoarthritis. Clinically, this cam impingement is more common in men[150].

134 Illustrated by Agrawal *et al.* 2015 and Ragupathy *et al.* 2015.
135 Greenspan 1993.
136 Aufderheide and Rodriguez-Martin 1998: 375.
137 Giuffra *et al.* 2019.
138 Aufderheide and Rodriguez-Martin 1998: 375.
139 Aufderheide and Rodriguez-Martin 1998: 376.
140 Cąkar *et al.* 2015.
141 Aufderheide & Rodriguez-Martin 1998: 267
142 Eshed *et al.* 2002
143 Eshed *et al.* 2002
144 Giuffra et al. 2019
145 Leunig *et al.* 2009
146 After Hack *et al.* 2010
147 Nötzli *et al.* 2002
148 Leunig *et al.* 2009
149 Court-Brown *et al.* 2015:1984
150 Chaudhry & Ayeni 2014

F.961 [1647] was noted for nodular and spiculated bone on the inferior articular surface of the left tibia, along the lateral facing margin of the medial malleolus. This may relate to a medial impingement syndrome of the ankle, which is clinically seen in the athletic population[151].

AGE-RELATED DEGENERATION

Eighteen individuals had manifestations of age-progressive skeletal disorders, which were largely attributed to the degeneration of joints. Figure S5.2 shows the age distribution of the various conditions identified.

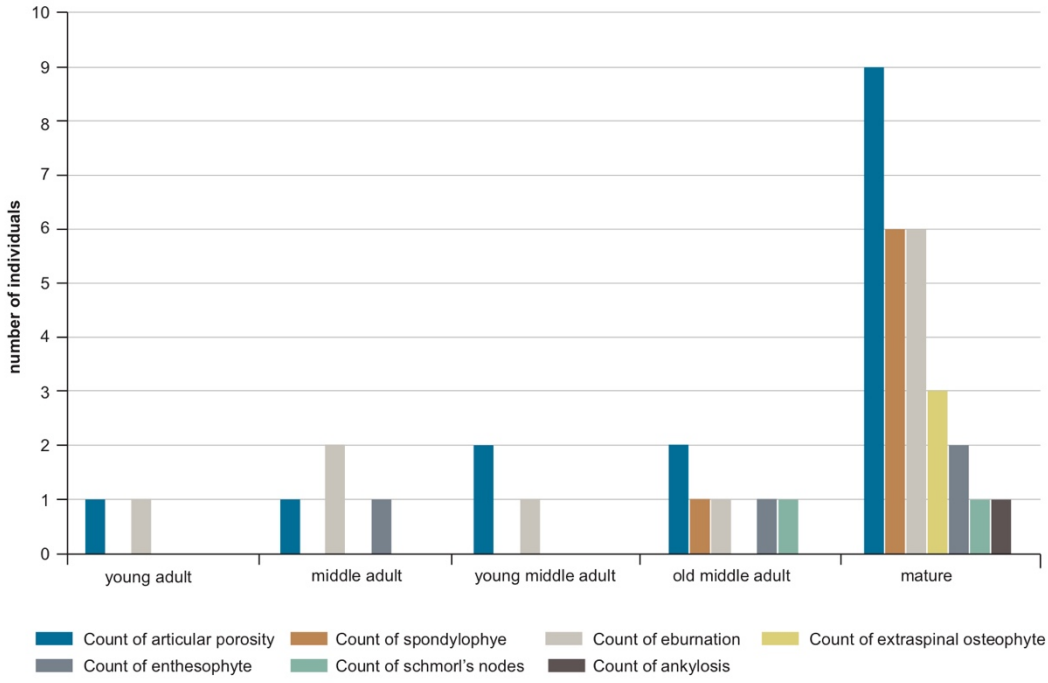


Figure S5.2 Graph of age-related degenerative conditions

Articular porosities

Porosity on subchondral bone was noted on fifteen individuals (F.164, F.165, F.166, F.509, F.941, F.943, F.942, F.943, F.944, F.946, F.959, F.1096, F.1097, F.1098, F.1099). Four females and eight males were affected. Demographically, the Knobb's Farm assemblage sees an increasing incidence of porosity at diarthrodial regions where the number of mature adults affected (seven) exceeds the sum of individuals within the preceding age brackets (five).

[151] Manoli 2010

As a marker of joint degeneration, and specifically osteoarthritis, the presence of porosity on subchondral bone has been debated for its relationship and significance[152]. This is particularly the case where the skeleton or assemblage has been subject to taphonomic alteration. However, it has been consistently recorded in conjunction with degenerative joint disease in the paleopathological literature. Clinically, the appearance of porosity is considered the first feature of osteoarthritis[153] and in general is the most frequent feature in young adults[154].

Spondylophytes

Spondylophytes were observed in seven individuals (F.166, F.941, F.944, F.946, F.959, F.1097 and F.1099). Three females and four males were affected. Demographically, there is an age-related bias in the skeletons from Knobb's Farm: the number of mature adults affected (six) exceeds the sum of individuals within the preceding age brackets (one).

Spondylophytes are osteophytes specific the vertebral column and are considered to be a general indicator of increased age[155]. However, it is unclear whether formation serves to stabilize the joint as part of a normal remodelling process or develop and contribute to the pathology of joint dysfunction[156]. Biologically, it is likely that mechanical stimuli (such as abnormal loading) are transcribed to biochemical factors (such as the hormone/cytokine, leptin), which initiates the process of chondrogenesis[157] i.e. the forerunner of bone formation.

Eburnation

Eburnation was noted in ten individuals (F.165 [Sk.323 and Sk.324], F.166, F.509, F.935 [Sk.1314], F.949, F.941, F.942, F.946, F.1096)

Eburnation is osteologically considered to be pathognomonic of osteoarthritis[158]. It is defined as an area of smooth polished bone at diarthrodial regions and occurs subsequent to cartilage destruction[159]. The implication is pain, stiffness and reduced movement in the affected joints[160].

These individuals had osteoarthritic changes affecting the elbow, wrists, back and hips. Demographically, there is an age-related bias: the number of mature adults affected (six) exceeds the sum of individuals within the preceding age brackets (three). The condition occurred in six females, four males, and one skeleton with indeterminate sex. Three individuals were affected in both the spinal and appendicular joints, one in the spine, and seven in their appendicular joints. Four individuals were affected in their wrist: two on the left side, two on the right.

Enthesophytes

Enthesophytes were noted in five individuals, which affected the neck (F.165 Sk.323 and F.942 [Sk.1352]), elbow (F.941) hand (F.939) and knee (F.165 [Sk.324]). Qualitative scoring was based on the system outlined by Villotte[161] whereby expressions were differentiated as minor and major as well as asymmetry. There was a demographic split of two females and two males. Enthesophytes

[152] See Rothschild 1997
[153] Findlay & Kuliwaba 2016; Goldring & Goldring 2016
[154] Zampetti *et al.* 2016
[155] van der Kraan & van den Berg 2007
[156] Goldring & Goldring 2016
[157] van der Kraan & van den Berg 2007
[158] Roberts 2017; Waldron 2008: 28
[159] Findlay & Kuliwaba 2016
[160] Hunter & Felson 2006
[161] Villiotte 2013

can be considered as a musculoskeletal stress marker[162] where a bony expression occurs at tendon insertion sites. The expressions seen at the neck specifically relate to the alar ligament which is thought to contribute to stabilisation of the craniocervical junction[163]. In clinical cases, the expression in the elbow, (specifically termed a traction spur) may develop spontaneously, after a traumatic event, or in association with sport activities such as weight lifting[164]. The notable expressions in the left hand relate to the sheath attachments (specifically the A4 annular ligaments) that retain the ligament flexors (digitorum sublimis) on the intermediate phalanges. This can also be considered an enthesopathy[165]. Of the annular ligaments in the hand, the A4 are the most important in preventing a condition known as bowstringing when the proximal interphalangeal joint is flexed[166]. Whether a heritable or habitual trait, the expression may have enabled this individual to sustain a strong grasp or grip. The enthesophytes in the knee likely relates to a mechanically-induced overuse injury; commonly referred to as Jumper's knee, it affects the attachment of the patellar tendon to the lower pole of the patella[167]. Clinically, it is common in sports such as volleyball and basketball.

DEVELOPMENTAL DISORDERS AND OTHER SKELETAL TRAITS

Large, pneumatised air cells were noted on two individuals (F.946, F.948). This can sometimes be mistaken for cloacae. Those that occur in the mastoid are normal age-related developments[168]. It is worth pointing out however, that multiple factors influence the formation of these air cells, including humidification, the control of inspired air, and the moderation of air flow in respiration, the effect of which can add resonance during phonation[169].

F.164 [320] and F.166 [327] both have supernumerary lumbar vertebrae: a heritable condition with no clinical significance. (As the genetic evidence discussed in Section 14 shows, these two individuals belonged to matrilineal haplogroups H and H1i1 respectively, so it is possible that the extra lumbar vertebrae might be inherited on the mother's side. Unfortunately, due to poor preservation, no Y chromosomes could be determined for any of the skeletons at Knobb's Farm, so it is not possible to assess whether these two individuals may have shared a male relative or inherited the condition via the paternal line.)

F.1099 [1889] had an elongated temporal styloid process. This can result from a natural elongation of the styloid itself or from ossification of the stylohyoid ligament[170]. The normal range of the styloid is 20-30mm and is considered elongated when greater than this[171]. Clinically known as Eagle's syndrome when symptomatic, there are a wide variety of symptoms. These include cervical neck pain, throat pain, a foreign body sensation in throat, earache, headache, pain in the cervicofacial region, pain on swallowing and pain on changing head position[172]—although 50% of cases are asymptomatic[173]. The exact cause of the elongated styloid process is not clear; local

[162] Villotte *et al.* 2010
[163] Tubbs *et al.* 2011
[164] Alvi *et al.* 2014
[165] Cashmore & Zakrzewski 2013
[166] Schweizer 2001
[167] Benjamin *et al.* 2002
[168] Schillinger 2014
[169] Hindi *et al.* 2014
[170] Mann & Hunt 2005: 45–46
[171] Moffat *et al.* 1977
[172] Müderris *et al.* 2014
[173] Mann & Hunt 2005: 45–46

chronic irritations, endocrine disorders in females at menopause and mechanical stress or trauma during development could all result in calcification[174].

ORAL PATHOLOGY

Thirty-four individuals in the Knobb's Farm assemblage had teeth and/or fragments of mandible/maxilla.

Staining

Mid orangey, brown-red staining was noted on the labial, buccal, and lingual surfaces of six individuals (F.152, F.164 [Sk.319], F.166, F.943, F.945 and F.1097). There was a demographic split of three females and three males, ranging from one juvenile, two middle adults and three mature adults. This staining may be attributed to chromogenic bacteria such as *Serratia marcescens* and *Flavobacterium*. These bacteria are associated with poor oral hygiene, especially in children[175]. Differentially, this could also be attributed to localised taphonomic agent.

Antemortem tooth loss

Antemortem tooth loss was noted in middle and mature adults of sixteen individuals (F.163, F.164 [Sk.320], F.165 [324], F.166, F.509, F.939, F.949, F.951, F.958, F.959, F.961, F.942 [Sk.1338 and Sk.1352], F.943, F.944, F.946). Tooth loss was split over nine females and seven males. Although an age-related phenomenon, it is clinically associated with poor oral hygiene subsequent to advanced carious lesions, periodontal disease and trauma.

Dental calculus

Of the thirty-four individuals with teeth present, fourteen were recorded with dental calculus (F.164 [Sk.320], F.165 [Sk.324], F.166, F.509, F.700, F.931, F.941, F.943, F.949, F.950, F.953, F.958, F.963, F.1096). All fourteen presented with labial and/or buccal calculus; six with a lingual presence; and one with occlusal formation. Demographically, this was split over six females and eight males. there was also an increasing prevalence with age, with calculus found on one young adult, seven middle adults (two young, four old), and five mature adults. (The last adult with dental calculus could not be assigned to a specific age category). Where calculus is seen in archaeological populations, the general inference (in lieu of bimolecular analysis) is that they did not practice regular oral hygiene.

Dental calculus is a mineralized bacterial plaque that can form within a matter of days[176]. Its formation is dependent on a multitude of factors such as the consumption of alkaline foods and sugars, and individual variation such as their bacterial load genetic variation in the salivary content and the presence of disease[177]. If the calculus is left to form, the implication is an increased susceptibility to oral disease, for example gingivitis[178], and periodontal disease[179].

[174] Gokce *et al.* 2008
[175] Manuel *et al.* 2010; Mortazavi *et al.* 2014
[176] Lieverse 1999
[177] Akcali & Lang 2017
[178] Akcali & Lang 2017
[179] Timmerman & Van der Weijden 2006

Carious lesions

Seventeen out of the thirty-four individuals with teeth had caries (F.164 [Sk.319], F.165, F.166, F.509, F.700, F.941, F.942 [Sk.1338 and Sk.1352], F.943, F.944, F.945, F.946, F.950, F.951, F.961, F.1095, F.1096). Demographically, this was split over ten females and seven males. The most frequent location was interproximal (twelve individuals) followed by cervical (six individuals), occlusal (three individuals), and root (two individuals). Five individuals had large carious instances where the dimension of the lesion spanned multiple surfaces. There was an increasing prevalence with age, with caries noted in one young adult, nine middle adults (three young, three old), and seven mature adults. (The remaining adults with caries could not be assigned to a specific age category).

Caries result from the localised destruction of dental enamel by the acidic by-products of bacterial fermentation of dietary carbohydrates. Untreated caries in permanent teeth is the most prevalent modern clinical condition in humans, affecting about 35% of the world population[180, 181].

It is known that there is an increase in caries in British populations during the Roman period[182].The frequency of caries in ancient populations have been used in previous studies as a proxy measure of carbohydrate consumption; the inference being that there was either a transition away from a protein dominant diet and/or an increase of cultivated crops added to the diet[183]. It is worth noting that consuming milk at the same time as carbohydrate-rich foods buffers the cariogenic effect on teeth. Properties in milk proteins are antibacterial[184] and prevent demineralization of the enamel[185].

Abscesses

Acute dental abscesses were noted in five individuals (F.164 [Sk.319], F.164 [Sk.320], F.166, F.945 and F.1097). Four had multiple instances and one had a single instance. Demographically, abscesses were present in four females (three mature and one young middle adult) and one mature male.

Acute dental abscesses occur secondarily to dental caries, trauma[186], and possibly as a result of a poorly-extracted tooth. All the abscesses identified in the Knobb's Farm skeletons were periapical and are clinically the most common form of dental infection[187]. This pathology results from a persistent presence of infective material within the root and around the apex of a tooth. Tissue liquefaction and an accumulation of pus would have caused pain and tenderness of the tooth to pressure. Before the introduction of antibiotics, dental abscesses were a leading cause of mortality[188].

Periodontal disease

Two individuals (one male and one female) were noted for moderate periodontal disease (F.943 and F.945). This condition is caused by a variety of pathogenic agents that are found in oral biofilms, such as dental plaque (a precursor to calculus). The condition can result in inflammation and destruction of gum tissue (gingiva), the periodontal ligament, root cementum, and alveolar

[180] Kassebaum *et al.* 2015
[181] Selwitz *et al.* 2007
[182] Bonsall & Pickard 2015
[183] Hillson 2008: 313
[184] Bowen & Pearson 1993
[185] Aimutis 2004
[186] Robertson & Smith 2009
[187] Siqueira & Rôças 2013
[188] Clarke 1999; Robertson & Smith 2009

bone[189]. The presentation in both cases at Knobb's Farm were a porotic alteration of the alveolar margin.

Tooth trauma

Two individuals (one female F.941 and one male F.931) had a mechanical occlusal trauma to the crown of a tooth. In both instances, they were characterised by a chip to the enamel with worn fracture margins.

The lower third left molar of female F.164 [320] is dilacerated where the roots are abruptly angled distally. This developmental anomaly has multiple causes, but it is generally accepted that mechanical trauma to the deciduous tooth displaces the permanent tooth germ in such a way that thereafter it forms at an angle[190].

With a similar aetiology, there were two female individuals (F.946 and F.958) with a vertical hypoplastic plane form defect. This possibly resulted from a trauma to the tooth's deciduous predecessor.

Enamel hypoplasia

Enamel hypoplasia was noted in twelve individuals (F.954, F.700, F.930, F.931, F.935, F.949, F.954, F.958, F.942, F.943, F.946, F.1095), with the majority being a furrow form defect. The demographic was split over four females, five males and three indeterminately sexed individuals. The average age for the development of these defects was 3.5 years, determined by the macroscopic estimation of its decile location[191].

This dental pathology manifests when the individual is exposed to physiological stress in early life whilst tooth crowns are developing[192]. There is generally a greater prevalence in men than women[193].

The progenitor of this physiological stress is far from certain in the literature. These defects have in the past been tantalizingly attributed to the onset of weaning. The idea is that the child experiences a chronic nutritional deficiency as they move onto solid foods[194]. The Greek physician Soranus of Ephesus detailed in his book *Gynecology* that:

> As soon as the infant takes cereal food readily and when the growth of the teeth assures the division and trituration of more solid things (which in the majority of cases takes place around the third or fourth half-year), one must stealthily and gradually take it off the breast and wean it by adding constantly to the amount of other food but diminishing the quantity of milk. For thus the infant will be weaned without harm, getting away little by little from the first habit[195].

Soranus's recommended weaning age would seem to neatly fit with the idea that dental hypoplasia may be related to weaning. However, the epidemiology is more complex: other factors such as fever, disease, the mother's health and other environmental factors can all contribute[196, 197], so weaning cannot be the sole reason. Rather, it is a set of circumstances, of which weaning is one, that give the infant a poor growth environment[198], so resulting in these enamel defects.

189 Dewitte & Bekvalac 2011
190 Jafarzadeh & Abbott 2007
191 Using charts outlined in Hillson 2014: 77–78.
192 Nelson 2018
193 Larsen 2015: 20
194 See Blakey *et al.* 1994; Lanphear 1990
195 Temkin 1956
196 Katzenberg *et al.* 1996
197 Lewis 2007: 106
198 Larsen 2015: 51

SECTION 6: INHUMATION BURIALS: CATALOGUE

By BENJAMIN NEIL

METHODS

Morphological sex estimation

Sex estimation targeted any available sexually dimorphic element, or part thereof, including the os coxae, skull and other elements with sex specific landmarks[199]. Confidence of sex estimation was defined by the following criteria:

Term	*Read as*	*Meaning*
Female	Female	Analyst has full confidence in the determination of sex for the remains
Male	Male	
(Female)	Probably Female	Analyst does not have full confidence in the determination, but feels the remains are probably the stated sex.
(Male)	Probably Male	
Female?	Possibly female	Analyst does not have confidence in the determination, but feels the available evidence hints at the stated sex.
Male?	Possibly male	
Indet.	sex indeterminate	The remains have been analysed, but are lacking sufficient diagnostic morphology for a determination of sex

Table T6.1: Categories of morphological sex estimation

Age at death estimation

Age at death estimation was preferably based on data sets derived from British populations using methods based on the degenerative changes of the clavicle[200], the pubic symphysis[201], the auricular surface[202], and the acetabulum[203]. This was supplemented with the degree of ectocranial suture closure[204]. General observations of articular degeneration were also recorded according to frequency and severity. Where applicable, the degree of dental development[205] and epiphyseal union[206] was recorded. Assessment of prenatal through to young adult development was based on methods and data outlined by Scheuer & Black[207] and Schaefer *et al.*[208]. Where multiple methodologies for one individual were used, the age estimations were calculated as a geometric mean (central tendency). Fragmented bone will often have ambiguous or unobtainable morphological information thus age can be indeterminate; however, where fragments exhibited developmental, degenerative and dimensional characteristics that were clearly not neonate, infant

[199] Methods used are outlined in Buikstra *et al.* 1994, Bruzek 2002, Norén *et al.* 2005, France 1998, and Rogers 1999.
[200] Falys & Prangle 2015
[201] Brooks & Suchey 1990
[202] Buckberry & Chamberlain 2002
[203] Calce, 2012
[204] Meindl & Lovejoy 1985
[205] Ubelaker 1999
[206] Buikstra *et al.* 1994
[207] Scheuer & Black 2000
[208] Schaefer *et al.* 2009

or juvenile, the inference was adult. Table T6.2 shows the age categories to which each individual was assigned.

Sub-Adult				*Adult*				
Neonate	Infant	Juvenile	Sub-adult	Adult	Young adult	Young Middle adult	Old Middle Adult	Mature adult
<6months	0–4	5–12	13–18	18+	18–25	26-–35	36–45	46+

Table T6.2: Categories of skeletal age estimation

Completeness, preservation, trauma and pathology
Any measurable bone element was recorded[209]. The overall completeness of a skeleton was calculated according to the percentage of elements present[210], in conjunction with weight data[211]. Stages of preservation followed the notation system developed by McKinley[212], shown in Table T6.3. The level of fragmentation was assessed using the specialist's own scoring system outlined in Table T6.4. Any further taphonomic alteration was recorded, including gnawing, discolouration, polish and human modification. The assemblage was studied for any traumatic and pathological change using paleo-pathological and modern clinical examples to inform on the health status of this sample. Bone element refitting was undertaken it investigate salient and inferred trauma, particularly in regard to decapitation. Temporary ribbons of 3M masking paper, (backed with easy release pressure-sensitive rubber adhesive) were used to achieve this. Where clear marks of trauma were evident, the bone was assessed using a LED UV loupe with a triplet ×10 20.5mm aplanatic achromatic lens. Stature was estimated using data compiled by Trotter[213].

Score	*Definition*
Grade 0	Surface morphology clearly visible with fresh appearance to bone and no modifications
Grade 1	Slight and patchy surface erosion
Grade 2	More extensive surface erosion than grade 1 with deeper surface penetration
Grade 3	Most of bone surface affected by some degree of erosion; general morphology maintained but detail of parts of surface masked by erosive action.
Grade 4	All of bone surface affected by erosive action; general profile maintained and depth of modification not uniform across whole surface.
Grade 5	Heavy erosion across whole surface, completely masking normal surface morphology, with some modification
Grade 5+	As grade 5 but with extensive penetrating erosion resulting in modification of profile

Table T6.3: Level of skeletal preservation.

[209] Using criteria set out in Buikstra *et al.* 1994
[210] Using data outlined by Rowbotham *et al.* 2017
[211] Using weight data outlined by Trotter & Hixon 1974 and Trotter & Peterson 1970
[212] McKinley 2004:16
[213] Trotter 1970

Score	*Definition*
Low	At least one of an axial, upper and lower appendicular element is complete
Medium	Excluding sullegic and trephic processes, all axial and appendicular elements are broken due to some taphonomic agency but at least one bone from each major anatomical zone can be refitted
High	None of the elements can be completely refitted. Fragment sizes mostly range between 10mm and 200mm with diagenetic processes impacting on bone survival
Very high	Fragment sizes mostly range between 10mm and 50mm. significant diagenetic activity is a likely factor for poor preservation.

Table T6.4: Level of skeletal fragmentation.

Dental recording
Teeth were catalogued using the Universal Notation System and recorded using the shorthand notations shown in Table T6.5.

p	*l*	*x*	*b*	*/*	*r*	*ne*	--
present in bone	loose	lost antemortem	broken post-mortem	lost post-mortem	root only	not erupted	bone not present
cl	*ca*	*sc*	*pa*	*hy*	*t*	*s*	
calculus	caries	sclerosed	periapical abscess	hypoplasia	trauma	staining	

Table T6.5: Dental recording notations.

INHUMATIONS IN CEMETERY 1

Plans of all burials in Cemetery 1 are shown in Figure S6.1.

Feature 152, Skeleton 259

Grave dimension: c.1.75 × c.07 × 0.31m
Burial position: N–S, extended supine, full articulation. The skull was rotated to face east. The right arm was flexed at the elbow to bring the hand over the left side of the stomach. The left arm was flexed at the elbow to bring the hand over the sacrum. Both legs were flexed slightly at the knee to point eastwards.
Grave goods: none
Age: juvenile, around 11 years' old
Morphological sex: probably male
Genetic sex: not assigned
Mitochondrial DNA haplogroup: no data
Percentage of skeleton present: 48%
Preservation grade: variable 3–4
Level of fragmentation: 3
Taphonomy: bone is friable; endocranial staining
Trauma: fracture of the spine on one vertebra [1]

[1] An avulsion fracture of a probable C6 or C7 spinous process from the lamina. Interspinous fusion is in evidence with the with the inferior vertebral counterpart. See the discussion on 'Fractures' in Section 5.

Skeletal pathology: none identified
Other skeletal observations: none identified
Dental Pathology: enamel hypoplasia [2] and tooth staining [3]

[2] A furrow form defect on tooth (21). The macroscopic estimation of the decile locations indicates 3.2 years' of age.
[3] Orangey-red staining occurs on the labial, buccal and lingual surfaces, predominantly over the left dental arcade.

—	—	—	—	—	—	—	—	/	/	/	*s*	*s*	*s*	*s*	/
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
p	*p*	*p*	*p*	*p*	*p*	—	*s*	*s*	*s*	*s*	*s hy*	*s*	*p*	*p*	/

Feature 162, Skeleton 313

Grave dimension: 1.77 × 0.8 × 0.08m
Burial position: N–S, prone, partial articulation
Grave goods: none
Age: adult, 18+ years' old
Morphological sex: indeterminate
Percentage of skeleton present: 7%
Preservation grade: 1
Level of fragmentation: 3
Taphonomy: none identified
Trauma: none identified
Skeletal pathology: none identified
Other skeletal observations: none identified
Dental Pathology: elements not present

Figure S6.1a Plans of inhumation burials in Cemetery 1

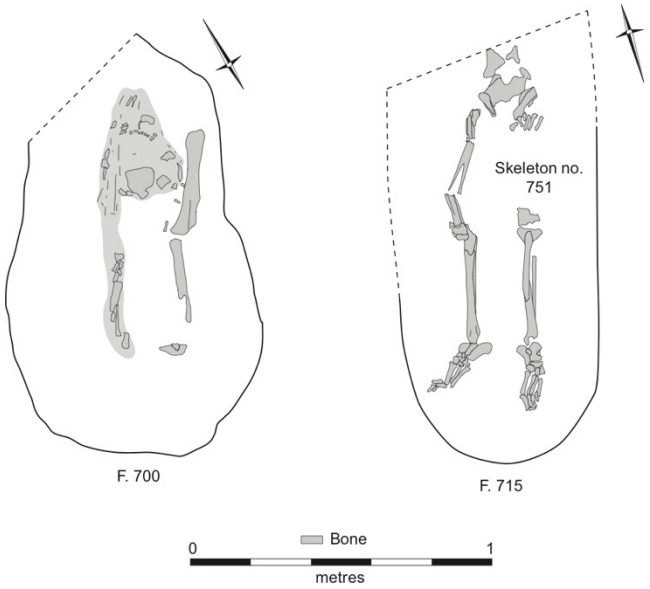


Figure S6.1b Plans of inhumation burials in Cemetery 1

Feature 163, Skeleton 316

Grave dimension: 1.05 × 0.75 × ?m
Burial position: indeterminate position and orientation, partial articulation.
Grave goods: none
Age: infant, around 4 years' old
Morphological sex: possibly female
Percentage of skeleton present: 20%
Preservation grade: 2–3
Level of fragmentation: 4
Taphonomy: none identified
Trauma: none identified
Skeletal pathology: none identified
Other skeletal observations: none identified.
Dental Pathology: elements not present

Feature 164, Skeleton 319

Grave dimension: 2.3 × 0.85 × 0.15m
Burial position: NW–SE, disarticulated. Disturbed by the subsequent inhumation burial of Sk.320. The skull lay against the western edge of the grave cut, on its left side facing SW. The mandible lay with teeth uppermost and chin facing NW. The right femur was prone, orientated N–S against the eastern edge of the grave cut. The left femur was supine, orientated SW–NE lying between the right knee of Sk320 and the proximal end of the right femur.
Grave goods: miniature beaker placed above the presumed location of right shoulder/head
Age: mature, around 45 years' old
Morphological sex: female
Genetic sex: XX
Mitochondrial DNA haplogroup: H5
Percentage of skeleton present: 28%
Preservation grade: 2
Level of fragmentation: 3
Taphonomy: none identified
Trauma: none identified
Skeletal pathology: a plaque on the inner surface of the cranium [1]

[1] A smooth, thin, interrupted plaque of yellowish-white sclerotic bone occurs on the endocranial surface, centred on the midline of the frontal bone and the sagittal suture. The plaque extends 55mm anterior-inferior and 12mm medial-lateral, extending c.14mm posteriorly from the bregma.

Other skeletal observations: none identified.
Dental Pathology: caries [2], multiple abscesses; antemortem tooth loss, staining to teeth (buccal and lingual).

[2] The large caries on tooth (1) has a maximum dimension of 8.33mm.

l s ca	—	—	—	—	—	—	—	/	*x pa*	*/ pa*	—	—	—	—	—
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
—	—	*x*	*x*	*x*	*x pa*	/	/	/	*p*	*p*	—	—	*l s* —	*l s* —	—

Feature 164, Skeleton 320

Grave dimension: 2.3 × 0.85 × 0.15m
Burial position: N–S, extended, prone, partial articulation: decapitated. The skull was placed face down between the knees with the base of the skull facing northwards. The right arm was flexed at the elbow to bring the hand underneath the left pelvis. The left arm was extended to bring the hand next to the left hip. Both legs were extended.
Grave goods: (1) A cluster of 30 beads was located around 50mm to the right of the cervical vertebrae, with a single bead of the same style located around the mouth of the skull. (2) A miniature beaker placed on the centre of back.
Age: mature, c.40 years' old
Morphological sex: Female
Genetic sex: not assigned
Mitochondrial DNA haplogroup: H
Percentage of skeleton present: 90%

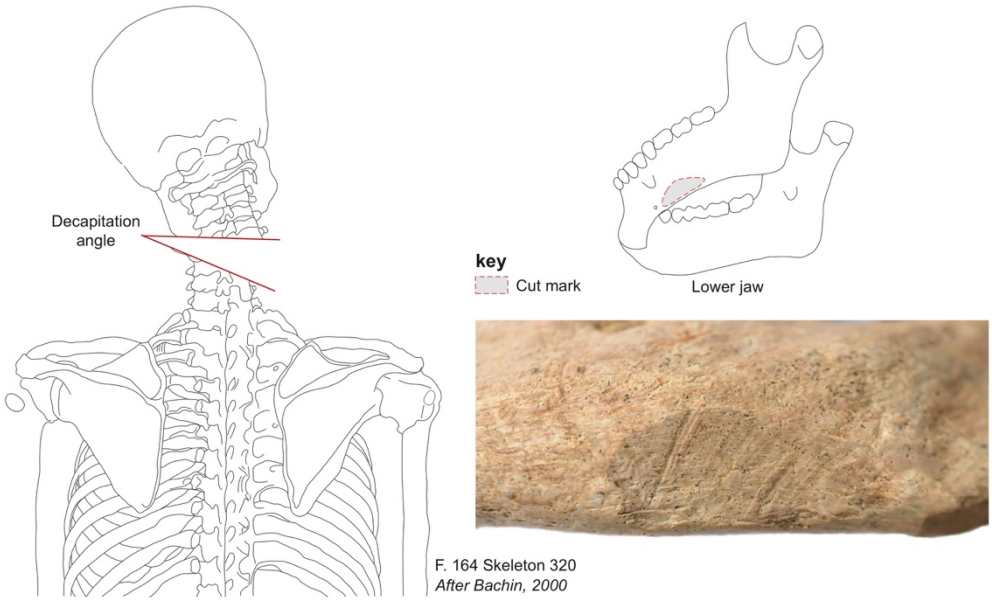


Figure S6.2 Decapitation and cut marks on Skeleton 320, F.164

Preservation grade: variable, 14
Level of fragmentation: 1
Taphonomy: general mid-brown discolouration to all the bone
Trauma: decapitation [1]

[1] Three crosscuts in oblique alignment were noted (Figure S6.2): (a) one on the inferior border of the left mandibular body, (b) one inferior to the superior articular facet and left pedicle of the fourth cervical vertebrae and (c) one through the body of the fifth cervical vertebrae. The morphology of the cut to the mandible clearly shows areas of sharp striations and ridges across the profile[214]. It suggests the heavy action of a blade directed left to right from a posterior position with enough energy to slice through all three bones, narrowly missing the superior surface of the lateral half of the right clavicle.

Skeletal pathology: possible trauma to the palette or, differentially, vitamin deficiency [2]

[2] There is slight microporosity over the palatine process, which indicates either minor trauma or scorbutic episodes (i.e. a deficiency in vitamin C). Both of these cause bleeding and the formation of vascularised bone[215].

Other skeletal observations: none identified.

[214] See Greenfield 2011; Tennick 2012.
[215] Larsen 2015: 39.

Dental Pathology: tooth trauma [3]; antemortem tooth loss; dental calculus; and tooth staining [4]

[3] The third lower left molar (17) is dilacerated where the roots are abruptly angled distally. see discussion for aetiology.

[4] The buccal and labial dental staining occurs predominantly over the maxillary teeth.

cl	*p*	*s*	*s*	*p*	*s*	*s*	*s*	*cl*	*cl*	*cl*	*cl*	*cl*	*cl*	*cl*	*p*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
— l s	*s*	*p*	*p*	*p*	*p*	*p*	*p*	*p*	*r*	*p*	*p*	*p*	*p*	*x*	*p*

Feature 165, Skeleton 323

Grave dimension: 1.8 × 0.85 × 0.33m

Burial position: S–N, flexed on right side, partial articulation. The left upper limb was extended beside the body. The right upper limb was out of normal anatomical position. Both lower limbs were tightly flexed at the knee, although they were not stacked.

Grave goods: none

Age: mature, 40–64 years' old

Morphological sex: male

Percentage of skeleton present: 60%

Preservation grade: variable 1–2

Level of fragmentation: 2

Taphonomy: mid red-brown staining to bones, particularly of the appendicular elements. This burial disturbed the earlier inhumation Sk.324 in the same re-cut grave.

Trauma: none identified

Skeletal pathology: possible anaemic disorder [1]

[1] There is Porotic hyperostosis located over the occipital planum.

Other skeletal observations: tendon expression [2]; osteoarthritis / degeneration [3]; mal-fusion of a cranial suture [4]

[2] A superiorly-directed enthesophyte from the odontoid process of the axis measures 4.31mm superior–inferior and 7.37mm anterior–posterior. It involves the alar ligament, which is responsible for stabilising the craniocervical junction (CVJ) and functions to limit axial rotation.

[3] Eburnation of the right inferior articular process of a lumbar vertebra, and slight eburnation over the right femoral head indicate the initial stages of osteoarthritis. Microporosity over the left femoral head

[4] Mal-fusion of the right masto-squamosal suture.

Dental Pathology: elements not present

Feature 165, Skeleton 324

Grave dimension: 1.8 × 0.85 × 0.33m

Burial position: S–N, extended, prone, partial articulation: decapitated. The skull was placed vertically, facing west, on the outside of the of the right femur. The left arm was extended beside the body. Both legs were extended, though the right femur was out of anatomical position.

Grave goods: miniature jar placed by the right shoulder

Age: old middle adult c.38 years' old

Morphological sex: probably female

Genetic sex: XY

Mitochondrial DNA haplogroup: no data

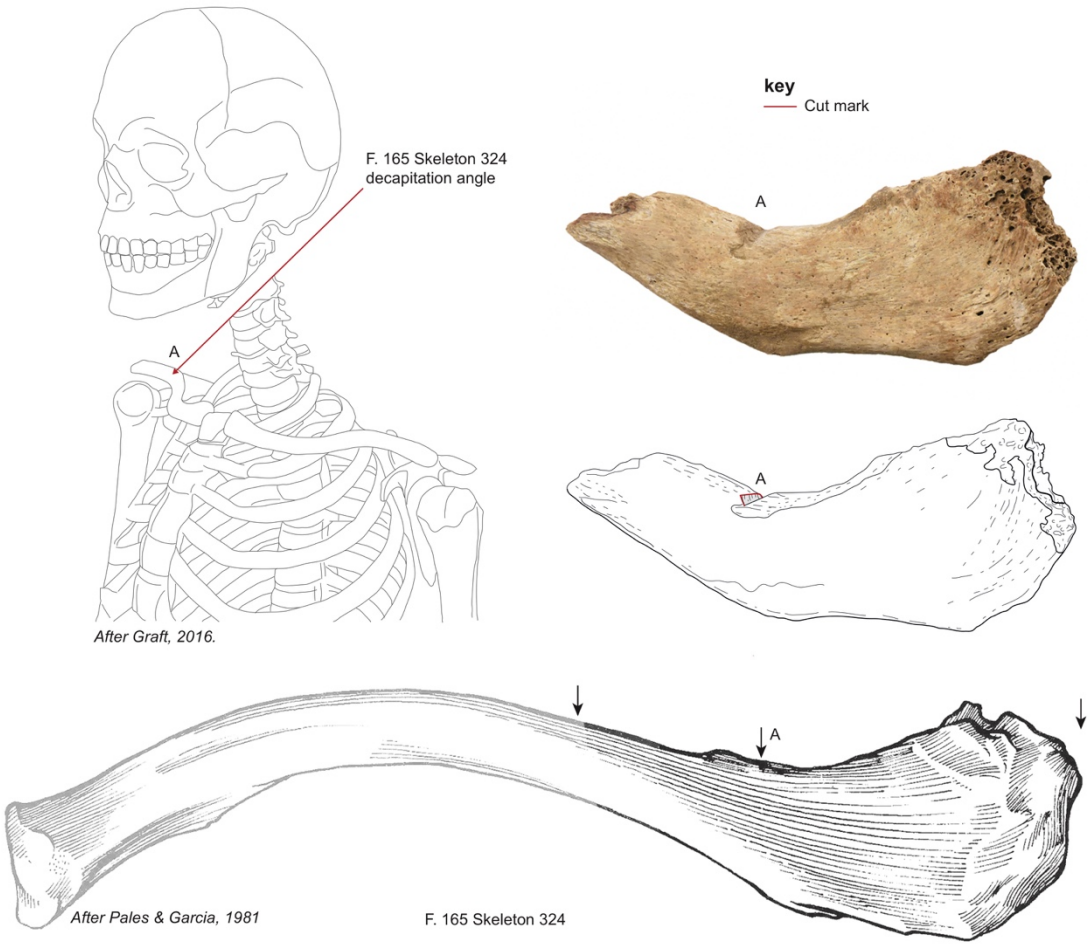


Figure S6.3 Decapitation and cut marks on Skeleton 324, F.165

Percentage of skeleton present: 45%
Preservation grade: variable 1–2
Level of fragmentation: 2
Taphonomy: post-burial polish to the right collar bone [1]

[1] The polish on the clavicle was only seen under magnification. There are small areas of polish confined to high points around the margin of the right clavicle chop mark, which indicates prolonged contact with a hard secondary surface.

Trauma: cut/chop mark to the clavicle [2]; a small benign tumour on the inner surface of the cranium [3]; a healed fracture of the right hand [4] (Figure S6.3).

[2] A chop mark over the anterior surface of the right clavicle is located approximately 42mm from its lateral end. It is characterised as a near 'V' shaped kerf. It is 7.30mm in length and 3.44mm wide, with a smooth, horizontally-striated medial wall and a slightly irregular lateral wall. This suggests the heavy action of a sword—possibly the tip—directed from a left posterolateral position in a posterosuperior–anteroinferior direction.

[3] An endocranial button lesion was noted, 8.53mm diameter, and 21.94mm from left coronal suture adjacent to frontal bone midline. See discussion for aetiology.

[4] 'Y' pattern fracture at the proximal end of the right first metacarpal. It is taphonomically damaged but had healed misaligned and adducted.

Skeletal pathology: none observed

Other skeletal observations: Osteoarthritis in the right elbow [5]; tendon expression [6]

[5] Eburnation of the right humeral lateral condyle indicates osteoarthritis.

[6] Inferiorly extended enthesophyte of the right patellar apex.

Dental Pathology: antemortem tooth loss; caries [7]; dental calculus [8].

[7] Interproximal caries.

[8] Medium accumulation of dental calculus.

—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
/	*ca cl*	*ca*	*ca*	*ca*	*cl*	*cl*	/	*x*	*cl*	—	—	—	—	—	—

Feature 165, from grave fill

Grave dimension: 1.8 × 0.85 × 0.33m
Burial position: disarticulated
Grave goods: none
Age: mid adult, 26–45 years' old
Morphological sex: possibly female
Percentage of skeleton present: 8%
Preservation grade: variable, 2–3
Level of fragmentation: 3
Taphonomy: none identified
Trauma: none identified
Skeletal pathology: none identified
Other skeletal observations: none identified
Dental Pathology: elements not present

Feature 166, Skeleton 327

Grave dimension: 1.86 × 0.69 × 0.31m
Burial position: S–N, extended, prone, full articulation. The head was slightly rotated to face west. The right upper limb was slightly flexed at the elbow to bring the hand above the right hip. The right shoulder was in an elevated position. The left upper limb was flexed at the elbow to bring the hand across the front of the lower lumbar vertebrae. Both lower limbs were extended.
Grave goods: none
Age: mature, c.42 years' old
Morphological sex: male
Genetic sex: XY
Mitochondrial DNA haplogroup: H1i1
Percentage of skeleton present: 85%
Preservation grade: variable 1–2
Level of fragmentation: 2
Taphonomy: minor root etching

Trauma: possible cut marks [1]

[1] Three or four possible fine cut marks over the superior border of the left scapular spine.

Skeletal pathology: possible dietary disorder [2]

[2] Mild bilateral porotic hyperostosis over the supraorbital origin, extending towards the frontal process of the zygomatic bones, which have mild cribra over both masseteric origins. Although several the hand tufts are slightly hypertrophic with minor spicules, this is likely a normal variation. Differentially, a spade-like appearance may broadly indicate a metabolic disorder. The woven bone in both acetabular fossae likely relate to the cam impingements discussed below.

Other skeletal observations: age-related degeneration [3], including osteoarthritis in the right wrist and both hips

[3] Age related degeneration is characterised by slight spondylophytes and endplate microporosity to the vertebral bodies. Minor Schmorl's nodes are noted in two thoracic and one lumbar vertebrae. The sacralised sixth lumbar is the result of a congenital condition that causes partial or complete fusion of the most inferior lumbar vertebra to the sacrum. Although common clinically, it is less so in archaeological samples[216].

The osteoarthritis is characterised by eburnation of the right capitate head. Age related degeneration is characterised by the bilateral macroporosity of the acromioclavicular joints. Bilateral cam impingements characterised as a contour abnormality at the femoral head-neck junction, (see discussion).

Ankylosis was noted between an unsided intermediate and distal foot phalange. This condition has a variety of aetiologies, including infection, trauma or a developmental defect[217]. The latter is referred to as symphalangism, which is the likely cause in this case, being a failure of segmentation and interphalangeal joint formation[218].

Dental Pathology: slight dental calculus (lingual and buccal); multiple caries [4]; multiple abscesses [5]; multiple antemortem tooth loss; heavy tooth wear [6]; and tooth staining [7].

[4] Multiple interproximal and large caries of the maxillary molars.

[5] Both abscesses occur on the buccal sides of the maxilla. The abscess for tooth (2) has a maximum diameter of 5mm. The abscess for tooth (14) has a maximum diameter of 7.62mm.

[6] Heavy occlusal attrition.

[7] Mid orangey-red staining of the teeth, predominantly over the left dental arcade.

ca	*ca ab*	*ca*	*cl s*	*cl s*	*cl s*	*p*	*p*	*p*	*s*	*s*	*s*	*ca s*	*ab r*	*r*	*c*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
s	*cl s*	*cl s*	*p*	*p*	*p*	*p*	*p*	*p*	*p*	*p*	*s*	*s*	*cl s*	*s*	*s*

Feature 700, Skeleton 701

Grave dimension: truncated

Burial position: S–N, extended, supine, in partial articulation. The head was laid between the lower legs on its left side, facing west. Decapitated. The grave and body had been truncated at the pelvis, with all of the upper body lost.

Grave goods: none

Age: middle adult, 33–45 years' old

Morphological sex: probably female

Genetic sex: consistent with XX but not XY

Mitochondrial DNA haplogroup: no data

Percentage of skeleton present: 15%

[216] Mann & Hunt 2013: 102

[217] Mann & Hunt 2005: 181

[218] Barnes 2012: 154

Preservation grade: variable 3–4
Level of fragmentation: 4
Taphonomy: truncated
Trauma: none identified
Skeletal pathology: possible anaemic disorder [1]

[1] Expanded frontal diploë: porosity 0.55–1.55mm; table around 11.40mm thick. Thalassemia? (See discussion).

Other skeletal observations: none identified.
Dental Pathology: slight dental calculus (buccal); caries [2]; enamel hypoplasia [3]

[2] Small cervical caries.

[3] A furrow form defect on teeth (5), (8), (9), (12), (21), (22), (23), (26), (27), (28), and (29). The macroscopic estimation of the decile locations indicates development at around 3.4–4.1 years' of age.

ca	*x*	*p*	*p*	*hy*	*p*	*p*	*hy*	*hy*	*p*	*p*	*hy*	*x*	*p*	*p*	*cl*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
p	*p*	*p*	*hy*	*hy*	*hy*	*hy*	*p*	*p*	*hy*	*cl hy*	*cl hy*	*p*	*p*	*p*	*x*

Feature 715, Skeleton 751

Grave dimension: 1.53+ × 0.6m × 0.12m (truncated)
Burial position: N–S, extended supine. Partial articulation. Truncated at the top of the pelvis, with all of the upper body lost.
Grave goods: none
Age: adult, 18+ years' old
Morphological sex: indeterminate
Percentage of skeleton present: 17%
Preservation grade: variable 1–3
Level of fragmentation: 3
Taphonomy: truncated; frequent dark grey mottling to the bone.
Trauma: none identified
Skeletal pathology: none identified
Other skeletal observations: none identified
Dental Pathology: elements not present

INHUMATIONS IN CEMETERY 2

Plans of all burials in Cemetery 2 are shown in Figure S6.4

Feature 509, Skeleton 521

Grave dimension: c.2.0 × c.1.0 × c.0.4m, interred over Sk.932
Burial position: SSW–NNE, extended, supine, in full articulation. The skull faces forward. The left arm was flexed at the elbow so that the hand lay over the right pelvis. The right arm was flexed at the elbow, so that it lay over the left arm, with the right hand over the left pelvis. Both legs were extended.
Grave goods: none
Age: mature, c.45 years' old
Morphological sex: male
Percentage of skeleton present: 60%
Preservation grade: variable 3–4
Level of fragmentation: 3
Taphonomy: slight to moderate 'sandpaper' concretions over the bone
Trauma: none identified
Skeletal pathology: none observed
Other skeletal observations: osteoarthritis of the hips [1]

[1] Sclerotic bone margin with possible subchondral cysts surrounding an area of eburnated bone over both femoral heads. Minor marginal lipping of the lumbar superior/inferior articular facets; moderate marginal lipping of the right acetabulum with irregularity of the lunate/fossa surface, eburnation within the left acetabular fossa. Slight microporosity of the right radial articular fossa.

Dental Pathology: slight dental calculus (both labial and buccal); caries [2]; multiple antemortem tooth loss.

[2] root caries.

p	*l ca*	*x*	*p*	*p*	*p*	*/*	*p*	*/*	*b*	*p*	*p*	—	—	—	—
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
b	*p*	*x*	*r*	*l b*	—	—	—	*p*	*b*	*b*	*b*	*b*	*x*	*p ca*	*l*

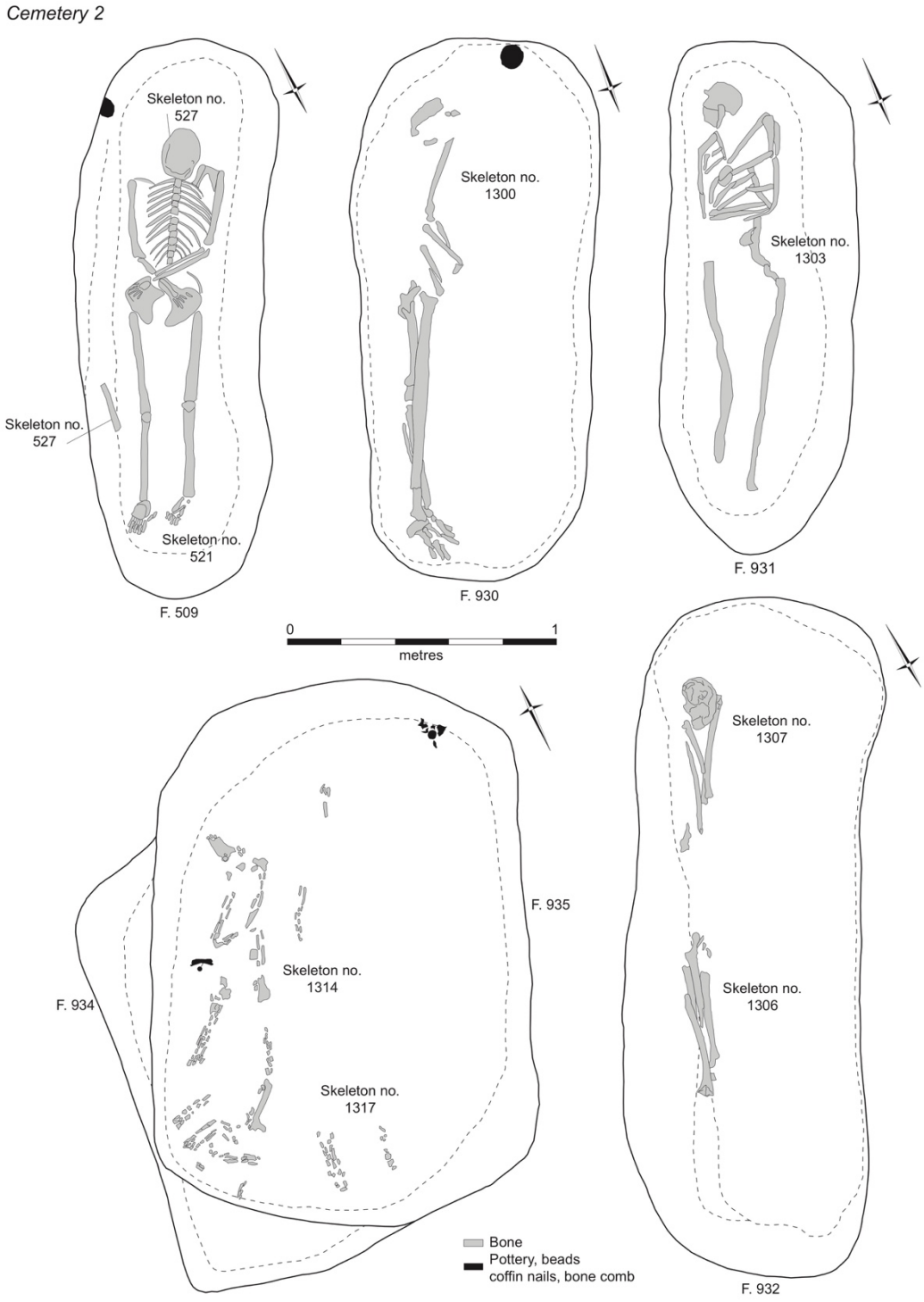


Figure S6.4a Plans of inhumation burials in Cemetery 2

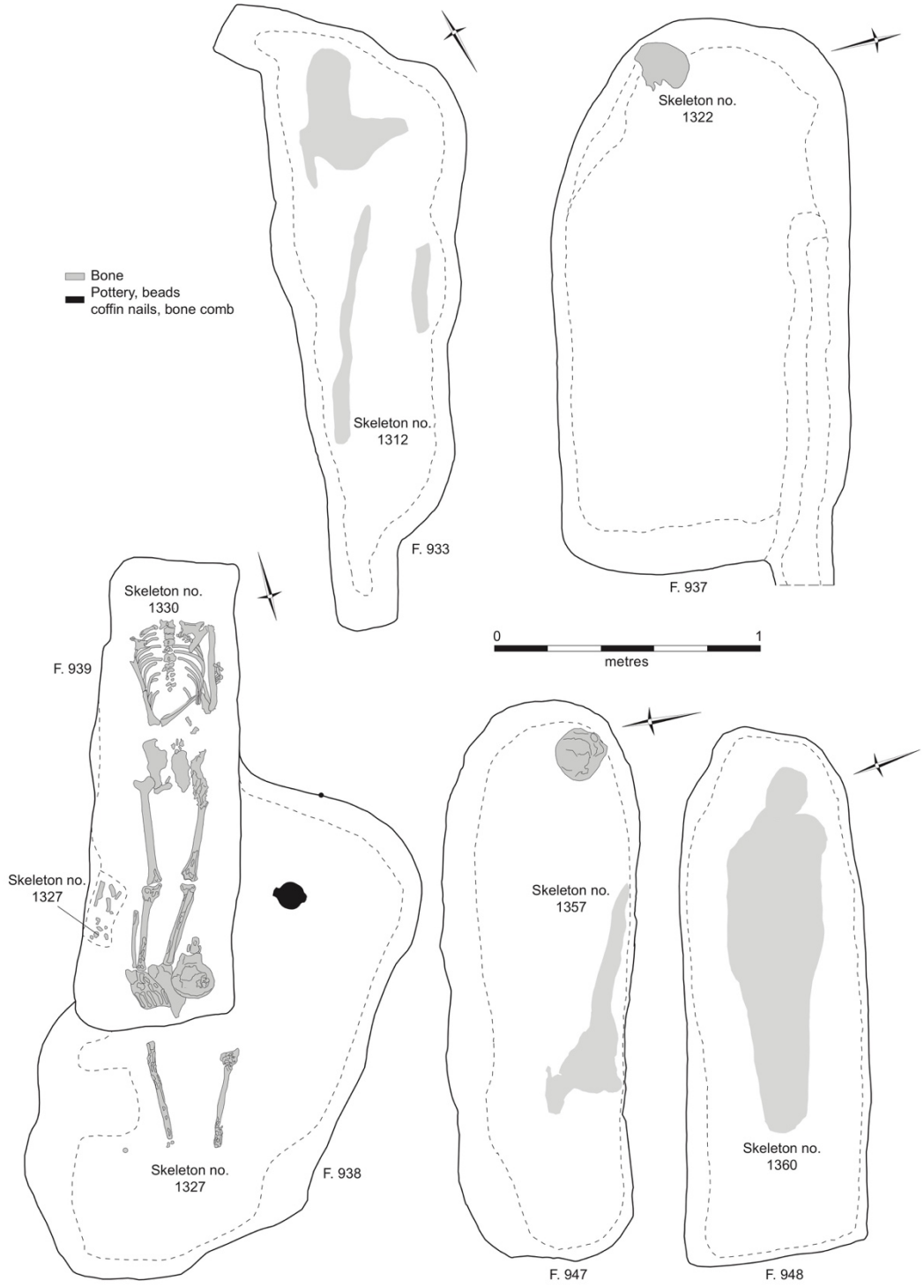


Figure S6.4b Plans of inhumation burials in Cemetery 2

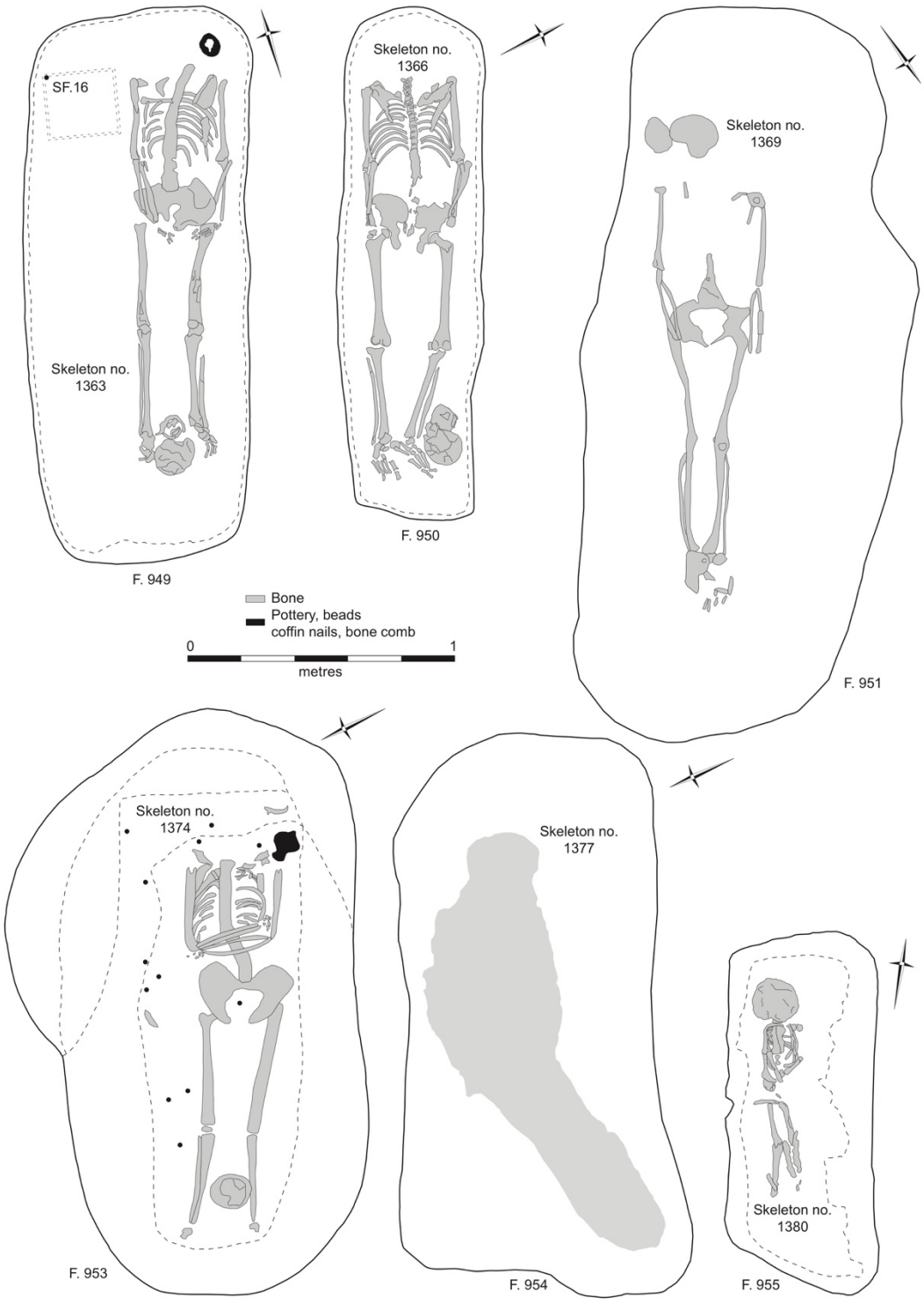


Figure S6.4c Plans of inhumation burials in Cemetery 2

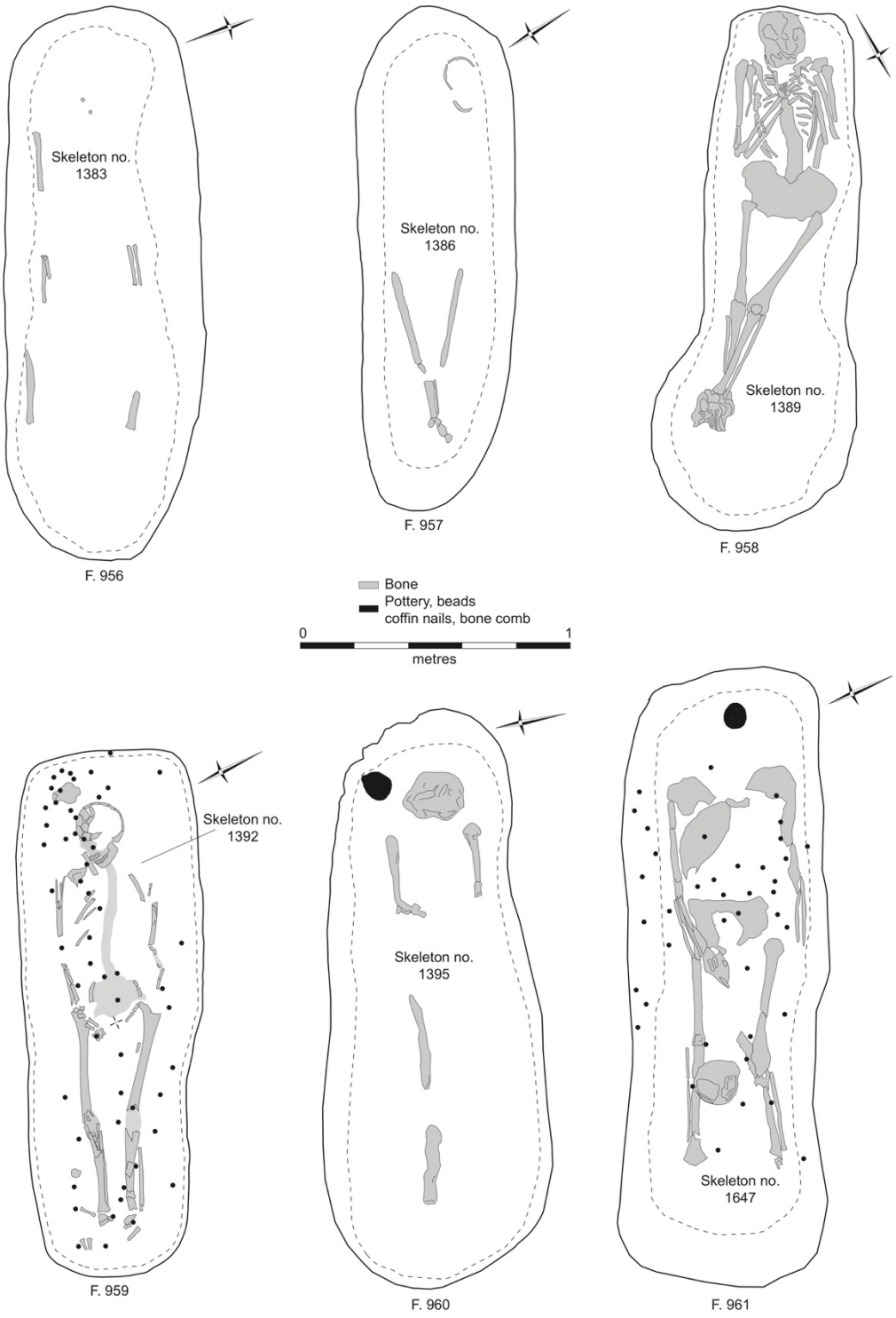


Figure S6.4d Plans of inhumation burials in Cemetery 2

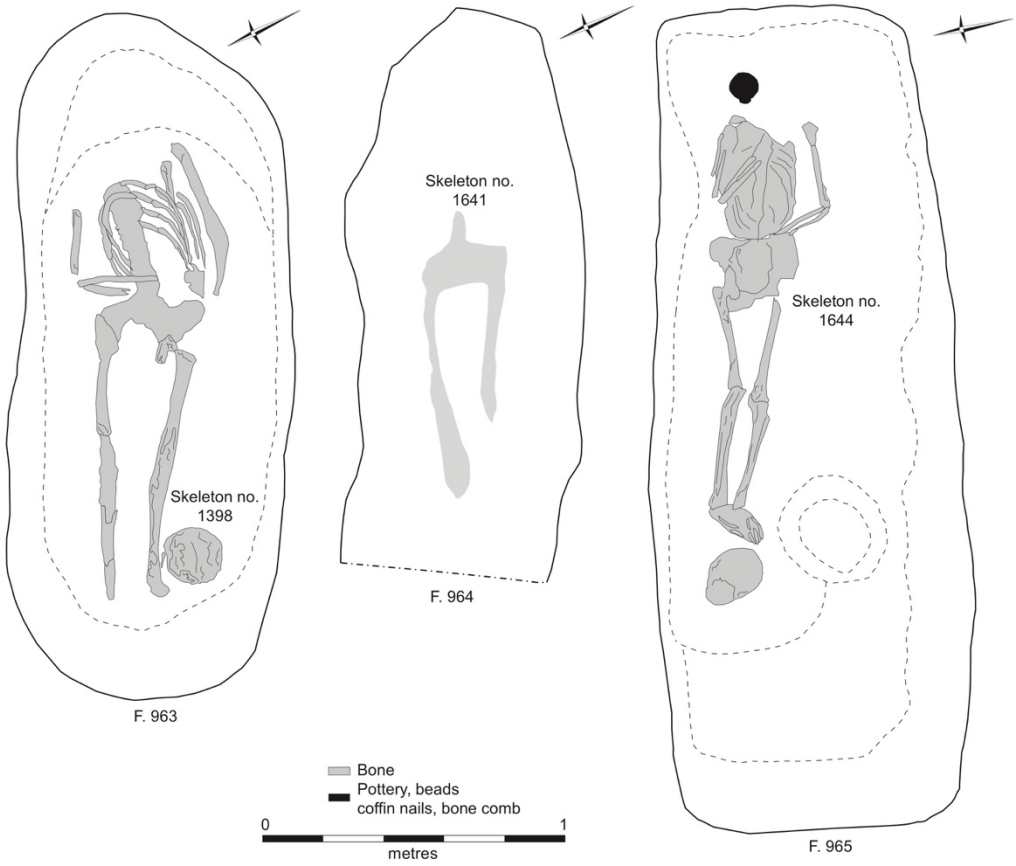


Figure S6.4e Plans of inhumation burials in Cemetery 2

Feature 930, Skeleton 1300

Grave dimension: 2.06 × 0.91 × 0.22m
Burial position: SSW–NNE extended on the left side, ?full articulation. The right arm was flexed at the elbow to bring the hand in front of the pelvis. Both legs are extended and with the right leg directly stacked over the left.
Grave goods: Miniature beaker placed by the head
Age: young mid adult, 25–35 years' old
Morphological sex: indeterminate
Percentage of skeleton present: 3%
Preservation grade: variable 4–5
Level of fragmentation: 4
Taphonomy: none observed
Trauma: none identified
Skeletal pathology: none identified
Other skeletal observations: none identified.
Dental Pathology: hypoplasia [1]

[1] A furrow form defect on tooth (22). The macroscopic estimation of the decile locations indicates development at 3.6 years' of age.

/	/	/	/	/	/	/	/	/	/	/	*b*	/	/	*b*	/
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
/	/	*b*	/	/	/	/	/	/	/	*b hy*	/	*b*	/	*b*	/

Feature 931, Skeleton 1303

Grave dimension: c.1.9 × c.0.7 × 0.06m
Burial position: SSW–NNE, extended, supine, ?full articulation. The right arm is flexed at the elbow to bring the hand over the top half of the left humerus. The left arm is flexed at the elbow to bring the hand below the right elbow. Both legs were extended.
Grave goods: none
Age: young mid adult, 25–35 years' old
Morphological sex: probably male
Percentage of skeleton present: 10%
Preservation grade: 4
Level of fragmentation: 3
Taphonomy: none identified
Trauma: none identified
Skeletal pathology: none identified
Other skeletal observations: usual bone morphology in the lower legs [1]

[1] Expression of the interosseous crests of both tibiae may relate to a strong interosseous membrane stabilising the tibia/fibula. This membrane separates the anterior and posterior tibialis muscle.

Dental Pathology: dental calculus (labial and buccal); hypoplasia [2]; trauma [3]

[2] A furrow form defect on teeth (7), (8), (10), (22) and (26). The macroscopic estimation of the decile locations indicates 2.3–4.9 years' of age.

[3] A mesiobuccal chip to tooth (18) with worn occlusal fracture margin.

—	*l*	—	*l*	*l*	*l*	*l hy*	*lhy*	—	*l hy*	*l*	*l*	*l cl*	*l cl*	*l*	*l*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
—	—	*l*	*l*	*l*	*l cl*	*l cl hy*	*l cl*	*l cl*	*l*	*l cl hy*	*l*	*l*	—	*l t*	—

Feature 932, Skeleton 1306

Grave dimension: 2.58 × 0.94 × 0.34m
Burial position: NNE–SSW, disarticulated. A collection of lower limbs arranged against the northern edge of the grave cut in the western half of the of the grave.
Grave goods: none
Age: adult, 18+ years' old
Morphological sex: indeterminate
Percentage of skeleton present: 12%
Preservation grade: 4
Level of fragmentation: 3
Taphonomy: none identified
Trauma: none identified
Skeletal pathology: none identified
Other skeletal observations: none identified
Dental Pathology: elements not present

Feature 932, Skeleton 1307

Grave dimension: 2.58 × 0.94 × 0.34m
Burial position: NNE–SSW, disarticulated. A collection of lower limbs and skull fragments arranged against the northern edge of the grave cut in the eastern half of the of the grave.
Grave goods: none
Age: young adult, 17–25 years' old
Morphological sex: probably male
Genetic sex: not assigned
Mitochondrial DNA haplogroup: no data
Percentage of skeleton present: 8%
Preservation grade: 3–4
Level of fragmentation: 4
Taphonomy: none identified
Trauma: none identified
Skeletal pathology: none identified
Other skeletal observations: none identified
Dental Pathology: elements not present

Feature 933, Skeleton 1312

Grave dimension: 1.7 × 0.7 × 0.02–0.09m
Burial position: NNE–SSW, extended, ?supine, partial articulation. Indeterminate position.
Grave goods: none
Age: sub-adult, 13–18 years' old
Morphological sex: indeterminate
Percentage of skeleton present: 2%
Preservation grade: 2
Level of fragmentation: 4
Taphonomy: none identified
Trauma: none identified
Skeletal pathology: none identified
Other skeletal observations: none identified
Dental Pathology: elements not present

Feature 935, Skeleton 1314

Grave dimension: 2.0 × 1.4 × 0.05m
Burial position: NNE–SSW, indeterminate position. Partial articulation. Double burial with Skeleton 1317.
Grave goods: miniature beaker placed above the head
Age: mid adult, 26–45 years' old
Morphological sex: indeterminate
Percentage of skeleton present: 5%
Preservation grade: variable 4–5
Level of fragmentation: 4
Taphonomy: none identified
Trauma: none identified
Skeletal pathology: none identified
Other skeletal observations: osteoarthritis of the left wrist [1]
[1] Slight eburnation on the left capitate facet for the hamate.
Dental Pathology: elements not present

Feature 935, Skeleton 1317

Grave dimension: 2.0 × 1.4 × 0.05m
Burial position: N–S?, indeterminate position, partial articulation. Double burial with Skeleton 1314.
Grave goods: none
Age: young adult, 18–25 years' old
Morphological sex: indeterminate
Percentage of skeleton present: 2%
Preservation grade: 2
Level of fragmentation: 4
Taphonomy: none identified
Trauma: none identified
Skeletal pathology: none identified
Other skeletal observations: none identified

Dental Pathology: enamel hypoplasia [1]

[1] Shallow furrow form defect to teeth (5), (6), (8), (9), and (11). The macroscopic estimation of the decile locations indicates development at 2.3–4.9 years' of age.

—	—	—	—	*l b hy*	*l b hy*	*l b*	*l b hy*	*l b hy*	*l b*	*l b hy*	—	—	—	—	—
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Feature 937, Skeleton 1322

Grave dimension: 2.05 × 1.2 × 0.17m
Burial position: WNW–ESE, partial articulation. This inhumation consists the skull only, placed against the SW corner of the grave. It was on its right side, facing south.
Grave goods: none
Age: adult, 18+ years' old
Morphological sex: indeterminate
Percentage of skeleton present: 2%
Preservation grade: variable 4–5
Level of fragmentation: 4
Taphonomy: the bone has a chalky texture with rounded fracture margins
Trauma: none identified
Skeletal pathology: none identified
Other skeletal observations: none identified
Dental Pathology: none identified

—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
—	*l b*	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Feature 938, Skeleton 1327

Grave dimension: 1.7 × 1.30 × 0.04–0.10m
Burial position: SSW–NNE, extended, truncated by F.939 so that only the lower legs remain in situ
Grave goods: miniature flagon, probably not in situ
Age: adult, 18+ years' old
Morphological sex: indeterminate
Percentage of skeleton present: 3%
Preservation grade: variable 3–4
Level of fragmentation: 4
Taphonomy: the bone has rounded fracture margins
Trauma: none identified
Skeletal pathology: none identified
Other skeletal observations: none identified
Dental Pathology: elements not present

Feature 939, Skeleton 1330

Grave dimension: 1.77 × 0.60 × 0.12–0.18m
Burial position: NNE–SSW, extended prone, partial articulation: decapitated. The skull was placed on its right side by the left foot, facing north. The arms were crossed in front of the body: the left arm was flexed at the elbow to bring the hand around the bottom half of the right humerus. The legs are extended with ankles drawn together.
Grave goods: none
Age: mid adult, 26–45 years' old (towards the higher range)
Morphological sex: female
Percentage of skeleton present: 32%
Preservation grade: variable 2–3
Level of fragmentation: 3
Taphonomy: 'sandpaper' concretions over the bone
Trauma: none identified
Skeletal pathology: none identified
Other skeletal observations: possible musculoskeletal stress marker [1]

[1] Expression of the flexor digitorum sublimis attachment on the left intermediate hand phalanges was noted (see discussion).

Dental Pathology: multiple teeth lost antemortem; (21)–(27) (31) and (32) [2]

[2] Complete alveolar resorption of the right mandible, with near complete resorption of the left.

—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
—	*x*	*x*	—	—	*x*	*x*	*x*	*x*	*x*	*x*	*x*	—	—	—	—

Feature 947, Skeleton 1357

Grave dimension: 2.08 × 0.76 × 0.32m
Grave furniture: the burial was bounded by an L-shaped gully
Burial position: W–E, ?supine, unknown articulation
Grave goods: none
Age: adult, 18+ years' old
Morphological sex: indeterminate
Percentage of skeleton present: 4%
Preservation grade: variable 4–5
Level of fragmentation: 4
Taphonomy: 'sandpaper' concretion on the bones
Trauma: none identified
Skeletal pathology: none identified
Other skeletal observations: none identified
Dental Pathology: elements not present

Feature 948, Skeleton 1360

Grave dimension: 2.40 × 0.80 × 0.05–0.07m
Grave furniture: burial bounded by an L-shaped gully
Burial position: ESE–WNW, extended, supine, ?full articulation.

Grave goods: none
Age: adult, 18+ years' old
Morphological sex: male
Percentage of skeleton present: 16%
Preservation grade: variable 3–5+
Level of fragmentation: 4
Taphonomy: 'sandpaper' concretion on the bones
Trauma: none identified
Skeletal pathology: none identified
Other skeletal observations: age-related skeletal development [1]

[1] Large mastoid air cell.

Dental Pathology: none identified

—	—	—	/	*r*	*r*	—	—	—	—	/	*x*	*x*	*x*	—	—
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
l	*l*	*l*	/	/	/	/	/	/	/	/	/	/	*l*	*l*	/

Feature 949, Skeleton 1363

Grave dimension: 2.15 × 0.87 × 0.23m
Burial position: SSW–NNE, extended, supine, partial articulation: decapitated. The skull was placed face down between the feet with the base of the skull facing southwards. Both upper limbs were flexed at the elbow to bring the hands to rest over the respective sides of the pelvis. Both lower limbs were extended.
Grave goods: (1) miniature beaker placed immediately to the left of where head should be located; (20 double-spiked loop, possibly remains of a wooden box or drawer, in the northwestern corner of the grave
Age: old mid adult, 33–45 years' old
Morphological sex: male
Genetic sex: not assigned
Mitochondrial DNA haplogroup: no data
Percentage of skeleton present: 58%
Preservation grade: variable 4–5
Level of fragmentation: 4
Taphonomy: the bone is delaminated with 'rounding' of fracture margins. There are fine 'sandpaper' concretions on the bone surface. The bone had a dark greyish-brown discolouration, and there is occasional dark grey mottling, particularly over the surface of the skull.
Trauma: possible dislocation of the right hip [1]

[1] A healed partially displaced avulsion fracture centred around the fovea capitis of the right femoral head. This may have resulted from extreme external rotation of the femur, dislocation or dysplasia of the hip[219]. However, it is likely that it resulted from repetitive hyperextension (from activities such as running) thereby placing an inordinate amount of stress on the ligamentum teres with subsequent failure[220].

[219] Cerezal *et al.* 2010; O'Donnell *et al.* 2014
[220] Guanche & Sikka 2005

Skeletal pathology: A small 'button' lesion [2]; non-specific infection [3]

[2] An osteoma on the posterior surface of an angle fragment of a right rib was observed. See discussion for aetiology.

[3] Fragments of sternal body and manubrium were seen to be sclerosed, woven and spiculated with an absence of internal trabecular structure. See discussion for aetiology.

Other skeletal observations: possible hole in the sternum [4]; osteoarthritis of the lower back and left hip [5]

[4] The sternal body had an 'incomplete' foraminal defect, located on the lower third on the posterior surface, left of the midline. There are several explanations for its formation. Clinically, sternal abnormalities are associated with cardiac defects, either though pressure and displacement of the heart[221] or vascular bundles making passage though the embryonic cartilaginous bundles of the sternum[222]. The most likely explanation is due to incomplete ossification of the cartilaginous bundles[223]. Prevalence of the foramen between the sexes is ambiguous, where Janssens[224] suggests that it occurs more frequently in women, McCormick[225] suggests it occurs twice as frequently in men.

[5] Osteoarthritic changes were noted with slight eburnation over the posterior rim of the S1 sacrum endplate and very slight eburnation over the left femoral head.

Dental Pathology: dental calculus [6]; antemortem tooth loss; enamel hypoplasia [7]; trauma/infection [8]

[6] There was slight to moderate dental calculus over the mesiolabial crown margins of teeth (22) (21) and (20). There was moderate to heavy calculus over the buccal and lingual (and unusually) occlusal surfaces of the lower left second molar (31) and lower right second molar (18). This would suggest that these teeth were not in occlusion with their maxillary counterparts, perhaps due to antemortem loss.

[7] Enamel hypoplasia was most evident for teeth (29) (28) (27) (22) and (21) as a combination of furrow form and plane form defects. The macroscopic estimation of the decile locations indicates formation between 2.7 to 4.4 years' of age.

[8] The sclerosed root apex of tooth (20) possibly resulted from minor apical trauma or infection.

—	—	*x*	*x*	*x*	*l, p*	*l, p*	*l, p*	*l, r*	—	*l, r*	—	—	—	—	*l*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
l	*l cl*	*l*	*hy l p*	*hy l p*	*hy l p*	*l*	*l*	*/*	*/*	*p hy cl*	*p hy cl*	*p sc*	*/*	*l cl*	*l cl*

Feature 950, Skeleton 1366

Grave dimension: 1.90 × 0.60 × 0.20m

Burial position: ESE–WNW, extended prone, partial articulation: decapitated. The skull was face down, with its base facing east. It leaned slightly on its left side and was placed next to the right ankle. Both arms were extended so the hands lay over their thighs. Both legs were extended.

Grave goods: none

Age: mature, c.46 years' old

Morphological sex: male

Genetic sex: XY

Mitochondrial DNA haplogroup: J1c1e

Stature: 168 ± 3 cm

[221] Aktan & Savaş 1998
[222] Crubézy 1992
[223] McCormick 1981
[224] Janssens 1960
[225] McCormick 1981

Percentage of skeleton present: 76%
Preservation grade: variable 3–5
Level of fragmentation: 2–3
Taphonomy: 'sandpaper' concretions on the bone; the bone is delaminated; dark grey mottling; brown staining to the bone with additional browny-orange staining by plant roots
Trauma: none identified
Skeletal pathology: possible anaemic disorder [1]

[1] Significant cribra orbitalia in both orbits. Slight porotic hyperostosis over posterior aspect of parietals.

Other skeletal observations: none identified
Dental Pathology: interproximal and cervical caries; dental calculus; staining to the teeth

/	/	/	l	l	l	l	l s	l s	l	l	l	b	/	l c	/
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
p b	p	l s	l s	l s	b	l	b	b	l	l	l	l	l s	l	l

Feature 951, Skeleton 1369

Grave dimension: 2.65 × 1.26 × 0.13–0.25m
Burial position: NNE–SSW, supine, extended, full articulation. Both arms were extended so the hands lay over their thighs. Both legs were extended with the ankles together.
Grave goods: miniature beaker placed on right side of head
Age: middle adult, 26–45 years' old
Morphological sex: probably male
Genetic sex: not assigned
Mitochondrial DNA haplogroup: no data
Percentage of skeleton present: 43%
Preservation grade: variable 3–5+
Level of fragmentation: 3
Taphonomy: the bone has a chalky texture; grey mottling to bone
Trauma: trauma to right femur [1]

[1] Unusual right femoral proximal shaft geometry, possibly relating to a healed long oblique fracture from a superiomedial-inferolateral direction. Possible adductor brevis avulsion defined by an area of remodelling medially adjacent to the proximal apex of the linea aspera. This remodelling includes an outline of a cortical fragment 25.92mm length and 9.06mm width.

Skeletal pathology: none identified
Other skeletal observations: none identified
Dental Pathology: interproximal caries; antemortem tooth loss; trauma or infection to the root of tooth (6)

—	l ca	—	—	—	l sc	—	l	l	—	l	—	l	—	—	l
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
l	x	x	x	l	l	/	/	/	l	l	/	/	x	x	x

Feature 953, Skeleton 1374

Grave dimension: 2.25 × 1.10 × 0.37m
Grave furniture: coffin: 26 nail fragments, minimum of 11 nails
Burial position: ESE–WNW, supine extended, partial articulation: decapitated. The head was placed between the lower legs, toward the ankles. The base of the skull faced upwards, and was turned to look southwards. Both arms were crossed over the body: the right arm was flexed at the elbow to bring the hand over the bottom half of the left humerus. The left arm was flexed at the elbow to bring the hand below the right elbow. Both legs were extended.
Grave goods: miniature beaker placed by the left shoulder
Age: young mid adult, 25–35 years' old
Morphological sex: male
*Percentage of skeleton present:*58%
Preservation grade: variable 3–5
Level of fragmentation: 3
Taphonomy: the bone is delaminated; mid grey mottling to the bone
Trauma: none identified
Skeletal pathology: possible anaemic disorder [1]; pathology to the knee [2]

(1) The slight porosity over the left half of the frontal and parietal bones may indicate hyperostosis, however there also appears to be an inflammatory response over the left half of the calvaria with a marginally thickened outer table (an additional 1.60mm). Possible sclerotic nodule superior to the left mastoid, which is absent (likely due to a taphonomic process, i.e. no lysis). Differentially, this could be a taphonomic mimic.
(2) Osteochondritis dessecans occurs on the medial tibial plateau, towards the anterior side. It measures c. 20mm diameter, and is healed and sclerosed. The exact pathophysiology and aetiology of this condition is still unclear, despite its prevalence[226]. Clinically, it is regarded as an acquired lesion of subchondral bone characterised by degrees of osseous resorption, collapse, and sequestrum formation. Thus, causes can range from trauma and inflammation to genetics and vascular abnormalities[227].

Other skeletal observations: none identified
Dental Pathology: dental calculus (labial, buccal and lingual)

l	—	—	*l*	*l*	*l*	*l cl*	*l*	—	—	*l*	—	—	*l*	*l*	*l*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
b	*l*	*l*	*b*	*b*	*l*	*l*	*l*	*l*	—	—	*l*	—	—	—	—

Feature 954, Skeleton 1377

Grave dimension: 2.00 × 1.00 × 0.03–0.08m
Burial position: ESE–WNW, supine, extended, ?full articulation. The body appears to have been slightly flexed at the lower back, towards the left side, making a 'banana' pose. The arms appear to have been tight against the body, although it was unknown whether they were crossed. The legs were extended.
Grave goods: none
Age: young adult, 17–25 years' old
Morphological sex: indeterminate
Percentage of skeleton present: 30%

[226] Zhang & Liu 2017
[227] Jacobi *et al.* 2010

Preservation grade: variable 4–5
Level of fragmentation: 4
Taphonomy: none identified
Trauma: none identified
Skeletal pathology: none identified
Other skeletal observations: none identified
Dental Pathology: enamel hypoplasia [1]

[1] Shallow furrow form defect to tooth (6). The macroscopic estimation of the decile location indicates development at 2.9–3.3 years' of age.

l	*l*	*l*	*l*	*l*	*l hy*	—	—	—	—	*l*	*l*	*l*	—	—	—
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
—	*l*	*l*	—	—	—	—	—	—	—	—	—	—	*l*	*l*	—

Feature 955, Skeleton 1380

Grave dimension: 1.37 × 0.62 × 0.15m
Burial position: NNW–SSE, extended, supine, full articulation. The right arm was flexed at the elbow to bring the hand over the left side of the body. Both legs were extended.
Grave goods: none
Age: infant, c.3 years' old
Morphological sex: possibly male
Percentage of skeleton present: 36%
Preservation grade: variable 3–4
Level of fragmentation: 4
Taphonomy: 'sandpaper' concretions on the bone; the bone is diffusely mottled black
Trauma: none identified
Skeletal pathology: none identified
Other skeletal observations: none identified
Dental Pathology: none identified

l	*l*	*l*	*l*	*l*	/	/	*l*	/	*l*
A	B	C	D	E	F	G	H	I	J
T	S	R	Q	P	O	N	M	L	K
/	*l*	*l*	/	/	/	/	*l*	*l*	*l*

Feature 956, Skeleton 1383

Grave dimension: 1.92 × 0.75 × 0.16m
Burial position: ESE–WNW, extended, ?supine, ?full articulation.
Grave goods: none
Age: adult, 18+ years' old
Morphological sex: indeterminate
Percentage of skeleton present: 3%
Preservation grade: variable 4–5+
Level of fragmentation: 4
Taphonomy: 'sandpaper' concretions on the bone
Trauma: none identified
Skeletal pathology: none identified
Other skeletal observations: none identified
Dental Pathology: elements not present

Feature 957, Skeleton 1386

Grave dimension: 1.85 × 0.55 × 0.12m
Burial position: ESE–WNW extended, supine, ?full articulation. Legs are extended, with the left foot stacked over the right.
Grave goods: none
Age: adult, 18+ years' old
Morphological sex: indeterminate
Percentage of skeleton present: 5%
Preservation grade: variable 4–5+
Level of fragmentation: 4
Taphonomy: plant rooting still present throughout the bone
Trauma: none identified
Skeletal pathology: none identified
Other skeletal observations: none identified
Dental Pathology: elements not present

Feature 958, Skeleton 1389

Grave dimension: c.1.80 × 0.75 × 0.40m
Burial position: SSW–NNE, extended supine, full articulation. The left arm was flexed at the elbow to bring the hand over the left clavicle. The right arm was flexed at the elbow to bring the hand over the sternum. Both legs were extended, with the left lower leg crossed over the right. Although the legs are separated, the position could possibly be consistent with burial in a shroud—the weight of the skull on the shins might have separated the legs.
Grave goods: none
Age: old mid adult, c.39 years' old
Morphological sex: probably female
Percentage of skeleton present: 68%
Preservation grade: 2
Level of fragmentation: 3
Taphonomy: 'sandpaper' concretion to the bone; patchy dark grey/black mottling; and orangey-red staining

Trauma: none identified
Skeletal pathology: possible anaemic disorder [1]

[1] fragments of posterior parietal diploë appear thickened (max 9.6mm) and aerated with structural porosity >1mm. Tables are unaffected. Thalassemia?

Other skeletal observations: none identified
Dental Pathology: dental calculus (lingual and buccal); antemortem tooth loss; enamel hypoplasia [2]; impacted tooth [3]

[2] Shallow furrow form defect to tooth (8) (9) and (27). The macroscopic estimation of the decile locations (8) and (9) indicates development at 2.4 years' of age. A vertical, hypoplastic defect on (27) (see discussion).

[3] Impacted tooth (11).

ne	*l*	*l*	*p*	*b*	*/*	*b*	*b hy*	*p hy*	*p*	*p*	*p*	*p*	*p*	*p*	*ne*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
ne	*p*	*x*	*p*	*p*	*p hy*	*b*	*b*	*b*	*b*	*b*	*b*	*b*	*p*	*p*	*ne*

Feature 959, Skeleton 1392

Grave dimension: 1.90 × 0.65 × 0.20m
Grave furniture: coffin: 129 nail fragments (minimum 22 nails); the burial was bounded by an L-shaped gully
Burial position: ESE–WNW, extended, supine. Full articulation. The head was rotated to lie on its right side. Both arms were extended to bring the hands over the respective sides of the pelvis. Both legs were extended.
Grave goods: miniature beaker placed above and to the right of the head
Age: old mid adult, 33–45 years' old
Morphological sex: male
Percentage of skeleton present: 33%
Preservation grade: variable 4–5+
Level of fragmentation: 4
Taphonomy: 'sandpaper' concretion on the bones; delamination of the bones; mid brown staining
Trauma: none identified
Skeletal pathology: none identified
Other skeletal observations: age-related degeneration [1]

[1] Indications of spondylophytes / degeneration in lumbar fragments; macroporosity of the right acromioclavicular joint.

Dental Pathology: antemortem tooth loss

p	*p*	*p*	*l*	*l*	*l*	—	—	—	—	*b*	*b*	*b*	—	—	—
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
ne	*x*	*p*	*b*	*b*	*b*	*/*	*/*	*/*	*/*	*b*	*b*	*b*	*/*	*/*	*ne*

Feature 960, Skeleton 1395

Grave dimension: 2.32 × 0.74 × 0.18m
Burial position: ESE–WNW, extended, supine, ?full articulation. The right arm was flexed at the elbow to bring the hand above the left hip. The right leg was extended.
Grave goods: Miniature jar placed by the right side of the head

Age: adult 18+ years' old
Morphological sex: indeterminate
Percentage of skeleton present: 3%
Preservation grade: variable 4–5
Level of fragmentation: 4
Taphonomy: none identified
Trauma: none identified
Skeletal pathology: none identified
Other skeletal observations: none identified
Dental Pathology: elements not present

Feature 961, Skeleton 1647

Grave dimension: 2.27 × 0.77 × 0.22m
Grave furniture: coffin: 80 nail fragments (minimum 18 nails); the grave was bounded by an L-shaped gully
Burial position: ESE–WNW, extended supine, partial articulation: decapitated. The skull was placed between the legs over the top half of the right tibia. It was face down the base facing south. The right arm was extended to bring the hand beneath the right pelvis. The left arm was extended to bring the hand next to the left thigh. Both legs were extended.
Grave goods: miniature jar, placed where decapitated head should be.
Age: young mid adult, 25–35 years' old
Morphological sex: male
Percentage of skeleton present: 25%
Preservation grade: variable 3
Level of fragmentation: 4
Taphonomy: none identified
Trauma: none identified
Skeletal pathology: possible anaemic disorder [1]

[1] Porotic hyperostosis over frontal and parietal bones.

Other skeletal observations: impingement of left ankle [2]

[2] Nodular/spiculated bone on the inferior articular surface of the left tibia along the lateral facing margin of the medial malleolus—possibly relating to an impingement aetiology (see discussion for aetiology).

Dental Pathology: caries [3]; antemortem tooth loss [4]

[3] Lingual caries

[4] Tooth (18) was possibly lost within a month before death. This was estimated by the amount of woven bone along the outer walls of the alveolus. One can expect to see approximately 40% new bone between 6 and 8 weeks along the outer walls of the alveolus after tooth loss[228].

—	—	*l ca*	—	—	—	—	—	—	—	—	—	—	—	—	—
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
—	—	—	—	—	—	*/*	*/*	*/*	*l*	—	*l*	*l*	*l st*	*x*	*l*

[228] Cohen & Cohen-Lévy 2014

Feature 963, Skeleton 1398

Grave dimension: 2.10 × 0.90 × 0.40m
Burial position: ESE–WNW, extended, supine, partial articulation: decapitated. The head was placed face down next to the bottom half of the left tibia, with the base facing north. The right arm was flexed at the elbow to bring the hand around the left side. The right arm was slightly away from the body at the shoulder and slightly flexed at the elbow to bring the hand over the left pelvis. Both legs were extended.
Grave goods: none
Age: adult 18+ years' old (possible young adult)
Morphological sex: male
Percentage of skeleton present: 34%
Preservation grade: variable, 4–5
Level of fragmentation: 3
Taphonomy: 'sandpaper' concretions on the bone
Trauma: none identified
Skeletal pathology: none identified
Other skeletal observations: none identified
Dental Pathology: dental calculus (labial, buccal, lingual)

—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
—	—	—	—	*l*	*l cl*	*l*	—	—	—	*l cl*	*l*	*l*	*l*	—	—

Feature 964, Skeleton 1641

Grave dimension: 1.80 × 0.82 × 0.12m
Burial position: ESE–WSW, extended, indeterminate position. Partial articulation. The grave cut was sufficient only to accommodate the inhumation of the lower half of the body; both legs were extended to bring the ankles together.
Grave goods: none
Age: young adult, 18–25 years' old
Morphological sex: indeterminate
Percentage of skeleton present: 5%
Preservation grade: variable 4
Level of fragmentation: 4
Taphonomy: truncated
Trauma: none identified
Dental Pathology: elements not present
Skeletal pathology: none identified
Other skeletal observations: none identified

Feature 965, Skeleton 1644

Grave dimension: 1.85 × 0.55 × 0.12m
Burial position: ESE–WNW, extended, supine. Partial articulation: decapitated. The head was placed below the feet, face down, with the base facing northwards. The left arm was slightly away from the body and flexed at the elbow to bring the hand over the sacrum. The right arm

was flexed at the elbow to bring the hand over the left clavicle. Both legs were extended to bring the knees and feet together. The feet pointed southwards.

Grave goods: miniature head necked flagon placed above the right shoulder
Age: old mid adult, 33–45 years' old
Morphological sex: male
Percentage of skeleton present: 29%
Preservation grade: 5
Level of fragmentation: 4
Taphonomy: bone was delaminated
Trauma: none identified
Skeletal pathology: none identified
Other skeletal observations: none identified
Dental Pathology: none identified

—	—	*b*	*r*	*r*	—	—	—	—	—	—	*l*	*l*	*r*	—	—
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
x	*x*	*x*	*x*	—	—	—	*l*	*l*	—	—	—	—	—	—	—

INHUMATIONS IN CEMETERY 3

Plans of all burials in Cemetery 3 are shown in Figure S6.5.

Feature 940, Skeleton 1333

Grave dimension: c.2.2 × c.0.6 × ?m
Burial position: SSW–NNE, extended supine, partial articulation
Grave goods: none
Age: adult 18+ years' old
Morphological sex: indeterminate
Percentage of skeleton present: 13%
Preservation grade: variable 3–4
Level of fragmentation: 4
Taphonomy: none identified
Trauma: none identified
Skeletal pathology: none identified
Other skeletal observations: none identified
Dental Pathology: elements not present

Feature 941, Skeleton 1337

Grave dimension: 1.80 × 0.65 × 0.18m
Burial position: SSW–NNE, extended, supine, partial articulation: decapitated. The skull lay between the ankles face down with the base of the skull facing south. Both arms lay across the body. The left arm was flexed at the elbow to bring the hand beneath the right elbow. The right arm was flexed at the elbow to bring the hand over the upper half of the left humerus. Both legs were extended.
Grave goods: miniature flagon placed at the right shoulder
Age: mature, c.49 years' old
Morphological sex: female
Genetic sex: XX
Mitochondrial DNA haplogroup: no data
Percentage of skeleton present: 57%
Preservation grade: variable 2–3
Level of fragmentation: 3
Taphonomy: 'sandpaper' concretions on the bone
Trauma: healed skull fracture [1]

[1] A healed frontal bone fracture 4.40mm superior to the frontal nasal suture with large callus formation within the right sinus. See the discussion on 'Fractures' in Section 5.

Skeletal pathology: possible dietary disorder [2]

[2] Porotic hyperostosis over supraorbital ridges; cribra orbitalia in the left orbit.

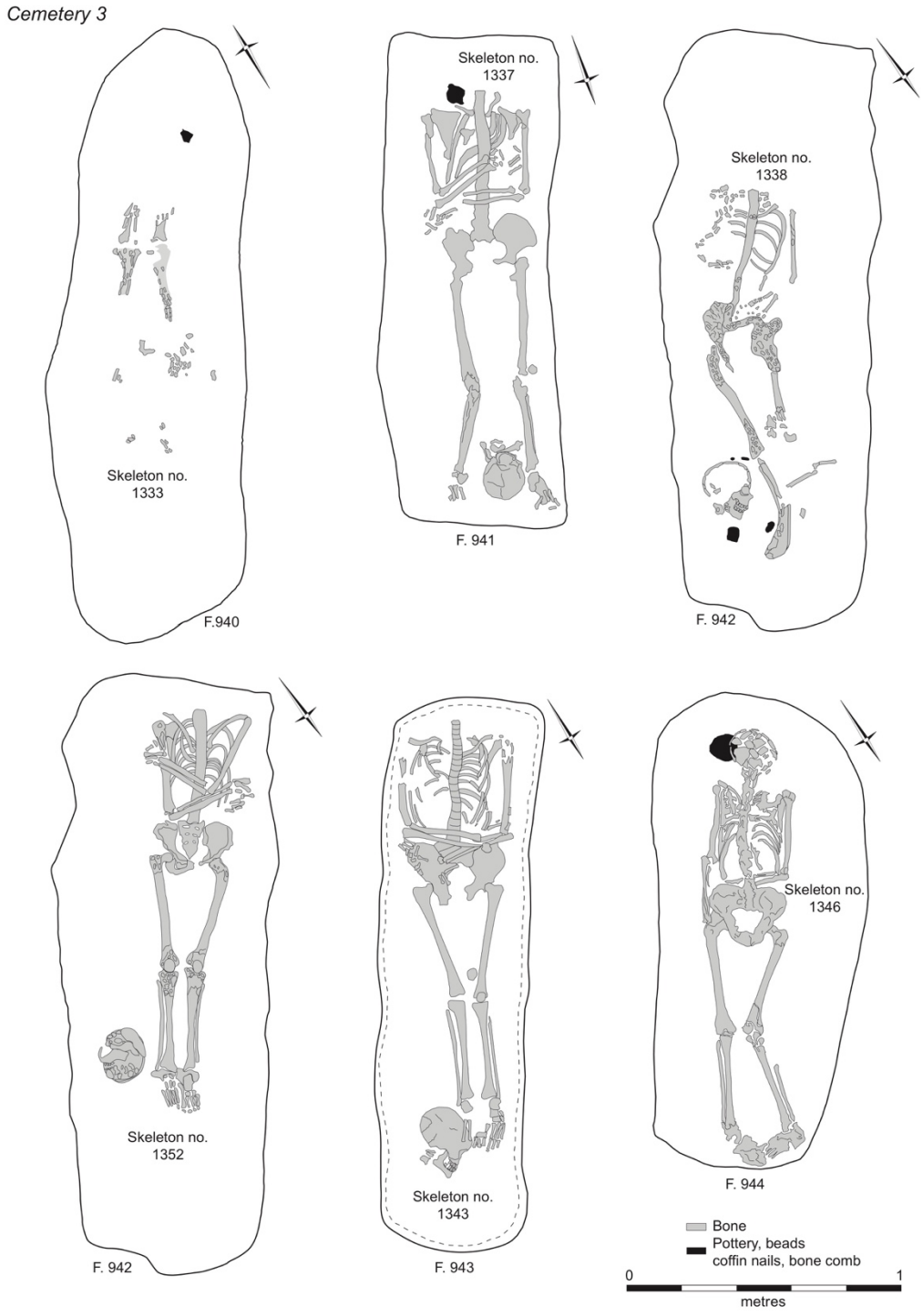


Figure S6.5a Plans of inhumation burials in Cemetery 3

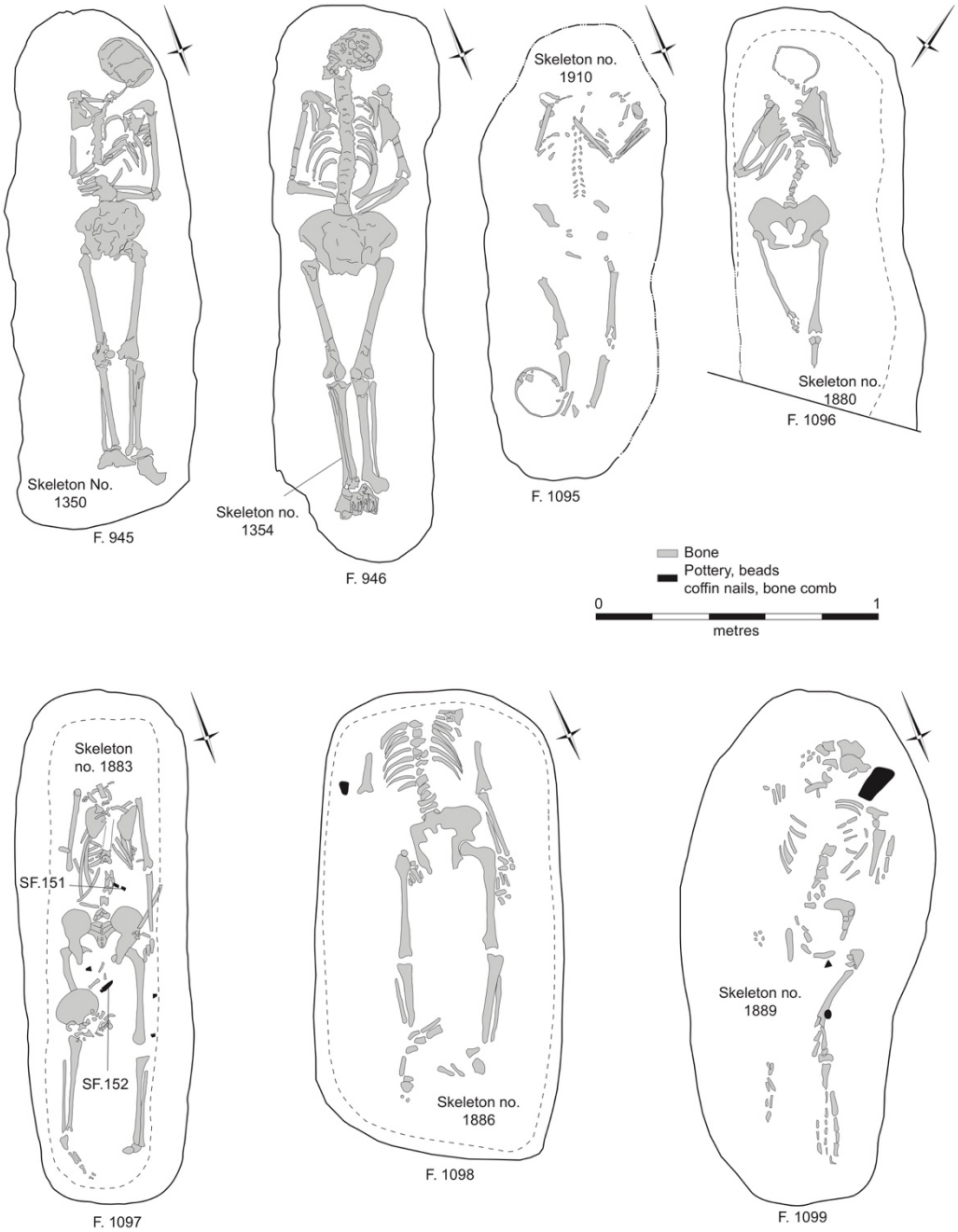


Figure S6.5b Plans of inhumation burials in Cemetery 3

Other skeletal observations: age-related degeneration and osteoarthritis in the right hip.

[3] Bilateral age-related changes in the temporomandibular joint. Marginal lipping around left glenoid fossa. A moderate enthesophyte (traction spur) on left ulna olecranon, which is widely assumed to develop in response to high tensile forces within a tendon or ligament[229], and may have been a source of substantial elbow pain[230]. Lipping around left radial tuberosity was noted. Spondylophytes were recorded on the lower cervical, upper thoracic and lower lumbar vertebrae and sacral S1. Vertebral endplate micro/macroporosity was noted. Microporosity was noted over right acetabular fossa, particularly posteriorly. Eburnation over the posterior surface of the right femoral head with associated microporosity. Slight to moderate osteophyte formation around a tibial medial condyle fragment with non-eburated impressed grooves on the plateau, orientated in an anterior-posterior direction. The largest of these grooves is 6.77mm width. Calcification/fusion of the lateral sesamoid bone for the left first metacarpal. This may have been symptomatic as a tender mass around the metacarpophalangeal joint[231].

Dental Pathology: large caries [4]; trauma [5]; slight to moderate dental calculus

[4] Large interproximal caries.

[5] Occlusial chip to tooth (9).

—	*l r*	*cl*	*l*	*/*	*b*	*l cl*	*l*	*l t*	*l*	*/*	*l*	*l*	*/*	*l*	*l*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
x ab	*ca ab*	*/*	*l*	*l cl*	*l*	*l*	*l*	*l*	*l*	*l*	*l cl*	*l*	*x*	*l*	*l cl*

Feature 942, Skeleton 1338

Grave dimension: 2.17 × 0.75 × 0.24m

Burial position: SSW–NNE, supine, partial articulation: decapitated. The skull was placed next to the right knee on its left side, facing north. The left arm was flexed at the elbow to bring the hand over the sacrum. The right arm was flexed at the elbow to bring the hand over the distal end to the left humerus. Both legs were extended, with the right foot over the left. The position is possibly consistent with burial in a shroud.

Grave goods: none

Age: old mid adult, 33–45 years' old

Morphological sex: male

Genetic sex: XX

Mitochondrial DNA haplogroup: H3+152

Percentage of skeleton present: 37%

Preservation grade: variable 2–3

Level of fragmentation: 34

Taphonomy: 'sandpaper' concretions on the bone

Trauma: none identified

Skeletal pathology: none identified

Other skeletal observations: age-related degeneration in the right hip [1]

[1] Moderate marginal lipping around the lateral margin of the right femoral head.

[229] Benjamin *et al.* 2006

[230] Alvi *et al.* 2014

[231] Wood 1984

Dental Pathology: caries [2]; enamel hypoplasia [3], antemortem tooth loss.

[2] Interproximal, cervical and root caries.

[3] Shallow furrow form defect to tooth (9). The macroscopic estimation of the decile location indicates development at 3.3–3.7 years' of age.

l ca	*l*	*x*	*l ca*	*l*	*/*	*/*	*l ca*	*l ca hy*	*/*	*/*	*l*	*l*	*/*	*/*	*/*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
l ca	*/*	*/*	*l*	*l*	*/*	*/*	*/*	*/*	*/*	*r*	*l*	*l*	*/*	*l*	*l*

Feature 942, Skeleton 1352

Grave dimension: 2.17 × 0.75 × 0.24m

Burial position: SSW–NNE, supine, partial articulation: decapitated. The individual had been decapitated before being placed in hard up against the southern limit of the grave. The head was placed upside down, leaning slightly on its left side next to the bottom half of the right tibia/fibula. Both arms were crossed across the body. The right arm was flexed at the elbow to bring the hand around the side of the lower right ribs. The left arm was flexed at the elbow (which rested over the right radius) to bring the hand over the top half of the right humerus. Both legs were extended, with the feet together. The position is consistent with burial in a shroud.

Grave goods: none

Age: young mid adult, c.31 years' old

Morphological sex: female

Percentage of skeleton present: 78%

Preservation grade: variable 3–4

Level of fragmentation: 3

Taphonomy: mid greyish brown discolouration to the bones

Trauma: a fracture to elbow [1]

[1] Partially-healed avulsion fracture of the right lateral epicondyle. See the discussion on 'Fractures' in the general discussion

[2] Porotic/spiculated distal end to the first distal foot phalanx.

Skeletal pathology: none identified

Other skeletal observations: pressure facet on the right ankle (1), osteoarthritis (2) tendon expression (3)

[1] An anterolateral pressure facet noted on right tibia. Slight to moderate eburnation over the tibial talar facet, especially posteriorly with medially coalescing porosity.

[2] Slight to moderate eburnation over the anterior margin of the trochlear surface of the right talus with a faceted/eburnated area over the lateral portion of the neck[232]. See the discussion on 'Eburnation' in Section 5 for details.

[3] enthesophyte formation around the anterior articular process for the odontoid process. See the discussion on 'Fractures' in Section 5 for details.

[232] Ari *et al.* 2003; Singh 1959

Dental Pathology: antemortem tooth loss, occlusal caries, heavy occlusal attrition [5]

[5] Heavy mandibular incisor attrition to root, especially lingually on teeth (26) and (23).

—	—	—	—	—	—	—	*l*	*l*	*l*	/	*l*	*l*	/	*l*	*l ca*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
ne	*x*	*x*	*l*	*l*	/	*l*	*l*	*l*	*l*	*l*	*r ca*	*l*	*x*	*b ca*	*ne*

Feature 943, Skeleton 1343

Grave dimension: 2.00 × 0.60 × 0.10–0.20m

Burial position: SSW–NNE, extended supine, partial articulation: decapitated. The individual had been decapitated before being placed in hard up against the southern limit of the grave. The head was placed in the grave first with the right foot resting over the right side of the skull's frontal bone. The skull was placed on its left side facing north. The left arm was flexed at the elbow to bring the hand to rest over the right pelvis. The right arm was flexed at the elbow to bring the hand over the left elbow. The legs are extended with the knees and ankles drawn together. The position is consistent with burial in a shroud.

Grave goods: none

Age: old mid adult, 33–45 years' old

Morphological sex: male

Genetic sex: XY

Mitochondrial DNA haplogroup: H17

Percentage of skeleton present: 65%

Preservation grade: 1

Level of fragmentation: 3

Taphonomy: 'sandpaper' concretions on the bone.

Trauma: sword trauma to the skull: four chop marks [1] (Figure S6.6)

[1] On refitting the skull, two cut marks to the occipital bone and one to the right parietal were noted. The inferior occipital mark (A) was located obliquely from the inferior left lateral aspect of the occipital protuberance and across the median nuchal line. At 11.36mm length, the superior wall of the cut mark was smooth and vertical with a sharp side and straight floor (or 'kerf'); the inferior wall was rough. The superior mark, (B) was parallel to (A) 30mm right and posterior to the lambda. At 11.36mm length, it could only be partially reconstructed. The inferior wall was smooth and vertical with a sharp side. A cut mark centred over the right parietal angle where it meets the lambda was noted whilst under excavation (C). This excised a roundel of bone, which would have exposed the dura mater. Although this could not be reconstructed, the posteroinferior wall of the cut mark was steep to penetrate through the diploë and inner table. The superoanterior wall was rough, and the longitudinal morphology of the mark tapered anteriorly. The largest cut mark (D), was made perpendicular to cut mark (C). Although a full reconstruction could not be made due to sullegic factors, it was approximately 44mm long. The inferior wall was steep and smooth with a straight floor. Postero-superiorly, the mark appeared to produce an irregular roundel of bone, incising the diploë, but not the inner table. All four of these marks are consistent with the action of a sword[233]. These injuries would have been traumatic, with mark (C) possibly damaging the dura mater. Mark (D) possibly damaged a superoposterior branch of the superficial temporal artery but would not have been fatal. There were no obvious signs of defensive wounds to the arms or hands, which suggests that the head was deliberately targeted, designed to quickly disorientate and incapacitate to prevent retaliation[234]. The absence of any inflammatory reaction or osteogenic healing suggests this occurred perimortem.

[233] Lewis 2008
[234] Powers 2005

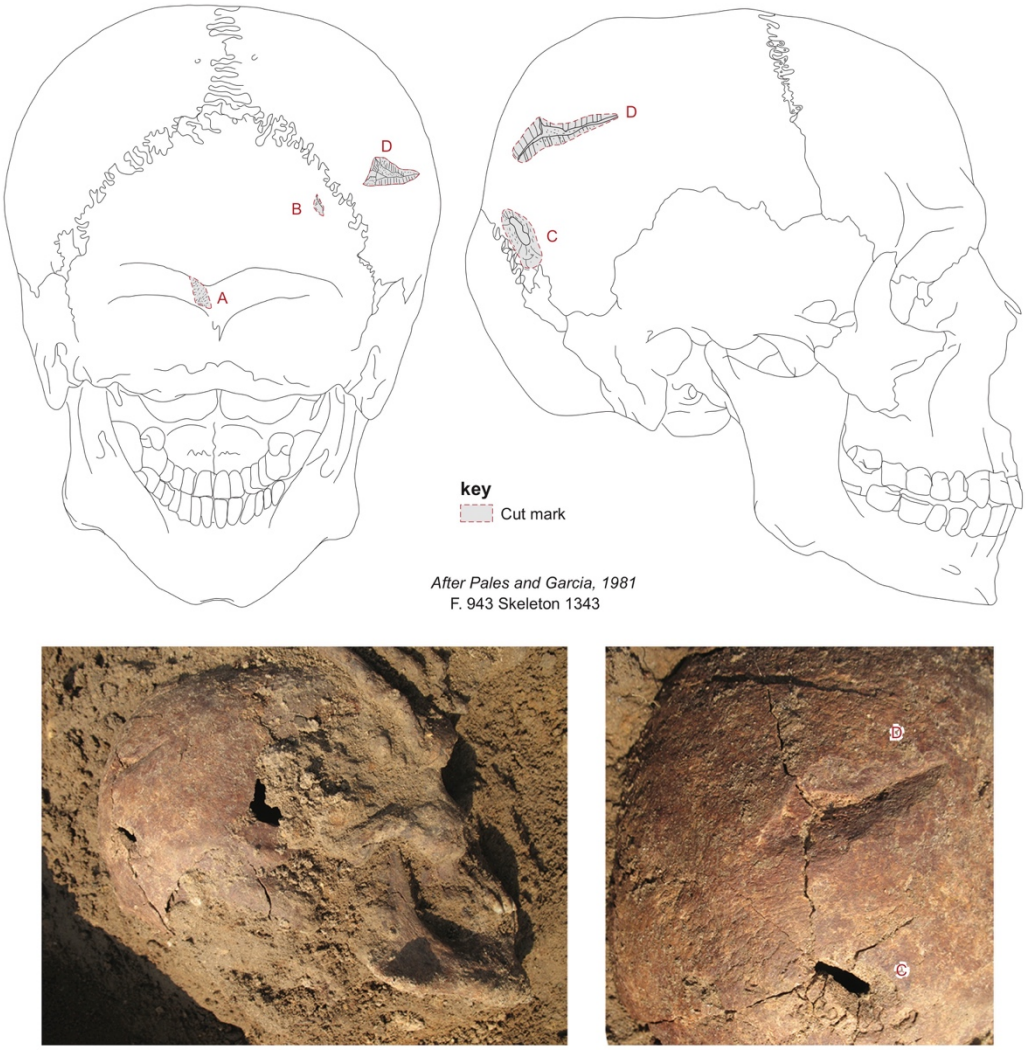


Figure S6.6 Cut marks to the skull of Skeleton 1343, F.943

Skeletal pathology: none identified
Other skeletal observations: age related degeneration in the lower spine and sacrum [2]

[2] Degenerative changes were noted in the lower throracic and lumbar vertebrae, as well as macroporosity over the sacrum (S1) endplate. The presence of small Schmorl's nodes on the vertebrae support the aging of this individual. The condition is essentially a physiological process rather than a disease and often inevitable where to a constant erect posture puts continuous increased pressure on the spine[235]. Functionally, it is a herniation of nucleus pulposus through the cartilage and bone into the body of the adjacent vertebra. Though these lesions are often asymptomatic,

[235] Ombregt 2013

they are highly heritable[236] and can cause back pain when the herniation into the vertebral marrow irritates a nociceptive system[237].

Dental Pathology: moderate dental calculus, caries [3]; periodontal disease [4]; enamel hypoplasia [5]; antemortem tooth loss.

[3] Occlusal caries.

[4] Periodontal disease was noted around the alveolar margin of the lower right third molar (32) mostly lingual, extending mesially around the margin for tooth (31) and characterised by microporosity and sclerotic bone, (notably in the form of a small hamartoma). It is caused by a variety of pathogenic agents that are found in oral biofilms, such as dental plaque (a precursor to calculus), which result in inflammation and destruction of gum tissue (gingiva), the periodontal ligament, root cementum, and alveolar bone[238].

[5] Shallow furrow form defect to tooth (8). The decile location of the furrow form defects indicates development at 3.4–3.8 years' of age.

—	—	—	*p*	*p*	*p*	*cl*	*cl hy*	*cl st*	*cl st*	*cl*	*r*	*cl*	*p*	*cl*	—
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
st cl	*/*	*/*	*ca*	*cl*	*cl*	*cl*	*p*	*p*	*p*	*p*	*p*	*p*	*x*	*x*	*/*

Feature 944, Skeleton 1346

Grave dimension: 1.70 × 0.73 × 0.16m

Burial position: SSW–NNE, extended prone, full articulation. The head was rotated slightly westwards. The right arm was flexed to bring the hand in front of the left pelvis; the left arm was extended beside the body to bring the hand in front of the left leg. Both legs were extended, with the knees together.

Grave goods: Miniature jar placed against the left side of head

Age: mature, c.70 years' old

Morphological sex: probably male

Genetic sex: XX

Mitochondrial DNA haplogroup: H3

Percentage of skeleton present: 67%

Preservation grade: 2

Level of fragmentation: 3

Taphonomy: dark grey mottling on the inner surface of the cranium; 'sandpaper' concretions on the bone

Trauma: possible curvature of the upper spine [1]

[1] Bilateral fracture of a cervical body at the pedicle junction, with trauma to the superior endplate and anterior surface. Possible cervical kyphosis. See discussion.

Skeletal pathology: endocranial osteoma [2], possible masticatory trauma [3]

[2] There is a lozenge-shaped endocranial button lesion left of the superior apex of the frontal crest (of the frontal bone) which measures 9.18mm long and 4.40mm wide.

[3] There is minor spiculation over the palatine process, which indicates minor trauma. See discussion.

[236] Williams *et al.* 2007
[237] Kim & Jang 2018
[238] Dewitte & Bekvalac 2011

Other skeletal observations: age-related degeneration in the left hand [4]; osteoarthritis [5]; possible 'knock knee' [6]

[4] Significant marginal lipping around the left and right first metacarpals and the head of the first proximal phalange of the left hand.

[5] Macroporosity of a cervical inferior articular facet. Moderate spondylophytes over surviving lower thoracic and lumbar body fragments. Ankylosis between two thoracic/lumbar body fragments around the anterior margin.

[6] Moderate lipping around a condyle fragment of the tibia. In its inhumed position, the right leg presented as a coronal plane deformity, i.e. the femur was externally rotated so the knee was medially deviated, giving the appearance of genu valgum, otherwise known as 'knock knee'. Clinically, nutritional rickets is the leading cause of coronal plane deformities in children in developing nations, whereas trauma is probably the leading cause of pathologic genu valgum in developed nations[239].

Dental Pathology: unusual and significant occlusal wear; interproximal caries; significant antemortem tooth loss.

p	*p*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	—	—	—
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
—	*p*	*x*	*x*	*x*	*l*	*l*	*l ca*	*l ca*	*l ca*	*l ca*	*x*	*x*	*x*	*x*	*p*

Feature 945, Skeleton 1350

Grave dimension: 1.80 × 0.75 × 0.20m
Grave furniture: box burial
Burial position: SSW–NNE, extended prone, full articulation. The head was slightly rotated to face north. The left arm was flexed at the elbow to bring the hand over the upper half of the right humerus. The right arm was flexed at the elbow to bring the hand below the left elbow. Both legs were extended, with the feet pointing north west. The position is consistent with burial in a shroud.
Grave goods: none
Age: young middle adult, c.34 years' old
Morphological sex: probably female
Genetic sex: consistent with XY but not XX
Mitochondrial DNA haplogroup: no data
Percentage of skeleton present: 79%
Preservation grade: variable 1–2
Level of fragmentation: 3
Taphonomy: none identified
Trauma: none identified
Skeletal pathology: vitamin deficiency [1]

[1] Cribra orbitalia, which is seen in both orbits of this individual.

Other skeletal observations: none identified

[239] Gautam *et al.* 2013

Dental Pathology: caries (1), periapical abscesses (2), periodontal disease 93), tooth staining 94)

[2] Large interproximal caries involving teeth (30) and (29).

[3] Periapical abscess 3.41mm posterior to the right mental foramen involving the mesiobuccal root of tooth (30). Healing abscess for tooth (14).

[4] Periodontal disease of alveolar bone involving teeth (14) and (15).

[5] Mid orangey-red staining on the labial, buccal, occlusal and lingual surfaces of the right dental arcade.

ne	*l*	—	*b*	*l*	*l*	*l*	*l*	*l*	*l*	*l*	*l r*	*p r*	*p r ab*	*p ab*	—
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
l	*l*	*l c ab*	*l ca*	*l*	*l*	*l*	*l*	*l*	*l*	*l*	*l*	*l*	*l*	*l*	*l*

Feature 946, Skeleton 1354

Grave dimension: 2.04 × 0.59 × 0.25m

Burial position: SSW–NNE, extended prone, full articulation. The head was rotated slightly to face east. The right arm was flexed at the elbow to bring the hand over the sacrum. The left arm was flexed at the elbow to bring the hand towards the proximal end of the right radius. Both legs were extended with the knees and ankles drawn together. The position is consistent with burial in a shroud.

Grave goods: none

Age: mature, c.48 years' old

Morphological sex: female

Genetic sex: XX

Mitochondrial DNA haplogroup: H26

Percentage of skeleton present: 60%

Preservation grade: variable 1–3

Level of fragmentation: 4

Taphonomy: truncated, mid-light grey mottling, mid brown discolouration to bones

Trauma: ligament tear in the right leg [1]

[1] Probable avulsion of the short head origin of the biceps femoris (lateral side of posterior right femur). See discussion

Skeletal pathology: none identified

Other skeletal observations: age-related degeneration [2, 3, 4]; osteoarthritis of the left elbow and wrist [5]

[2] Osteophyte formation on the anterior side of the mandibular fossa of the right temporal bone (i.e. degeneration of the temporomandibular joint) spondylophyte formation around a cervical body fragment and a right superior articular facet. Cervical endplate macroporosity (max 2.76mm). Thoracic endplate microporosity, minor thoracic spondylophytes, becoming moderate in lower thoracic/lumbar body fragments

[3] Exostoses and marginal lipping for the distal interphalangeal collateral ligament of the left and right hands as well as for the right second metacarpal head. Hypertrophied phalangeal tufts of the right hand.

[4] Large mastoid air cell.

[5] Eburnation of the left humeral capitulum with associated micro- and macroporosity with associated eburnation on the medial side of the left radial articular fovea with an inferiorly-directed osteophyte on the medial side of the head. Marginal lipping around the left ulna olecranon. Slight eburnation of the radial facet of the left lunate, significant eburnation of the left trapezium, occurring over the facets for the first metacarpal, scaphoid and trapezoid.

Dental Pathology: antemortem tooth loss; caries [6]; enamel hypoplasia [7]

[6] Cervical and interproximal caries.

[7] Tooth (8) has a labial plane form defect: hypoplastic resulting from trauma to the deciduous predecessor (approximately 4.45mm S-I length, c.0.82mm width).

—	*l*	—	—	—	—	—	*l*	—	—	*l*	—	—	—	—	—
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
x	*l ca*	*x*	*l*	*l ca*	*l hy*	*l*	*l*	—	—	—	—	—	—	—	—

Feature 1095, Skeleton 1910

Grave dimension: 1.80 × 0.65 × 0.10m
Burial position: SSW–NNE, extended, prone, partial articulation: decapitated. The head was placed base down next to the bottom half of the left tibia to face northwest. The left arm was flexed at the elbow to bring the hand over the right clavicle. The right humerus was extended, but there was nothing left of the lower right arm. Both legs were extended.
Grave goods: none
Age: old mid adult, 33–45 years' old
Morphological sex: possibly female
Genetic sex: not assigned
Mitochondrial DNA haplogroup: no data
Percentage of skeleton present: 30%
Preservation grade: variable 3–4
Level of fragmentation: 4
Taphonomy: post-mortem movement, possibly due to ploughing
Trauma: none identified
Skeletal pathology: possible anaemic disorder [1]

[1] Localised hyperostotic extracranial extension which is porotic and sclerotic. Porosity is coalescing in places, ranging from 0.5–2mm diameter. Outer table is seen preserved in some fracture margins. Thalassemia? See discussion.

Other skeletal observations: none identified
Dental Pathology: caries [2]; enamel hypoplasia [3]; habitual wear [4]

[1] Interproximal caries

[2] Shallow furrow form defect to teeth (5) and (6). The macroscopic estimation of the decile locations indicates development at 4.2–4.7years' of age.

[3] Habitual wear of an upper premolar (unsided)

—	—	—	*l ca*	*l ca hy*	*l hy*	—	—	—	—	—	—	—	—	*l*	—
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
—	—	—	*l*	*l*	*l*	*l*	*/*	*/*	*l*	*/*	*l*	—	*l ca*	—	—

Feature 1096, Skeleton 1880

Grave dimension: 1.70 × 0.70 × 0.10m
Burial position: SE–NW, extended, prone, ?full articulation. The right arm was flexed at the elbow to bring the hand over the left side of the body. The left arm was flexed at the elbow to bring the hand in the region of the right elbow. Both legs were extended to bring the knees together. The position is consistent with burial in a shroud.
Grave goods: none
Age: young adult, 18–25 years' old (towards higher end of scale)
Morphological sex: possibly female
Genetic sex: not assigned
Mitochondrial DNA haplogroup: no data
Percentage of skeleton present: 47%
Preservation grade: variable 3–4
Level of fragmentation: 4
Taphonomy: the skeleton has been truncated below the knees; the bone is delaminated; there is 'sandpaper' concretion on the bones
Trauma: none identified
Skeletal pathology: Possible anaemic disorder [1]

[1] Cribra orbitalia in both orbits; porotic hyperostosis over posterior fragments of parietal

Other skeletal observations: Age-related degeneration [2]; osteoarthritis of the right wrist [3]

[2] Moderate endplate microporosity to vertebral body fragments. Bilateral moderate microporosity of the acetabular fossae. Bilateral moderate porosity over the humeral heads. Bilateral moderate porosity over the femoral heads.

[3] Eburnation of the MC1 and MC2 facets of the right trapezium.

Dental Pathology: dental calculus [4]; caries [5]

[4] Considerable labial and buccal dental calculus.

[5] Occlusal and interproximal caries.

b st	*b*	*p cl*	*p cl*	*p cl*	*p cl*	*p cl*	*p cl*	*p cl*	*p cl*	*p cl*	*p cl ca*	*p st*	*p st*	*p*	*l*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
b	*p ca*	*p cl*	*p cl*	*p cl*	*p cl*	*p cl*	*p cl*	*p cl*	*p cl*	*p*	*p cl*	*p cl*	*p cl*	*p*	*p*

Feature 1097, Skeleton 1883

Grave dimension: 1.95 × 0.55–0.65m × 0.4m
Burial position: SSW–NNE, extended, prone, partial articulation: decapitated. The skull and upper cervical vertebrae were placed vertically over the bottom third of the right femur, facing look eastwards. The left upper limb was flexed at the elbow to bring the hand underneath the right chest. The right upper limb was extended to bring the hand next to the right hip. Both lower limbs were extended.
Grave goods: none. A bone comb was found broken into three pieces (behind the decapitated head, in the abdomen, and under the spine). It is interpreted as being on the body when decapitated, rather than being a deliberate grave offering.
Age: mature, c.63 years' old
Morphological sex: probably female
Genetic sex: XX
Mitochondrial DNA haplogroup: no data
Percentage of skeleton present: 45%

Preservation grade: variable 2
Level of fragmentation: 3
Taphonomy: 'sandpaper' concretion on bone, rare splitting of bones.
Trauma: cut marks to the mandible, cranium, clavicle, upper upper limbs and thighs [1, 2]; hip injury, possibly incurred during sub-adult years [3] (Figure S

[1] Glancing through-cut of the right mastoid process and suprameatal crest. One 'chop' mark into the right mandibular ramus, directed anteriorly. Two parallel cut marks across the condylar neck of the right mandible: superior mark: 10.55mm length, inferior mark: 6.14mm length. One fine cut mark, 4.43mm length on the posteroinferior border of the mandible, located below the left canine.

[2] Left clavicle: Two fine cut marks (c.1.2mm length) across the long axis of the superior and posterior borders.
Left and right humeri: multiple fine cut marks obliquely across the long axis over the posterior surfaces ranging between 5–17mm and 10–40mm length respectively.
Left radius: four fine equidistant cut marks (ranging 1–2mm length) on the posterior surface, across the long axis located lateral to the radial tuberosity.
Right radius: two fine cut marks (ranging 1–2mm length) on the posterior surface across the long axis, located lateral to the radial tuberosity.
Left femur: multiple fine cut marks across the long axis of the posteromedial surface.

[3] A bilateral developmental anomaly of the ilio-ischial ossification of the acetabulum was noted; this likely related to an injury of the triradiate cartilage during this individual's sub-adult years'. Clinically, there are multiple scenarios for how this injury occurs, though frequently it is a result of a high energy trauma[240]. The injury can be continuous and progressive or have an insidious onset up to 20 to 30 years' afterwards, resulting in a decreased range and pain with motion. Alternatively, this could have resulted from an 'overuse' injury during early adolescence, due to a rapid and sustained increase in (athletic) activity and a malalignment from sustained femoral anteversion and foot hyperpronation[241].

Skeletal pathology: possible anaemic disorder [4]

[4] Slight porotic hyperostosis was noted over the supraorbital margin and supercillary ridges,

Other skeletal observations: osteoarthritis [5]

[5] Osteoarthritic changes were noted with the slight eburnation with coalescing porosity of two cervical body fragments and slight eburnation of a lumbar right inferior articular facet. Moderate spondylophytes around the right side of the sacral promontory was also noted, which may have related to the ilio-ischial ossification.

Dental Pathology: tooth staining [6], abscess [7].

(6) A mid orangey-red labial surface stain

(7) Periapical abscess within the socket of the upper left incisor (11) was noted. This would have been the result of a persistent presence of infective material within the root and around the apex of a tooth. Tissue liquefaction and an accumulation of pus would have caused pain and tenderness of the tooth to pressure. Before the introduction of antibiotics, dental abscesses were a leading cause of mortality[242]. Moderate occlusal wear to eight surviving teeth was noted.

—	—	*l, ca*	/	/	*l?*	*p*	*l, ca, st*	*l*	*p*	*p*	*p*	—	—	—	—
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
—	*x*	*x*	*r?*	*r?*	/	/	/	/	*l*	*l*	*l*	*l*	*x*	*x*	—

[240] Liporace *et al.* 2003
[241] Ergen *et al.* 2012
[242] Clarke *et al.* 1986; Robertson & Smith 2009

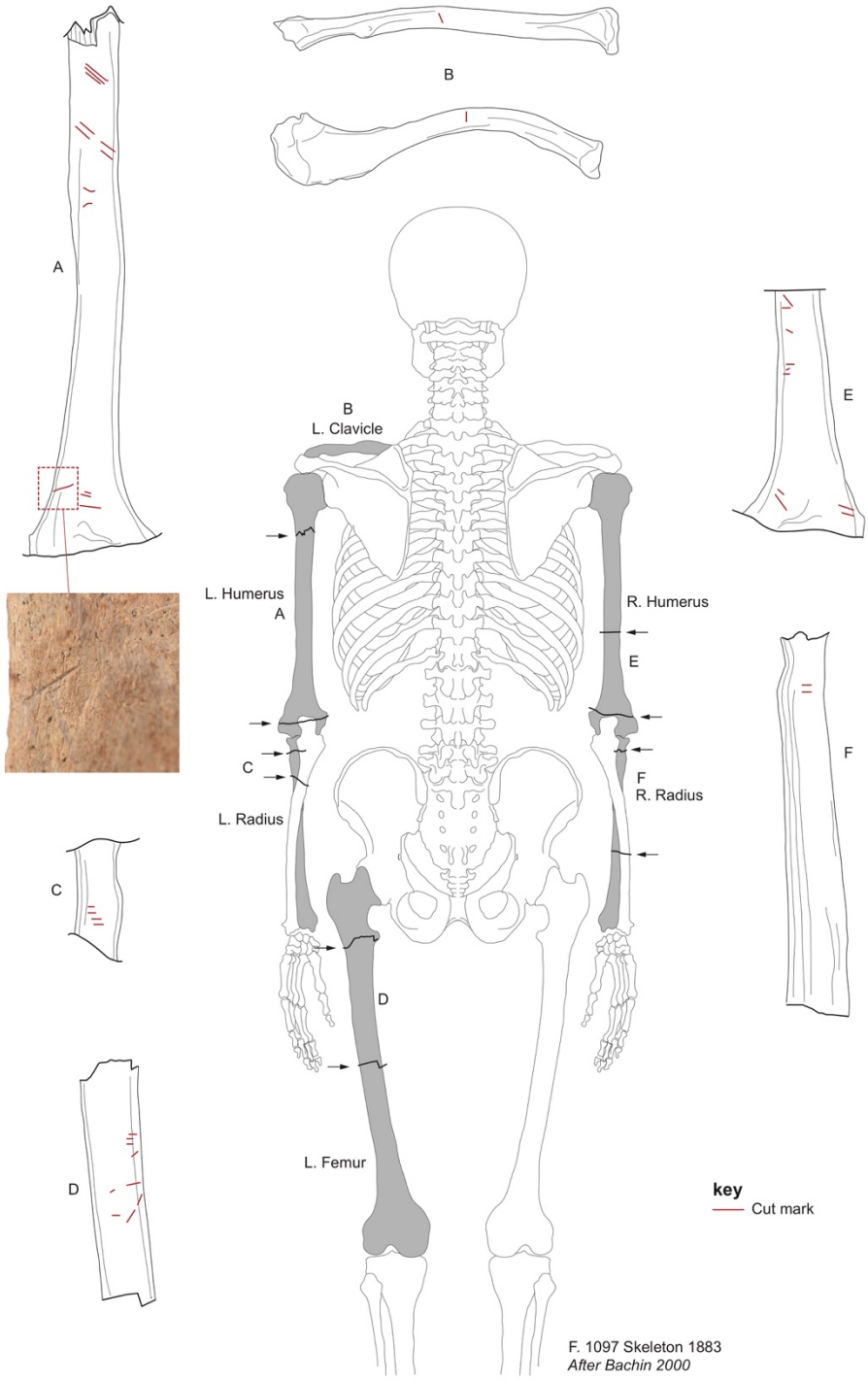


Figure S6.7a Cut marks to Skeleton 1883, F.1097

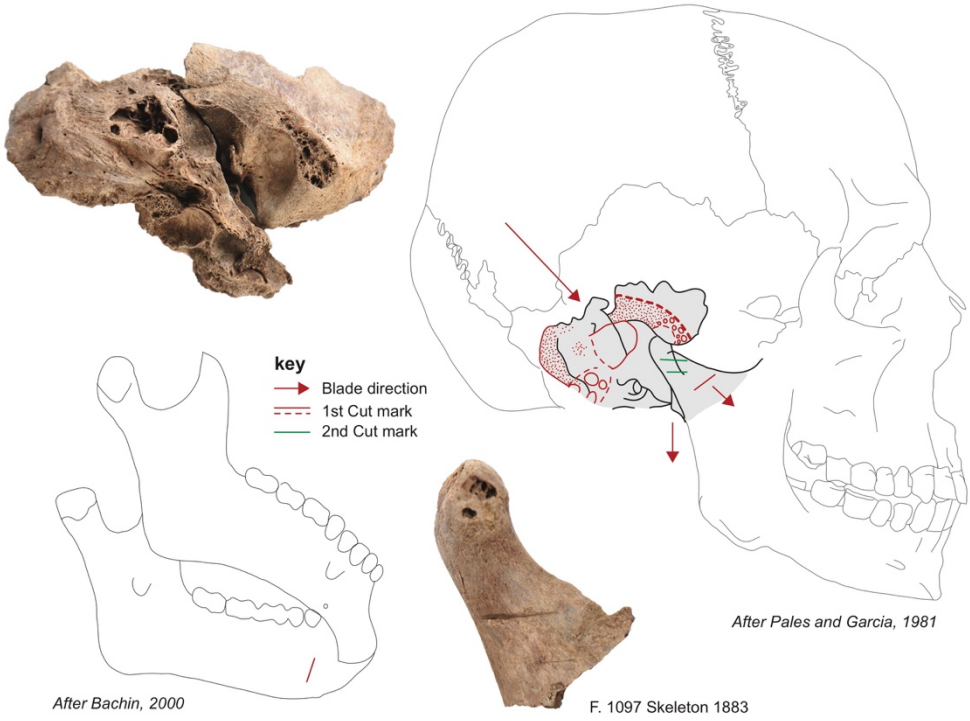


Figure S6.7b Cut marks to Skeleton 1883, F.1097

Feature 1098, Skeleton 1886

Grave dimension: c.1.80 × 0.9 × 0.13m
Burial position: SSW–NNE, extended, supine, partial articulation: possibly decapitated—the skull was missing. The left arm was extended to bring the hand next to the left leg. Both legs were extended.
Grave goods: none
Age: mid adult, 26–45 years' old
Morphological sex: possibly male
Percentage of skeleton present: 23%
Preservation grade: variable 2–3
Level of fragmentation: 4
Taphonomy: none identified
Trauma: none identified
Skeletal pathology: cyst within the hip [1]

[1] Large supra-acetabular cyst (2.5ml) within the left pelvis with associated round and capillary cystic lesions. These occur on the lunate surface and supra-acetabular groove, and range from 1.4 to 3.8mm. See the discussion on 'Other trauma' in Section 5 for more detail.

Other skeletal observations: age-related degeneration [2]

[2] Coalescing porosity over the left proximal radioulnar joint and trochlear notch. Slight left femoro-acetabular impingement: type B.

Dental Pathology: elements not present.

Feature 1099, Skeleton 1889

Grave dimension: 1.68 × 0.58 × 0.11m

Burial position: SSW–NNW extended, prone, ?full articulation. Both arms were flexed at the elbow to bring the hands over the respective shoulders. Both legs were extended.

Grave goods: none

Age: mature, c.50 years' old

Morphological sex: possibly male

Genetic sex: consistent with XX but not XY

Mitochondrial DNA haplogroup: J1c5

Percentage of skeleton present: 28%

Preservation grade: 3

Level of fragmentation: 4

Taphonomy: skeleton truncated.

Trauma: broken finger [1]

[1] Healed fracture of a right proximal phalanx: See discussion.

Skeletal pathology: none identified

Other skeletal observations: developmental anomaly in the mandible [1]; age-related degeneration [2].

[1] Long styloid process (+37.85mm). See Discussion

[2] Considerable spondylophyte formation around the lumbar and sacral vertebral fragments, with coalescing porosity over the endplates. Similar formations were also noted on a cervical fragment.

Dental Pathology: elements not present

Plate 3: F.930, Skeleton 1300 in Cemetery 2.

Plate 4: F.931 Skeleton 1303 in Cemetery 2

Plate 5: F.933 Skeleton 1312 in Cemetery 2

Plate 6: F.935, Skeletons 1314 and 1317 in Cemetery 2

Plate 7: F.938 and F.939, Skeletons 1327 and 1330 in Cemetery 2

Plate 8: F.947, Skeleton 1357 in Cemetery 2

Plate 9: F.948, Skeleton 1360 in Cemetery 2

Plate 10. F.949, Skeleton 1363 in Cemetery 2

Plate 11. F.950, Skeleton 1366 in Cemetery 2

Plate 12. F.951, Skeleton 1369 in Cemetery 2

Plate 13. F.953, Skeleton 1374 in Cemetery 2

Plate 14. F.954, Skeleton 1377 in Cemetery 2

Plate 15. F.955, Skeleton1380 in Cemetery 2

Plate 16. F.957, Skeleton 1386 in Cemetery 2

Plate 17. F.958, Skeleton 1389 in Cemetery 2

Plate 18. F.959, Skeleton 1392 in Cemetery 2

Plate 19. F.960, Skeleton 1395 in Cemetery 2

Plate 20. F.961, Skeleton 1647 in Cemetery 2

Plate 21. F.963, Skeleton 1398 in Cemetery 2

Plate 22. F.964, Skeleton 1641 in Cemetery 2

Plate 23. F.965, Skeleton 1644 in Cemetery 2

Plate 24: F.940 Skeleton 1333 in Cemetery 3

Plate 25: F.941 Skeleton 1337 in Cemetery 3

Plate 26: F.942, Skeleton 1338 in Cemetery 3

Plate 27: F.945 and F.946, Skeletons 1350 and 1354 in Cemetery 3

SECTION 7: LATE IRON AGE AND ROMAN POTTERY

By KATE ANDERSON *and* FRANCESCA MAZZILLI

A total of 2,286 sherds weighting 38,732g were recovered, almost all of them from the Southern Area. More than half dated generically to the second to the fourth centuries (1,204 sherds, 17,656g), although the bulk of these were probably produced and deposited in the first half of this period.

The majority of sherds were unsourced local wares (1,792 sherds, 25,479g)—mostly sandy or shell-tempered wares, but there were also smaller quantities of white wares, colour-coated and slipped wares. Fourteen complete or near-complete vessels were recovered from Late Roman graves (Figure S7.1)

POTTERY SOURCES

Samian ware

A total of 31 sherds weighting 412g were Samian ware. These constituted 1.3% of the assemblage. This low percentage is typical of the small quantities imported onto other Romano-British rural sites in Cambridgeshire, such as Northstowe Phase 1 Area M (1.4%)[243] and North West Cambridge (1.9%)[244].

Nene Valley

A small number of Nene Valley colour-coated ware sherds were recovered: 138 sherds, weighting 2,163g. This was 6% of the assemblage, which is similar to other rural sites in Cambridgeshire, such as 7.1% at Northstowe Phase 1 Area M[245].

Of note is the large number of late Roman beakers, almost all of them miniatures, in graves. This contrasts with the absence of Nene Valley bowls and dishes from the same period, even though they are extremely common on other rural sites in Cambridgeshire, such as Northstowe Phase 1 Area M[246].

The Nene Valley was also the source of middle Roman grey wares (91 sherds, 2,628g) and white wares (16 sherds, 1229g), and a complete late Roman parchment ware flagon (200g) found in Grave F.938.

Horningsea

A total of 187 sherds of Horningsea ware were found, weighting 5,285g. They spanned the early Roman period to second–fourth centuries and constituted 8.1% of the assemblage. This is an extremely common coarse ware in Cambridgeshire throughout the Roman period[247].

[243] Mazzilli in Collins 2016a
[244] Perrin, in Evans & Cessford *in prep.*
[245] Mazzilli, in Collins 2017
[246] Mazzilli, in Collins 2017
[247] Evans *et al.* 2017; Mazzilli, in Collins 2017; Mazzilli, in Aldred *forthcoming*

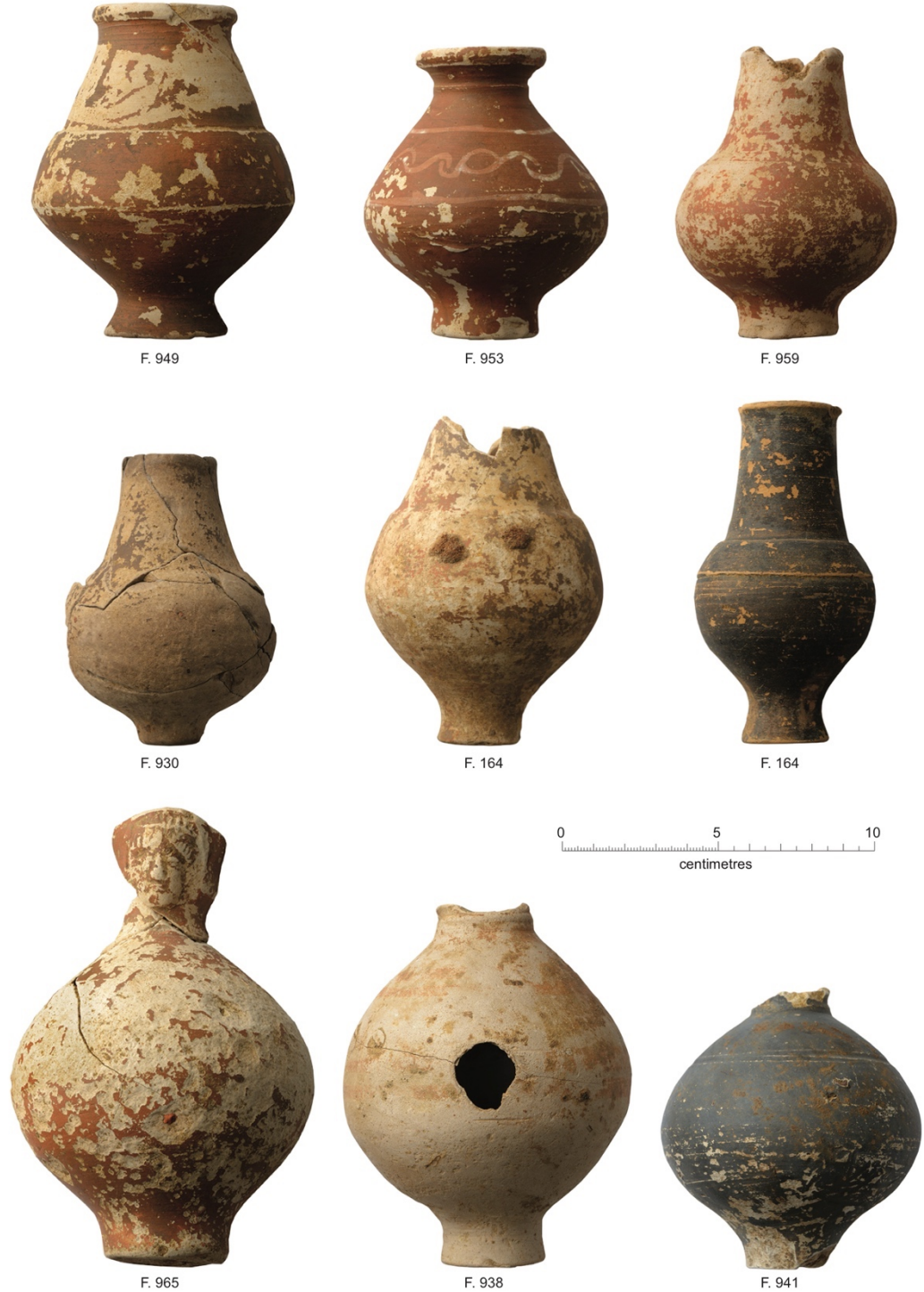


Figure S7.1a Fourteen whole pots recovered from the Late Roman graves

Figure S7.1b Fourteen whole pots recovered from the Late Roman graves

Other minor sources

Only a few fragments were recovered from other identifiable sources, including Colchester, Verulamium, West Stow, Mancetter-Hartshill, Brampton, Pakemham, Portchester Fabric D and Wattisifeld wares. Of particular note is the absence of late Roman fine wares from Hadham and Oxford, even those these are found across the rural landscape of Cambridgeshire[248].

[248] Mazzilli, in Collins 2017; Mazzilli, in Aldred *forthcoming*; Perrin, in Evans & Cessford *in prep*.

PHASES

Table T7.1: Late Iron Age to Early Roman (mid-first century AD)

fabric	*no. of sherds*	*weight (g)*
Late Iron Age	**40**	**105**
Grog-tempered ware	4	50
Sandy ware	31	46
Shell-tempered ware	5	9
Late Iron Age–AD 50	**2**	**2**
Sandy ware	2	2
Late Iron Age to Early Roman	15	168
Black slipped ware	4	21
Coarse sandy grey ware	4	29
Grog-tempered ware	1	14
Reduced sandy ware	6	104
Total	**184**	**219**

Table T7.2: Early Roman (mid-first to mid-second centuries AD)

fabric	*no. of sherds*	*weight (g)*
Black slipped ware	12	851
Buff sandy ware	6	81
Coarse sandy grey ware	178	3,113
Horningsea grey ware	68	1,428
Oxidised sandy ware	35	457
Samian ware (South Gaul)	1	1
Shell-tempered ware	26	416
Verulamium white ware	1	144
White ware	2	16
Total	**329**	**6,507**

Table T7.3: Early/Middle Roman phase (mid–first to mid–third centuries AD)

fabric	*no. of sherds*	*weight (g)*
first to second century	**41**	**502**
Black slipped ware	15	123
Coarse sandy grey ware	21	358
Grog-tempered ware	1	7
Micaceous coarse sandy grey ware	2	9
White ware	2	5
Early Roman/second century	**131**	**2,159**
Black-slipped ware	18	108
Colchester Samian ware	2	12
Coarse sandy grey ware	50	1,268
Fine sandy grey ware	4	18
Oxidised sandy ware	1	2
Shell-tempered ware	42	237
Verulamium white ware	10	492
West Stow fine reduced ware	1	10
White ware	3	12
Early/Middle Roman	**45**	**920**
Coarse sandy grey ware	16	429
Micaceous coarse sandy grey ware	2	52
Oxidised sandy ware	27	439
second century	**24**	**671**
Samian ware (central Gaul)	15	245
Coarse sandy grey ware	1	13
Mancetter-Hartshill ware	2	314
Nene Valley colour-coated ware	2	30
West Stow reduced fine ware	4	45
White ware	1	24
first to third century	**54**	**586**
Black-slipped ware	2	15
Coarse sandy grey ware	47	325
Horningsea burnished ware	1	44
Horningsea grey ware	1	139
Oxidised sandy ware	2	61
Wattisifeld grey ware	1	2
Total	**295**	**4,838**

Table T7.4: Middle Roman (mid-second to mid-third centuries AD)

fabric	*no. of sherds*	*weight (g)*
Middle Roman	**56**	**672**
Colchester colour coated ware	2	97
Nene Valley colour-coated ware	53	571
Samian (eastern Gaul)	1	4
second to third century	**269**	**6,379**
Black-slipped ware	1	62
Brampton white ware (?)	4	146
Buff sandy ware	1	12
Colour-coated ware	2	37
Coarse sandy grey ware	85	1,767
Fine sandy grey ware	22	376
Horningsea burnished ware	2	79
Horningsea grey ware	4	260
Imitation burnished ware	5	199
Nene Valley colour-coated ware	10	161
Nene Valley grey ware	68	2,077
Nene Valley white ware	3	128
Oxidised sandy ware	7	323
Pakenham colour-coated ware	1	49
Reduced sandy ware	1	19
Samian ware (central Gaul)	6	84
Samian ware (eastern Gaul)	8	82
Shell-tempered ware	32	338
White slipped ware	2	26
White ware	5	154
Total	**325**	**7,051**

Table T7.5: Middle/Late Roman (second to fourth centuries AD)

Although all of the pottery forms in this phase were produced broadly between the second and fourth centuries AD, there are almost no wares and forms specific to the third or fourth centuries (below).

fabric	*no. of sherds*	*weight (g)*
Black slipped ware	44	263
Buff sandy ware	3	18
Coarse sandy grey ware	557	6,647
Colour-coated ware	2	34
Fine sandy grey ware	7	101
Slipped ware	1	28
Horningsea burnished ware	4	110
Horningsea grey ware	107	3,225
Nene Valley colour-coated ware	43	386
Nene Valley grey ware	23	551
Nene Valley white ware	10	540
Oxidised sandy ware	57	589
Reduced sandy ware	7	12
Shell-tempered ware	321	5,036
Wattisifeld grey ware	1	14
White slipped ware	5	19
White ware	11	70
Total	**1203**	**17,643**

Table T7.6: Late Roman (third to fourth centuries AD)

fabric	*no. of sherds*	*weight (g)*
Coarse sandy grey ware	4	56
Grog tempered ware	1	13
Imitation burnished ware	1	97
Nene Valley parchment ware	1	200
Nene Valley coloured coated ware	30	1,015
Nene Valley white ware	3	561
Portchester Fabric D ware (?)	1	7
Shell-tempered ware	3	357
Total	***44***	***2,306***

RESIDUAL POTTERY IN GRAVES

Beyond the complete pots placed in graves as gravegoods, there were an additional 89 sherds weighting 469g recovered from 12 graves (Table T7.7). It has been suggested that apparently residual pottery might sometimes actually reflect the remains of graveside rituals[249].

The sherds recovered from the graves at Knobb's Farm comprise 31 different types of vessels, most of them consisting of one or a couple of fragments of sherds. Most of the sherds appear worn and small, which suggests that they were not deliberately deposited as grave goods. Because of their fragmentation, only a wide date range has been estimated. It was only possible to identify the form of nine vessels: all were jars apart from one Nene Valley coloured-coated cornice beaker and one Verulamium reeded-rim bowl.

Although the fragmented nature of sherds seems to suggest their residuality, the large number of fragmented sherds recovered from sealed context is notable. It might imply disturbance of the soil in this cemetery areas and of the graves themselves. Grave F.940, for instance, was truncated by ploughing and this might explain the presence of two different types of vessels, in addition to the semi-complete broken oxidised jar which was most likely a grave good. Disturbance also occurred when graves were reused to inter a second body (e.g. F.164).

There are three graves in which pottery might not be residual. The first is the fragmentary pottery group of coarse sandy grey ware sherds in grave F.165 where they are quite chunky and not worn, although they do not still amount to a semi-complete vessel. Second is the large quantity of a shell-tempered jar with angular beaded rim which was recovered in grave F.958 (25 sherds). These pieces are however all small fragments (62g in total). Third, grave F.940 contained fragments of a semi-complete burnt coarse sandy oxidised jar (27 sherds, 439 g), together with one fragment of Horningsea ware and two local coarse sandy grey ware fragments. The jar dates to the second or early third century AD, while the three closely datable graves in this cemetery (F.1095, F.1097, and F.1098) all belong to the later fourth century. Nonetheless, the recovery of a semi-complete broken burnt vessel from in a non-burnt context may imply the use of this grave good for ritual activities in honour of the deceased before its deposition. Ritual practice involving pottery vessels is implied elsewhere at Knobb's Farm: the miniature flagon in F.938 had a hole bored into it, and the miniature beaker in F.930 had been burnt.

These three groups of pottery sherds suggest the possibility of more than one offering made per grave, and that grave goods at Knobb's Farm were not exclusively miniature jars or beakers but they also locally-produced jars.

[249] Biddulph 2015

Table T7.7: Residual pottery in graves

feature/fabric	*form/ no. vessels*	*no. of sherds*	*weight (g)*	*date*	*additional semi-complete vessel*	*skel.*	*fragmentation of the skeleton*
F.165	**2–4**	**14**	**121**	**Mid 2nd–4th C. AD**	Shell-tempered miniature jar (4th C. AD)	yes	Medium fragmentation /disturbed by other skeleton/s
Coarse sandy grey ware		10	109	Mid 2nd–4th C. AD			
Nene Valley colour-coated ware		2	8	Mid 2nd–4th C. AD			
Oxidised sandy ware		2	4	Mid 2nd–4th C. AD			
F.166	**0–3**	**9**	**28**	**Mid 2nd–4th C. AD**		yes	High
Grog–tempered ware		1	13	Mid 2nd–4th C. AD			
Sandy grey ware		1	3	Mid 2nd–4th C. AD			
Sandy reduced ware		7	12	Mid 2nd–4th C. AD			
F.937	**3–5**	**8**	**48**	**Late Iron Age /2nd C. AD**		yes	Very high fragmentation (almost no bone found)
Buff sandy ware		1	3	Early Roman			
Grog–tempered ware	Jar	1	14	Late Iron Age /early Roman			
Reduced sandy ware		3	4	Late Iron Age /early Roman			
Shell–tempered ware	Jar with everted flat topped rim	1	7	Mid 1st–2nd C. AD			
Verulamium white ware	Reeded rimmed bowl	2	20	Mid 1st–2nd C. AD			
F.940	**1–3**	**30**	**498**	**2nd–4th C. AD**	Oxidised jar	yes	Very high

feature/fabric	*form/ no. vessels*	*no. of sherds*	*weight (g)*	*date*	*additional semi-complete vessel*	*skel.*	*fragmentation of the skeleton*
Coarse sandy grey ware		2	25	Roman	(2nd–early 3rd C. AD)		
Horningsea grey ware		1	34	2nd–4th C. AD			
Oxidised sandy ware	Jar with everted bifid rim and small cordoned decoration (burnt)	27	439	2nd C.–early 3rd C. AD			
F.942	**3–5**	**10**	**58**	**2nd–4th C. AD**		yes	High/very high and truncated
Coarse sandy grey ware	Jar	3	6	2nd–4th C. AD			
Horningsea grey ware		2	20	2nd–4th C. AD			
Nene Valley colour-coated ware	Cornice rimmed beaker	1	3	Late 2nd–3rd C. AD			
Shell-tempered ware		3	11	Roman			
Nene Valley white ware		1	18	2nd–4th C. AD			
F.943	**0–3**	**4**	**11**	**Prehistoric to 2nd–4th C. AD**		yes	Medium
Horningsea grey ware	Jar with everted rim	1	4	2nd–4th C. AD			
Nene Valley colour-coated ware		1	1	Mid 2nd–4th C. AD			
Shell-tempered ware		2	6	Prehistoric			

feature/fabric	*form/ no. vessels*	*no. of sherds*	*weight (g)*	*date*	*additional semi-complete vessel*	*skel.*	*fragmentation of the skeleton*
F.944	**1–3**	**2**	**7**	**Prehistoric/Roman**	Horningsea miniature jar (2nd–4th C. AD)	yes	High
Prehistoric		1	5	Prehistoric			
Coarse sandy grey ware		1	2	Roman			
F.947	**0–1**	**2**	**13**	**2nd–4th C. AD**		yes	Very high (almost no bone found)
Shell–tempered ware	Jar with upright rounded rim	2	13	2nd–4th C. AD			
F.948	**0–2**	**4**	**15**	**Prehistoric/Roman**		yes	Very high
Prehistoric		3	10	Prehistoric			
Coarse sandy grey ware		1	5	Roman			
F.951	**1–2**	**1**	**5**	**1st–3rd C. AD**	Nene Valley colour–coated beaker (4th C. AD)	yes	High
Coarse sandy grey ware		1	5	1st–3rd C. AD			
F.953	**1–4**	**3**	**14**	**2nd–3rd C. AD**	Nene Valley colour–coated miniature beaker (4th C. AD)	yes	High
Coarse sandy grey ware	Jar with everted rim	1	4	2nd–3rd C. AD			
Reduced sandy ware		1	1	Roman (?)			
Shell–tempered ware		1	9	Roman			
F.958	**1–4**	**31**	**93**	**Late Iron Age to 2nd–4th C. AD**		yes	High
Oxford Samian ware		2	12	Mid–late 2nd C. AD			
Coarse sandy grey ware		3	12	2nd–3rd C. AD			

feature/fabric	*form/ no. vessels*	*no. of sherds*	*weight (g)*	*date*	*additional semi-complete vessel*	*skel.*	*fragmentation of the skeleton*
Reduced sandy ware		1	7	Late Iron Age /early Roman			
Shell–tempered ware	Jar with angular beaded rim	25	62	2nd AD			
F.962	**1**	**2**	**12**	**2nd–3rd C. AD**		no	No bone found
Fine sandy grey ware		2	12	2nd–3rd C. AD			
Grand Total		**89**	**484**				

SECTION 8: FAUNAL REMAINS

By VIDA RAJKOVAČA

The Roman animal bone assemblage from all of the excavation phases comprised a total of 3,697 animal bone fragments weighing 31.6 kilograms. This material includes both hand-recovered bone and fragments retrieved from sample residues >4mm. (The fragments from residues were scanned during assessment, but not included in the assessment of species). This is a very modest assemblage when set alongside those recovered at the Roman settlements immediately to the south at the Camp Ground (42,254 fragments, 649 kilograms) and Langdale Hale (16,319 fragments, 184.5 kilograms)[250]. This suggests either that the buildings excavated at Knobb's Farm were primarily for storage or industrial activity and did not generate much domestic waste, or else that the Romans were deliberately accumulating animal waste elsewhere within the settlement—but outside the excavated areas.

A total of 307 specimens could be identified to specific species, and a further 405 assigned by size. Refitting fragments were classed as a single specimen. Table T8.1 shows the number of identified specimens (NISP) sorted by phase, species and size. Material from Late Iron Age/Early Roman phase comprised only 2% of NISP and highlights the peripheral nature of activity on the site at this time. Bone from Early Roman features comprised 15% of NISP. The peak of activity coincided with the peak of pottery use on the site during the Middle Roman period, with 80% of NISP. The cessation of activity in the Late Roman phase is highlighted by the paucity of animal bone, comprising just 3% of NISP.

Like the sites at Camp Ground and Langdale Hale, the domestic assemblage was made up primarily of cattle (NISP = 85) with a minimum of seven individuals identified across all phases. This was followed by sheep (NISP = 36) with a minimum of three animals, and horse (NISP = 29) also with a minimum of three animals. Pig was represented by a single specimen. With such low numbers, it is not possible to draw any more detailed conclusions, beyond the broad observation that the site is consistent with other Roman sites in the Fenland region which are dominated by cattle, followed by sheep, while pig formed only a very small component[251].

It is a measure of the peripheral nature of activity on the site that the single largest assemblage by species was not a domestic species but fox. The majority of fox bones were recovered from tank F.739 ([822], [834]) dated to mid-second to mid-third centuries AD, although some was also recovered from the nearby undated pit F.743 ([863]). Foxes were represented by a wide range of skeletal elements, which would seem to indicate that the whole animals were brought to, or caught on the site. Majority of the fox bones were of a young animal and sixteen of them were porous. There was no evidence of cut marks on any of the bones, which makes inferring their significance difficult. The foxes were most likely either hunted or opportunistically trapped for their fur, then brought to and skinned in the proximity of the water, before the unwanted carcasses were dumped (E. Fairnell pers. comm.). Although the skinning process would normally have left cut marks on the bones, it is possible that, if the foxes were skinned as a fresh kill, there might be no cut marks at all. Exploitation of wild species, including otter and beaver, is known from Iron Age and Roman sites nearby[252], and the fox bones found at Knobb's Farm may belong in the same category. It is, however, also possible that the foxes were simply killed for preying on sheep, with no interest in their pelts.

[250] Evans, Appleby *et al.* 2013: 369, 116
[251] Allen *et al.* 2017: 94–95.
[252] Evans, Appleby *et al.* 2013: 383

The fish bones recovered from the bottom of a large jar (<154>, [1103], F. 732) found in an early Roman well were from the carp family (*Cyprinidae*), of about 10–15 cm total length. They were in a poor condition, amounting to a few individuals. The fish would have been common in fenland waterways. It is possible that the bones in the pot were remains of a meal or represent storage. They are, however, probably not associated with the production of the Roman fish sauce, *garum*. Pliny reports that this sauce was made from fish intestines (*Natural History* 31:43), rather than whole fish, as is implied by the presence of bones (as well as the scale recovered from bulk samples—see Section 9).

Table T8.1. Number of Identified Specimens (NISP) and the Minimum Number of Individuals (MNI) for all species from Late Iron Age and Romano-British contexts—breakdown by phase.

	Late Iron Age/ Early Roman			*Early Roman*			*Middle Roman*			*Late Roman*		
Taxon	NISP	%NISP	MNI	NISP	%NISP	MNI	NISP	%NISP	MNI	NISP	%NISP	MNI
Cow	2	*33.3*	1	11	*20.7*	1	71	*28.9*	4	1	*33.3*	1
Sheep/ goat	.	.	.	3	*5.7*	1	32	*13.1*	1	1	*33.3*	1
Pig	.	.	.	1	*1.9*	1	.	.	.	.	.	.
Horse	4	*66.7*	1	5	*9.4*	1	11	*4.5*		1	*33.3*	1
Dog	.	.	.	1	*1.9*	1	.	.	.	.	.	.
Red deer	.	.	.	.	.	.	2	*0.8*	1	.	.	.
Fox	.	.	.	.	.	.	129	*52.7*	3	.	.	.
Cyprinid (fish)	.	.	.	32	*60.4*	.	.	.	.	.	.	.
Sub-total to species	**6**	***100***	**.**	**53**	***100***	**.**	**245**	***100***	**.**	**3**	***100***	**.**
Cattle-sized	3	.	.	22	.	.	111	.	.	15	.	.
Sheep-sized	3	.	.	7	.	.	42	.	.	1	.	.
Rodent-sized	.	.	.	.	.	.	68	.	.	.	.	.
Mammal n.f.i.	1	.	.	20	.	.	85	.	.	.	.	.
Bird n.f.i.	.	.	.	.	.	.	2	.	.	.	.	.
Total	**13**	**.**	**.**	**102**	**.**	**.**	**553**	**.**	**.**	**19**	**.**	**.**

Note: The abbreviation n.f.i. denotes that the specimen could not be further identified.

SECTION 9: ENVIRONMENTAL REMAINS:

By ANNE DE VAREILLES *and* RACHEL BALLANTYNE

METHODOLOGY

Samples were processed using an Ankara-type flotation machine at the CAU. Flots were collected in a 300μm sieve, and the heavy residue washed over a 1mm mesh. This report focuses upon the plant remains. Heavy residues were scanned by eye down to 4mm, and plant remains were added to corresponding flots. Very few artefactual remains were recovered. The flots were examined under a low-power microscope, with identifications made using the reference collection of the Pitt-Rivers Laboratory (Department of Archaeology, University of Cambridge). All plant nomenclature follows Stace[253], although for wheat and barley the traditional classifications in Zohary and Hopf[254] have been followed.

PRESERVATION

Charred, mineral-replaced and de-watered plant remains were recorded. The majority of charred cereal grains recovered were moderately puffed and distorted, making their close identification untenable. Fragmentation and abrasion were common, suggesting that the remains may have existed as surface debris for some time before their deposition within the ditch contexts. Some damage may also have been caused by the sand component of the soil itself. Most of the material was poorly preserved. The few exceptions were from [1503] in burnt feature F.1005, interpreted as a corn dryer or industrial hearth, and from nearby [1512] [1538] in ditch F.1008, where numerous cereal chaff items survived in good condition.

RESULTS

In the Northern Area the assemblages were all extremely small (<0.1 litres in volume), and plant macrofossils and other remains were exceedingly scarce, indicating that these features were entirely peripheral to any main focus of either domestic or agricultural/pastoral activity. The few remains which were recorded are all probably derived from very small quantities of scattered or wind-blown refuse, which were almost certainly accidentally incorporated within the feature fills. De-watered elderberry (*Sambucus nigra*) 'pips' were recorded from sample 107 taken from the trackway ditch F.1360.

Significant results for the Southern Area are ordered chronologically, as the use of the site evolved significantly over time.

Late Iron Age and Romano-British: mid-first century AD

The only activity in this phase was around the Late Iron Age enclosure ditch. The two slightly richer contexts were LIA gully F.161, [352], and Romano-British ditch, F.125, [244]. In both cases, grains and chaff of spelt or emmer wheat (*Triticum spelta/dicoccum*) provided some evidence for crop processing. The single wild seeds, of a vetch/wild pea (*Vicia/Lathyrus* sp.), black nightshade (*Solanum nigrum* L.) and oat or brome grass (*Avena/Bromus* sp.) recovered from these samples are all taxa that could be arable weeds.

[253] Stace 1997
[254] Zohary and Hopf 2000

Early Roman: mid-first to mid-second centuries AD

The sample from the well F.732, [1104], produced little charcoal, grain and wild grass seed, and these do not appear to have been intentionally discarded into the well. In fact, this feature seems to have been kept mostly clear of any charred waste. A few fish scales were recovered—presumably related to the large jar containing fish bones also found in the well. Some dried waterlogged seeds were seen during sorting, suggesting that the basal fill was not only once waterlogged but that the 'well' was not covered from naturally-deposited debris.

The remaining contexts dating to this phase had very few remains, with occasional single specimens of unidentifiable grains or wild seeds. The one taxon of note is great fen sedge (*Cladium mariscus* (L.) Pohl), of which a charred seed occurred in ditch [242] F.143 and a charred leaf fragment in ditch [118] F.101. This plant grows in undisturbed wet soils, and cannot be an arable weed. There is evidence for the collection and use of great fen sedge at other Roman sites (both these features are early Roman), for example at Stonea[255], and the plant may have been used as kindling or thatching.

Middle Roman: mid-second to mid-third centuries AD

Samples in this phase provided evidence for difference stages of crop processing.

Three samples were taken from feature F.1005, interpreted as a corn dryer, and come from the sequence of fills [1503], [1504] and [1505]. Of these [1503] contained a very rich assemblage of charred plant remains, accompanied by numerous dark blackish–brown burnt clay fragments and a few burnt flints. Fill [1504] was nearly sterile, and fill [1505] included moderate charred plant remains with probable burnt soil. In fill [1503], the charred plant remains were dominated by cereal chaff identifiable to spelt wheat (*Triticum spelta*) and emmer/spelt wheat (*Triticum dicoccum/spelta*). The few cereal grains were quite puffed, and most were only identifiable as wheat (*Triticum* sp.) and wheat/barley; one grain was comparable to spelt wheat, and another two to a hexaploid wheat variety that could have been hulled (e.g. spelt wheat) or free-threshing (e.g. breadwheat). The limited range of wild seeds recovered from this feature is likely to represent crop weeds, of which the main constituents were bromes/oats (*Bromus/Avena* sp.), curled dock (*Rumex* cf. *crispus*) and scentless mayweed (*Tripleurospermum inodorum*). Fill [1505] had equal amounts of wheat grain and chaff, in contrast to the chaff-dominated [1503]. Two grains were comparable to spelt wheat, and the chaff was of spelt wheat and emmer/spelt wheat. One twisted and hulled grain indicated six-row barley (*Hordeum vulgare*). Very few wild seeds were present in [1505]. Most were brome grass (*Bromus* sp.), with single seeds of a small daisy family type (*Asteraceae* indet.) and great fen sedge (*Cladium mariscus*). The abundant burnt clay in [1503] and burnt soil in [1505] suggested that the charred plant remains in F.1005 may represent *in situ* ash; this feature could be the remains of an oven, kiln or corn-drier flue. Research into Roman corn-driers by van der Veen[256] showed they often had multiple purposes beyond drying of grain for storage—malting in particular. Furthermore, it is difficult to distinguish the material being processed from the fuel ash. The abundant spelt wheat chaff in F.1005 may therefore represent parching of spikelets (grain encased in chaff) prior to their pounding to release grain, or it may represent the chaff by-products from this process being used as a fuel.

Close to the corn-dryer was ditch F.1008. Fills [1512] and [1538] contained two of the richest assemblages of charred plant remains recovered at Knobb's Farm. Both contexts were very similar in composition, although [1538] had a much higher density of remains. Both contexts were

[255] van der Veen 1996
[256] van der Veen 1989

dominated by cereal chaff, most of which was spelt wheat and emmer/spelt wheat. The charred grain mirrored the chaff identifications, and was dominated by wheat; only a small proportion of grain is identifiable more closely to emmer/spelt wheat. A number of wheat grains had germinated, but as they were a low proportion of the grain from both contexts, they probably represent a natural component of the harvested crop rather than malting. Two other cereal varieties were further represented within ditch F.1008. A few barley grains occurred in both samples, with two chaff fragments (rachis internodes) in [1538]; one rachis internode is of the six-row variety. A small number of rachis internodes in both samples were also of free-threshing wheats. One rachis internode in [1538] is well enough preserved to identify it as hexaploid—most probably of breadwheat (*Triticum aestivum*). One seed of flax (*Linum usitatissimum*) in [1538] may represent its cultivation for linseed and/or linen. The wild seeds, probably crop weeds, were also similar in samples [1512] and [1535]. Taxa represented in both included small-seeded docks (*Rumex sanguineus/conglomeratus/obstutifolius*), small vetches/wild peas (*Vicia/Lathyrus* sp.), scentless mayweed (*Tripleurospermum inodorum*) and brome grasses (*Bromus* sp.).

Wild plant seeds were found in all three flues by Buildings I and II: F.736, F.737 [870] and F.738 [907]—mostly in F.737, which was the only one to contain any cereal (*Triticum* cf. *spelta* L.).

In Building III, which was interpreted as a granary, a sample from beamslot F.1141 [1538] produced a single cereal grain (*Triticum/Hordeum* sp.) along with wild seeds of buttercup (*Ranunculus* cf. *sceleratus*) and dock (*Rumex*), as well as grass seeds (Poaceae).

Immediately north of the granary building, a rich, well-preserved crop assemblage was found in ditch F.797 [1095]. Most of the grains, seen mainly through the chaff, were of spelt wheat (*Triticum spelta*). The other cereal grains—13 grains of barley and 5 grains of free-threshing wheat (*Triticum aestivum*)—may have been contaminants (intentional or not) of the main spelt crop. The wild seeds were very numerous, as were the cereal ear chaff and grains. However, the proportions of grains to glume bases and grains to wild seeds point to waste rather than a burnt deposit of stored spelt and/or emmer wheat ears. The fragments from the base of the cereal ears have rough breaks, suggesting that these were snapped from the straw rather than cut, possibly during threshing. The wild plant seeds form a typical assemble of crop weeds from the Cambridgeshire area during the Roman period. Particularly numerous were seeds of stinking chamomile (*Anthemis cotula*), scentless mayweed (*Tripleurospermum inodorum*), oraches (*Atriplex patula/prostrata*), docks (*Rumex sanguineus/ conglomeratus/ obstutifolius*), brome or rye grasses (*Bromus/Lolium*), and other grasses (Poaceae). Most of the wild seeds recovered are considered large, either in themselves or together in a seed-head (e.g. *Agrostemma githago* and *Anthemis cotula*). These types of seeds are usually the last to be removed during hand-sorting, which suggests that the plant assemblage probably represents waste accumulated during the last few stages of spikelet threshing, sieving and sorting. The almost complete absence of charcoal suggests that the cereal waste was not added to a wood fire but burnt separately or as a specialised fuel.

The last feature to contain a very large assemblage was the midden pit F.1235, [2346]. This appears to have formed over several processing events of various type of crops. The composition of this assemblage clearly shows that processing waste from various crops was intentionally discarded into F.1235. Hulled barley (*Hordeum vulgare sensu lato*), free-threshing hexaploid wheat (*Triticum aestivum sensu lato*), spelt and maybe emmer wheat (*Triticum spelta* and *Triticum spelta/dicoccum*), as well as perhaps oats (*Hordeum/Avena* sp.) were cleaned and consumed on the site. Even if every grain fragment is counted as a whole glume wheat grain, the ratio of grains to glume bases (1:5.8) is still far lower than the norm (1:1). Wild seeds were not as numerous as cereal chaff but did outnumber cereal grains. The range of arable weed seeds also suggests that the

assemblage was made up of various crops that seem to have grown in different areas. There is evidence for both heavy, wet soils as well as for lighter soils, with some areas apparently more fertile than others.

CONCLUSION

Spelt and possibly emmer, hulled six-row barley, free-threshing wheat and flax were consumed on site through the Roman period. The weed species are typical of Cambridgeshire assemblages, and indicate that the inhabitants were not sourcing their grain from distant locations. The bulk of crops were grown on local surrounding soils and were probably harvested at the base of the straw, leaving the ears to be separated during threshing. The wild taxa are dominated by large-seeded grasses, particularly brome (*Bromus* sp.), which are difficult to remove from grain due to their similar morphology. A number of taxa are characteristic of light free-draining soils, particularly scentless mayweed (*Tripleurospermum inodorum*) and wild radish (*Raphanus raphanistrum*), which suggests cultivation was upon the locally free-draining gravel subsoil. Very similar ranges of wild taxa have been found at Langdale Hale to the south, and all are notable for their relative lack of wetland plants[257]. In contrast, the nearby Roman settlement at the Camp Ground has numerous wetland plants, particularly reeds, in its later phase[258]. Unlike the Campground, there is no evidence for systematic collection of fen resources at Knobb's Farm.

[257] Evans, Appleby *et al.* 2013: 143–161
[258] Evans, Appleby *et al.* 2013: 391–408.

Table T9.1: Northern Area—Late Iron Age and Early Roman

Sample number	**105**	**107**
Context	3747	3861
Feature	F.1316	F.1360
Feature type	enclosure ditch	trackway ditch
Sample volume (litres)	?	13
Flot fraction examined	100%	100%
Non Cereal seeds		
Atriplex patula/prostrata		+ w
Chenopodiaceae indet.		+ w
Tree/shrub macrofossils		
Sambucus nigra L.		+ w
Charcoal		
large charcoal (>4mm)		
medium charcoal (2–4mm)	+	+
small charcoal (<2mm)	+	+

Key: – = 1 or 2 specimens, + = <10 specimens, ++ = 11–50 specimens, +++ = >50 specimens
cf. = compare, w = de-watered, m= mineral replaced

Table T9.2: Southern Area—Late Iron Age

Sample number	**104**	**109**	**111**
Context	217	244	352
Feature	F.122	F.125	F.161
Feature type	ditch	ditch	gully
Sample volume (litres)	14	15	6
Flot fraction examined	100%	100%	100%
Cereal grains			
Triticum spelta/dicoccum		1	
Cereal grain indet.		1	2
Cereal chaff			
Triticum sp. (glume base)		1	1
Non Cereal seeds			
Avena/Bromus sp.			1
Solanum nigrum L.		1	
small *Vicia/Lathyrus* sp. (<3mm)			1
Charcoal			
large charcoal (>4mm)	–	–	+
medium charcoal (2–4mm)	+	+	++
small charcoal (<2mm)	+	+	+++

Table T9.3: Southern Area—Early Roman

Sample number	**108**	**110**	**114**	**115**	**117**	**10**	**11**	**29**
Context	242	348	118	124	382	716	715	1104
Feature	F.143	F.103	F.101	F.110	F.137	F.707	F.707	F.732
Feature type	ditch	ditch	ditch	ditch	ditch	cremation burial	cremation burial	well
Sample volume (litres)	14	15	15	?	14	13	5	7
Flot fraction examined	100%	100%	100%	100%	100%	100%	100%	100%
Cereal grains								
Cereal grain indet.				1				
Cereal chaff								
Triticum spelta/dicoccum (glume base)					1			
Non Cereal seeds								
Bromus sp.			1					
Cladium mariscus (L.) Pohl	1		1 leaf frag.					
Other artefacts								
fish scales								+
Charcoal								
large charcoal (>4mm)	–	+		–				
medium charcoal (2–4mm)	+	++	++	+	–			
small charcoal (<2mm)	+	++	+++	+	+	+	+	

Table T:9.4: Southern area—Middle Roman—flues and corn dryers

Sample number	**15**	**18**	**20**	**58**	**59**	**60**
Context		870	907	1503	1504	1505
Feature	736	737	738	1005	1005	1005
Feature type	Flue	Flue	Flue	Corn dryer/ oven/ kiln	Corn dryer/ oven/ kiln	Corn dryer/ oven/ kiln
Sample volume (litres)	10	10	6	9	2	9
Flot fraction examined	100%	100%	100%	12.5%	100%	100%
Cereal grains						
Hordeum vulgare sensu lato						1
Triticum cf. *spelta* L.		5				2
Triticum spelta/dicoccum				1		
Triticum spelta/aestivum sensu lato				2		
Triticum sp.				6	2	5
Triticum/Hordeum sp.				5		4
Cereal grain indet.		6		14	2	7
Cereal chaff						
Hordeum/Triticum (awn frags.)		6				
Triticum spelta L. (glume base)				71		3
Triticum spelta L. (spikelet fork)				4		
Triticum spelta/dicoccum (glume base)				253		4
Triticum spelta/dicoccum (spikelet fork)				9		1
Triticum spelta/dicoccum (rachis internode)				4		1
Triticum aestivum sensu lato (rachis node)		1				
Non Cereal seeds						
Anthemis cotula L.	1	12	2			
Anthemis cotula / Tripleurospermum inodorum	1	1	1			
Asteraceae indet.				2		1

Sample number	**15**	**18**	**20**	**58**	**59**	**60**
Brassica/Sinapis sp.	1			1		
Bromus sp.						5
Chenopodiaceae indet.		1				
Cladium mariscus (L.) Pohl	4					1
Medicago/Trifolium sp.		2				
Odontites vernus		1				
Poa spp.				1		
Rumex cf. *crispus* L.				2		
Rumex conglomeratus/ obtusifolius/sanguineus		1				
Rumex sp.				1		
Tripleurospermum inodorum (L.) Schultz-Bip.		7		2		
small *Vicia/Lathyrus* sp. (<3mm)				1		
large Poaceae indet. (>4mm)		4				
small Poaceae indet. (<2mm)		2				
seed indet.		5	1			
Wetland plant macrofossils						
trigonous *Carex* sp.		2				
lenticular *Carex* sp.		2		1		
Other artefacts						
burnt soil/slag				+		–
pottery sherds						++
burnt stone				+++		
Charcoal						
large charcoal (>4mm)		+		+		–
medium charcoal (2–4mm)		++		++		+
small charcoal (<2mm)	+++	+++	++	+++	–	++

Table T9.5: Southern area—Middle Roman—boundary ditches and other features

Sample number	**28**	**61**	**62**	**73**	**81**	**82**	**90**
Context	1095	1512	1538	2022	1716	2346	1739
Feature	F.797	F.1008	F.1008	F.1141	F.1057	F.1235	F.1039
Feature type	boundary ditch	boundary ditch	boundary ditch	granary	pit	midden pit	well
Sample volume (litres)	10	4	2.5	20	15	20	15
Flot fraction examined	25%	100%	25%	100%	100%	100%	100%
Cereal grains							
Hordeum vulgare sensu lato	13	2	1		2	43	
Hordeum/Avena						1	
Triticum spelta L.		1					
Triticum cf. *spelta* L.		11					
Triticum spelta/dicoccum	329	2	5		5	18	
Triticum aestivum sensu lato	5						
Triticum spelta/aestivum sensu lato			9				
Triticum sp.	67	4	12			4	
Triticum/Hordeum sp.		3	2	1	3	21	
Triticum/Bromus sp.			2				
Cereal grain indet.	166	9	15			86	1
Cereal chaff							
Hordeum vulgare subsp. *vulgare* (rachis internode)			1				
Hordeum vulgare sensu lato (rachis internode)			1			85	
Hordeum/Triticum (awn frags.)	93						
Avena fatua type (floret base)			1				
Avena sp. (awn frags)	4						
Triticum spelta L. (glume base)	178	43	210		2	428	1

Sample number	**28**	**61**	**62**	**73**	**81**	**82**	**90**
Triticum spelta L. (spikelet fork)			4				
Triticum spelta/dicoccum (glume base)	40	115	427		3	64	1
Triticum spelta/dicoccum (spikelet fork)		6	12				
Triticum spelta/dicoccum (rachis internode)		6	5				
Triticum aestivum sensu lato (rachis node)	3		1			4	
Triticum aestivum/turgidium type (rachis node)			4				
Triticum sp. (glume base)	438				1	252	2
Triticum sp. (rachis internode)						++	
indet. cereal awn fragments—excluding oat						3	
indet. cereal culm node						3	
Indet. cereal ear base (no clear cut marks)	21						
Non Cereal seeds							
Agrostema githago	6					2	
Anagallis sp.	2						
Anthemis cotula L.	163					2	
Anthemis cotula /Tripleurospermum inodorum	42						
Asteraceae indet.	1	3	4				
Aphanes sp.						1	
Apiaceae indet.						1	
Atriplex patula/prostrata	59					14	
Brassica cf. *nigra*	1						
Brassica/Sinapis sp.	25					2	
Bromus cf. *secalineus* L.		4					
Bromus sp.		12	20				
Bromus/Lolium	29						

Sample number	**28**	**61**	**62**	**73**	**81**	**82**	**90**
Chenopodium album L.			1				
Chenopodiaceae indet.	2					6	
Cladium mariscus (L.) Pohl	2				1	3	
Coincya monensis (L.) Greuter & Burdet						1	
Eleocharis cf. *palustris* (L.) Roem. & Schult.		1					
Eleocharis sp.						7	
Epilobium sp.						2	
Fallopia convolvulus	3						
Galium aparine L.	1					10	
Hyoscyamus niger L.						1	
Isolepis sp.						1	
Linum usitatissimum			1				
cf. *Linum usitatissimum*	1						
Malver sp.						2	
Medicago/Trifolium sp.	8	2				25	
Odontites vernus	8						
Papaver sp.					1	1	
Polygonum aviculare L.		1				8	
Prunella vulgaris L.						1	
Ranunculus acris/repens/bulbosus L.						3	
Ranunculus cf. *sceleratus* L.				1			
Raphanus raphanistrum L.			1				
Rumex conglomeratus /obtusifolius/sanguineus	57		5			5	
Rumex sp.	10			1	1	12	
Senecio sp.			1				
Silene sp.	4						

Sample number	**28**	**61**	**62**	**73**	**81**	**82**	**90**
Stellaria palustris Retz./ *graminea* L.		1					
Tripleurospermum inodorum (L.) Schultz-Bip.	72	2	8		1	4	
small *Trifolium* spp. (<1mm)		1					
small *Vicia/Lathyrus* sp. (<3mm)	11	3	3			4	
Vicia/Lathyrus/Pisum sp.					1		
large Poaceae indet (>4mm)	152 (140)		15		1	87	
medium Poaceae indet (2-4mm)	28		2			10	
small Poaceae indet. (<2mm)	128					8	2
Poaceae fragment indet. —wild or cultivated grass seed frag.	45 (100–500)			1	3	+++	
seed indet.	34	2		1	2	30	
cotydelons indet.				3	1		
Other artefacts							
bone fragments				–	++	++	+
small bone		++	+			+	
burnt soil / slag		–	–				
pottery sherds					++	+	
burnt/baked clay					–		
worked clay					–		
fish bone						–	
fish scales		–					
Charcoal							
large charcoal (>4mm)	–	+	+		–	+	
medium charcoal (2–4mm)	+	++	++		+	+++	+
small charcoal (<2mm)	+	+++	+++	++	+++	+++	+++

Table T9.6: Southern area—Late Roman

Sample number	**56**	**57**
Context	1336	1336
Feature	F.941	F.941
Feature type	Inhumation Burial	Inhumation Burial
Sample volume (litres)	4	2
Flot fraction examined	100%	100%
Non Cereal seeds		
Poa spp.	1	
Other artefacts		
small bone		++
Charcoal		
medium charcoal (2–4mm)	+	
small charcoal (<2mm)	+	+

SECTION 10: WORKED STONE

By SIMON TIMBERLAKE

The quern stone assemblage appears typical of first to third century Roman sites in Cambridgeshire. The use of rotary querns appears to dominate even in rural contexts like Knobb's Farm.

Ten of the fourteen pieces found were made from Millstone Grit. These came from production centres in the southern Pennines, where Roman to Early Medieval quern stone quarries have been identified at sites such as Hathersage (north Derbyshire) and Wharnecliffe Edge (South Yorkshire)[259]. These quernstones appear in Northern England, the Midlands and eastern England from the end of the first century AD. In eastern England and East Anglia, these became the dominant quern type on settlements, and the use of flat-topped Millstone Grit rotary querns with radially grooved dressing suggests a date from the second century AD onwards.

The occurrence of at least one quern, <19>(1), made from Old Red Sandstone is interesting, and its appearance at Knobb's farm is an outlier to their usual distribution. The typical quarry and manufacturing sites for these would have been located in the southwest of England, most likely in the Forest of Dean and Wye Valley, the Mendips Area, and near Bristol. While over a thousand Old Red Sandstone rotary querns of Romano-British date have been recovered from around two hundred sites, only a few are from the East of England. There is a small cluster of these along the Bedfordshire/Cambridgeshire/Northamptonshire borders may relate to their proximity to the likely distribution centre at Verulamium, although proximity to major roads to the south and southwest may also be a factor. Quern <19> (1) is one of the best preserved of the rotary quernstones from Knobb's farm and, broadly speaking, can be equated with Shaffrey's Type 2b 'Lozenge style' ORS quern. Half of this type have been dated (by site) to the second century AD, while only a quarter to the first/second centuries AD. Again, this points to a second century date for crop-processing at Knobb's Farm.

The absence of querns made from more local stones may be significant. There are no beehive querns made from Hertfordshire Puddingstone conglomerate. This type was typically early: Iron Age through to the end of the first century AD[260]. The decline of this form locally may have pre-dated the development of the settlement and crop-processing at Knobb's Farm during the second century AD. Perhaps more relevant is the absence of imported lava stone querns from the Rhineland. These querns were favoured by the military, and imports continued throughout the Roman period, probably being distributed from Camulodunum. These querns were common in the Cambridge area, with examples found at Babraham[261]; Vicar's Farm, Northwest Cambridge[262], and the Hutchinson Site, Addenbrookes[263], although their distribution does appear to tail off to the north of Cambridge.

One saddle quern made from sarsen was found at Knobb's Farm. This type of quern was still in evidence in rural communities at as Knobb's Farm. Quernstone <118> does not appear to have been large enough to grind cereal grain, but it may have been used in a domestic culinary context, or perhaps even had some application in a small workshop.

[259] Peacock 1988
[260] Lucas and Whittaker 2001
[261] Armour 2007
[262] Lucas and Whittaker 2001
[263] Evans *et al.* 2004

The function of the large domed lump of dense rock in pit F.1051 is uncertain. Its proximity to the granary may have some bearing on its function. It may be a stone weight for thatch or roof coverings, or even capping stones. It might also be an unfinished an abandoned example of a small, locally-made beehive-type quern, perhaps with a secondary utilitarian use.

WORKED STONE CATALOGUE

SOM 09 <19> F.1051 [1716]

(1) Sandstone quern. Weight: 3346g. Dimensions: 195mm wide × 280mm long × 300–70mm thick (rim>axis). Approximately one quarter section of the lower stone of a rotary hand mill quern made from an Old Red Sandstone (?)conglomerate or pebbly grit. The lithography of this is quite characteristic, with an arenaceous quartz sand-grit matrix and cement with other (<15%) lithic clasts (all <5mm diameter), and approximately 15% of larger sub-round vein quartz pebble clasts. The original diameter of the quern (based on the radial section from the central perforation) must have been around 400mm. The shape of this stone is of the 'cake' or 'lozenge' type[264]. It has a low convex roughly-shaped based and an almost flat (but slightly concave) fairly worn grinding surface, the latter being very slightly upturned toward the central perforation (of c.20–25mm). There is evidence for a finely-pecked dressing throughout. A darkened patina over much of the surface suggests burning. No cracking of the stone is evident. The quernstone was probably deliberately smashed on its discard from use.

(2) Gritstone rotary quern (two adjoining pieces). Weight: 1278g (total). Dimensions (both together): 170mm long (radial) × 11mm wide (concentric) × 45mm thick. A quern made from a relatively non-conglomoritic coarse-grained Millstone Grit. This seems to be part of a flat-topped ?upper stone with a slightly concave profile to the grinding surface. The grinding surface exhibits a fairly-worn yet still-distinctive radial grooving (10mm wide and x.10–15mm apart). The upper surface has been pecked (dressed) flat. The flat-sided, near-vertical external rim of the stone (50mm) is slightly thicker than the worn interior (40mm). Of interest is the worn yet still-square cut half-perforation through this stone, made for the purposes of holding in a wooden peg (possibly 80 × 40mm wide?) as a handle ('rhynd') for turning the mill. It would seem that this was cut through the entirely of the stone, and that the cut for this is worn on the underside. The fracture between the two adjoining pieces is quite fresh, suggesting this occurred in situ, and may be modern. Otherwise, the broken fragment of quern is quite abraded, which might suggest redeposition and movement around the site.

(3) Gritstone rotary quern fragment. Weight: 258g. Dimensions: 70mm × 80mm ×35mm. A small, non-diagnostic fragment of a small rotary hand mill quern. The grinding surface on this piece is extremely smooth and worn. The dark patina might suggest burning (soot) or, alternatively, contact with an organic horizon such as peat. The slight pinkish stain and friable nature of the edge suggests burning.

(4) Gritstone rotary quern fragment. Weight: 116g. Dimensions: 60mm × 60mm × 30mm thick. A tiny rim section of a rotary quern. This is a flat-topped radially-grooved quern made from Millstone Grit. Very worn traces of the grooving are evident underneath. This fragment may perhaps be a fragment of an upper stone, as this piece is both thin and worn.

(5) Part of a large domed lump of dense rock of uncertain function. Weight: 41316g. Dimensions: 200 mm × 170mm × 100mm. This piece appears to have been shaped, although given that the work is crude, the purpose is unclear. The rock is of a non-local exotic—a dense,

[264] Shaffrey 2006

crystalline part mafic-igneous rock containing phenocrysts of the pyroxene mineral augurite, possibly an andesite or basalt. The rock was almost certainly collected from glacial drift deposits, but the natural source of the stone is probably northern England or southwest Scotland (Inner Hebrides?). The roughly domed polygonal 'shaping' of the rock and the pitted surface suggests crude flaking and pitting, but it is difficult to distinguish this completely from weathering. The underside, first thought to be that of a quern, is definitely natural. This piece might have been a weight or possibly a capstone to a post.

SOM 09 <70> F.1079, [1865]. Gritstone rotary quern fragment. Weight: 1198g. Dimensions 110mm (radial) × 112 mm (concentric) × 40–50mm (rim>internal). Possibly part of an upper stone. This piece exhibits the vertically-dressed edge of a rim. It has a very crudely pecked (shaped) upper surface. The grinding surface is very worn and grooved, and furrows are sub-radial in this section. Given the low degree of curvature of the rim, the original dimensions of this particular quern may have been >500mm.

SOM07 <91> F.748, [881]. Gritstone rotary quern. Two fragments of quern composed of medium-grained Carboniferous Millstone grit (arkosic sandstone).

(1) Dimensions: 150mm × 80mm × 40mm thick. This piece appears to be the outer edge of an upper stone. It has a straight tapered rim; a fairly flat pitted (dressed) upper surface; and a moderately worn and slightly concave grinding surface.

(2) Dimensions: 80mm × 80mm × 30mm thick. This second piece has a more used appearance than (1). It has a very worn grinding surface. The dressed milling ridges have worn away and, instead, there is evidence of some rotary scoring. A slight lip formed by wear is evident against the rim and the grinding surface has been worn to a slightly concave profile

SOM07 <66> F.739, [836]. Gritstone rotary quern. Dimensions: 140mm × 150mm × 20mm thick. A single piece from inside a thin, well-worn upper stone of a Millstone Grit rotary quern. The outer rim has broken away, although part of the tapered axle/feed hole of the stone is preserved. The feedhole would have been about 50mm in diameter. The full diameter of the stone may have been about 500mm. The grinding surface is fairly well worn; concentric wear grooves are visible and the underside of the stone has a moderately concave profile. The stone is stained black, perhaps through burning, and there is evidence for some accreting iron pan.

SOM07 <131> F.719, [1044]. Gritstone rotary quern fragment. Dimensions: 70mm × 50mm × 20mm thick. A small fragment from what was probably once a rotary quern stone. The piece is made from Millstone Grit; the fabric (grain) of this particular stone is very coarse. It seems likely this piece is from the edge of the axle/feedhole of an upper stone. Like <066>, this piece seems to be from a thinned and well-worn broken stone.

SOM07 <163> Surface Find 420/220. Gritstone rotary quern fragment. Dimensions: 80mm × 80mm × 40–45mm thick. A fragment from the edge (rim) of an upper stone of rotary quern. The piece is composed of a moderately coarse-grained and slightly pebbly Millstone Grit (arkosic sandstone). The piece is similar to one of the quern fragments in <091>. The fragment has a straight slightly tapered face to the rim edge. The upper surface is rough and undressed. The grinding surface is well worn and slightly concave.

SOM07 <7> F.702, [705]. Gritstone quern fragment. Dimensions: 100mm × 110mm × 25mm thick. A fragment from the rim edge of an upper stone of medium-grained Millstone Grit. This piece has a well-worn grinding surface with a wear-formed lip or ridge approximately 20mm wide around the outer edge. The grinding surface is smooth and very definitely concave. The face of the outer rim is dressed; it is moderately flat but tapered outwards. The upper surface of the stone is rough and appears to have been cut by a prominent semi-circular groove approximately 10mm wide. The original diameter of this stone was probably around 500mm.

SOM07 <168> Unstratified from machining. Gritstone rotary quern fragment. Dimensions: 100mm × 70mm × 30mm thick. A small fragment from the outer edge of an upper rotary quern stone, most probably of Millstone Grit. This has a well-worn concave grinding surface and slightly raised wear lip around the rim. The face of the rim shows a slight outwards taper.

SOM07 <031> F.726 [785]. Gritstone or Sandstone rotary quern. Dimensions: 250mm × 150mm × 20–60mm thick in centre. A large fragment of the basal stone for a rotary quern. It is formed from an arkosic pebbly grit/sandstone: probably Millstone Grit or possibly Old Red Sandstone. The stone has a very roughly dressed and uneven flat underside and a fairly well worn (convex) upper grinding surface. The grinding surface is pitted in places from grind wear. The outer edge is considerably smoother but with slight concentric wear grooves. Almost 300 mm of the rim is preserved. The original stone may have had a 200mm+ radius (perhaps 450mm diameter?).

SOM07 <118> F.778 [992]. A sandstone saddle quern. Dimensions: 135mm wide × c.120mm long (broken at both ends) × up to 50mm thick. A fragment of a saddle-quern made from a fine grained quartzitic sandstone sarsen boulder. The sandstone is probably of Cretaceous (Lower Greensand) or Lower Tertiary origin: the occasional flecks of white mica, grain size and silica cement are distinctive. The quern has a flat top which has been worn smooth through use. There is a central depression about 70mm wide, 5mm deep and of uncertain length (probably about 140mm). This depression was worn smooth through use, probably from a rolling/ grinding action carried out using a cylindrical or elongated rubbing stone. This patch of wear appears to post-date the fire-staining (reddening) of the upper surface. Slight crazing or cracking resulting from this heating can be seen on the underside of the quern. This underside also appears to have been worn smooth prior to burning. The flat base would have helped stabilise or anchor the quern during use.

SECTION 11: METALWORK

By JUSTIN WILES

Iron nails

In total, 276 fragments of nail were recovered with a combined weight of 298g. These fragments represent a minimum of 72 complete nails (see Table S11.1 below). The majority of nails with partial or complete heads can be identified as Manning type 1 nails[265]. The only exceptions are <295>, a near complete nail with a diamond shaped head (Manning type 2), and two small intrusive post-medieval tacks recovered from F.965. In addition, an incomplete double-spiked loop was recorded and is discussed below.

Table T11.1. Iron nails

Feature	Context	Fragments	Weight (g)	Type	Minimum number of nails
164	320	2	7.4	Nail	1
181	372	2	1.6	Nail	1
931	1304	4	10.5	Nail	1
935	1318	1	1.1	Nail	1
939	1326	3	3.0	Nails	2
943	1342	5	0.6	Nail	1
945	1348	3	1.7	Nail	1
947	1356	6	4.3	Nails	3
948	1359	1	2	Nail	1
949	1362	1	4.9	Double spiked loop	N/A
951	1368	2	2.6	Nails	2
953	1373	26	77	Nails	11
954	1376	2	2.4	Nails	2
955	1379	2	2	Nail	1
958	1388	1	2.2	Nail	1
959	1391	129	54.5	Nails	22
961	1646	80	112.2	Nails	18
962	1621	3	12.7	Nails	2
963	1397	2	0.2	Nail	1
965	1644	2	0.6	Post-Medieval tacks	N/A

The nails are in a very poor state of preservation with many only surviving as hollow corrosion product or in small fragments. As a result, the totals in Table T11.1 may only represent a small percentage of the nails originally used in each burial. Equally, the presence of a small amount of iron fragments could have originated from the grave backfill rather than coffins or boxes. Features F.953, F.959 and F.961 all have a significant number of nails and, based on their location within each cut, it is likely they represent the remains of coffins.

[265] Manning.1985: 133

The incomplete double-spiked loop recovered from the south-east corner of F.949 may be from a box or drawer[266]. This would explain the wide grave cut and off-centre location of the inhumation.

Copper Alloy

SOM00 <135> Subsoil TR3. An incomplete double-oval shoe-buckle frame. One loop and the central bar are missing. The centre of the remaining loop widens towards the apex and is decorated with four transverse radiating grooves and three centrally located oval protrusions. Dimensions 31 × 25 × 2mm. Weight 4.4g. 16th century in date.

SOM07 <169> F.719. An incomplete armlet made from a single piece of twisted copper alloy wire, oval in section, both terminals are missing. Length 222mm, thickness 2mm. Weight 6.82g. Roman and third–fourth century AD[267].

SOM07 <170> F.729. A small, irregularly shaped fragment of copper alloy casting spill. Dimensions 14 × 10 × 6mm. Weight 2.2g. Undated.

SOM09(2) <121> SF.180. A finger ring made from a single piece of sub-rectangular sectioned wire, coiled three times with slightly tapered terminals. A parallel was recorded from Colchester[268]. Internal diameter 20mm. Weight 6.9g. Late Iron Age or Early Roman in date: 100 BC to 200 AD.

Lead

SOM04 <189> F150. A lead plug-type pottery repair recovered from an urned cremation. Irregular in shape. Dimensions 59.4 × 37.1 × 10.9mm. Weight 105.1g. The repair refits into the base of refitting pottery fragments <188>.

Coins[269]

SOM08 <275> SF.11 F.900. A probable copper alloy *As* in very poor condition: no surface details remain. Diameter 26mm. Weight 6.5g. First to early third century AD.

SOM08 <276> SF.12 F.906. A copper alloy *Sestertius* in poor condition: very few surface details remain. Diameter 31mm. Weight 19.7g. First to early third century AD.

[266] Crummy 1983: 119
[267] Crummy 1983: 37
[268] Crummy 1983: 48
[269] Morehead 2013

SECTION 12: BONE COMB

By IAN RIDDLER

Figure S12.1 Late Roman bone comb from Grave F.1097

Fragments of a late Roman double-sided composite comb were dispersed across several locations in grave F.1097 (Figure S12.1). Most of the comb survives, although it lacks one of its four tooth segments, as well as the four iron rivets that originally secured it together, which may have decayed in the soil conditions. In its original state the comb consisted of four antler tooth segments and two end segments, secured to two antler connecting plates by four rivets. Traces of iron staining can be seen on some of the connecting plate fragments, suggesting that the rivets were made of iron. They were arranged with the two end rivets along the centre line of the comb, whilst the two middle rivets were set above and below that line. The outer rivets passed through the end segments whilst the middle rivets secured the tooth segments on one edge, in a conventional riveting pattern for the period. The connecting plates are undecorated and rectangular in section, with bevelled edges. Saw marks from the cutting of the teeth are confined to those bevelled edges.

The comb was an accomplished product, although it is a relatively simple version of the object type. Originally it would have been about 98–100mm in length and 60mm in width, well within

the range of sizes established for combs of this type[270]. The two back edges are lightly profiled with concave curves beyond each set of teeth. Combs of a similar, simple design are known from Poundbury and South Shields, and an end segment from York Minster may also have belonged to this type[271]. There are five teeth per centimetre on one side of the comb and seven per centimetre on the other. This was the most common arrangement of fine and coarse teeth to be seen on late Roman combs[272].

Crummy has suggested that late Roman combs were prepared without adornment and subsequently personalised with decoration at the point of sale[273]. Under that model, this comb, with its simple, basic design, would have reached her Stage 1. A problem with the model is the evidence that suggests that the connecting plates of these combs were decorated *before* the comb had been assembled, which indicates that a decorative scheme lay in the mind of the antler worker from an early stage of the manufacturing process. A small technical point about the comb is also significant. One of the end segments (SF000) includes a ring-and-dot motif adjacent to its rivet hole. At first sight, this makes no sense at all, particularly as this decoration would never have been seen, once the comb had been assembled. What it does suggest, however, is that the perforations for the rivets were drilled with a tool actually designed to provide ring-and-dot decoration. The tool would normally just scrape the surface of the antler but it could also be used as a drill to pierce a hole right through the segment. In this case a first attempt was made to drill the hole with this tool but it was in the wrong place and a realigned hole was then drilled.

The comb was dispersed to three locations in the grave. Two parts lay close together, one (SF152) close to the decapitated head and between the legs, and the other (SF153) above it in the grave fill. These two parts provide the majority of the comb, including three tooth segments, an end segment and numerous fragments stemming from a connecting plate. Some distance away, in the chest area of the deceased, lay two conjoining pieces of the other connecting plate for the comb, whilst the second end segment (000) came from a different context (1887). Most of the comb was placed close to the head, the most common location for combs in late Roman graves[274]. The head had been removed from the body but the comb was none the less placed in close proximity to it, following common practice. A second location on the chest was chosen for a connecting plate, which had probably fragmented, fracturing across the end rivets, possibly whilst the comb was still in use. One of the end segments was deposited in a different context. The fourth tooth segment was not found in the grave and could have been retained by those undertaking the internment. It is possible that the comb was dismantled prior to burial and it may have been deliberately broken, in order to be placed in separate locations in the grave, but this is by no means certain and the placing of most of the comb by the head follows conventional practice.

Combs found in late Roman graves were normally buried intact and securely fastened together. Where they are no longer complete, that is usually a consequence of the burial conditions, and that may well be the situation here. Cool has drawn attention to the redeposition of a comb at the Lankhills cemetery, originally buried in one grave and then removed, with the decayed fragments placed on the chest of a female buried in a grave set into the backfill of the original grave[275]. The majority of late Roman combs have come from the graves of adult females, with just a few deposited with children or juveniles[276]. The earliest double-sided composite combs were deposited

[270] Riddler and Trzaska-Nartowski 2014, fig 1.7
[271] Greep 1993: fig 78.3; Winter 1906: 46; MacGregor 1995, fig 160.14.2.
[272] Riddler and Trzaska-Nartowski 2014, fig 1.6
[273] Crummy 2001: 103; 2004: 174
[274] Jones 2013: 68
[275] Cool 2010: 274
[276] Cool 2010: 273; Jones 2013: 62

c.350 AD, or possibly a little later, and they continued in use into the early part of the fifth century AD[277]. Radiocarbon dates for graves with double-sided composite combs suggest that they did not continue to be manufactured or used far into the fifth century AD[278]. Within the typological scheme for these combs devised by Markus Blaich this comb fits into his Group 1 on the basis of the cross-section of its connecting plates. On the Continent, Group 1 combs first occur in the last third of the fourth century and only continue into the early part of the fifth century[279].

[277] Crummy 2004: 175
[278] Gerrard 2015: 568; Hills and O'Connell 2009
[279] Blaich 1999, 311–315

SECTION 13: SCIENTIFIC DATING

CREMATIONS

Two samples of cremated bone were submitted for radiocarbon dating. The results are summarised in Table T13.1.

Feature	*Sample*	*C14 reference*	*$\delta^{13}C$*	*Uncalibrated date (68.2%)*	*Calibrated date (IntCal 13) (95.4%)*
F.140	Cremated human bone	SUERC-85785 (GU51212)	-20.8‰	2085 ± 30 BP	193–40 cal. BC (95.4%)
F.150	Cremated human bone	SUERC-85786 (GU51215)	-23.0‰	1848 ± 30 BP	85–237 cal. AD (95.4%)

Table T13.1: Radiocarbon dates of cremation burials

The prehistoric date for F.140 appears to be the result of an 'old wood' effect: the bone has absorbed carbon from the wood used to build the pyre. This could easily have been several hundred years old if the timber was, for example, oak.

The pottery urns used in both burials dated to the mid-to-late first century AD. Combined with the radiocarbon results, this suggests that the cremation in F.150 was buried in the last decades of the first century AD.

INHUMATION BURIALS

Samples from sixteen skeletons were submitted for radiocarbon dating. The initial test run of four ribs all failed to produce sufficient collagen for processing, so a second group of large bones (femurs and ulnas) were submitted. Only two samples contained sufficient collagen to return a result: F.1095 and F.1098 in Cemetery 3.

Feature	*Sample*	*C14 reference*	*$\delta^{13}C$* *$\delta^{15}N$*	*Uncalibrated date (68.2%)*	*Calibrated date (IntCal 13) (95.4%)*
F.1095	human femur	SUERC-86551 (GU51687)	-21.0‰ 11.9‰	1648 ± 29 BP	332–433 cal. AD (85.8%) 461 cal. AD (0.5%) 489–533 cal. AD (9.1%)
F.1098	human femur	SUERC-86550 (GU51685)	-21.0‰ 11.9‰	1747 ± 29 BP	231–384 cal. AD (95.4%)

Table T13.2: Radiocarbon dates of inhumation burials

As these two inhumations are nearly-adjacent, it is plausible that they were buried at or around the same time. On this assumption, the combined probability distributions for each produces dates of 260–275 cal. AD (9.2%) or 325–395 cal. AD (86.2%), peaking at 340–380 AD

This a good match to the date of the bone comb found in F.1097, which is close to both dated burials in Cemetery 3. This form was not deposited in British graves earlier than c.350 AD (and from c.365 AD on the Continent) and ceased to be used in the early fifth century. Given the surprising uniformity of burials in Cemetery 3—particularly in the frequent use of shrouds unlike

the other two cemeteries—this suggests all of the burials in this plot date to the second half of the fourth century.

SECTION 14: ANCIENT DNA

By CHRISTIANA LYN SCHEIB

Teeth and petrous bones from thirty-three individuals were processed using standard protocols for ancient DNA extraction and sequencing[280]. Inhibitor removal techniques were not explored at this time as twenty-one libraries amplified to a high enough quantity to be sequenced. Of these, eleven had human DNA content over 1%. Results are summarised in Table T14.1.

The molecular sex of individuals was estimated using a script by Skoglund and colleagues[281]. This script makes use of the ratio of reads mapping to the Y chromosomes over the number of total reads mapping to X and Y (Ry). Ratios of 0.075 or higher indicate males (Figure S14.1). It was run with default settings as suggested by Skoglund's documentation. Results are either returned as:

- XX or XY ("XX" when Ry + CI [=1.96*SE] < 0.016 and "XY" when Ry − CI >0.075)
- 'consistent with XX but not XY' (Ry − CI < 0.016 and Ry + CI < 0.075)
- 'consistent with XY but not XX' (Ry − CI > 0.016 and Ry + CI > 0.075)
- 'not assigned.'.

Genetic sex could be estimated as XX or XY for eleven samples and 'consistent with' estimated for three. The rest could not be assigned due to lack of data. Where there was a morphological and a genetic sex estimate (13 cases), the morphological agrees with the genetic sex estimation only 8/13 (61%) of the time.

Ten of the eleven samples with more than 1% human DNA could be mitochondrially haplotyped. Of the mitochondrial lineages that could be identified, none matched each other (except for context numbers 318 and 319, which share a matching haplotype and genetic sex estimation, indicating as thought that they are likely the same individual.) Both H and J haplogroups found are common in Britain today at 44.7% and 11.5% respectively (Eupedia) and there are at least nine independent maternal lineages located at this site. Unfortunately, due to lack of preservation none of the samples are high enough coverage at this stage to explore indigeneity/phylogeography/migration.

Due to poor preservation, no Y chromosomes could be determined, nor could autosomal relatedness be examined.

Figure S14.1 shows the locations of the individuals in the three cemeteries where matrilineal haplogroups could be determined, along with oxygen isotopes, and the two skeletons found with extra lumbar vertebrae (probably the result of an inherited condition).

[280] Scheib *et al*. 2019

[281] Skoglund *et al.* (2013) available online at https://github.com/pontussk/ry_compute

Table T14.1: Sample and aDNA processing details with results of mitochondrial haplogroups and sex assignment

Cemetery	*Feature*	*Context*	*ID*	*Unique Human*	*Cov (X)*	*mtDNA Contamination*	*mtDNA Hg*	*mtDNA Cov (X)*	*Assignment*	*Morphological Sex Estimate*
1	F.152	259	KNF001	0.01%	0.000	No Data	No Data	0.48	not assigned	(M)
1	F.164	318	KNF002	4.95%	0.011	0.91%	H5	10.82	XX	n.a.
1	F.164	319	KNF003	9.79%	0.024	1.06%	H5	7.49	XX	F
1	F.164	320	KNF004	2.12%	0.008	2.40%	H	3.12	Not Assigned	F
1	F.165	324	KNF005	3.02%	0.004	No Data	No Data	0.92	XY	(F)
1	F.166	327	KNF006	21.21%	0.055	0.00%	H1i1	15.94	XY	M
1	F.700	701	KNF008	0.15%	0.000	No Data	No Data	0.34	consistent with XX but not XY	(F)
2	F.932	1307	KNF010	0.00%	0.000	No Data	No Data	0.00	not assigned	(M)
2	F.949	1363	KNF019	1.03%	0.000	No Data	No Data	0.01	not assigned	M
2	F.950	1366	KNF020	5.49%	0.016	0.28%	J1c1e	12.61	XY	M
2	F.951	1369	KNF021	0.00%	0.000	No Data	No Data	0.01	not assigned	(M)
3	F.941	1337	KNF012	0.13%	0.000	No Data	No Data	0.87	XX	F
3	F.942	1338	KNF013	3.10%	0.007	1.40%	H3+152	8.77	XX	M
3	F.943	1343	KNF014	4.52%	0.012	1.56%	H17	15.90	XY	M
3	F.944	1346	KNF015	4.31%	0.012	0.00%	H3	21.36	XX	(M)
3	F.945	1350	KNF016	0.24%	0.001	No Data	No Data	0.37	consistent with XY but not XX	(F)

Cemetery	*Feature*	*Context*	*ID*	*Unique Human*	*Cov (X)*	*mtDNA Contamination*	*mtDNA Hg*	*mtDNA Cov (X)*	*Assignment*	*Morphological Sex Estimate*
3	F.946	1354	KNF018	1.20%	0.003	0.00%	H26	3.70	XX	F
3	F.1095	1910	KNF029	0.01%	0.000	No Data	No Data	0.41	not assigned	F? / indet.
3	F.1096	1880	KNF030	0.01%	0.000	No Data	No Data	0.91	not assigned	F?
3	F.1097	1883	KNF031	0.21%	0.001	No Data	No Data	2.43	XX	(F)
3	F.1099	1889	KNF032	0.05%	0.000	0.00%	J1c5	2.25	consistent with XX but not XY	M?

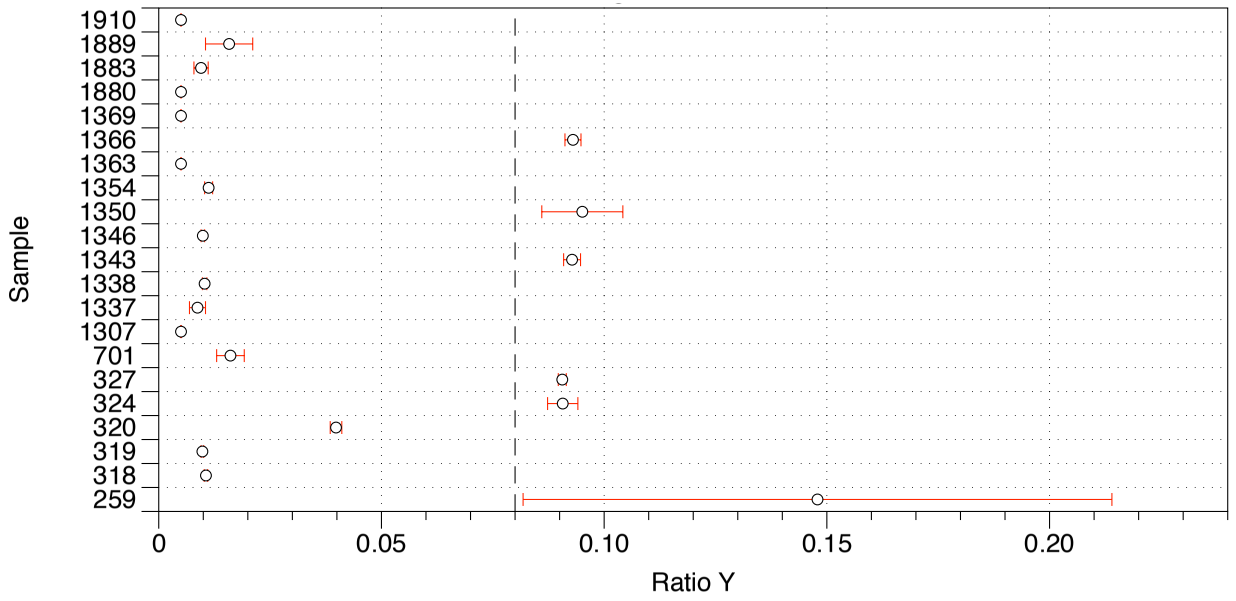
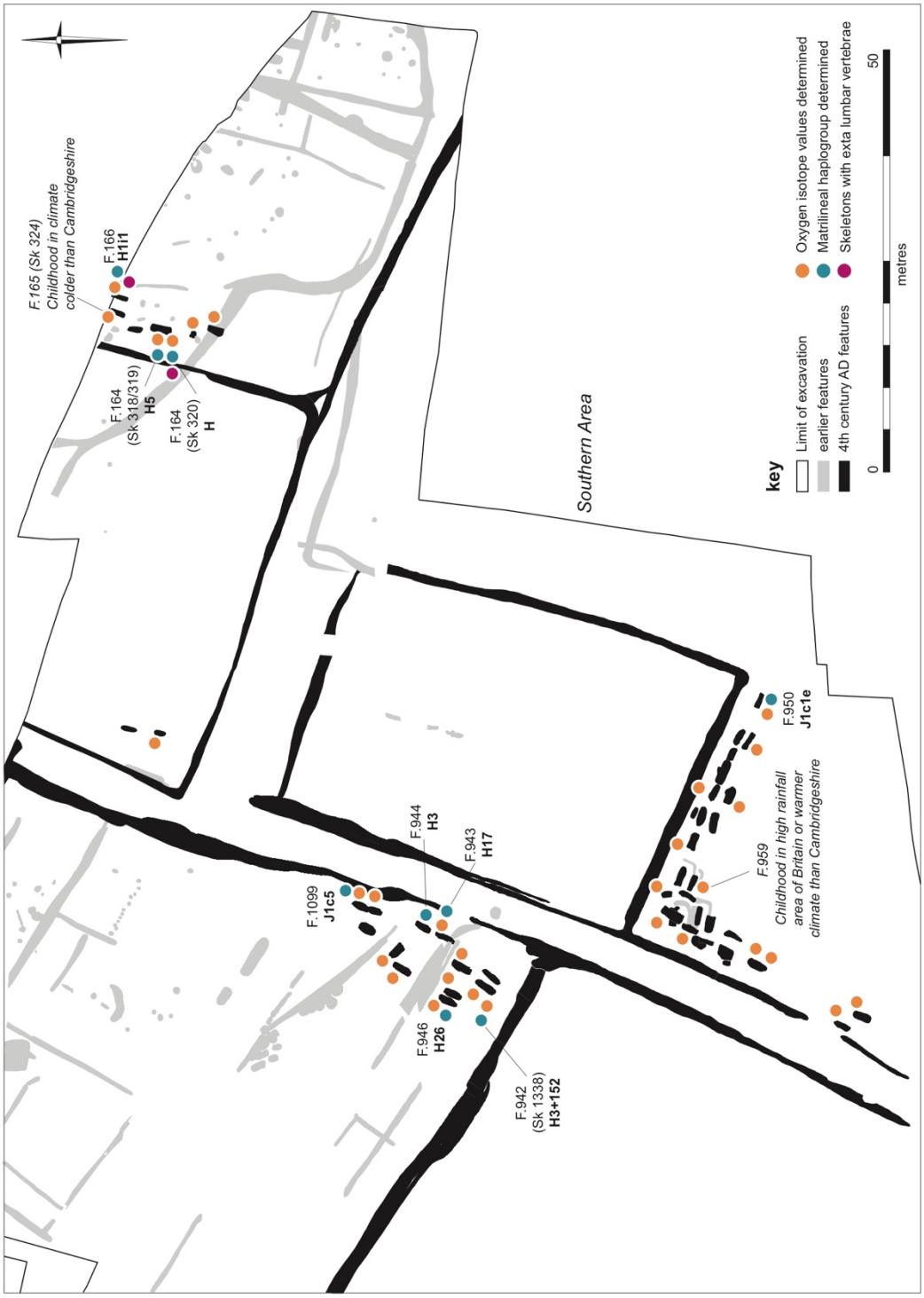


Figure S14.1 Ratio of reads mapping to chrY vs. total sex chromosomes


F.165 (Sk 324)
Childhood in climate
colder than Cambridgeshire
F.166
H11
F.164
(Sk 318/319)
H5
F.164
(Sk 320)
H
Southern Area
F.950
J1c1e
F.959
Childhood in high rainfall
area of Britain or warmer
climate than Cambridgeshire
F.944
H3
F.943
H17
F.1099
J1c5
F.946
H26
F.942
(Sk 1338)
H3+152
key
Limit of excavation
earlier features
4th century AD features
Oxygen isotope values determined
Matrilineal haplogroup determined
Skeletons with exta lumbar vertebrae
0
50
metres

SECTION 15: ISOTOPES
(ANALYSIS OF OXYGEN AND CARBON STABLE ISOTOPES FROM THE HUMAN REMAINS)

By EMMA LIGHTFOOT

INTRODUCTION

Oxygen and carbon stable isotope analyses were conducted on tooth enamel from human remains excavated at Knobb's Farm, Somersham, Cambridgeshire. Oxygen isotope values reflect the water drunk during tooth formation and are used to identify migrants, while the carbon isotope values are indicative of diet.

Enamel samples were analysed from thirty-three individuals from Roman period burials and one Iron Age individual. Sampling focused on adult individuals, and both males and females were analysed. The site is divided into three cemeteries, all of which are included here in order to see if there are any differences between them. An unusually high proportion of decapitated and prone burials were also present and, where possible, were included in the sample set to allow for comparison between the decapitated individuals and the remainder of the population.

BACKGROUND

Stable isotope analysis is a quantitative method for studying palaeodiet based on the fact that the stable isotope ratios in body tissues reflect those of the dietary intake. Individuals who consumed isotopically different diets can therefore be distinguished on the basis of their skeletal chemistry.

Oxygen and carbon isotopic ratios in tooth enamel carbonate reflect the food and drink consumed during the time of tooth formation (i.e. childhood)[282]. Oxygen isotopes reflect the water consumed during childhood, which varies isotopically with location due to climate[283]. Individuals who consumed drinking water with oxygen isotope values different to those derived from the local precipitation are identified as migrants[284]. Carbon isotopes ratios in tooth enamel reflect food consumed during childhood, but unlike bone collagen, reflects the whole diet[285]. Carbon isotopes can be used to distinguish between two types of plants, C_3 (trees, shrubs and temperate grasses) and C_4 (sub-tropical grasses)[286], and between marine and terrestrial diets[287].

MATERIALS AND METHODS

Thirty-three individuals were sampled for enamel carbonate isotope analysis representing samples from the three cemeteries (and the one Iron Age individual), males and females, and decapitated individuals. Second and third molars and premolars were preferentially sampled, however preservation was such that other teeth were analysed from eight individuals (see Table S15.1).

Enamel powder was sampled using a drill with a diamond drill attachment. The pre-treatment method was based on that described in Balasse *et al.*[288]. 0.1ml of 2–3% aq. sodium hypochlorite was added per mg of sample. The samples were then left for 24 hours at 4 ºC before being rinsed

[282] Harrison and Katzenberg 2003
[283] Dansgaard 1964; Rozanski *et al.* 1992; 1993
[284] Evans *et al* 2012; Lightfoot and O'Connell 2016
[285] Ambrose & Norr 1993; Tieszen & Fagre 1993
[286] Vogel and Van der Merwe 1977
[287] Schoeninger and DeNiro 1984
[288] Balasse *et al.* 2002.

five times with distilled water to remove the sodium hypochlorite. 0.1mg of acetic acid was then added per mg of sample. The samples were then left for four hours at room temperature, before the acetic acid was removed and the samples rinsed. Samples were then frozen and freeze-dried to remove any remaining liquid. The samples were then transferred to a vial with a screw cap holding a septa and PCTFE washer to make a vacuum seal. Samples were analysed using a Micromass Multicarb Sample Preparation System, where they were reacted with 100% orthophosphoric acid at 90°, and the carbon dioxide produced was dried and transferred cryogenically into a VG SIRA mass spectrometer for isotopic analysis. Carbon and oxygen isotopic ratios are expressed as delta values on the VPDB scale, calibrated using the NBS19 standard[289]. Repeated measurements on international and in-house standards show that the analytical error is better than ±0.08‰ for carbon and ±0.10‰ for oxygen.

The statistical analyses were performed using R version 1.0.143. Samples were tested for normality using histograms and Shapiro-Wilk tests, and for equality of variance using Levene's test. The parametric data were investigated using one-way ANOVA test and independent samples t-tests. The non-paramentric tests employed were Kruskal-Wallis tests. Outliers were identified in three ways: 1) as lying more than 2 times the standard deviation from the mean; 2) as lying more than 1.5 times the inter-quartile range (IQR) below quartile 1 (Q1) or above quartile 3 (Q3); and 3) as lying more than 2 median absolute deviations (MAD) from the median[290].

In order to compare the oxygen results to published data from other sites in Britain, the data were converted using the following equations, from carbonate oxygen VPDB to SMOW:

$$\delta^{18}O_{VSMOW} = 1.03091 \times \delta^{18}O_{VPDB} + 30.91 \quad [291]$$

and from carbonate to phosphate using:

$$\delta^{18}O_{PO4} = 1.0322 \times \delta^{18}O_{CO3} - 9.6849 \quad [292]$$

These conversion equations increase the error associated with the data[293]. Therefore, the data will be used in its native form where possible, and converted data are only used when the results are compared to other studies.

[289] Craig 1957; Coplen 1995
[290] See Lightfoot and O'Connell 2016 and references therein for details.
[291] Coplen *et al.* 1983
[292] Chenery *et al* 2012
[293] see Pryor *et al.* 2014

Table T15.1: Sample details and results of stable isotopic analysis on the Late Roman inhumation burials

Sample Code	*Feature No.*	*Context No.*	*Tooth*	*Age (category)*	*Age (years)*	*Sex*	*Cemetery*	*Prone*	*Decapitated*	$\delta^{13}O_{CO3}$ *(VPDB)*	$\delta^{13}C_{CO3}$ *(VPDB)*	$\delta^{18}O_{PO4}$ *(SMOW)*
KF152	152	259	LRM1	juvenile	11	(M)	1			-4.34	-13.24	17.59
KF163	163	316	LLM1	infant	4	(F)	1			-4.69	-13.98	17.23
KF164-319	164	319	LLM2	mature	45	F	1			-5.79	-13.93	16.06
KF164-320	164	320	ULM3	mature	40	F	1	Y	Y	-4.94	-13.36	16.96
KF165	165	324	LRM2	mid adult	38	(F)	1	Y	Y	-6.95	-14.64	14.82
KF166	166	327	LRM3	mature	42	M	1	Y		-5.95	-14.17	15.89
KF509	509	521	LLM2	mature	44	M	2			-5.43	-13.97	16.43
KF700	700	701	ULM3	mid adult	33-45	(F)	1			-5.29	-14.38	16.58
KF930	930	1300	LLM2	young mid adult	25-35	indet.	2			-4.13	-13.11	17.82
KF931	931	1303	ULM3	older young mid adult	25-35	(M)	2			-5.76	-13.97	16.08
KF932	932	1307	ULPM2	older young adult	17-25	(M)	2			-4.28	-14.15	17.67
KF935	935	1317	ULC	young adult	18-25	indet.	2			-3.05	-14.64	18.97
KF941	941	1337	LRPM1	mature	49	F	3		Y	-3.61	-13.58	18.37
KF942-1338	942	1338	LLM3	old mid adult	33-45	M	3	Y	Y	-5.77	-14.21	16.07
KF942-1352	942	1352	LLPM	young mid adult	31	F	3		Y	-3.85	-13.88	18.11
KF943	943	1343	LRM3	old mid adult	33-45	M	3		Y	-6.25	-14.94	15.56
KF945	945	1350	LLC	young middle adult	34	(F)	3	Y		-3.78	-14.89	18.2
KF946	946	1354	LRPM2	mature	48	F	3	Y		-5.88	-13.57	15.96
KF949	949	1363	LLM3	old mid adult	33-45	M	2		Y	-3.86	-13.30	18.1
KF950	950	1366	LLM2	mature	55	M	2	Y	Y	-4.69	-13.85	17.22

Sample Code	*Feature No.*	*Context No.*	*Tooth*	*Age (category)*	*Age (years)*	*Sex*	*Cemetery*	*Prone*	*Decapitated*	*$\delta^{13}O_{CO3}$ (VPDB)*	*$\delta^{13}C_{CO3}$ (VPDB)*	*$\delta^{18}O_{PO4}$ (SMOW)*
KF951	951	1369	LRM3	middle adult	26-45	(M)	2			-4.80	-13.54	17.11
KF953	953	1374	ULM2	young mid adult	25-35	M	2		Y	-3.23	-14.06	18.78
KF954	954	1377	LRM1	young adult	17-25	indet.	2			-3.98	-13.07	17.98
KF955	955	1380	ULM1	infant	3	M?	2			-3.56	-14.15	18.43
KF958	958	1389	URM2	old mid adult	39	(F)	2			-5.77	-13.09	16.08
KF959	959	1392	URM3	old mid adult	33-45	M	2			-2.95	-13.29	19.08
KF961	961	1647	LLPM2	young mid adult	25-35	M	2		Y	-4.06	-13.97	17.9
KF963	963	1398	LLM1	young mid adult	18+	M	2		Y	-5.47	-14.58	16.39
KF1095	1095	1910	LRPM1	old mid adult	33-45	F?/indet	3	Y		-4.79	-14.45	17.12
KF1096	1096	1880	LLM3	young adult	18-25	F?	3	Y		-5.89	-13.65	15.94
KF1097	1097	1883	ULPM	mature	63	(F)	3	Y	Y	-3.56	-13.64	18.43
KF1099	1099	1889	LRPM1	mature	50	M?	3	Y		-4.75	-13.59	17.16
KF1384	1384	4061	ULC	old mid adult	33-45	M?	MIA			-3.51	-14.05	18.48

RESULTS

Full sample details and isotopic results are provided in Table T15.1. The Roman period data are shown in Figure S15.1 and summarised in Table T15.2. The tooth enamel isotope values range from -7.0 to -3.0‰ in $\delta^{18}O_{CO3}$ (mean = -4.7±1.0‰) and from -14.9 to -13.1‰ in $\delta^{13}C_{CO3}$ (mean = -13.9±0.5‰). When converted the $\delta^{18}O_{PO4}$ values range from 14.8 to 19.1‰ (mean = 17.2±1.1‰). Only one outlier was detected; KF165 (mid-adult, probably female, decapitated prone) was identified as having a low oxygen isotope value using the mean and standard deviation method only ($\delta^{18}O_{CO3}$ = -7.0‰).

	$\delta^{18}O_{CO3}$ (‰)	$\delta^{13}C_{CO3}$ (‰)	$\delta^{18}O_{PO4}$ (‰)
n	32	32	32
Mean	-4.7	-13.9	17.2
St Dev	1.0	0.5	1.1
Median	-4.7	-14.0	17.2
IQR	1.9	0.6	2.0
Minimum	-7.0	-14.9	14.8
Maximum	-3.0	-13.1	19.1
Range	4.0	1.9	4.3

Table T15.2: Summary of stable isotope results from Knobb's Farm, Cambridgeshire, including data converted to $\delta^{18}O_{PO4}$ as explained in the text

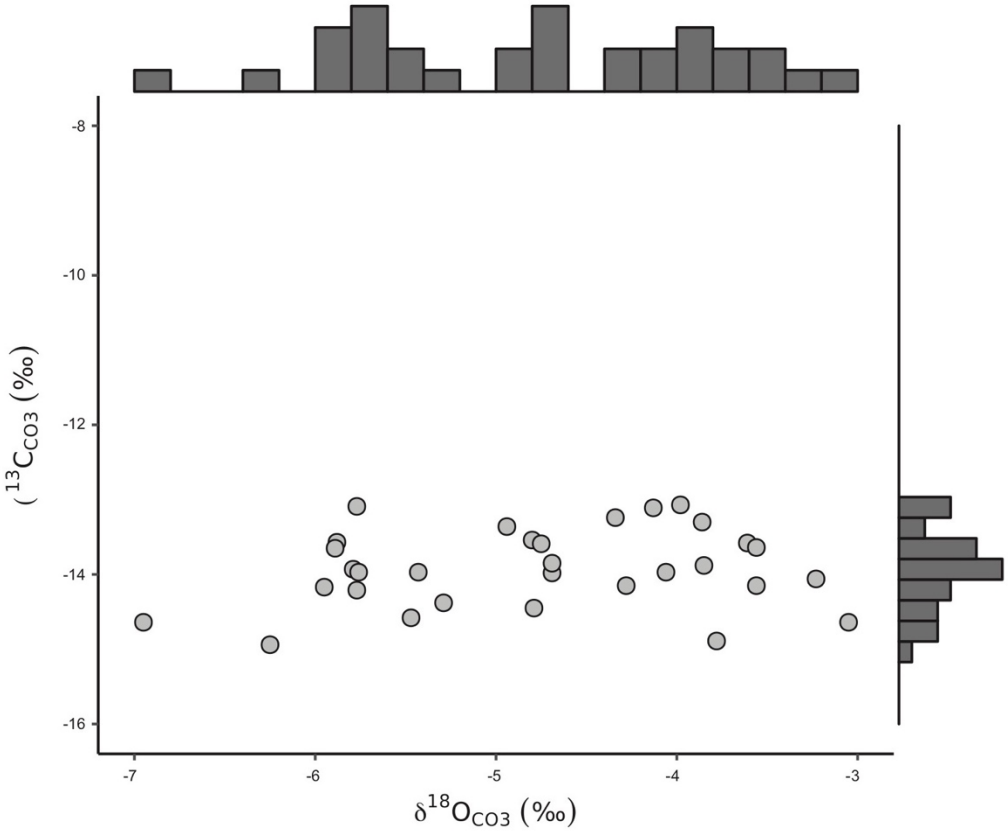


Figure S15.1: Scatter plot of stable carbon and oxygen isotope results from Late Roman burials at Knobb's Farm, Cambridgeshire

The Roman individuals were excavated from three different cemeteries (Table T15.1). The results for each cemetery are summarised by cemetery in Table T15.3 and shown in Figure S15.2. There were no statistical differences between the three cemeteries in either $\delta^{18}O_{CO3}$ or $\delta^{13}C_{CO3}$.

Cemetery		*1*	*2*	*3*
n		*7*	*15*	*10*
$\delta^{18}O_{CO3}$ (‰)	Mean	-5.4	-4.3	-4.8
	St Dev	0.9	1.0	1.1
	IQR	1.1	1.4	2.1
	Minimum	-7.0	-5.8	-6.3
	Maximum	-4.3	-3.0	-3.6
	Range	2.6	2.8	2.7
$\delta^{13}C_{CO3}$ (‰)	Mean	-14.0	-13.8	-14.0
	St Dev	0.5	0.5	0.5
	IQR	0.6	0.8	0.8
	Minimum	-14.6	-14.6	-14.9
	Maximum	-13.2	-13.1	-13.6
	Range	1.4	1.6	1.4

Table T15.3: Summary of stable isotope results from each cemetery at Knobb's Farm, Cambridgeshire

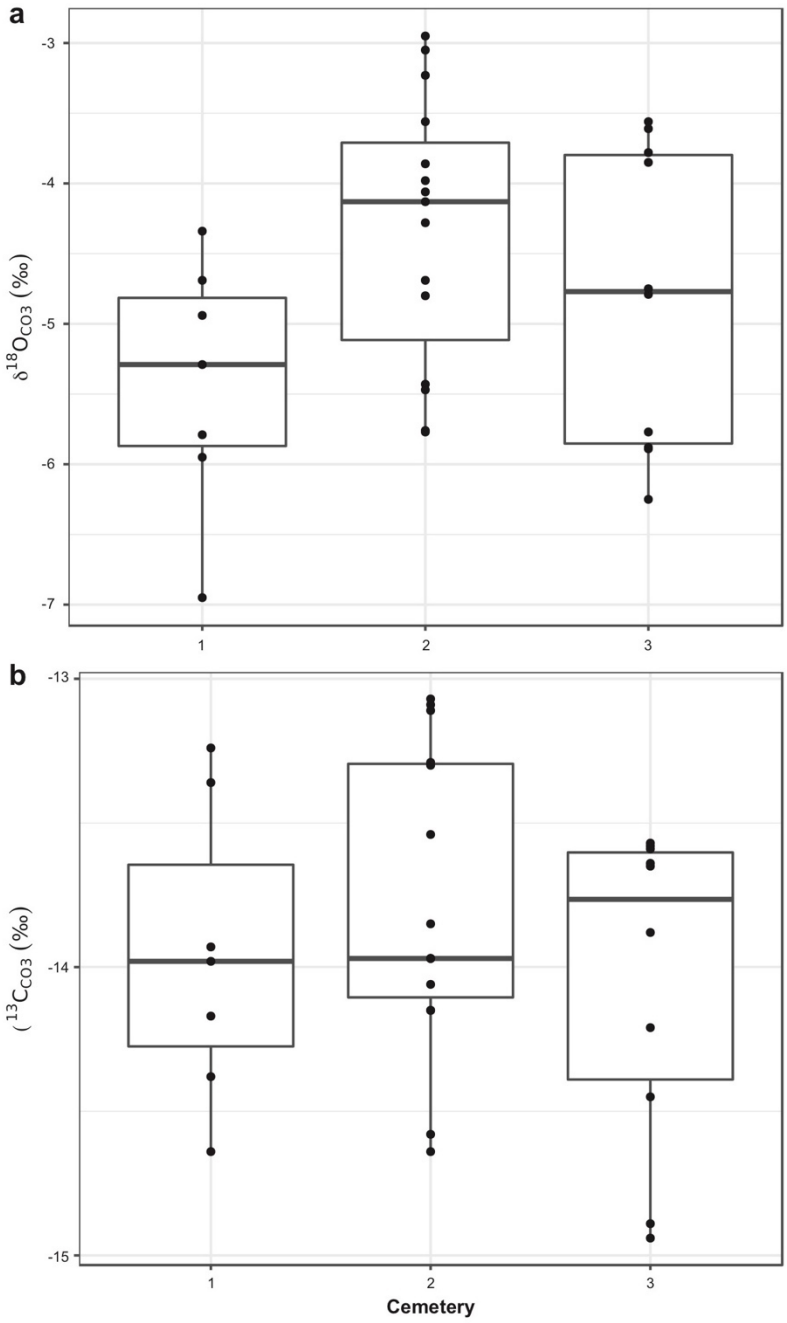


Figure S15.2: Boxplots showing human isotope results from Knobb's Farm split by cemetery: (a) $\delta^{18}O_{CO3}$ and (b) $\delta^{13}C_{CO3}$

The Roman individuals represented both males and females (Table T15.1). The results are summarised sex in Table T15.4 and shown in Figure S15.3. Note that individuals determined to be 'possibly male/female' (i.e. M?/F?) are grouped with 'indet.' due to the small sample. Although sample size is small, there are no clear or statistical differences in either $\delta^{18}O_{CO3}$ or $\delta^{13}C_{CO3}$ when the sample are grouped by sex.

Sex		*M*	*(M)*	*F*	*(F)*	*indet.*
n		*10*	*4*	*5*	*6*	*7*
$\delta^{18}O_{CO3}$ (‰)	Mean	-4.8	-4.8	-4.8	-5	-4.3
	St Dev	1.2	0.7	1.1	1.3	0.9
	IQR	1.8	0.7	1.9	1.6	1
	Minimum	-6.3	-5.8	-5.9	-7	-5.9
	Maximum	-3	-4.3	-3.6	-3.6	-3.1
	Range	3.3	1.5	2.3	3.4	2.8
$\delta^{13}C_{CO3}$ (‰)	Mean	-14	-13.7	-13.7	-14.1	-13.8
	St Dev	0.5	0.4	0.2	0.7	0.6
	IQR	0.3	0.6	0.3	0.9	1
	Minimum	-14.9	-14.2	-13.9	-14.9	-14.6
	Maximum	-13.3	-13.2	-13.4	-13.1	-13.1
	Range	1.7	0.9	0.6	1.8	1.6

Table T15.4: Summary of stable isotope results from Knobb's Farm, Cambridgeshire, grouped by sex

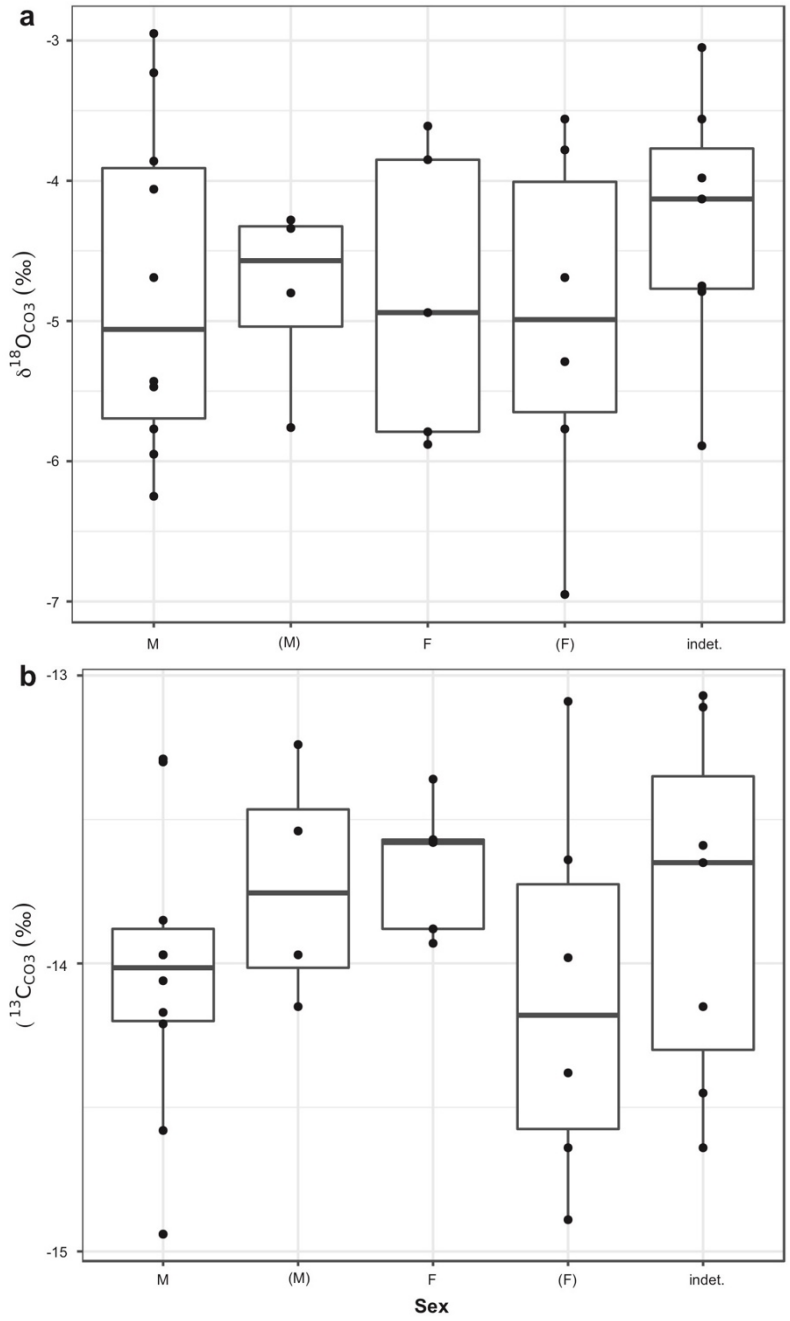


Figure S15.3: Boxplots showing human isotope results from Knobb's Farm split by sex: (a) $\delta^{18}O_{CO3}$ and (b) $\delta^{13}C_{CO3}$

An unusually high proportion of the Roman individuals were decapitated (Table T15.1). The results from decapitated and intact individuals are compared in Table T15.5 and shown in Figure S15.4. There are no statistical differences in either $\delta^{18}O_{CO3}$ or $\delta^{13}C_{CO3}$ when the sample are grouped by individuals who were decapitated and those who were not.

		Decapitated	*Intact*
n		*14*	*18*
$\delta^{18}O_{CO3}$ (‰)	Mean	-4.7	-4.7
	St Devi	1.1	1.0
	IQR	1.6	1.8
	Minimum	-7.0	-6.0
	Maximum	-3.2	-3.0
	Range	3.7	3.0
$\delta^{13}C_{CO3}$ (‰)	Mean	-14.1	-13.8
	St Dev	0.5	0.5
	IQR	0.7	0.8
	Minimum	-14.9	-14.9
	Maximum	-13.3	-13.1
	Range	1.6	1.8

Table T15.5: Summary of stable isotope results from Knobb's Farm, Cambridgeshire, comparing decapitated individuals to the rest of the population

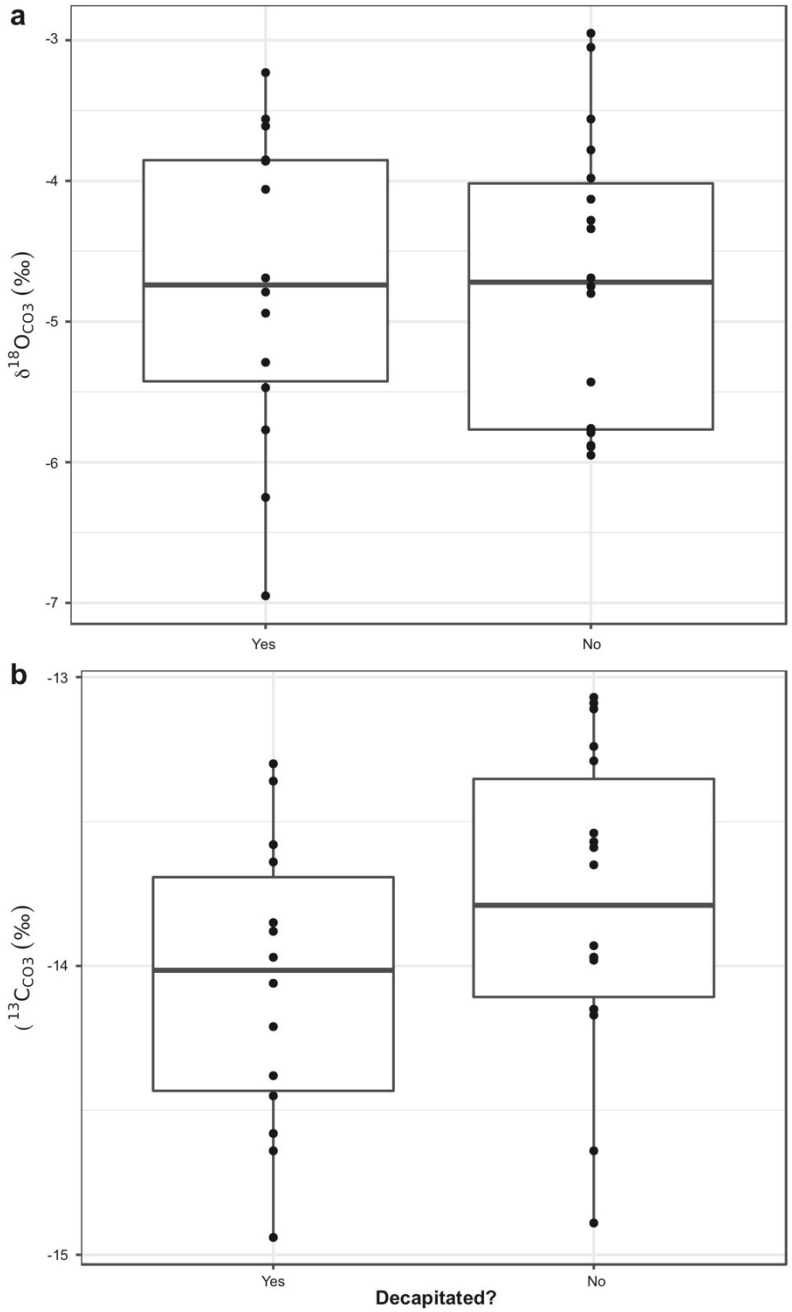


Figure S15.4: Boxplots showing human isotope results from Knobb's Farm comparing decapitated individuals to the rest of the population: (a) $\delta^{18}O_{CO3}$ and (b) $\delta^{13}C_{CO3}$

An unusually high proportion of the Roman individuals were prone (Table T15.1). The results from prone and supine individuals are compared in Table T15.6 and shown in Figure S15.5. There are no statistical differences in either $\delta^{18}O_{CO3}$ or $\delta^{13}C_{CO3}$ when the sample are grouped by individuals who were prone and those who were not.

The Iron Age individual (KF1384) has a relatively high $\delta^{18}O_{CO3}$ value (-3.5‰) but a typical $\delta^{13}C_{CO3}$ value (-14.2‰).

Prone?		*Yes*	*No*
n		*11*	*21*
$\delta^{18}O_{CO3}$ (‰)	Mean	-5.2	-4.5
	Standard Deviation	1.0	1.0
	IQR	1.2	1.6
	Minimum	-7.0	-6.3
	Maximum	-3.6	-3.0
	Range	3.4	3.3
$\delta^{13}C_{CO3}$ (‰)	Mean	-14.0	-13.8
	Standard Deviation	0.5	0.5
	IQR	0.7	0.9
	Minimum	-14.9	-14.9
	Maximum	-13.4	-13.1
	Range	1.5	1.9

Table T15.6: Summary of stable isotope results from Knobb's Farm, Cambridgeshire, comparing prone individuals to the rest of the population

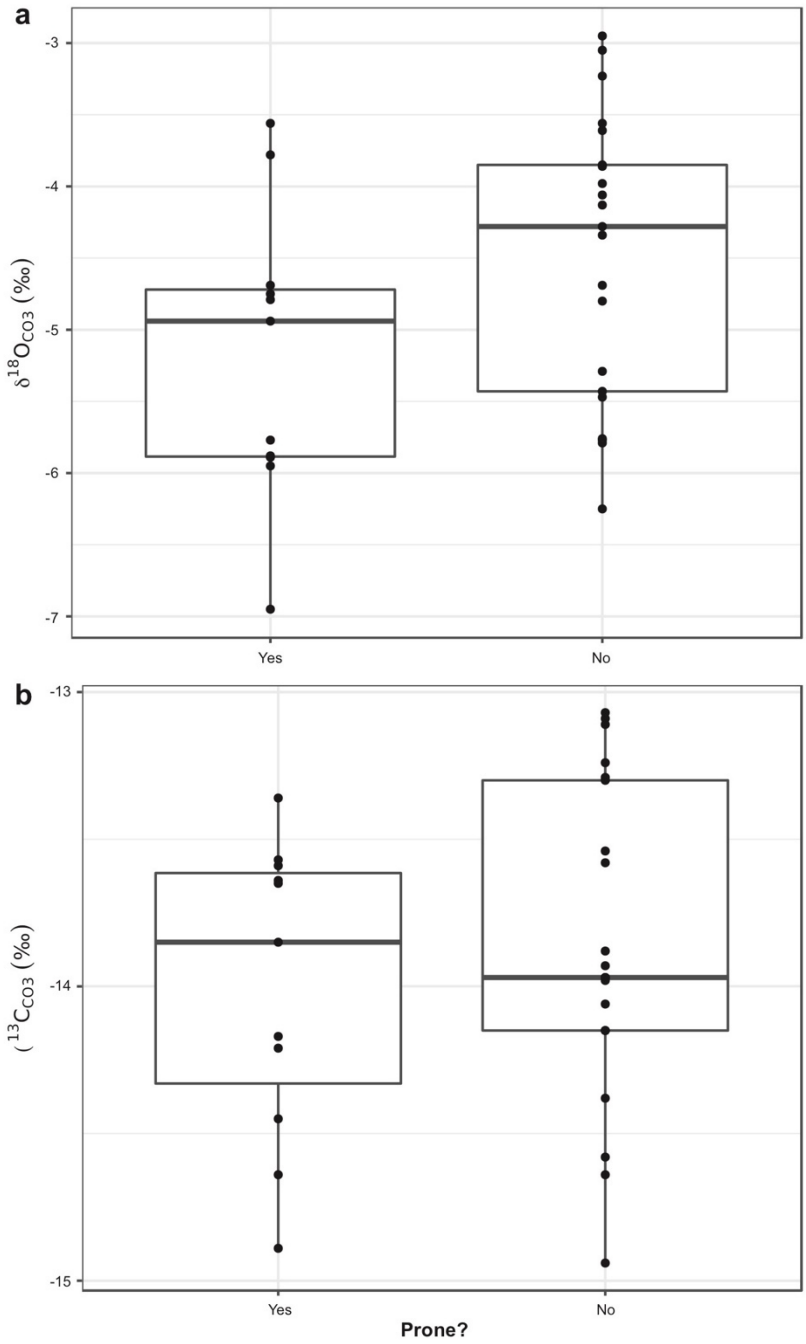


Figure S15.5: Boxplots showing human isotope results from Knobb's Farm comparing prone individuals to the rest of the population: (a) $\delta^{18}O_{CO3}$ and (b) $\delta^{13}C_{CO3}$

DISCUSSION

The human oxygen isotope values fall within the range of published data from human tooth enamel from Britain[294], and the range in values is typical for a sample set of this size[295]. However, the lowest value (KF165, $\delta^{18}O_{CO3}$=-7.0‰, $\delta^{18}O_{PO4}$=14.8‰) can be considered unusually low compared to published data from Britain, and was identified as an outlier by one of the three methods used. Evans and colleagues[296] have shown that British oxygen isotope data can be divided into two end member groups, representing two bioclimatic zones—a, largely eastern, low rainfall zone and a, largely western and southern, high rainfall zone. The mean $\delta^{18}O_{PO4}$ for the low rainfall zone is 17.2‰ ±1.3‰ (2SD). This mean value fits well with the data presented here, indicating that the Knobb's Farm individuals are likely to largely be from the eastern 'low rainfall zone' of Britain. However, comparison to this low rainfall dataset suggests that in addition to individual KF165, individual KF959 with the highest $\delta^{18}O$ value ($\delta^{18}O_{CO3}$=-3.0‰, $\delta^{18}O_{PO4}$=19.1‰) can also be considered to have an unusual oxygen isotope value. In the case of KF165, the oxygen isotope value suggests that this individual likely spent their childhood somewhere colder than Cambridgeshire (such as the Alps or central Europe), while individual KF959 could have spent their childhood the 'high rainfall' area of Britain (e.g. Cornwall or western Wales), or somewhere warmer than Cambridgeshire (such as the Mediterranean, although the low carbon isotope values indicate they did not grow up in a subtropical environment). KF165 had been decapitated and buried prone.

The carbon isotope values indicate that the analysed individuals consumed diets based upon C_3 plants, such as wheat and barley, and animals fed upon C_3 plants, as would be expected in Britain. The carbon isotope values seen here are particularly low, which may indicate the consumption of (plant) food from a closed environment[297] and/or an area with high water availability[298]. Alternatively, the low carbon isotope results may suggest that some freshwater fish were consumed from a water source with very low carbon isotope values. While no fauna were available to confirm this hypothesis, fish bone carbon isotope results from Bronze Age Must Farm suggest that this is a plausible theory[299].

There are no differences, as seen through tooth enamel carbonate isotope analysis, within the Roman population from Knobb's Farm. There is no evidence that either sex consumed different food or water (and therefore were more likely to be migrants) than the other, nor is there any correlation between the three different cemeteries and either isotope value. Despite the high number of decapitated individuals in this site, there is no correlation between decapitation status and food and water consumed during life. Nor is there any difference in food and water consumed between the prone individuals and the rest of the population.

The single Iron Age individual has a similar carbon isotope value to the rest of the population, indicating a diet based on C_3 plants and animals fed upon C_3 plants, and potentially some freshwater fish consumption. Although relatively high, the Iron Age individual's oxygen isotope value also

294 Evans *et al.* 2012; Lightfoot and O'Connell 2016
295 Lightfoot and O'Connell 2016
296 Evans *et al.* 2012
297 The canopy effect; van der Merwe and Medina 1991
298 Condon *et al.* 1992
299 Lightfoot *et al.* 2019 forthcoming

fits within that of the Roman dataset and the most parsimonious explanation is that this individual lived locally during childhood.

CONCLUSION

This study has shown that the population buried at Knobb's Farm, Cambridgeshire, were homogenous in that there are no differences in isotopic results between males and females, between the three different cemeteries, or between the decapitated individuals and the rest of the population. As expected, the carbon isotope values indicate that people consumed diets based on C_3 plants, such as wheat and barley, and animals that consumed C_3 plants, although the consumption of freshwater fish is also possible. In terms of oxygen isotope results, no clear outliers were identified, however individuals at either extreme of the data distribution can be considered unusual and tentatively considered as migrants from two very different environments.

ACKNOWLEDGEMENTS

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SECTION 16: LOCAL ROMAN-ERA BURIALS

By ROB WISEMAN

In order to provide a baseline for comparing Roman-era burial practices, a database of well-recorded excavations in Cambridgeshire and Peterborough was created. In total, 884 burials from forty-eight excavations were included. Figure S16.1 shows the locations of these burial sites. Table T16.1 lists the site names and sources. Data for each burial entered into the database included:

- basic burial type (cremation, inhumation)
- date of burial or site (where known)
- sex of the individual
- age category of the individual
- burial posture of inhumations (supine, prone, flexed)
- grave orientation of inhumations
- whether bodies had been decapitated
- use of a coffin or sarcophagus
- gravegoods—with particular note taken of pottery types, sizes and sources
- location of gravegoods within the grave
- other objects found in the grave such as animal bones or nails.

A summary of key data, relevant to the burial patterns found at Knobb's Farm, is included in Table S16.2. Table T16.3 summarises major gravegoods found in these burials.

Figure S16.1: Location of excavated Roman-era burials in Cambridgeshire and Peterborough

no.	*site name*	*references*
1	Fox Cover Farm, Market Deeping	Trimble 2000
2	Itter Crescent, Peterborough	Henley, Lyons & Pickstone 2012
3	Durobrivae/Water Newton	Casa Hatton & Wall 1999
4	Lynch Farm, Orton Longueville	Jones 1975
5	Orton Longueville	Wilson *et al.* 1975: 252; Dallas 1975
6	Coneygree Road, Stanground	Patten 2012
7	King's Dyke, Whittlesey	Challands 1977: 27–28
8	Longhill Road, March	Peachey 2012
9	Prickwillow Road, Ely	Atkins and Mudd 2003
10	Lancaster Way, Ely	Patten 2015
11	West Fen Road, Ely	Regan 2001
12	Watson's Lane, Little Thetford	Lucas and Hinman 1996
13	Knobb's Farm, Somersham	—
14	Camp Ground, Colne	Evans 2013
15	Langdale Hale, Colne	Evans 2013
16	Watermeet, Huntingdon	Nicholson 2006
17	The Parks, Godmanchester	Jones 1998
18	London Street, Godmanchester	Hoyland and Wait 1992
19	Northstowe (Phase 1 Areas C, E & J)	Collins 2016
20	Northstowe (Phase 1 Area M)	Collins 2017

21	Lower Cambourne	Wright *et al.* 2009
22	Knapwell Plantation, Cambourne	Wright *et al.* 2009
23	Jeavons Lane, Cambourne	Wright *et al.* 2009
24	Milton Barrow, Cambridge	Anon 1997
25	Arbury, Cambridge	Liversidge 1977; Fell 1952
26	NIAB Cemetery 19*	Preliminary results, Albion Archaeology
27	NIAB Cemetery 20*	Preliminary results, Albion Archaeology
28	NIAB Cemetery 72*	Preliminary results, Albion Archaeology
29	NIAB Cemeteries 16, 17, 32, 33, 62, 64, 66, 67, 90*	Preliminary results, Albion Archaeology
30	Girton College, Cambridge	Hollingworth and O'Reilly 1925
31	North West Cambridge (Site V)	Brittain 2014
32	North West Cambridge (RB1)	Cessford & Evans 2013
33	North West Cambridge (RB2A)	Cessford & Evans 2013
34	North West Cambridge (RB2C)	Cessford & Evans 2013
35	North West Cambridge (RB2D)	Cessford & Evans 2013
36	Vicar's Farm, Cambridge	Lucas & Whittaker 2001
37	Westminster College, Cambridge	Graham 2016
38	Chesterton Lane Corner, Cambridge	Cessford 2007
39	Clay Farm, Trumpington	Phillips and Mortimer 2012
40	Jesus Lane, Cambridge	Alexander, Dodwell & Evans 2004
41	Hatherdene Close, Cherry Hinton	Ladd and Mortimer 2017
42	AstraZeneca New Site, Cambridge	Tabor 2015
43	Barleyfields, Fulbourn	Moan 2015
44	Babraham Institute	Timberlake, Dodwell and Armour 2007
45	Foxton	Maynard *et al.* 1997
46	Linton Village College	Lethbridge 1937
47	Linton Village College	Gilmour 2009
48	Guilden Morden	Fox & Lethbridge 1926
49	Guilden Morden	Lethbridge 1936

Table T16.1: Site names and sources for excavations of Roman-era burials in Cambridgeshire and Peterborough

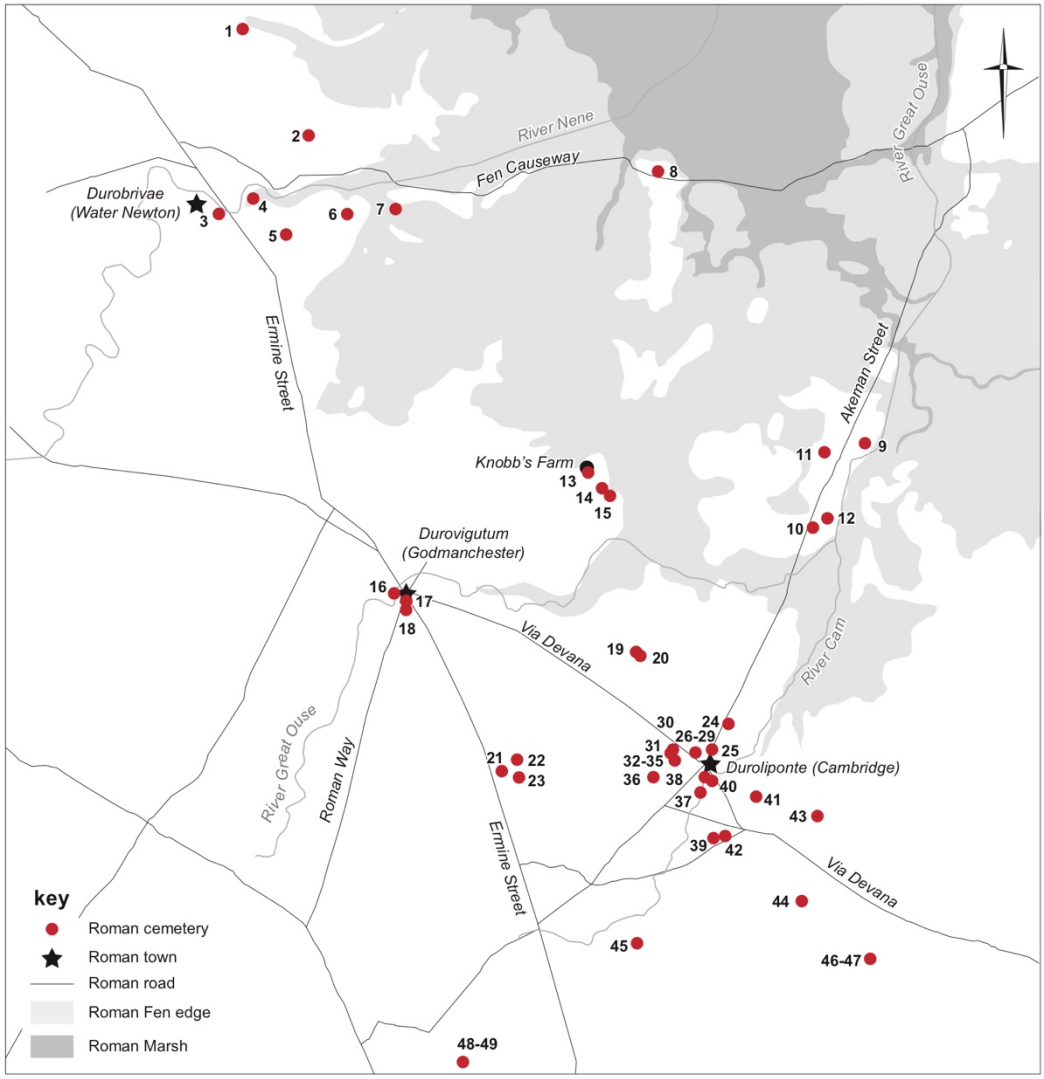

Figure S16.1 Location of Roman-era burials in Cambridgeshire and Peterborough

Table T16.2: Key burial patterns in the 48 excavations in Cambridgeshire and Peterborough containing Roman-era burials.

no.	*site*	*total burials*	*cremations*	*inhumations*	*supine*	*prone*	*coffins*
1	Fox Cover Farm, Market Deeping	17		12	8	3	
2	Itter Crescent, Peterborough	30		30		10	
3	Durobrivae/Water Newton	57		57	4		6
4	Lynch Farm, Orton Longueville	51	1	50	42	1	14
5	Orton Longueville	8		8	8		2
6	Coneygree Road, Stanground	1	1				
7	King's Dyke, Whittlesey	8		8	5	1	
8	Longhill Road, March	1		1	1		
9	Prickwillow Road, Ely	21	5	16	12	2	4
10	Lancaster way, Ely	8		8	7		1
11	West Fen Road, Ely	3		3	1		1
12	Watson's Lane, Little Thetford	3		3	3		
14	Camp Ground, Colne	19	5	14	3		4
15	Langdale Hale, Colne	13	8	5	1	3	1
16	Watermeet, Huntingdon	72		72	44	2	
17	The Parks, Godmanchester	60	1	59	50	6	11
18	London Street, Godmanchester	12		12	4		3
19	Northstowe (Phase 1 Areas C, E & J)	1		1		1	
20	Northstowe (Phase 1 Area M)	9	2	7	5		
21	Lower Cambourne	5		5	1		
22	Knapwell Planatation, Cambourne	2		2	2		1
23	Jeavon's Lane, Cambourne	4		4	1	1	

no.	*site*	*total burials*	*cremations*	*inhumations*	*supine*	*prone*	*coffins*
24	Milton Barrow, Cambridge	15	3	12		1	
25	Arbury, cambridge	7	1	6	5		1
26	NIAB Cemetery 19*	12		12	10		6
27	NIAB Cemetery 20*	13		13	9		5
28	NIAB Cemetery 72*	50		50	39		16
29	NIAB Cemeteries 16, 17, 32, 33, 62, 64, 66, 67, 90*	13		13	11	1	5
30	Girton College, Cambridge	4	3	1			
31	North West Cambridge Site V	2		2	1		2
32	North West Cambridge RB1	6	6				
33	North West Cambridge RB2A	9	5	4	4		
34	North West Cambridge RB2C	14		14	13		11
35	North West Cambridge RB2D	17	14	3	3		1
36	Vicar's Farm, Cambridge	43	9	34			8
37	Westminster College, Cambridge	2		2	2		2
38	Chesterton Lane Corner, Cambridge	1		1	1		
39	Clay Farm, Trumpington	5		5	3		
40	Jesus Lane, Cambridge	32		32	31		3
41	Hatherdene Close, Cherry Hinton	9	7	2			2
42	AstraZeneca New Site, Cambridge	8	3	5	5		2
43	Barleyfields, Fulbourn	3	2	1		1	
44	Babraham Institute	57	8	49	27		5
45	Foxton	22		22	12		2
46	Linton Village College (1937)	5		5	5		
47	Linton Village College (2009)	6		3	2		

no.	*site*	*total burials*	*cremations*	*inhumations*	*supine*	*prone*	*coffins*
48	Guilden Morden (1926)	45	4	41	35		3
49	Guilden Morden (1935)	88	41	47	31	1	2

**Figures from the NIAB cemeteries are preliminary results, kindly provided by Albion Archaeology, ahead of full assessment.*

Table T16.3: Selected gravegoods from the 48 excavations in Cambridgeshire and Peterborough containing Roman-era burials

no.	*site*	*pottery*	*beaker*	*flagon/ flask*	*miniature*	*small*	*Nene Valley*	*colour coated*	*hobnails*	*bone combs*	*coins*
1	Fox Cover Farm, Market Deeping										
2	Itter Crescent, Peterborough										
3	Durobrivae/Water Newton										
4	Lynch Farm, Orton Longueville	2	2				2	2		1	
5	Orton Longueville										
6	Coneygree Road, Stanground	1									
7	King's Dyke, Whittlesey										
8	Longhill Road, March										
9	Prickwillow Road, Ely	1	1		1		1		3		
10	Lancaster way, Ely										
11	West Fen Road, Ely	1				1			1		
12	Watson's Lane, Little Thetford								1		
14	Camp Ground, Colne	4	2	1	1	1	1	1			
15	Langdale Hale, Colne	3	1			1	1	1			
16	Watermeet, Huntingdon										1
17	The Parks, Godmanchester	4	3				3	1			1
18	London Street, Godmanchester	1									1
19	Northstowe (Phase 1 Areas C, E & J)										
20	Northstowe (Phase 1 Area M)	2									
21	Lower Cambourne										
22	Knapwell Planatation, Cambourne	1			1						
23	Jeavon's Lane, Cambourne								2		

no.	*site*	*pottery*	*beaker*	*flagon/ flask*	*miniature*	*small*	*Nene Valley*	*colour coated*	*hobnails*	*bone combs*	*coins*
24	Milton Barrow, Cambridge	3	1			1	1			1	
25	Arbury, cambridge	2				1		2			
26	NIAB Cemetery 19*	3		1	—	—	—	—	1		
27	NIAB Cemetery 20*	2	2		—	—	—	—	3		
28	NIAB Cemetery 72*	12	5		—	—	—	—	2		1
29	NIAB Cemeteries 16, 17, 32, 33, 62, 64, 66, 67, 90*	1			—	—	—	—	1		
30	Girton College, Cambridge	3	1	1				1			
31	North West Cambridge Site V										
32	North West Cambridge RB1								1		
33	North West Cambridge RB2A	5	3	1		1					
34	North West Cambridge RB2C	6	6		1		2	6	11		
35	North West Cambridge RB2D	14	4	8		2	1	2	1		
36	Vicar's Farm, Cambridge	10	1	4		4			9		
37	Westminster College, Cambridge										
38	Chesterton Lane Corner, Cambridge										
39	Clay Farm, Trumpington										
40	Jesus Lane, Cambridge	2		2		2	1	1	3		
41	Hatherdene Close, Cherry Hinton**	30	11	5	9		10	10	1		
42	AstraZeneca New Site, Cambridge	4	1			3			2		
43	Barleyfields, Fulbourn	1							1		
44	Babraham Institute	8	4	1	1	2	2	4	4		
45	Foxton	1					1	1		1	
46	Linton Village College (1937)	2				1					
47	Linton Village College (2009)										

no.	*site*	*pottery*	*beaker*	*flagon/ flask*	*miniature*	*small*	*Nene Valley*	*colour coated*	*hobnails*	*bone combs*	*coins*
48	Guilden Morden (1926)	7	1			1			1		1
49	Guilden Morden (1935)	10	1	1		3		2	2		

**Figures from the NIAB cemeteries are preliminary results, kindly provided by Albion Archaeology, ahead of full assessment.*

*** Figures for the Hatherdene Close cemetery are based on the initial assessment, and may be updated in the final publication.*

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