EAST ANGLIAN ARCHAEOLOGY

Frontispiece: The reburial of the human skeletal remains on The Green, Ormesby St Margaret, Sunday 24 June 2001 (*copyright Archant/EDP*)

A Medieval Cemetery at Mill Lane, Ormesby St Margaret, Norfolk

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East Anglian Archaeology
Report No. 130, 2009

NAU Archaeology and Historic Environment
Norfolk Museums and Archaeology Service

EAST ANGLIAN ARCHAEOLOGY
REPORT NO. 130

Published by
Historic Environment
Norfolk Museums and Archaeology Service
Union House
Gressenhall
Dereham
Norfolk NR20 4DR

in conjunction with
NAU Archaeology
Scandic House
85 Mountergate
Norwich NR1 1PY

and
ALGAO East
http://www.algao.org.uk/cttees/Regions

Set in Times Roman by Jenny Glazebrook using Corel Ventura™
Printed by Henry Ling Limited, The Dorset Press

ISBN 978 0 905594 49 1

For details of *East Anglian Archaeology*, see last page

East Anglian Archaeology was established in 1975 by the Scole Committee for Archaeology in East Anglia. The scope of the series expanded to include all six eastern counties and responsibility for publication passed in 2002 to the Association of Local Government Archaeological Officers, East of England (ALGAO East).

Cover photograph
Skeleton *75* with the excavation of skeleton *79* in progress

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Acknowledgements

Many thanks are expressed to everyone involved in this project. The excavation and watching brief were undertaken by Norfolk Archaeological Unit staff, without whose skill and enthusiasm the project would not have been a success: David Adams, Sarah Bates, Niall Donald, Kevin Forrest, Kären Gaffney, Steve Hickling, Steve Manifold and David Whitmore. Lucy Talbot processed the finds.

The help and advice offered by the late Alan Davison, Kären Gaffney (Norfolk Records Office), Kenneth Penn (Norfolk Archaeological Unit), Peter Marshall (English Heritage) and Sarah Massey (National Mapping Programme for Norfolk) was very much appreciated.

Thanks are also due to Archant and the Eastern Daily Press for granting permission to publish their photograph of the reburial ceremony.

Summary

During the construction of Ormesby bypass in east Norfolk, human bones were found by the contractors. Excavation revealed that these were not isolated burials but part of a cemetery. Sixty-two articulated burials were excavated which along with unstratified bones represented a minimum of forty-five adults and seventeen children. A date range of 11th–14th centuries has been suggested by radiocarbon determinations which were calibrated with consideration of the marine protein component of the diet of the individuals. Demographic, metrical, morphological, dental and pathological aspects of the population have also been studied, and compared with other contemporary Norfolk groups. Demographic analysis suggests a trend towards death in old age amongst the men and in young adult life for the women. Metrical analysis showed a similarity with medieval groups in Norfolk, and non-metric traits suggested a close affinity with people from a nearby Saxon cemetery and a medieval group from Norwich.

Ormesby had four churches during the medieval period: the locations of three (St Margaret, St Michael and St Peter) were known, and the fourth (St Andrew) suggested prior to this excavation. None of these were adjacent to the burials. Consideration of the archaeological evidence along with aerial photographs, cartographic and secondary documentary evidence allows an alternative location to be suggested for the church of St Andrew, adjacent to the burials.

Résumé

Au cours de la construction de la rocade d'Ormesby à l'est du Norfolk, des ossements humains ont été découverts par les entrepreneurs. Les fouilles ont révélé qu'il ne s'agissait pas de tombes isolées mais d'une partie de cimetière. Soixante-deux tombes contenant des squelettes articulés ont été mises à jour, ce qui, avec les ossements non stratifiés, représente un minimum de quarante-cinq adultes et de dix-sept enfants. Les déterminations au carbone 14 ont été étalonnées en fonction de la présence d'une protéine marine dans l'alimentation des personnes. Elles ont permis de proposer une période de datation comprise entre les onzième et quatorzième siècles. La population a également été étudiée sur le plan démographique, métrique, morphologique, dentaire et pathologique et les résultats obtenus ont été comparés avec ceux d'autres groupes contemporains du Norfolk. L'analyse démographique laisse supposer une tendance à la mortalité parmi les hommes âgés et les jeunes femmes adultes. L'analyse métrique révèle une similitude avec les groupes du Norfolk au Moyen Âge, alors que les traits non métriques suggèrent une affinité étroite avec les personnes du cimetière saxon voisin et avec un groupe de Norwich de l'époque médiévale.

Ormesby possédait quatre églises pendant la période médiévale: on a pu localiser trois d'entre elles (St Margaret, St Michael et St Peter) et pour la quatrième (St Andrew), il existait une hypothèse concernant son emplacement, qui était antérieure à ces fouilles. Aucune de ces églises ne se trouvait à côté des tombes. La prise en compte des preuves archéologiques, des photographies aériennes, des données cartographiques et des preuves documentaires secondaires permet toutefois d'avancer une autre hypothèse selon laquelle l'église St Andrew se trouvait à côté des tombes.

(Traduction: Didier Don)

Zusammenfassung

Bei Arbeiten zum Bau einer Umgehungsstraße um Ormesby in Ost-Norfolk stieß die Baugesellschaft auf menschliche Knochen. Die anschließende Ausgrabung ergab, dass diese nicht aus isolierten Bestattungen, sondern von einem Gräberfeld stammten. Insgesamt wurden 62 klar erkennbare Grabstätten ausgegraben, die zusammen mit einigen unstratifizierten Knochen mindestens 45 Erwachsenen und 17 Kindern zuzuordnen waren. Radiokarbonuntersuchungen, die unter Einbeziehung des Fischproteinbestandteils in der Ernährung der Personen kalibriert wurden, wiesen auf eine Zeitspanne vom 11. bis zum 14. Jh. hin. Des Weiteren wurden demographische, metrische, morphologische, dentale und pathologische Aspekte der Population untersucht und mit anderen in Norfolk gefundenen Gruppen aus derselben Zeit verglichen. Der demographischen Analyse nach starben Männer eher in hohem, Frauen dagegen eher in jungem Alter. Die metrische Analyse zeigte Ähnlichkeiten mit anderen mittelalterlichen Gruppen in Norfolk, dazu ließen die nicht metrischen Eigenschaften auf eine enge Affinität zu den Menschen auf einem nicht weit entfernten angelsächsischen Gräberfeld und einer aus Norwich stammenden mittelalterlichen Gruppe schließen.

Ormesby besaß im Mittelalter vier Kirchen; zu dreien davon (St Margaret, St Michael und St Peter) waren die Standorte bekannt, zu der vierten (St Andrew) gab es vor der Ausgrabung nur Vermutungen. Keiner dieser vermuteten Standorte lag in der Nähe der Grabstätten. Die Bewertung der archäologischen Befunde legt im Zusammenspiel mit Luftaufnahmen und kartografischem sowie sekundärem Quellenmaterial für die Kirche St Andrew nun einen anderen Standort unweit der Grabstätten nahe.

(Übersetzung: Gerlinde Krug)

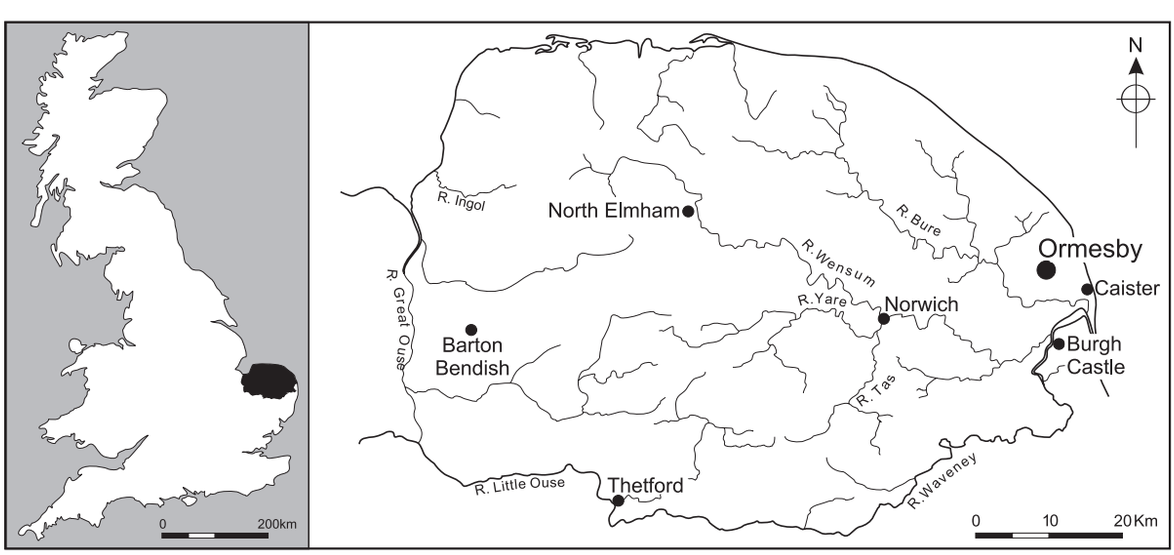

Figure 1 Location map

Chapter 1. Introduction

Project background
(Figs 1, 2 and 3)

Archaeological investigations along the line of the A149 Ormesby bypass in East Norfolk (Figs 1 and 2) were carried out by staff of the Norfolk Archaeological Unit. The work took place intermittently over a thirteen-month period from April 1995 into April 1996 and included fieldwalking, watching briefs and excavation. The fieldwork and initial analysis was funded by Engineering Services, Norfolk County Council. The full analysis and publication was supported by the Norfolk Archaeological Unit.

The route of the bypass (Fig. 2) started just to the west of Ormesby St Michael and diverged south from the old A149 at Manship's Farm following a south-east alignment, bisecting both Mill Lane and Filby Lane. Along this stretch three areas were fieldwalked and two areas were the subject of a watching brief. The central sector of the new road consisted of improvements to the existing Nova Scotia Road, so no fieldwork was undertaken in this sector. The bypass diverged from the line of Nova Scotia Road and continued to the south-east before joining the old A1064 Norwich Road; here two areas were fieldwalked. At the western end of the bypass, close to its junction with Mill Lane, a new link road into Ormesby St Margaret and St Michael was constructed. It was here that a number of burials were discovered, leading to an excavation of the road line (Site 31773, Fig. 3).

Fieldwalking was undertaken in stages in April 1995, December 1995 and January 1996, while the watching briefs took place in January and February 1996 according to the construction programme. Excavation of Site 31773 took place in April 1996, following the discovery of human bones by construction workers during the digging of the drainage channels. Once it was established that the bones were not from a single isolated skeleton, plans were put into place for the area of the road adjacent to the discovery to be excavated. In total sixty graves were identified. It is the results of the excavation of this burial area which form the main content of this report. Summaries of the results from the other fieldwork are presented in the Appendix.

Historical and archaeological background
(Fig. 2)

The site lies within the parish of Ormesby St Margaret with Scratby, in an area of east Norfolk known as Flegg, consisting of the two hundreds of East and West Flegg. During the Roman and early Saxon periods this area was an island (Williamson 1993, 13) and was later bordered to the south and west by the River Bure, to the north by the River Thurne and to the east by the North Sea.

Little is known of the early occupation of this area although finds dating from the Late Neolithic through to the Iron Age have been made (Wade-Martins 1994, 19–25). The Norfolk Historic Environment Record shows that the route of the new road passes close to a number of archaeological sites, the majority of which are known from aerial photographs or from the recording of stray finds. The aerial photographs show two main groups of features, a number of ring-ditches probably of Bronze Age date and an extensive field system which underlies the modern field divisions. During the Roman period known activity increased with a number of settlements and roads in the region, and the construction in the 3rd century of the Shore Fort at Caister-on-Sea (Wade-Martins 1994, 28–9).

Settlement in the area was heavily influenced by the Vikings, as is apparent in the predominance of *–by* place-names. Thirteen of the twenty-two villages in Flegg have names of Scandinavian origin (Cornford 2002, 22), including both Ormesby and Flegg. At the time of Domesday the Isle of Flegg was one of the most heavily populated areas of Norfolk, a situation which contrasted directly with the marshes of the surrounding area where there were large belts of unoccupied territory. This situation has been attributed to the fertile soils of the area as well as the strong Scandinavian influence (Darby 1971, 107).

During the medieval period the area continued to thrive although the 14th century saw a number of setbacks including poor harvests, the Black Death and the Peasants' Revolt (Cornford 2002, 190–1). Despite this, Flegg remained relatively wealthy into the 15th century, a wealth displayed in many of the churches of the area by the addition and renewal of architectural features.

Ormesby itself had four churches during its heyday (Fig. 2), two of which are still in use today, St Margaret and St Michael. St Margaret has a Norman doorway although the majority of the fabric dates from the 15th century (Pevsner and Wilson 2002, 628). Architecturally much of St Michael is 13th century with some 15th-century additions and 19th- and 20th-century restoration and alterations (Pevsner and Wilson 2002, 630). Little is known of the other two churches (St Andrew and St Peter) as no above-ground elements survive. The location of one of them (usually referred to as St Peter) has been clearly identified by aerial photography (Cambridge University Collection of Aerial Photographs BYJ 26–30; Batcock 1991, plate CXXV). The plan, visible in the photograph as a parchmark, indicates that the building probably originated in the early 12th century, with alterations occurring during the 13th to 15th centuries (Batcock 1991, 161). The location of the fourth church (St Andrew) is less secure, but it has been suggested that substantial remains found in a garden during the first half of the 20th century may represent it (Historic Environment Record 11737, marked as 'presumed site' on Fig. 2). However the results of this project suggests an alternative location which is discussed later.

Research aims

Once the presence of human remains on the line of the bypass had been established, a programme of excavation

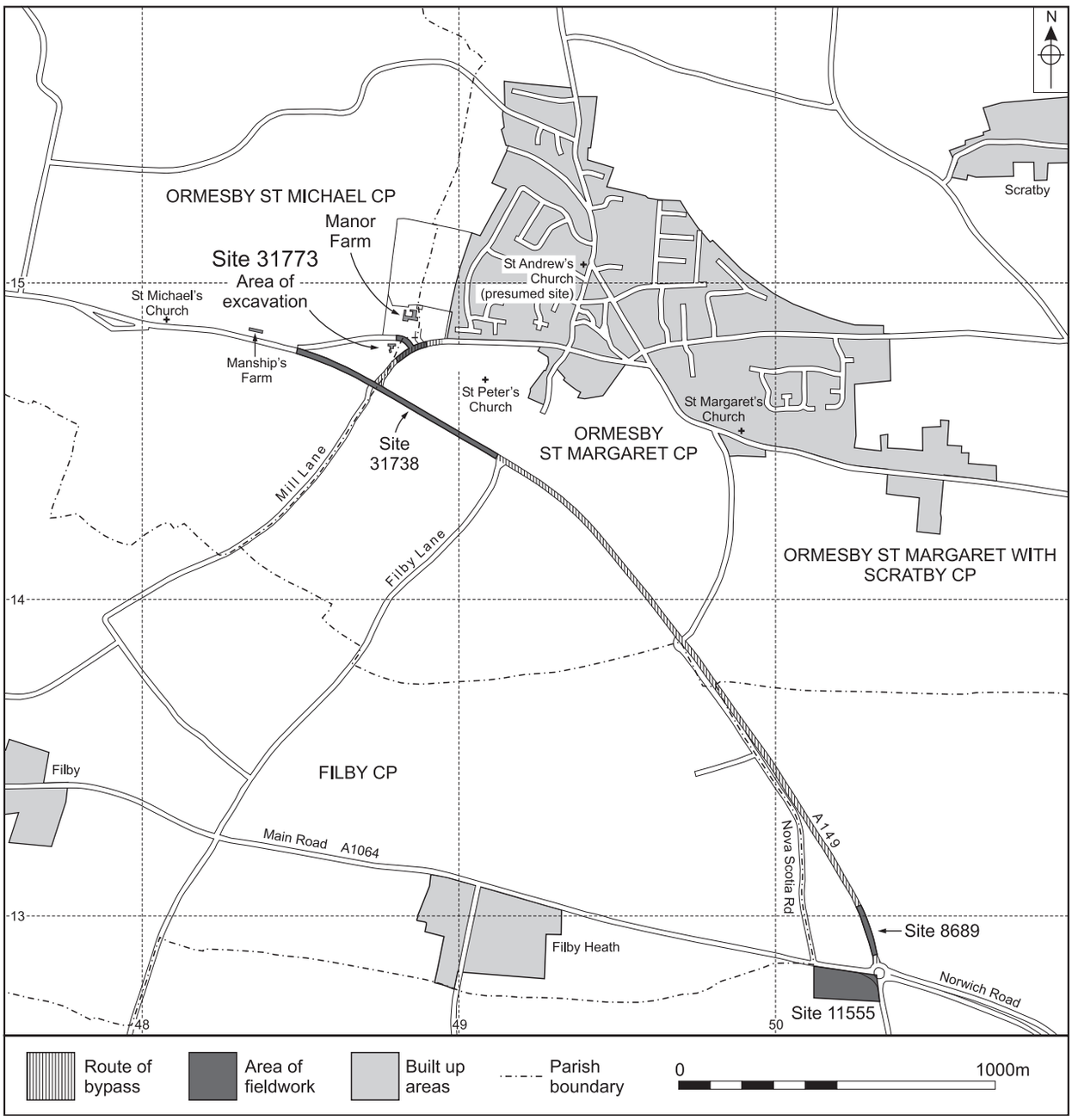

Figure 2 Location map, showing fieldwork and route of A149 Ormesby bypass. Scale 1:20,000

was set in motion. The initial aim was to identify the extent of the burials which lay within the limits of the area to be disturbed by construction. Having established this it was determined that all the human remains on the line of the road should be excavated, recorded and removed. Any other archaeological features identified in this area were also to be archaeologically recorded.

Following the excavation a brief assessment of the potential of the project was made and the following research aims determined:

- to determine the date of the cemetery
- to increase understanding of past societies, particularly in terms of health, diet, occupations, and demographic make up
- to examine the relationship between the cemetery and other contemporary features in the vicinity, such as settlement, religious buildings *etc*.
- to examine the site within the broader framework of contemporary or associated sites across East Anglia and if appropriate, nationally.

Analysis methodology

Analysis of the human bone was undertaken with the assumption being that these burials were either middle to late Saxon or medieval in date. It was not until this work had been completed that the results of the radiocarbon dating were received from the laboratory at Groningen University, Netherlands. Comment on these dates was

then sought from the Scientific Dating Team at English Heritage. Once it was established that the burials belonged to the historical period research was undertaken to try and establish why this place should have been a graveyard. This included consulting cartographic and secondary sources at the Norfolk Historic Environment Record, the Norfolk Record Office and the Heritage Centre at the Forum.

Publication and archive

This publication includes the results of all the fieldwork undertaken along the line of the Ormesby Bypass. The stratigraphic and artefactual evidence is presented in Chapter 2 and the results of the human bone analysis and the radiocarbon dating is detailed in Chapter 3. The concluding section summarises the results of the cartographic and secondary sources research. It attempts to put the location of this burial ground in context with the rest of the village and also comments on the different populations identified in the county.

The full archive, including the detailed skeletal records, is retained in the site archive (site code 31773 ZRS). This is presently held by the Norfolk Museums and Archaeology Service and can be consulted on request. The human bone assemblage has not been retained, but has been re-interred at Ormesby. This was undertaken at the request of the local community and church. The selection of the spot for reburial was undertaken in consultation with Norfolk Landscape Archaeology. A ceremony and blessing took place in June 2001 (frontispiece) and the place of re-interment on the village green is marked with a marble slab.

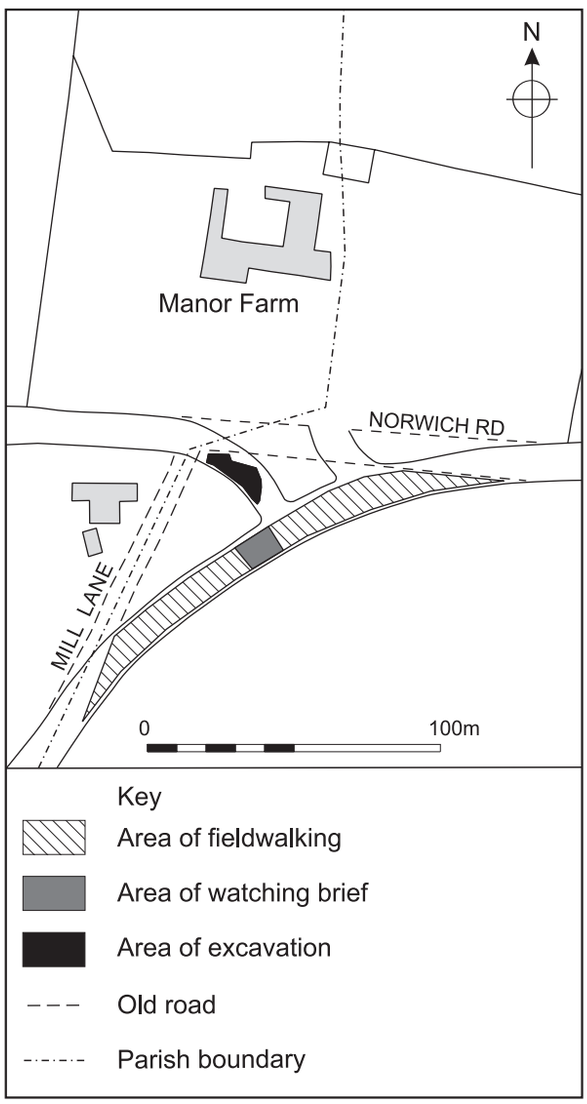

Figure 3 Site 31773 location. Scale 1:2,500

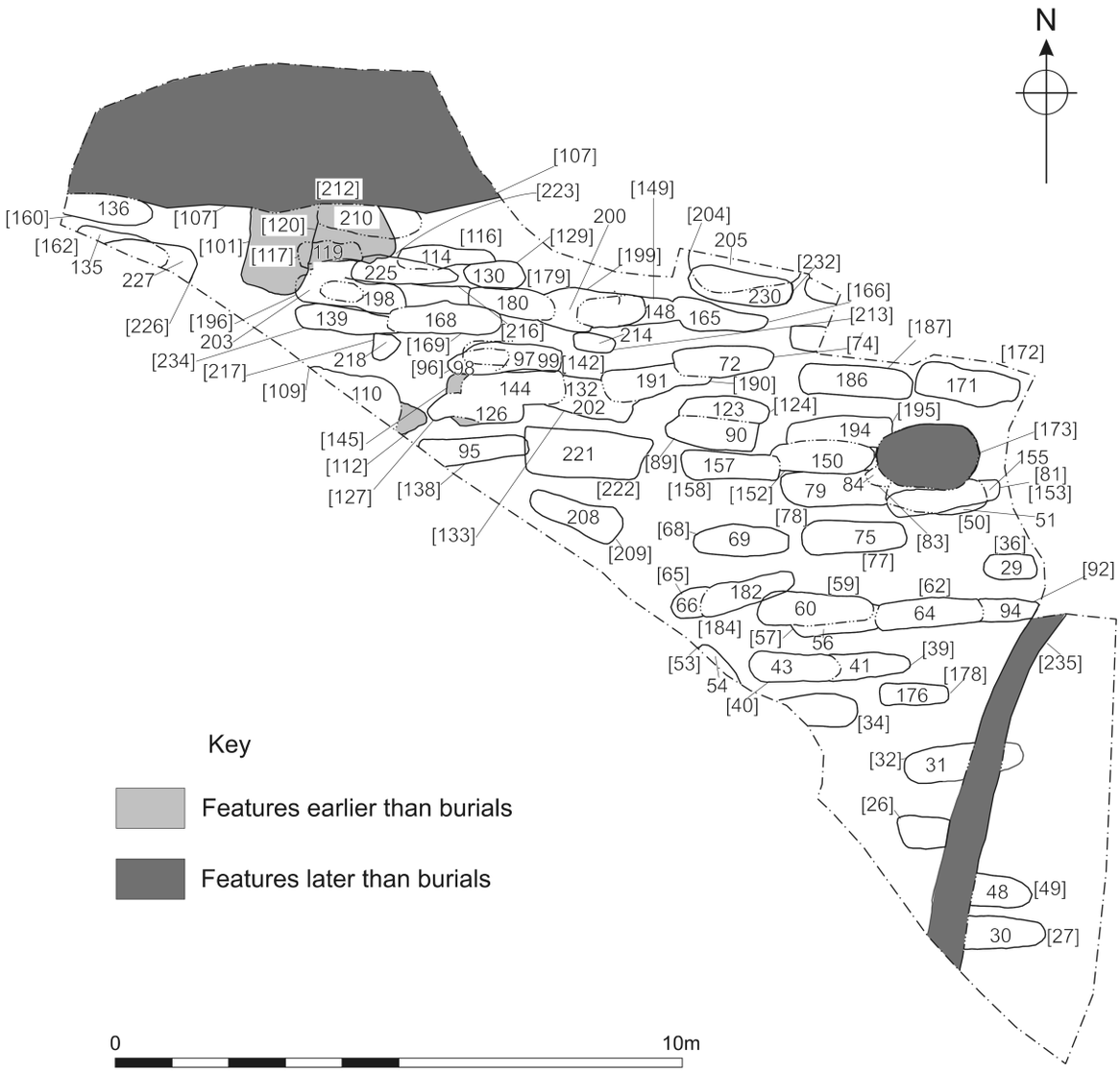

Figure 4 Site plan with skeleton and grave cut numbers, also showing earlier and later features. Scale 1:125

Chapter 2. The Excavation

Site location

(Figs 2 and 3)

The site was located within the ecclesiastical parish of Ormesby St Margaret, adjacent to its border with Ormesby St Michael, on the route of a new slip road towards the west end of the bypass (Figs 2 and 3). To the north was Crown Road and Manor Farm and to the west Mill Lane.

The area of excavation was limited to the width of the new road, which was 8m. The northern edge of site was defined by the existing road (Crown Road), and to the south the excavation finished at the point where the burials petered out. The overall area of excavation was *c.*28m x 8m.

Topography and geology

The site lay at *c.*11m OD on the edge of a gentle slope, with the land rising slightly to the south-east and dipping to the broads to the west. It sits on a raised 'island' elevated above sea level. The 'upland' soil here is a well drained, easily worked fertile loam, which lends itself to cultivation (Cornford 2002, 16), and is some of the most productive soil in the county (Corbett and Dent 1994). The underlying geology is of London Clay (British Geological Survey 1985) overlain by glacial deposits of clays, and sands and gravels (Funnell 1994, 14), rising above the marine and river alluvia of the surrounding valleys. The mixed nature of the drift geology was clearly evident during the excavation with the natural sub-soil changing between either sand or clay. This variation affected the condition of the bone and the ease of identification of the features.

The burial site

Discovery and methodology

(Figs 2 and 3)

The first burials disturbed by the contractor were on the line of a drainage trench which ran along the south-west edge of a new slip road which connected the local road system with the new bypass. This slip road ran on a north-west/south-east alignment (Figs 2 and 3). On discovery an archaeologist was called to the site to monitor the digging of the remainder of the drainage trench. It soon became apparent, however, that the skeleton discovered was not an isolated individual, but part of a much larger group. At this point arrangements were made to allow any further burials to be identified, recorded and excavated.

An initial topsoil strip of the area of the new road adjacent to the drainage trench had already been completed and the exposed ground surface had been somewhat compacted by lorry movements. However, soil had not been removed to the necessary formation level for the road construction, so this area was restripped, using a machine with a ditching bucket under archaeological supervision. This revealed the presence of twenty additional burials. It was only as the excavation of these progressed that it became apparent that there was a significantly greater number of graves than first estimated, some of which were intercutting. In total sixty graves, four pits, two ditches and one hearth were excavated.

Excavation of each grave had to be undertaken quickly so that no skeleton was left exposed overnight. Each archaeologist therefore had to excavate, record and lift a complete skeleton in a single day. In order that this could be achieved it was decided that the skeletons would not be conventionally planned. Instead each grave cut was planned, a thorough description and sketch plan of the skeleton made and photographs taken. A single context recording system was maintained throughout.

All the archaeological work was carried out under critical time pressure in order to minimise delay, and therefore any cost increases to the road construction scheme.

The excavated features

Pre-grave features

(Fig. 4)

Four features were identified which were cut by the burials. These were three pits and a hearth. All were located at the north-west end of the site (Fig. 4).

Pit *145* was sub-rectangular in shape (0.9 x 0.3+m) with a flat base and was cut by two graves (*127* and *142*). It was 0.17m deep, with a single fill, from which no artefacts were recovered. Close to this and with a similar fill was another pit (*112*). Ten sherds of Iron Age pottery and two of unglazed medieval ware were recovered from its fill.

Located to the north of the site was pit *101*, a much larger feature (1.7+ x 0.85m). This had been truncated by ditch *107* and grave *117*. It was oval in plan with a concave base and 0.3m deep. This has been interpreted as a fire pit due the nature of its fills, the lowest of which was almost entirely of charcoal with flecks of fired clay and burnt sand. Other fills also contained charcoal, but also more significant amounts of burnt clay and sand perhaps from a hearth (possibly feature *120*, see below). Two sherds of medieval pottery were recovered from the fills along with one intrusive post-medieval sherd (probably from later ditch *110*).

The other early feature was a hearth (*120*). Its full shape and size is not known as it was truncated by three graves (*212*, *117*, and *223*), but was probably sub-rectangular in plan with a flat base. Its lowest fill was a compacted brownish yellow clay. This lay across the base and lined the north side of the feature. Above this was a deposit of fired clay which was crimson in colour. No finds were recovered from these deposits.

The graves

(Fig. 5; Plates 1 and 2)

In total sixty graves were identified, most of which were sub-rectangular in shape with a flat base. Fifteen of the

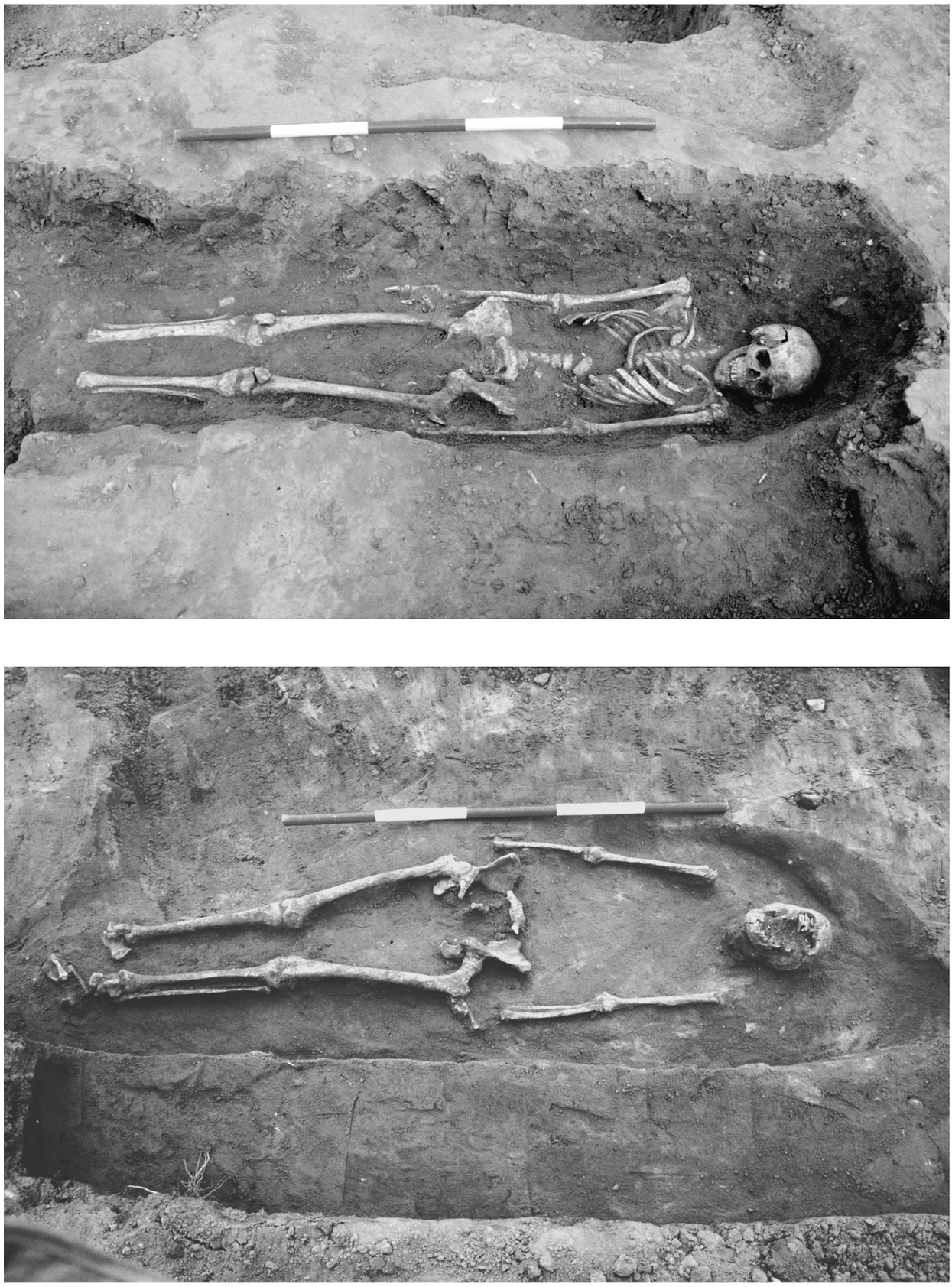

Plate 1 Skeletons *198* (top) and *205* (above) illustrating the differences in preservation of the bone

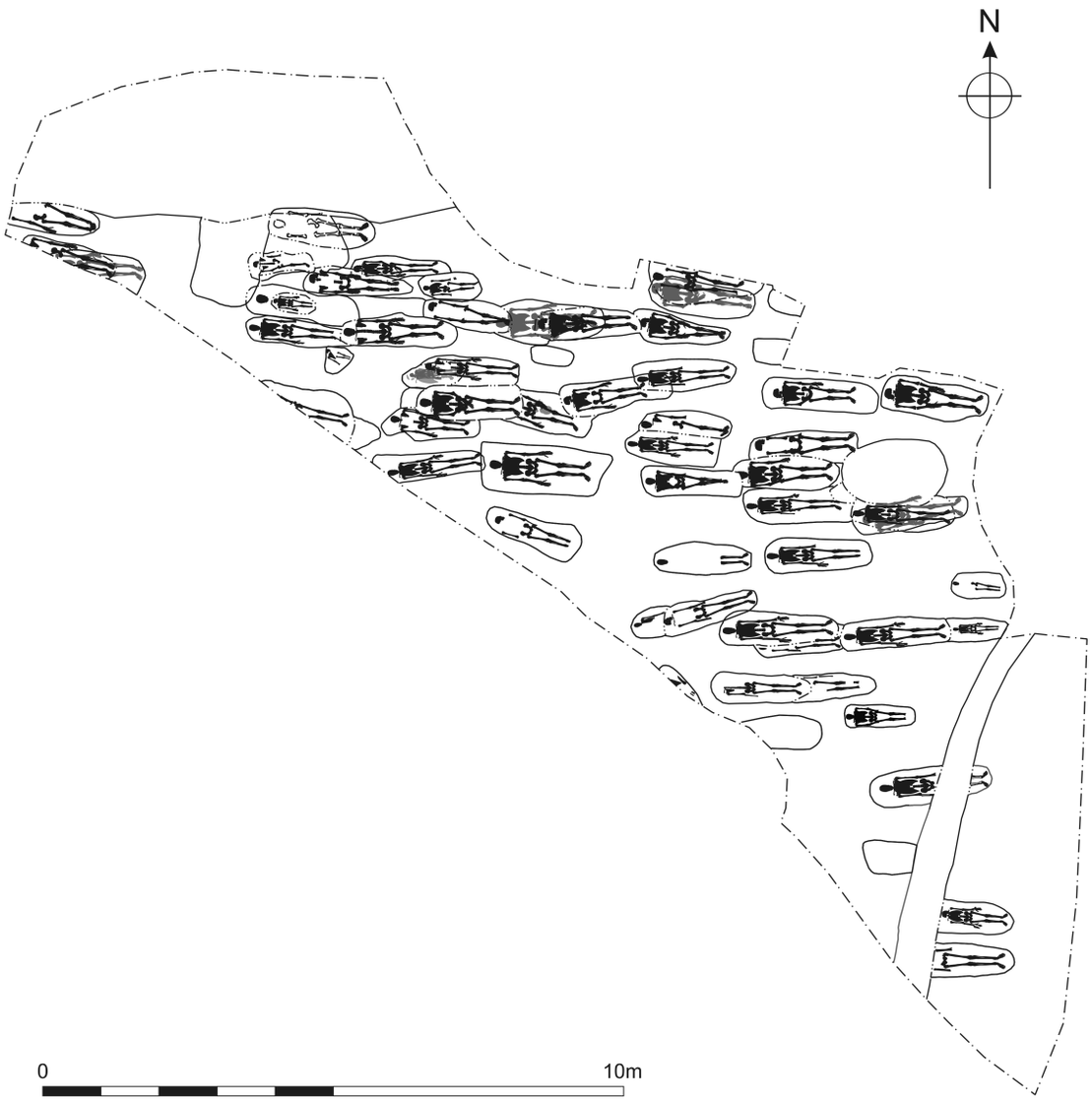

Figure 5 Plan of burials indicating body position. Scale 1:125

graves were extremely shallow being 0.10m in depth or less. The majority of these however had probably been truncated by the machining of the site. Two graves were exceptionally deep being 1.15m (*78*) and 1.05m (*212*) in depth. In length the majority of the non-truncated graves (thirty-six in number) ranged from 1.6m to 2.05m, only five were shorter than this, the smallest being 0.57m long. The width of the non-truncated graves (forty-eight in number) ranged between 0.30m and 0.84m and forty-one of these were between 0.4m and 0.6m wide. In general, the graves were reasonably in proportion, the longer graves also being the wider ones.

Overall survival of the bone was good, but there was some variation between individual burials (Plate 1), due to the differing nature of the subsoil into which graves were cut. Burials in the clay were particularly difficult to recognise and excavate. In many cases the clay was firmer than the bone, which made the retrieval of the bone problematic, however the bone was seen to survive in better quantity in the clay than the sand. Those buried in the sandy subsoil had often lost the majority of the more fragile bones which had been in close contact with the sand, particularly the ribs and the vertebrae.

The burials were aligned east-to-west and none of the bodies had been buried with grave goods. Very little pottery was recovered from the backfill of the graves, and the vast majority of this was residual prehistoric pot. Of the thirty-seven graves containing pottery two contained late Saxon Thetford-type ware sherds (10th–11th century) and seven contained sherds of medieval unglazed pottery (11th–14th century). Both the graves containing the Thetford-type ware were located to the south of the site, while those containing the medieval sherds were, with one exception, located to the north of the area.

All of the burials were supine, and in all except one, there was a single body in each grave cut (Fig. 5). The exception was grave *96* which contained three skeletons buried at the same time (Plate 2). The first body (*97*) placed in the grave was that of an old ?male, whose head was turned to face south. The second (*99*) was of a *c*.2 year old child placed above the right shoulder of the adult. The third was that of a *c*.5–6 year old child which was placed

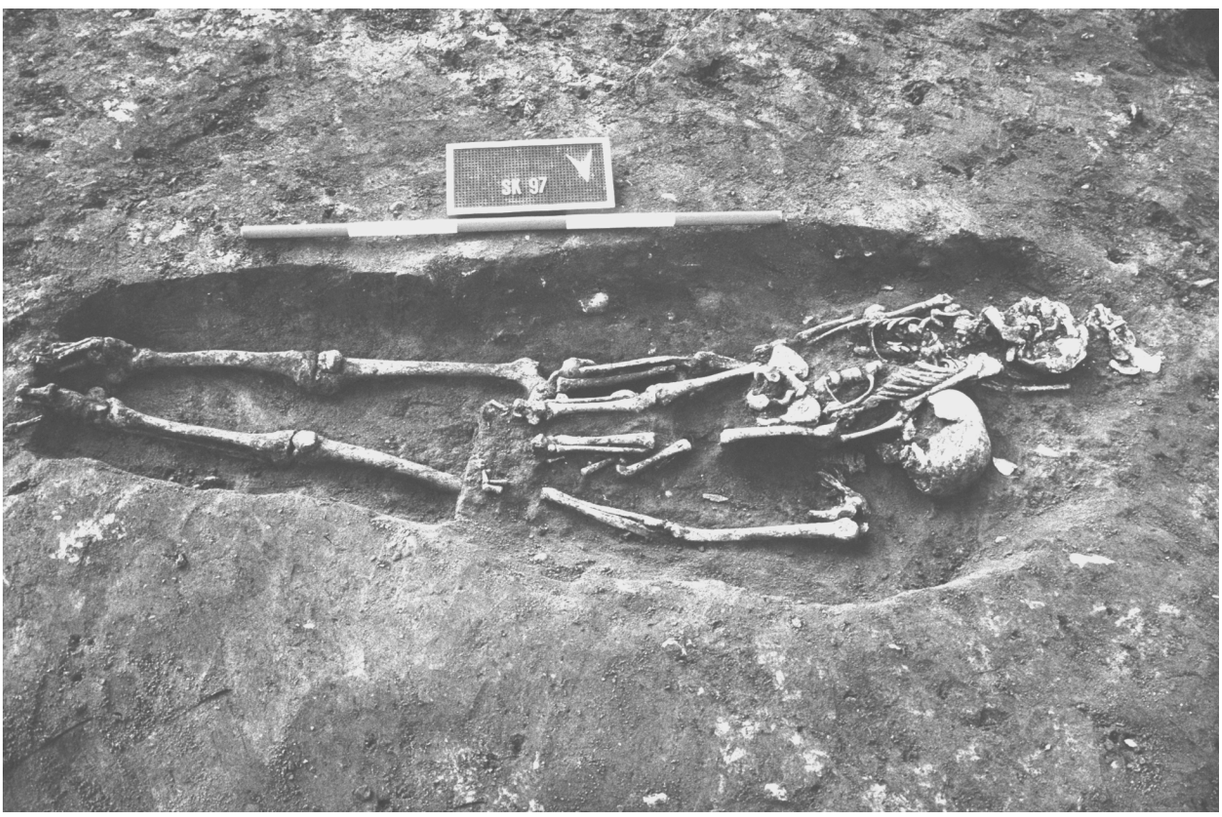

Plate 2 Skeletons *97*, *98* and *99*

over the right chest and shoulder of the adult, and partially over the younger child, again with head turned to the south.

In nine of the other burials the head was turned to the north. The majority had their arms by their sides, however ten had one arm over their pelvis and eight had both arms placed over their pelvis; seven others had a combination of arms placed either over or under the pelvis area, with only one having an arm crossed over the chest.

The full extent of the burial ground was not identified as the area of excavation was limited to the line of the new road. The eastern limit was established as no graves were present in the remainder of the stripped area in this direction, although no boundary marker, such as a ditch of line of post-holes, was found. Burials were not noted in the watching brief area located *c*.14m to the south, indicating that the burials did not extend far in that direction. It is certain that some burials remain to the north and west of the excavated area.

Later features
(Fig. 4)
Three of the excavated features were later than the graves. These consist of two ditches and a pit (Fig. 4).

Pit *173* was oval in shape (1.1m x 1.95m) with vertical sides and a flat base. It was 1.05m deep and cut through three graves (*52*, *85* and *154*). It contained two fills, the lower appearing to be in-washed material, indicating that the pit may have been left open for a while before being backfilled. The upper and predominant fill was a sandy loam and it appeared to have been deliberate backfilled. The only finds recovered were two sherds of redeposited Iron Age pottery.

Ditch *235* crossed the east part of the site on a broadly north to south alignment. No finds were recovered from this. The latest feature on site was ditch *107* which ran across the north edge of the excavation. This was 1.5m wide and 0.6m deep. It cut through pit *101* and two graves (*160* and *212*). The nature of the fills indicated a relatively recent date, either post-medieval or modern. Finds included disturbed and redeposited human bone and one sherd of Thetford-type ware pottery.

The pottery
by Sarah Percival

Introduction
(Table 1)
Two hundred and twenty-nine sherds weighing 0.998kg were excavated from fifty contexts at Ormesby. The assemblage included Bronze Age, Roman, Saxon, medieval and post-medieval sherds but was predominantly of Iron Age date. The pottery was fragmentary and mostly abraded.

Period	*No of Sherds*	*Weight (g)*
Prehistoric	201	812
Roman	3	7
Saxon and medieval	23	156
Post-medieval	1	19
Miscellaneous	1	4
Total	**229**	**998**

Table 1 Summary of pottery

Fabric	*Period*	*No of Sherds*	*Weight (g)*
F		3	7
F1	Iron Age	194	798
G1	Bronze Age	3	6
S1	Neolithic	1	1
Grey ware	Roman	3	7
Total		**204**	**819**

Table 2 The prehistoric and Roman pottery

The undiagnostic prehistoric and Bronze Age pottery
(Table 2)
Five small sherds weighing 8g were identified as prehistoric on the basis of the coarse flint inclusions and poor firing exhibited. One rim sherd (from grave *68*) is of a rolled form characteristic of Neolithic vessels however, the small size and poor preservation of the sherd prohibited exact chronological definition.

Bronze Age sherds were defined by the use of grog (crushed pottery) as a tempering agent. Three grogged sherds weighing 0.006kg were found from two contexts (grave *49* and unstratified).

The Iron Age pottery
(Table 2)
One hundred and ninety-four sherds of Iron Age pottery weighing 0.798kg were recovered. The sherds were predominantly undecorated body sherds of the coarse, flint-tempered fabric typical of Iron Age pottery found in Norfolk. A small number of quartz-sand tempered sherds were also found, these are also common to Iron Age assemblages of the region and, as with the Ormesby examples, are often burnished. A few diagnostic sherds were found, these consisted of three base sherds, six decorated sherds and eleven rim sherds. The base sherds were all simple and undecorated, the rim sherds were also undecorated and were either rounded, flattened or everted. All these forms are commonly found amongst the jars and bowls of a domestic Iron Age assemblage. Decorative techniques were limited to combed multiple lines, comb-impressed dots and the use of a single incised line to enhance the shoulder of the vessel. All but one of the decorated sherds were also burnished. Other surface treatments included wiping (one sherd) to leave a striated or roughened surface, and smoothing. The dating of the Iron Age assemblage cannot be defined due to the lack of diagnostic sherds but probably lies within the 6th to 3rd centuries BC.

The Roman pottery
(Table 2)
Three sherds (0.007kg) of Roman grey ware were recovered, from three graves, including one heavily abraded rim.

The Saxon, medieval and post-medieval pottery
(Table 3)
Twenty-five sherds of pottery dating to these periods and weighing 0.179kg were recovered.

The Saxon pottery
A single sherd of smooth Ipswich ware was found from an unstratified context. It had a sooted interior with a burnt oxidised exterior. One rim and one body sherd of Thetford-type ware were found in two separate grave fills.

The medieval pottery
Of the remaining twenty sherds, nineteen were local medieval unglazed ware and one Grimston ware. All indicate a date range of the 11th–14th centuries.

The post-medieval pottery
A single sherd of late medieval/transitional ware was recovered from the site.

Discussion by feature

The early features
Only two of the early features contained pottery. The late medieval transition sherd from pit *101* is definitely intrusive, as this feature was cut by the graves. This could have originated from the later feature, ditch *107*, which cuts both this pit and the graves. Pit *112* contained residual Iron Age sherds.

The graves
(Table 4)
Of the sixty graves excavated, thirty-seven contained pottery of which twenty-nine contained only residual Iron Age sherds. Eight graves contained Saxon or medieval sherds, of which two contained Thetford-type ware dated to the 10th–11th centuries, the remaining six contained medieval wares with an 11th–14th-century date range.

The later features
The later features contained only three sherds of residual material, although as has been noted above the pottery recorded as from pit *101* probably derived from the fills of ditch *107*.

Fabric	*Ceramic date*	*No of Sherds*	*Weight (g)*
Ipswich ware	*c.*720–850	1	6
Thetford-type ware	10th–11th	2	11
Early medieval ware/ local medieval unglazed	11th–14th	4	5
Grimston unglazed?	11th–14th	1	2
Local medieval unglazed	11th–14th	8	83
Local medieval unglazed ?	11th–14th	7	49
Late medieval transitional?	14th–15th	1	19
Miscellaneous		1	4
Total		**25**	**179**

Table 3 The Saxon, medieval and post-medieval pottery

Grave No	*Pottery Type*	*No of Sherds*	*Weight (g)*
27	Thetford-type	1	5
32	Iron Age	5	30
	Thetford-type	1	6
96	Iron Age	3	6
	Local medieval unglazed	2	17
109	Iron Age	7	32
	Grimston	1	2
	Local medieval unglazed	1	8
127	Local medieval unglazed	2	10
	Misc	1	4
212	Local medieval unglazed	2	22
223	Local medieval unglazed	1	6
226	Iron Age	1	2
	Early medieval ware/local medieval unglazed	4	5

Table 4 Saxon or later pottery from graves

Unstratified

The unstratified material (nineteen sherds weighing 0.103kg) is unremarkable apart from the presence of one sherd of smooth Ipswich ware.

Chapter 3. The Human Skeletal Remains

by Sue Anderson

Introduction

Human remains from a total of 103 contexts were submitted for analysis, but this was only a proportion of the original cemetery area. The burials were reasonably well spaced with few intercutting graves, and consequently there was a high proportion of complete individuals. Two bone samples were sent to the Centre for Isotope Research at the University of Groningen in order to obtain radiocarbon dates. These results have been calibrated and interpreted by Peter Marshall of English Heritage. It should be noted however, that the analysis of the bones was undertaken before the results of the dating were available.

Method

Measurements were taken using the methods described by Brothwell (1981), together with a few from Bass (1971) and Krogman (1978). Sexing and ageing techniques follow Brothwell (1981) and the Workshop of European Anthropologists (WEA 1980), with the exception of adult tooth wear scoring which follows Bouts and Pot (1989). Stature was estimated according to the regression formulae of Trotter and Gleser (Trotter 1970). All systematically scored non-metric traits are listed in Brothwell (1981), and grades of cribra orbitalia and osteoarthritis can also be found there. Pathological conditions were identified with the aid of Ortner and Putschar (1981) and Cotta (1978).

Comparative material

Comparisons are made with eight groups from Norfolk (Table 5). The groups from Caister-on-Sea, Thetford and Norwich are of urban or 'high' status, whilst those from North Elmham, Barton Bendish and Burgh Castle are rural in nature. Comparisons with other groups outside Norfolk are included where relevant.

Number of individuals

Sixty articulated skeletons and forty-three disarticulated contexts were submitted for analysis. Of the forty-three disarticulated contexts, thirty-seven were associated with graves and in general were found to belong to the skeleton or skeletons within those graves, or to adjacent earlier burials. Three (*Sk63*, *Sk203* and *Sk214*) have been counted as articulated skeletons since they consisted of a major part of the body, and one (*Sk202*) was thought to belong to a previously excavated skull (*Sk132*). The minimum number of individuals represented by the articulated remains was sixty-two. The disarticulated remains probably add a further ten individuals.

Condition

A macroscopic assessment of the condition of the bone was made. Such an assessment is very subjective and is based on experience of other skeletal groups. The majority of the skeletal material from this site was in average condition. The presence of sand and clay in the subsoil might normally be expected to have an adverse effect on bone, but the preservation of bone here was better than seen on subsoils of this type in other parts of the region, perhaps suggesting that some other factor had reduced the acidity in some parts of the site. At Lakenheath, Suffolk, the presence of only a small amount of chalk in some graves was found to increase the survival of bone greatly in comparison with neighbouring graves filled entirely with sand.

Table 6 presents the degree of completeness of each skeleton against general bone condition. Completeness was based on a count of forty elements of the skeleton. Representation of these elements (based on a percentage of the MNI of 62) is shown graphically in Fig. 6. Note that a skeleton could potentially score 100% completeness despite lacking a number of the small bones of the hands, feet, ribs, spine and skull.

Comparison with similar data suggests that the Ormesby skeletons as a group were better preserved and more complete than those from Farmer's Avenue and Timberhill in Norwich. This is probably a reflection of the general lack of disturbance of the graves with infrequent intercutting, as would be expected in a small rural cemetery.

Site Name	*Date Range*	*MNI**	*Analyst*
Burgh Castle	7th–10th	167	Anderson and Birkett 1991, 1993
Caister-on-Sea	8th–11th	139	Anderson 1991a, 1993
Thetford Red Castle	Late Saxon	85	Wells 1967
Thetford St Michael	11th–12th	101	Stroud 1993
North Elmham	10th–12th?	206	Wells 1980
Norwich Farmer's Avenue	10th–11th (–14th)	84	Anderson 1996a
Norwich Timberhill	12th–16th	184	Anderson 1996b
Barton Bendish All Saints	11th–18th	79	Stroud 1987

*MNI – Minimum Number of Individuals

Table 5 Norfolk cemetery groups

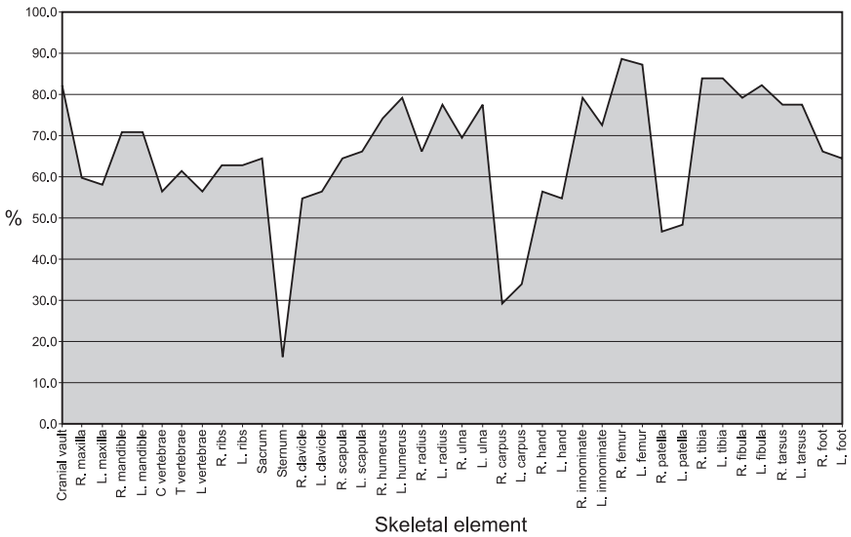

Figure 6 Skeletal elements present

Demographic analysis

Juveniles

(Tables 7 and 8)

Of the sixty-two articulated individuals, seventeen (27.4%) were below the age of 18 years. In addition, six of the ten disarticulated individuals were juvenile or sub-adult. The total proportion of children to adults (31.9%) is within normal limits for an incompletely excavated cemetery of the Saxon or medieval period (Anderson 1991b). Table 7 presents the figures for other Norfolk sites, together with mean ages at death, which is also within expected limits at Ormesby (articulated skeletons only).

The distribution of age at death for the twenty-two juvenile skeletons and disarticulated remains is presented in Table 8.

The six infants could be divided further. Three were newborn, one possibly even a pre-term foetus, one was *c*.6–12 months, and two were around 18 months old. Just over half the children in this group were younger than 6, and a similar pattern was found at Barton Bendish, Farmer's Avenue and Thetford St Michael. Other sites such as Timberhill, Caister-on-Sea, Burgh Castle and North Elmham seem to have had a greater mortality amongst children *over* 6 years of age.

Three of the six infants were derived from disarticulated contexts. This is a common finding in medieval

Completeness	*Above Average Condition*	*Average Condition*	*Below Average Condition*	*Total No*	*Total %*
0–20%	0	3	5	8	12.9
21–40%	0	1	7	8	12.9
41–60%	4	4	4	12	19.4
61–80%	0	5	0	5	8.1
81–100%	12	16	1	29	46.8
Total No	16	29	17	62	
Total %	25.8	46.8	27.4		

Table 6 Skeletal completeness against general bone condition

Site Name	*Type*	*% juveniles*	*Mean age at death*
Burgh Castle	Rural	15.2	10.3
Caister-on-Sea	'High Status'	23.0	7.9
Thetford Red Castle	Urban	28.2	2.6
Thetford St Michael	Urban	48.7	4.7
North Elmham	Rural	18.9	6.6
Norwich Farmer's Avenue	Urban	30.9	5.8
Norwich Timberhill	Urban	19.0	9.3
Barton Bendish All Saints	Rural	29.1	4.2
Ormesby	Rural	27.4	6.9

Table 7 Juveniles from Norfolk sites

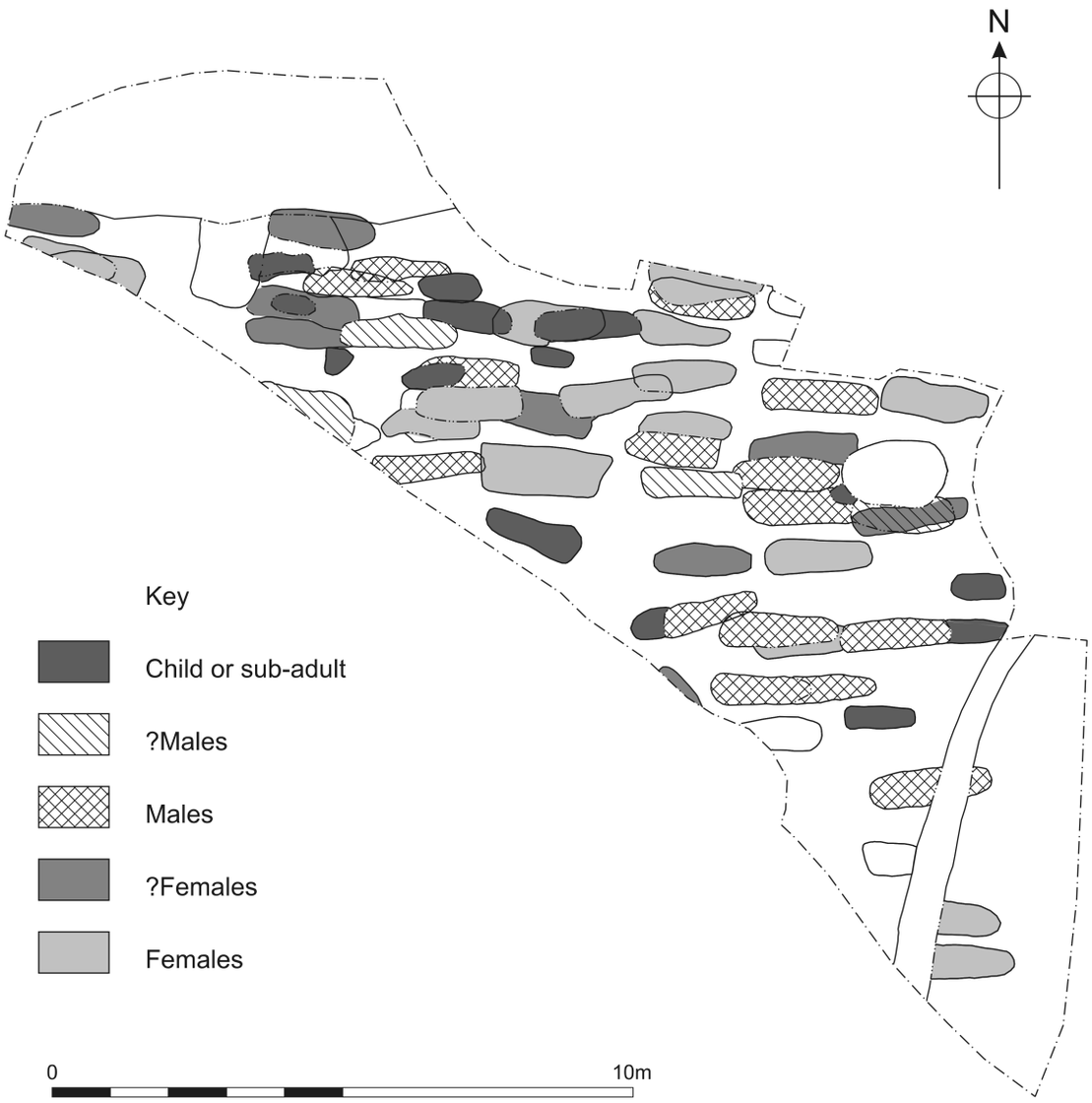

Figure 7 Distribution of males, females and children. Scale 1:125

churchyards, and suggests that gravediggers were less likely to collect all the bones of very small skeletons and rebury them together. In some groups this factor may have resulted in fewer infants being recovered than were originally present, particularly in heavily disturbed cemeteries such as Timberhill. However, there are many other biasing factors in the analysis of juvenile remains, such as poor preservation of fragile small bones, the possibility of burial elsewhere, burial with an adult resulting in total disintegration of the juvenile bones during decomposition, and the period of use of the cemetery.

Age Group	*No*	*%*
0–2	6	27.3
2–6	6	27.3
6–10	5	22.7
10–14	1	4.5
14–18	4	18.2
Not aged	1	

Table 8 Distribution of juvenile age at death

Adults

(Tables 9 and 10)

Of the forty-five articulated adults, fourteen were male, four were ?male, sixteen were female and eleven were ?female. The disarticulated remains add a further ?female (consisting of an unstratified complete right leg) and three unsexed individuals. Table 9 presents the numbers of articulated males and females together with the sex ratios for this and other Norfolk sites.

The majority of archaeological sites fall within the range of 1 male to 0.8–1.2 females, although clearly there are exceptions. The unusual sex ratios at Thetford Red Castle, Barton Bendish, Farmer's Avenue and Ormesby are probably due to the incomplete and non-random samples of the cemetery populations from these sites rather than to any unusual living population characteristics. The difference between the sexes at Ormesby is not statistically significant.

Table 10 shows the distribution of adult age at death. Categories of age rather than actual age ranges are employed because estimation of adult age at death is difficult with currently available techniques. The data should be taken to represent *biological* rather than

Site Name	*M+?M*	*F+?F*	*Ratio*
Burgh Castle	79	64	1:0.8
Caister-on-Sea	50	49	1:1
Thetford Red Castle	22	32	1:1.5
Thetford St Michael	19	20	1:1
North Elmham	82	76	1:0.9
Norwich Farmer's Avenue	23	41	1:1.8*
Norwich Timberhill	67	81	1:1.2
Barton Bendish All Saints	33	14	1:0.4*
Ormesby	18	27	1:1.5

*Statistically significant difference

Table 9 Numbers and ratios of males and females

	Male		*Female*		*Total*	
Age Group	*No*	*%*	*No*	*%*	*No*	*%*
Young	0	0.0	3	11.5	3	7.0
Young/middle-aged	1	5.9	8	30.8	9	20.9
Middle-aged	2	11.8	7	26.9	9	20.9
Middle-aged/old	5	29.4	4	15.4	9	20.9
Old	9	52.9	4	15.4	13	30.2
Total aged	17		26		43	
Un-aged adult	1	-	1	-	2	-

Table 10 Distribution of adult age at death

chronological age at death. Disarticulated remains are not included.

Many more women than men in this group were in the younger categories of age at death, whilst more men than women reached old age. A similar pattern has been found in other groups, such as Farmer's Avenue, and one possible cause is death in childbirth. However, it is unusual that over three-quarters of the male population at Ormesby were in the older age categories.

Caister-on-Sea also produced a high proportion of 'young' women, but at that site there were similar numbers of 'old' men and women. Burgh Castle, Timberhill and Thetford St Michael showed little difference between the sexes, but at Timberhill the majority of deaths occurred before middle age.

The Ormesby group appears to have been relatively healthy with few stress indicators showing in their skeletons. Their overall health may be reflected by the fact that almost a third of them reached old age, more if those in middle–old age are included. However, there may be other reasons for the lack of young men in a group. Possibilities include burial elsewhere due to death in battle, or the loss of part of a male population at sea. Some of the men from Ormesby may have been involved in fishing, which could partly explain the lack of younger men.

Sex	*No*	*Mean*	*Range*
Male	18	1.70m (5'7")	1.59m–1.80m (5'2"–5'10")
Female	23	1.59m (5'2")	*c*.1.41m–1.70m (4'7"–5'7")

Table 11 Means and ranges of adult stature

Metrical and morphological analysis

Stature

(Fig. 8; Table 11)

The means and ranges of estimated stature for adult males and females are presented in Table 11. Fig. 8 shows the distribution.

Medieval groups are often found to be slightly shorter than Saxon groups in the same region. The means for Ormesby are very similar to those found at Timberhill and Barton Bendish, but lower than those for Farmer's Avenue, Caister-on-Sea and Burgh Castle. The women at Ormesby were particularly short, four being under 5 feet tall, although they are still within the normal range for the region. The women from North Elmham were in fact slightly shorter on average.

Cranial indices

Measurements were taken from seven male and nine female skulls. Unfortunately a large number of skulls were heavily fragmented, and most of those which were not had been subjected to soil pressure which had deformed them to some degree. The cranial index could be calculated for five male skulls with a mean of 82.1 and a range of 76.2–91.6. The female mean for seven skulls was 79.3, and the range 69.2–84.1. The overall mean was 80.5. These means are higher than those found at all the other Norfolk sites except Thetford Red Castle, where the female mean was 80.4.

Only one skull was dolichocranial (narrow-headed), four were mesocranial, six were brachycranial (broad-headed) and one was hyperbrachycranial. Of those which could not be measured due to slight distortion, the majority appeared broad in comparison to length. The

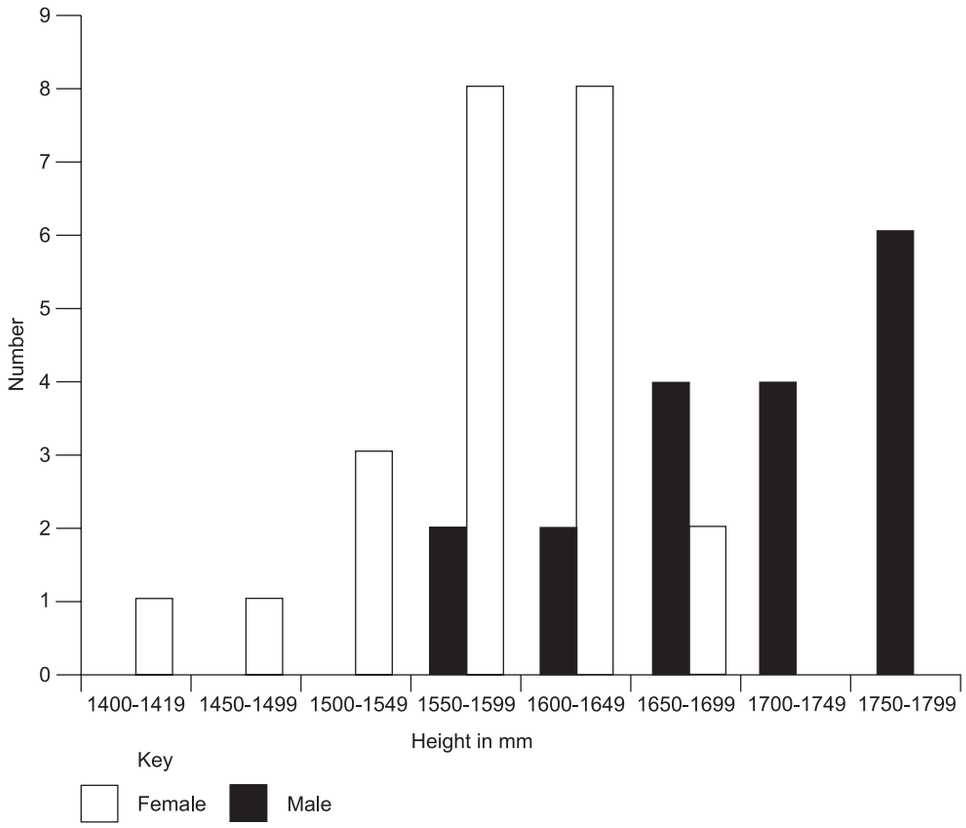

Figure 8 Stature distribution

skull types were plotted on the cemetery plan, and this suggested that the narrower skulls generally came from earlier graves. There is a widely recognised trend towards increasing head breadth in the medieval period, and the results from Ormesby suggest that the cemetery belongs to the high medieval period. The skeletons from Thetford Red Castle are an exception to the rule.

Post-cranial indices

The platymeric and platycnemic indices, which measure the relative flattening of the shaft of the femur and tibia respectively, were calculated. The majority of femora were narrow (hyperplatymeric and platymeric), which is thought to be a characteristic of earlier peoples (Brothwell 1981), but the tibiae were generally broad (eurycnemic), suggesting a medieval or later date. As the cause of femoral and tibial flattening is uncertain, further discussion of these indices is not worthwhile at present.

The robusticity of the femur was calculated where possible. There was a slight difference between the male and female means, but the ranges overlapped to a great extent. The male mean was 13.3 for the right femur and 13.4 for the left, compared with 12.6 and 12.7 for female right and left femurs respectively. The male range was 12.4–14.3 and the female 11.2–13.7. The males were slightly more robust than those from Timberhill, Farmer's Avenue and Burgh Castle, whilst the females were slightly more gracile than the Timberhill women but more robust than those of Farmer's Avenue and Burgh Castle. The differences may in part be due to their smaller stature.

Non-metric traits

(Fig. 9; Table 12)

Non-metric traits are small asymptomatic deviations from the 'normal' skeletal anatomy and are scored on a present/absent basis. A number have been shown to be of genetic origin, and this may be the case for others.

A statistical comparison of scores for males and females (Perizonius 1979) showed that only two traits were significant at the 5% level, and two at the 1% level. Posterior left atlas bridging occurred in more men than women, left third trochanter occurred in more women than

	Norfolk					*Suffolk*			*York*	
	BC	*CBY*	*FA*	*TH*	*TSM*	*BRD*	*ISS*	*IBF*	*FG4*	*FG6*
MMD	0.177*	0.023	0.037	-0.011	0.081	0.155*	0.076	0.032	0.119*	0.155*
No traits	51	43	78	78	51	34	60	60	62	62
Variance	0.0030	0.0360	0.0027	0.0022	0.0030	0.0055	0.0042	0.0024	0.0027	0.0020
√ x 2	0.109	0.120	0.104	0.093	0.109	0.149	0.130	0.098	0.103	0.090

BC – Burgh Castle; CBY – Caister-on-Sea; FA – Farmer's Avenue; TH – Timberhill; TSM – Thetford St Michael; BRD – Brandon; ISS – Ipswich School St; IBF – Ipswich Blackfriars; FG4 – Fishergate Period 4; FG6 – Fishergate Period 6

Table 12 Results of MMD comparison of Ormesby with sites in Norfolk, Suffolk and York

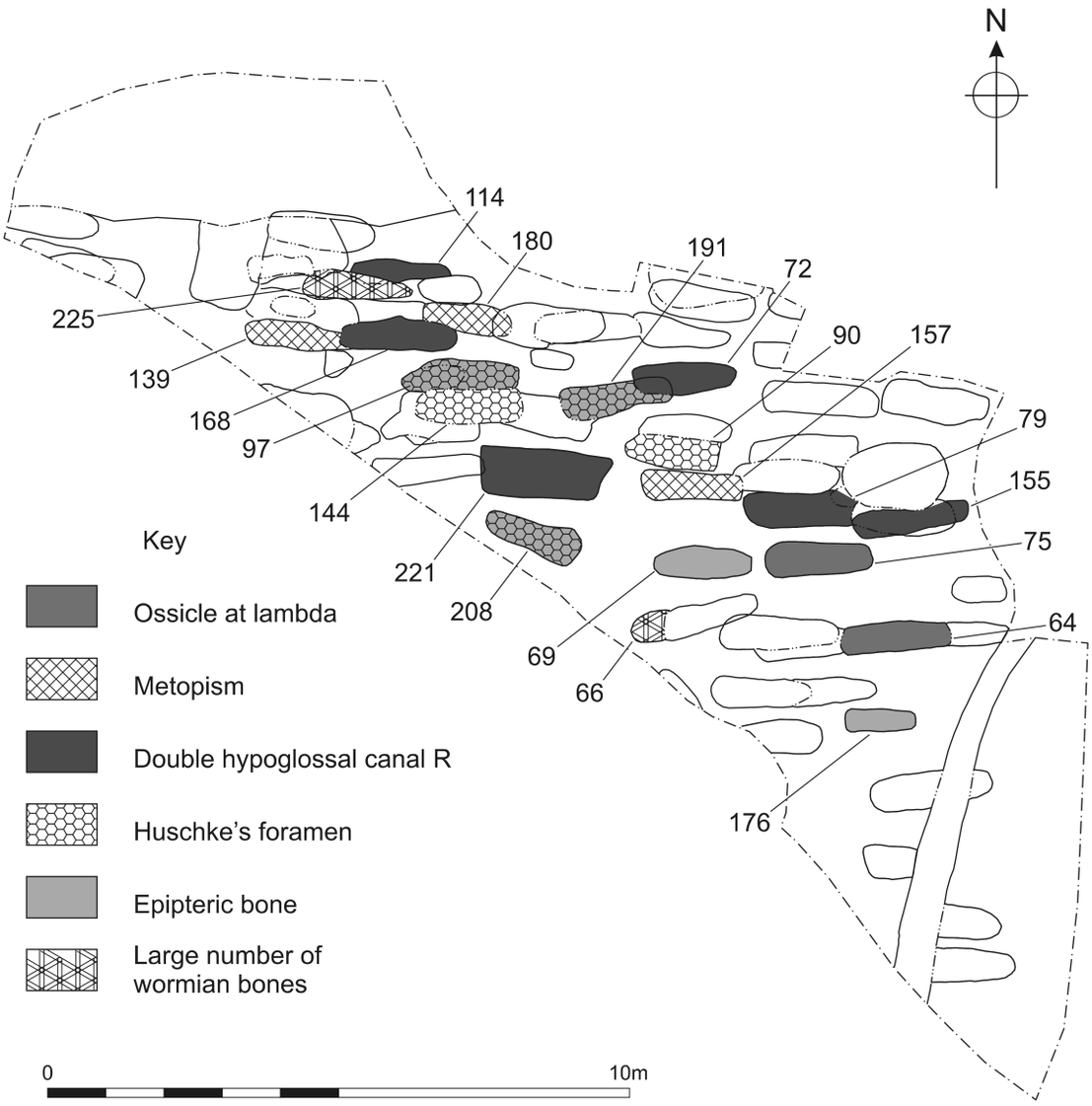

Figure 9 Distribution of the less common cranial non-metric traits

men, and vastus notch occurred significantly more often on both sides in men than in women, although the trait was generally very small. This level of difference, four out of the total eighty-two traits (4.9%), could occur by chance alone and does not suggest any overall difference between men and women in this group.

Non-metric traits are difficult to compare between sites due to differences in methods and choice of traits used by various analysts. The statistic known as the Mean Measure of Divergence (MMD) has been used to compare the Ormesby group with other Norfolk and Suffolk cemeteries, and two groups from Fishergate, York (Stroud and Kemp 1993) are also included. The formula published by Thoma (1981) has been used, and bilateral traits have been counted individually for each side.

The results of the MMD analysis are shown in Table 12. Differences between groups are significant (*) if they are greater than twice the square root of the variance, and the closer the MMD is to zero, the closer the two populations are to each other.

Of the Norfolk groups, Ormesby shows greatest similarity with Timberhill and Caister-on-Sea. The latter, although probably an earlier population, is very close to Ormesby and this probably explains the similarity between the two. However, the only Norfolk population to show a significant difference to Ormesby, that of Burgh Castle, is also geographically proximal. Significant differences have been found in both metric and non-metric analysis of the Burgh Castle and Caister-on-Sea groups (Anderson 1996a), and it seems likely that the two are from different genetic stock. The two Fishergate groups are actually closer to the Ormesby group than the latter is to Burgh Castle, although they are also significantly different. Saxon and medieval groups from Ipswich (School Street and Blackfriars sites) show similarities with Ormesby, but the middle Saxon group from Brandon is significantly different.

Non-metric traits can also be used to suggest possible family groupings in cemeteries. Uncommon traits were plotted on a plan of the Ormesby cemetery (Fig. 9), but no clear groupings could be established, although there were some possible relationships. Examples include *Sk64* and *Sk75* (both with ossicles at the lambda), *Sk225* and *Sk130* (large numbers of lambdoid wormian bones), *Sk180* and

Sk139 (both metopic), *Sk191* and *Sk97* (both with epipteric bones and Huschke's foramina), and *Sk150* and *Sk155* (both with absence of the anterior calcaneal facet; Fig. 10). Some of the rarer traits were dispersed quite widely across the excavated area, suggesting that the group derived from a relatively small genetic pool. There were almost certainly familial relationships between these people, but unfortunately it is not possible to distinguish closely related groups using this evidence.

Dental analysis

Dental remains of sixteen males (thirteen maxillae, sixteen mandibles), twenty females (eighteen maxillae, nineteen mandibles) and thirteen juveniles (ten maxillae, twelve mandibles) were present.

The adult dentitions, if complete, would contain a total of 1056 tooth postions, but 124 of these were uncertain or missing. This left 932 positions which could be recorded. From these, 136 (14.6%) teeth had been lost after burial, 131 (14.1%) had been lost during life and 33 (3.5%) were unerupted or congenitally absent. This left a total of 632 teeth *in situ*.

The thirteen juvenile dentitions provided 244 observable positions, of which seventy-seven contained deciduous teeth, one unerupted deciduous tooth, ninety-six permanent teeth, forty-nine unerupted permanent teeth, and twenty-one teeth had been lost post-mortem.

Ante-mortem tooth loss
(Table 13)
Twelve of the sixteen males (75.0%) and eleven of the twenty females (55.0%) had lost one or more teeth during life. Table 13 shows the amount of loss by sex and upper or lower jaw.

Sex	*Jaw*	*Positions*	*Lost*	*%*
Male	maxilla	183	50	27.3
	mandible	239	44	18.4
Female	maxilla	242	16	6.6
	mandible	283	21	7.4
Both	both	947	131	13.8

Table 13 Ante-mortem tooth loss

The males suffered from considerably greater tooth loss during life than the females. The major cause of this is probably the higher average age at death of the males in this group, since all forms of dental disease increase with age. However, a few individuals had lost teeth at a relatively young age compared with other groups, and it seems likely that tooth pulling was a common phenomenon. This could explain the high overall percentage of tooth loss at Ormesby.

Other groups range from 4.5% at Thetford St Michael, through 4.9% at Farmer's Avenue, 5.3% at Timberhill, 6.2% at Caister-on-Sea, 6.3% at Burgh Castle, 11.1% at North Elmham, *c*.15% at Barton Bendish and 15.9% at Thetford Red Castle. Although the expected pattern would be to see an increase through time, clearly there are exceptions. For example the high proportion at Thetford Red Castle would be unusual for a Saxon group, but several traits at this site make it atypical of its period.

Most of the teeth lost ante-mortem were molars or second premolars, as expected. These teeth are more susceptible to disease due to their larger crown surface areas and deeper contouring. A number of molar crowns had been destroyed in life, leaving only the roots. This was probably due to caries or attempts to pull badly decayed teeth.

Caries
(Table 14)
Five men (31.3%) and ten women (50.0%) had at least one carious lesion, two men and eight women having more than one carious tooth. Overall rates by jaw are shown in Table 14.

Sex	*Jaw*	*Teeth*	*Carious*	*%*
Male	maxilla	79	5	6.3
	mandible	148	7	4.7
Female	maxilla	187	13	6.6
	mandible	218	14	6.4
Both	both	632	39	6.2

Table 14 Caries

Caries affected women to a slightly greater degree than men. This is probably because many of the affected teeth in male jaws had already been lost before death, either as a result of tooth pulling or simply through decay and loosening of the teeth by the inevitable abscesses which follow large carious lesions. It is likely that the true caries rate at Ormesby was much higher, since teeth consisting of roots only were not counted as carious.

The degree of caries in a population is usually related to period. Saxon groups generally have a low caries rate, for example Thetford Red Castle 1.6%, Caister-on-Sea 1.8%, Burgh Castle 1.9%, Farmer's Avenue 3.9%. Timberhill, Thetford St Michael, and North Elmham have similar rates to Ormesby, 6.0%, 6.1% and 6.4% respectively, possibly due to their slightly later date. Later medieval sites in Norfolk were generally higher, e.g. 10.2% at Barton Bendish.

Like ante-mortem tooth loss, caries was most common in the molar and premolar regions of the dentition, for the same reasons. Where it was possible to ascertain the origin of the lesion, this was generally either occlusal or interstitial. Often the latter had resulted in the formation of a lesion in both teeth.

No caries was found in the juvenile dentitions.

Abscesses
(Table 15)
One or more abscesses were found in twelve women (60.0%) and fourteen men (87.5%). A single abscess occurred in three women and four men, two were found in six women and three men, and three or more were found in three women and seven men. Of the women, *Sk221* had the most abscesses, a total of nine. One man (*Sk97*) had twelve and another (*Sk157*) fourteen separate lesions. Frequencies by jaw are recorded in Table 15.

The prevalence of periapical abscesses in this group was remarkably high in comparison with other populations. The male maxillary frequency is particularly exceptional and is probably in part a result of the two badly

Sex	*Jaw*	*Positions*	*Abscess*	*%*
Male	maxilla	183	33	18.0
	mandible	239	20	8.4
Female	maxilla	242	15	6.6
	mandible	283	19	7.4
Both	both	947	87	9.2

Table 15 Abscesses

affected individuals mentioned above. Again, the difference between the sexes is due to the greater age at death of the men.

Other groups have generally low rates of abscesses: 2.0% at Burgh Castle, North Elmham and Thetford St Michael, 2.6% at Thetford Red Castle, 3.9% at Barton Bendish, 4.3% at Farmer's Avenue and Timberhill, and 5.4% at Caister-on-Sea.

Eleven of the fifty-three male abscesses were found under a carious tooth, whilst eight of the thirty-four female abscesses had this association. However, twenty-six male and eight female positions affected with abscesses had lost the tooth either post-mortem or ante-mortem. A number of these recorded as lost post-mortem may in fact have been lost during life, leaving only partially healed septic lesions by the time of death. Nineteen male and fifteen female abscesses were associated with non-carious teeth, but the majority of these were heavily worn with open pulp cavities, possibly in some cases the result of decay which had left no definite trace.

In most groups the molars and premolars are most commonly affected by abscesses, as would be expected given the distribution of other dental pathologies. At Ormesby, however, periapical lesions were spread throughout the jaw, and were generally more common around the front teeth. This may be because the most of the affected molars had been lost and any abscesses associated with them healed over before death. Often there was some evidence for this is the form of greatly reduced alveolar bone.

Periodontal disease

Six males and six females showed signs of periodontal disease, ranging from inflammatory changes to the tooth roots to chronic changes such as heavy resorption of the alveoli.

Unerupted/congenitally absent teeth

The overall frequency of unerupted or congenitally absent teeth amongst the adults was 5.0%. This is higher than all other local groups, rates for which were all around 2%.

In common with other sites, the third molars were the most likely teeth to be affected. The overall frequency for third molar agenesis was 28.6%, with little difference between men and women. Again, this figure is relatively high. Other local sites ranged from 14.7% (Farmer's Avenue) to 18.8% (Timberhill). The reason for the high rate at Ormesby is uncertain, but it may provide further evidence for a small gene pool, as suggested in connection with non-metric traits.

Other teeth were also congenitally absent or had unerupted. *Sk191*, a female aged *c*.25–30 years, had unerupted maxillary canines which were impacted across the alveoli of other teeth. In addition, three out of four of her second premolars were congenitally absent. Four premolars were missing from the dentition of *Sk150*, a middle-aged or old man, as were the maxillary second incisors and canines. *Sk60*, a middle-aged male, lacked three premolars, both maxillary canines and the left maxillary second incisor. In view of the similarity of unerupted and missing teeth in these three individuals, it seems likely that they were related. Unfortunately this could not be corroborated by the non-metric trait evidence.

Dental calculus

Calculus, or tartar, is a brownish deposit on the teeth which is easily removed after death, particularly during post-excavation washing. Although most skeletons in this group had signs of calculus deposition, a number had probably lost the greater part of it. Sixteen individuals had some calculus *in situ*, and of these seven cases were slight, seven were medium and two were considerable. The most surprising element in this was that twelve of those affected were female, only two male, and two were sub-adults. It is unusual to see such a marked difference between the sexes, but it can probably be attributed to the fact that a large number of male dentitions contained heavily worn teeth or had large areas of ante-mortem tooth loss, so no calculus had survived.

Enamel hypoplasia

Hypoplastic defects were seen on the teeth of twenty individuals, thirteen females, three males and four juveniles. Generally the defects consisted of slight ridging on the teeth, but one child (*Sk29*) had a large hypoplastic pit on the lower left deciduous canine. The front teeth, particularly the canines and incisors, were most commonly affected and the ridges had formed between the ages of one and six years, with a peak between three to five years of age. Hypoplasia is probably a result of phases of poor growth and may represent periods of illness or malnutrition, although the correlation between the condition and such periods in modern children is not high. In this group it was not very marked in any of the individuals affected, and the apparently high female prevalence is again due to the lack of male tooth crowns which had survived.

Miscellaneous dental pathology

Two individuals (*Sk48* and *Sk171*) had a number of small chips in the enamel at the edges of the teeth which may have occurred during life.

Pathology

Pathological analysis is based on articulated remains only, unless otherwise stated.

Comparisons with other groups are more difficult for pathological data, as methods of scoring are variable. Where possible, similarities and differences with other local and regional groups will be noted. (NB Although recorded, the Burgh Castle pathology was not synthesised before the death of the analyst, Dr David Birkett.)

Congenital anomalies

(Fig. 10)

A few common congenital anomalies were seen in this group.

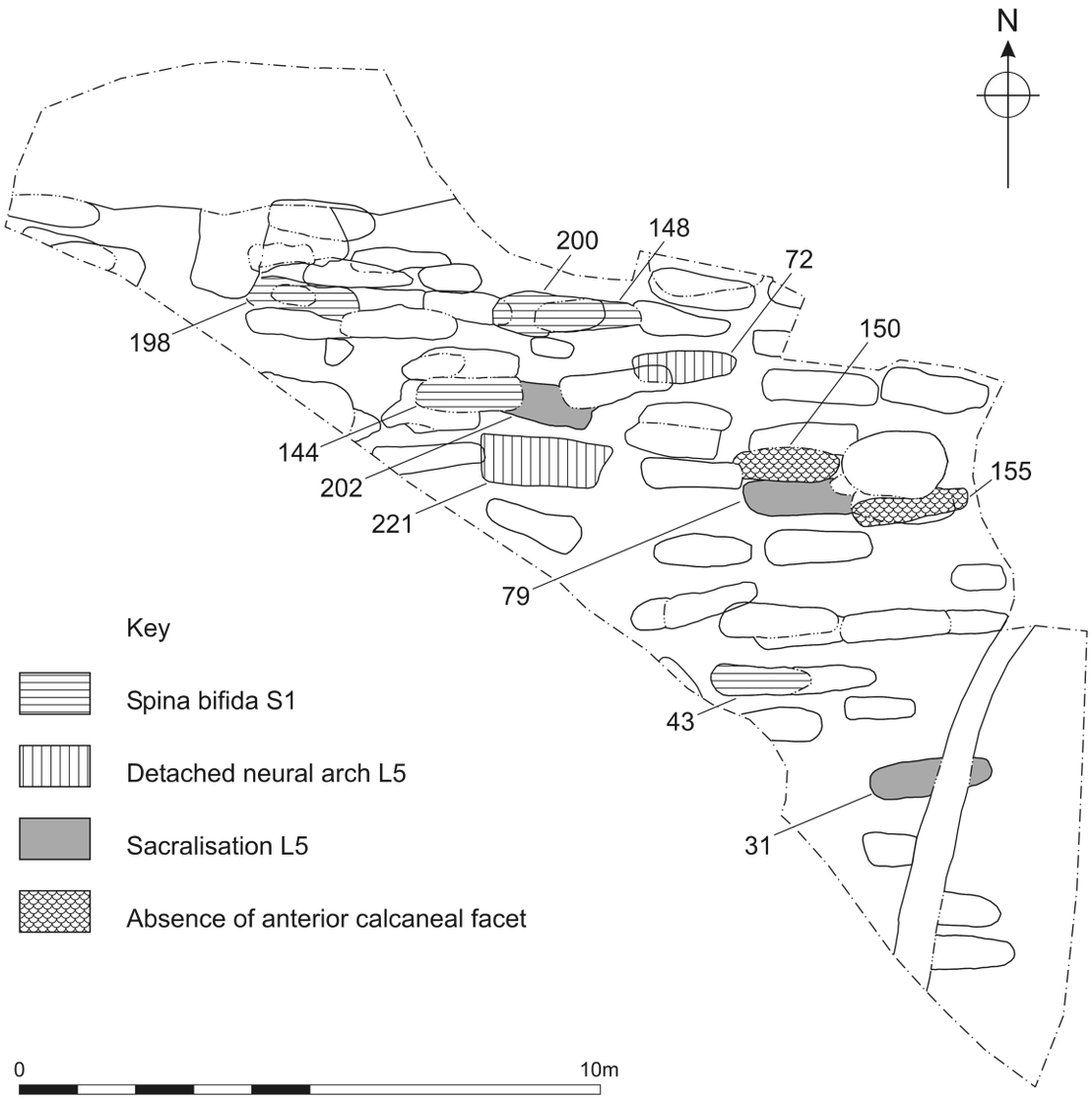

Figure 10 Distribution of anomalies affecting the lower spine and calcaneus

Detached neural arch (spondylolysis) of the fifth lumbar vertebra was seen in two individuals, *Sk72* and *Sk221*, both female. In the case of *Sk72*, there was some suggestion of spondylolisthesis, or slipping of the vertebral body forwards, which had produced lipping of the vertebra and the superior anterior edge of the sacrum. In this case, there may have been some pain in life. The presence of this anomaly in the two individuals, together with a non-metric trait (double hypoglossal canal on the right side only) could suggest a genetic relationship between them (Fig. 10).

Sacralisation of the fifth lumbar vertebra affected three individuals. *Sk31* was affected on the left side only, and the anomaly was bilateral in *Sk79* and *Sk202* (Fig. 10).

Spina bifida occulta was noted in six individuals, but very few sacra could be scored for the anomaly. In this group, it occurred most often in the form of a bifid arch on the first sacral segment (*Sk43*, *Sk144*, *Sk148*, *Sk198*, *Sk200*), but may have affected the complete sacrum of *Sk110*. The similarity of the condition in five individuals suggests a genetic relationship between them. This is particularly likely for *Sk148* and *Sk200*, who were buried close together (Fig. 10).

The right medial cuneiform of a woman, *Sk200*, was completely fused to the navicular. There were no signs of infection or arthritic change, nor was there any evidence for a fracture. This was probably a congenital or developmental anomaly. Ankylosis of other foot bones is known to occur relatively frequently, although these particular bones are not commonly involved.

Other congenital anomalies included the presence of possible cervical ribs in *Sk114*, although the lack of the seventh cervical vertebra made diagnosis uncertain, and the presence of a double left zygapophyseal facet on the tenth and eleventh thoracic vertebrae of *Sk150*.

Arthropathies and degenerative disease

(Plate 3; Table 16)

The most common pathological changes to be found in skeletal groups are those associated with degeneration and old age, particularly osteophytosis or lipping of the joints, and osteoarthritis. Table 16 shows the number of individuals affected by these two diseases in the major joints of the body out of the total number of joints of which at least one articular facet remained. Although this is not as accurate as scoring each individual bone, the group was

	Male					Female				
	Total	OP		OA		Total	OP		OA	
Area	No	No	%	No	%	No	No	%	No	%
Neck	10	7	70.0	3	30.0	14	4	28.6	3	21.4
Right shoulder	17	9	52.9	0	0	14	3	21.4	0	0
Left shoulder	14	8	57.1	0	0	16	3	18.8	1	6.3
Sternal joints	7	1	14.3	0	0	4	0	-	0	0
Mid spine/rib	12	8	66.7	4	33.3	14	5	35.7	1	7.1
Right elbow	16	3	18.8	0	0	16	1	6.3	0	0
Left elbow	16	2	12.5	0	0	17	2	11.8	1	5.9
Right wrist	11	3	27.3	1	9.1	9	1	11.1	0	0
Left wrist	10	2	20.0	2	20.2	11	1	9.1	0	0
Right hand	11	1	9.1	0	0	14	1	7.1	0	0
Left hand	14	1	7.1	0	0	13	1	7.7	0	0
Lower spine	13	8	61.5	5	38.5	12	2	16.7	1	8.3
Pelvic girdle	15	2	13.3	0	0	17	2	11.8	0	0
Right hip	16	3	18.8	5	31.3	24	5	20.8	0	0
Left hip	16	3	18.8	4	25.0	23	6	26.1	3	13.0
Right knee	17	4	23.5	3	17.6	24	2	8.3	2	8.3
Left knee	17	4	23.5	3	17.6	24	2	8.3	3	12.5
Right ankle	18	4	22.2	0	0	24	2	8.3	2	8.3
Left ankle	18	4	22.2	1	5.6	23	2	8.7	1	4.3
Right foot	16	2	12.5	1	6.3	18	2	11.1	1	5.6
Left foot	16	2	12.5	0	0	19	2	10.5	1	5.3

Table 16 Percentages of osteophytosis (OP) and osteoarthritis (OA) in men and women

not large enough to justify a full analysis and the method chosen provides more useful results in terms of comparing individuals.

In almost every joint there is a considerable difference between the sexes in this group, with males generally showing much greater frequencies of both diseases than females. This may be due to the greater number of older males than older females.

Both sexes were most affected in the spine, as is invariably the case. The shoulders and hips of the women were the next most frequently affected joints, whilst the men were also affected to a high degree in the shoulders, followed by the wrists, knees, ankles and hips. All these major joints are commonly affected in other groups, but there is no particular pattern of involvement other than the high frequencies associated with the vertebral and costal joints.

Arthritic changes, although associated with old age, have a number of other causative factors including genetic predisposition, sex, weight and movement (Waldron 1994). It is likely that various combinations of these factors arise in different individuals, so it is not possible to suggest a single cause either for particular skeletons or the group as a whole.

Evidence for another degenerative disease, diffuse idiopathic skeletal hyperostosis (DISH), was found in at least two males. Small areas of the spines of *Sk43* (L3–4 right) and *Sk95* (T10–L1) showed signs of developing ankylosing hyperostosis, although the lack of complete ankylosis would preclude a clinical diagnosis of DISH. Other signs in *Sk95* included new bone growth on the ligamentous attachments and calcification of the costal and thyroid cartilage.

The spine of *Sk64* showed the most gross changes in the group with ankylosis of the bodies and arches of T3–L2 and large osteophytes on L3–5. The sacro-iliac joints were also fused bilaterally but not symmetrically. The changes are suggestive of ankylosing spondylitis, an arthropathy of the spine which begins in early adult life and which affects between five to nine times as many men as women. There was some loss of joint space, but profusion of new bone on the anterior of the vertebrae and elsewhere in the skeleton, together with extreme calcification of the costal cartilage, makes a diagnosis of DISH equally possible. It may be that the two diseases occurred together in this man, or that the changes are related to a disease which affected the soft tissue. The presence of unusual arthritic or osteochondritic lesions in both knees and gross periostitis of both lower legs may be connected.

Sk31 also had bilateral fusion of the sacro-iliac joints, either as a result of an arthropathy secondary to a chronic bowel inflammation such as Crohn's disease, ankylosing spondylitis, or trauma. The spine of this individual was in poor condition.

Two other unusual arthropathies were found in this group. A woman, *Sk123*, had arthritic changes consisting of porotic areas in the left acetabulum (hip socket), and large porotic, eburnated and striated areas on both knee joints. A large cyst hole just lateral to the head facet of the left humerus extended at least 14mm into the cancellous bone and there were porotic lesions at the joints with the scapular acromion and lateral clavicle. However, the most gross changes were seen in the feet and ankles (Plate 3). There were porotic and sclerotic changes to the talo-calcaneal joints, most tarso-metatarsal joints and the distal inferior surfaces of both first metatarsals. All the joints

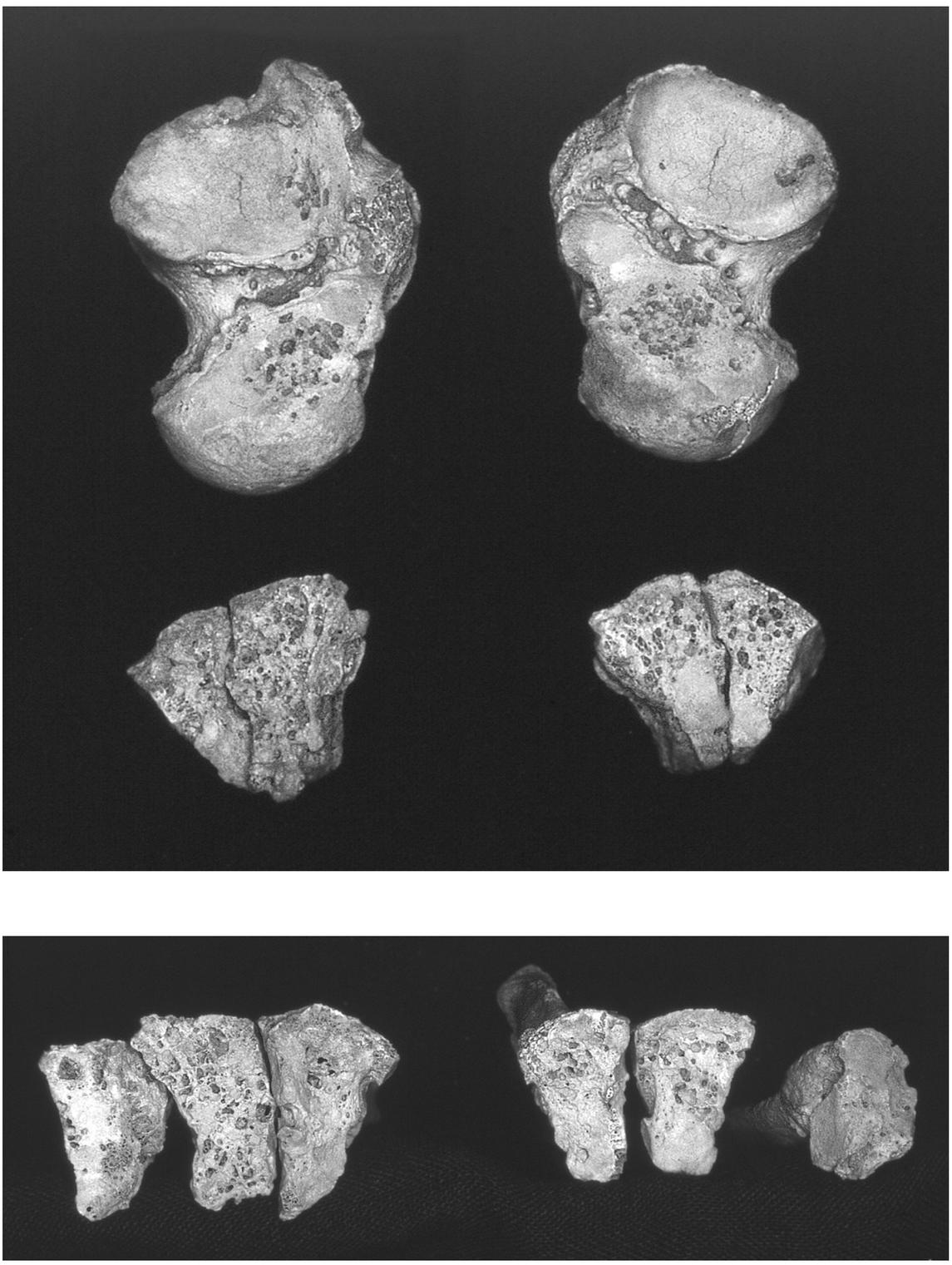

Plate 3 Skeleton *123*: (above) tarsal bones showing gross arthritic changes; (below) proximal ends of metatarsals showing gross arthritic changes

were lipped but there was no eburnation, and the tarso-metatarsal joints were close to fusing. The right hallucial phalanx proximal facet was cupped. The bodies of the bones were not porotic. This is likely to be a sero-negative spondylo-arthropathy such as Reiter's syndrome or psoriatic arthritis (Rogers *et al*. 1987), but unfortunately neither the hands nor the vertebrae were present so a conclusive diagnosis is not possible.

Sk230, an old man, had sclerotic changes to the superior parts of both acetabuli and damage to the corresponding parts of the femoral heads. There were erosive lesions in the bodies and facets of the C2–7 and T1–3 vertebrae. Erosive lesions occurred in most surviving wrist bones, all of which were osteoporotic. Eburnation was present between the radius and the scaphoid bilaterally. Most lesions occurred in the wrists and upper spine, although there may have been 'geodes' in

		Total			Class		
		N	+	*%*	*Porotic*	*Cribriotic*	*Trabecular*
Male	R	13	4	30.8	4	0	0
	L	14	3	21.4	3	0	0
Female	R	15	4	26.7	3	0	1
	L	15	5	33.3	3	1	1
Child	R	6	5	83.3	3	1	1
	L	6	5	83.3	3	1	1
Total	**R**	**34**	**13**	**38.2**	**10**	**1**	**2**
	L	**35**	**13**	**37.1**	**9**	**2**	**2**

Table 17 Frequencies of cribra orbitalia

the proximal humeri and some lower thoracic vertebrae. Most metacarpals and phalanges were in poor condition with only the shafts remaining from the left hand. Although there was some proliferation of new bone on the distal radius and ulna, there was none on the carpal bones. The right lunate and scaphoid were more affected by eburnation than those on the left, but this could be due to greater use of the right hand. There was a possible erosive lesion on the outer edge of a right proximal interphalangeal joint, and cupping of the proximal joint surface of one medial phalanx with definite loss of joint space. The distal end of the right radius showed gross deformity with enlargement of the joint surface, and the periarticular area was osteoporotic with large cyst holes at the edge of the joint. The lesions are suggestive of a symmetrical erosive arthropathy, the most likely being rheumatoid arthritis. There is no certainty that this disease occurred commonly before the 17th century, although earlier possible examples have been published (e.g. Hacking *et al.* 1994; Rothschild *et al*. 1988).

Osteoporosis, although normally associated with skeletal changes, is not easy to identify in long-buried bone as weight loss or thinning may be a result of post-mortem erosion and loss of collagen. However, it was probably present to some extent in *Sk123* and *Sk230*, the latter being affected in the arms and vertebrae. The vertebrae of *Sk132/202*, a ?female, may also have been affected, although they were in poor condition. *Sk97* had slight biparietal thinning, which is a relatively common form of osteoporotic change in elderly men.

General spinal pathology

Schmorl's nodes are lesions in the surfaces of the vertebral bodies which have been formed due to pressure from rupture of the intervertebral disc. They occur in the thoracic and lumbar regions of the spine and are related to physical stress in young adult life. In this group they were recorded in 53.8% of male and 33.3% of female thoracic vertebrae, and 50.0% of male and 28.6% of female lumbar vertebrae. Overall fifteen out of twenty-nine (51.7%) assessable individuals were affected in at least one vertebra. In general the males had more and larger lesions than the females, as well as a greater prevalence. This is the normal finding in groups of this general period, but in comparison with the Norwich populations the Ormesby prevalences are low, although they are slightly higher than those for Caister-on-Sea.

In the spine of *Sk150*, a middle-aged to old man, the Schmorl's nodes were exceptionally large, particularly between T6–T12, and there was some anterior wedging of the vertebrae. In this case the lesions may be attributable to Scheuermann's disease, which is a condition of uncertain aetiology but with an element of familial and constitutional predisposition. As with the normal manifestation of Schmorl's nodes, physical stress may play a part. The individual probably had a noticeably round and stiff back, and muscle pain in later life (Cotta 1978).

Two men and one woman had wedged vertebrae which would have caused slightly kyphotic or scoliotic spines. The L5 of *Sk75*, a male, was wedged to the left with a lesion in the body of the vertebra which was similar in appearance to anterior epiphyseal dysplasia. The T9 of *Sk144*, a female, was wedged to the right. The T1–T4 of *Sk221*, a male, were wedged anteriorly, probably as a result of arthritic or osteoporotic change.

Metabolic and nutritional disorders

(Table 17)

Metabolic diseases are largely dietary or hormonal in origin and rarely affect the skeleton. Those which might be expected to leave a trace include iron deficiency anaemia, scurvy (Vitamin C deficiency) and rickets (Vitamin D deficiency). Osteoporosis is partly a result of hormonal changes and dietary deficiency, but is included in the section on degenerative disease above as it is also a change related to the ageing process.

Pitting, porosis or new bone formation may occur in the roof of the eye socket, and is known as cribra orbitalia. It may be associated with anaemia. In this group thirty-nine individuals were assessable in one or both orbits, and the condition was found in six out of eighteen females (33.3%), four of thirteen males (30.8%) and six of eight children (75.0%), 41.0% overall, although in most cases it was very slight. The lesions were classified following the scheme devised by Knip (in Brothwell 1981), and the distribution is shown in Table 17.

The mildest porotic type is the most common in this and other groups, and high rates are often found in children. The overall rate of 41% was within the normal range. Caister-on-Sea and Thetford St Michael had lower rates (25.8% and 25.5% respectively), whilst Farmer's Avenue and Timberhill had higher rates (52.7% and 50.0% respectively). The juvenile rates are particularly high at Ormesby, but this is probably due to the small number of assessable children. Although the grosser lesions were seen in women and children rather than men in this group, the figures are too small to draw any conclusions.

Only one example of true porotic hyperostosis, also associated with iron deficiency anaemia, was found in this group, in *Sk94*, a nine year old child. Pitting was present on both parietals with slight thickening of the bone. The orbits were not preserved. Nine adult skulls showed slight pitting or striation which may indicate a healed state of the lesion, but could equally be within normal variation or due to an inflammation of the scalp.

One child (*Sk218*, ?premature newborn) unfortunately in very poor condition, may have had a deficiency disease which resulted in thickening of the cortical bone of the femur to between 1.5 and 2mm. Other possibilities include an infection or inflammatory disease.

Hyperostosis frontalis interna is an increased cortical thickening of the inner surface of the cranial frontal bone and is found almost exclusively in post-menopausal women. It occurred in two skeletons at Ormesby, *Sk48* and *Sk123*.

Circulatory disturbances

(Table 18)

These conditions are caused by a disruption in the blood supply to part of a bone. This results in the 'death' of that area and part of the bone may become detached. The original cause of the circulatory disturbance may be physical stress, prolonged pressure or trauma, or it can occur spontaneously.

The most common disease belonging to this category to be found in archaeological material is osteochondritis dissecans. This involves the breaking away of part of a joint surface, which may be resorbed or reunited and healed. Occasionally it remains in the joint space and causes the individual great pain on movement. In modern groups the condition is common in young active men, and is particularly common in the femoral condyles (knee).

Osteochondritic lesions were found in the skeletons of six women and nine men. A number of articular facets were involved and these have been generalised into joint areas as shown in Table 18.

	Male		*Female*	
Area	*Lesions*	*Individuals*	*Lesions*	*Individuals*
Knee	2	1	1	1
Ankle	11	6	3	3
Foot	1	1	0	0
Big toe joint	6	2	5	2

Table 18 Osteochondritic lesions

Prevalences have not been calculated owing to the large number of joint surfaces involved in each area, but it seems that men were more commonly affected than women, particularly in the bones of the ankle. Lesions in the metatarso-phalangeal joint of the big toe, and occasionally in the tarso-metatarsal joint, were common in both men and women, but unlike modern populations the knee was not often involved.

Infectious diseases

(Plates 4 and 5)

Periostitis is a common finding in most archaeological groups. It is an inflammatory condition of the outer layer of a bone and is most often found in the lower leg. Although it can be caused by a non-specific infection, it is generally of uncertain aetiology. The tibiae and/or fibulae of nineteen men and twenty-six women were assessable, and of these five men and five women showed signs of periosteal changes in one or more bones. The changes ranged from slight graining and new bone formation, through patches of lumpy periosteal new bone, to gross periostitis associated with other pathology. In some cases the periostitis had spread to the lower femora or the feet, and in one female (*Sk165*) there were inflammatory changes to the front of the sacrum which could be related. Gross periosteal changes in the legs of *Sk64* may have been related to his degenerative condition (see above).

Periostitis may also be related to specific infections. Two individuals not included in the above figures were also found to have periostitis of the tibiae and fibulae, but in these cases in association with more serious diseases. *Sk51*, an old ?male, was in a very fragmented state, but at least three lower thoracic vertebrae showed gross destruction and collapse with ankylosis of the bodies and spines. Fragments of amorphous calcified material had been collected with the left ribs, and these could be the remains of a paravertebral abscess. The few fragments of skull showed evidence for a single healed lesion, in the form of a pitted depression *c*.12 mm in diameter on the superior part of the right parietal. Although all of these findings could be consistent with tuberculosis, the diagnosis is uncertain for three reasons. Firstly, the lesion of the skull affected the outer table, whilst most tuberculous lesions of the cranial vault start from the inner table. Secondly, the fragmentary remains of the spine showed no evidence for abscesses or inflammatory changes. Thirdly, the calcified material was of uncertain origin. An equally plausible explanation for the skull and spinal lesions is a traumatic injury to the head which also resulted in a crush fracture of the vertebrae. Whatever the reason, the spinal pathology would have resulted in extreme discomfort and difficulty of movement, but if the individual had suffered from tuberculosis it was probably healed by the time of death.

Tuberculosis is often found in association with another specific infection, leprosy. One individual exhibited symptoms consistent with the lepromatous form of the disease. *Sk186*, a middle-aged male, showed pitting of the nasal floor and palate, together with a completely resorbed anterior nasal spine and reduction in the anterior alveolus (Plate 4 above). The left first maxillary incisor had been lost ante-mortem. There were gross periosteal changes to the lower halves of both tibiae along the interosseous lines and corresponding lesions on the fibulae (Plate 4 below). All the metatarsals had similar changes on the shafts. There was destruction of both first metatarsal heads with porosity, and all foot bones had porous new bone growth to some extent. Only two left toe phalanges survived, of which the hallucial phalanx was extremely diseased and may have been fused to the metatarsal. The other had a slightly narrowed shaft. There were no definite changes to the hands other than possible slight volar phalangeal grooves.

One other unusual inflammatory pathological condition was observed. *Sk110*, a possible male aged *c*.16–18 years, consisted of the lower half of the body only, the upper half having remained in section. There was a destructive osteoperiostitis of the left femur. The whole diaphysis was affected with layers of new bone and there

Plate 4 Skeleton *186*: (above) nasal floor showing pitting of superior palate and resorption of anterior nasal spine; (below) distal ends of left tibia and fibula showing roughened areas of periosteal new bone growth

was a moth-eaten appearance at the distal end. The bone was heavily grained on the posterior side with a continuous deep channel cutting into the cortex around the margins of the affected area (Plate 5). This has the appearance of scooped out areas common in tertiary syphilis. Although the most likely cause would seem to be a haematogenous osteomyelitis originally affecting the metaphysis and later the diaphysis of the growing bone, there is no support for this in the form of sequestra, involucra or cloacae. Periostitis is not usually found with a delineating channel, although if a subcutaneous abscess were the cause then this might occur. A treponemal infection such as syphilis cannot be ruled out, but the likely pre-Columbian date and the young age at death of this individual would seem to argue against it. The skull, which could have provided collaborative evidence for this, remains buried. Unfortunately the diagnosis of this unusual lesion remains uncertain.

Plate 5 Skeleton *110*, left femur showing 'moth-eaten' appearance at distal end (1) and channel around edge of infected area (2)

Inflammatory changes in the sinuses, sinusitis, may be caused by an infection, although other factors are often involved. These include air-borne pollutants such as smoke, or the presence of large abscesses opening into the sinus cavity. Thirteen women, thirteen men and seven children were assessable for maxillary sinusitis in this group, and of these seven women, eleven men and two sub-adults were affected, producing a comparatively high overall prevalence of 60.6%. Fifteen cases were bilateral, one case occurred in the right sinus alone, and the remainder were only assessable on one side. In most cases changes to the sinuses were minor, with slight pitting or new bone growth being the most common reaction. Seven cases were associated with abscess breakthrough and three with severe ante-mortem tooth loss. All but two of these were male.

Trauma

A few examples of mild trauma were seen in the form of exostoses, the results of torn muscles or ligaments. In two cases, a male (*Sk79*) and a female (*Sk155*), the distal part of the right tibia just above the joint with the fibula was involved, suggesting a sprained or badly twisted ankle. The proximal end of the right tibia was affected in another woman (*Sk69*), who had an ossified haematoma at the top of the soleal line, which may also be related to an injury of the foot or ankle. An exostosis in the intertrochanteric fossa of a woman, *Sk200*, may be the result of a trauma. The *obturator externus* muscle which laterally rotates the thigh is inserted at this point, but the origin at the anterior part of the ischio-pubic ramus was missing from this skeleton. This type of lesion has also been recorded as a non-metric trait (Brothwell 1981).

Eight individuals showed evidence for conventional fractures of one or more bones. All were well healed, although in some cases malalignment had occurred. The left clavicle was fractured in two skeletons, *Sk31* (male) and *Sk123* (female). Two upper left ribs of *Sk31* had also been broken, probably at the same time. At least one left rib was fractured in *Sk227* (female), and four in *Sk230* (male), whilst *Sk64* (male) had a fractured mid left rib and left second metacarpal. The left fifth metacarpal was affected in another male, *Sk225*, and a ?right finger phalanx of a female, *Sk221*, was well healed but grossly enlarged. The distal end of the left radius of *Sk171*, a woman, had a large stress fracture across the whole facet with clear cracking, slight distortion, and the formation of a large cyst hole. It is interesting that the majority of these injuries had occurred in the upper left side or left hand. This would be consistent with an attack by a right-handed assailant and it may be that a number of these fractures resulted from direct violence. Alternatively, they could be the result of accidents in which the individual fell awkwardly onto the outstretched left hand.

Stress fractures of one or more ankle or foot bones were noted in five men and three women. In most cases the lesions were found on the large facets of the calcaneus or talus, although sometimes the first or second metatarsal or proximal hallucial phalanx were affected. The right ankle was most commonly involved, although sometimes the lesions were bilateral. The ankle is frequently plagued by other types of stress lesions, such as osteochondritis

dissecans and osteoarthritis, and examples of this have been found at Ormesby (see above).

Sk60, a middle-aged male, had a 'flange' lesion of the left hip. There was destruction of the superior rim of the left acetabulum with an inflammatory response, consisting of pitting, new bone formation and osteophytosis, and loss of bone over a 40mm area. The right was unaffected. These lesions have been attributed to 'sudden but transient dislocation' (Wells 1976, 177), although they are also found in cases of coxa vara. A short-lived dislocation of the femur would seem to be the more likely cause in this case.

The possibility that the head and spinal lesions of *Sk51* may be of traumatic rather than infectious origin have been discussed above.

Neoplasms

Small benign osteomata were found on the cranial vaults of three individuals (*Sk72*, *Sk123* and *Sk139*). In all cases they were no larger than 5mm in diameter. A possible osteoma was noted on the right nasal bone of *Sk79*, but the lesion was slightly pointed rather than having the normal wart-like rounded appearance, and may have been due to trauma.

Osteochondromata, benign tumours with the appearance of short spurs of bone forming below a growth plate, were found in two individuals. *Sk51* had an exostosis on the proximal lateral side of the left tibia which was *c*.20 mm long. *Sk198*, a young female, had bilateral lesions on the medial sides of the tibia just below the proximal growth plate, in this case with a double exostosis on the left. In both cases the exostoses were large enough to have caused a slight lump in the overlying soft tissue and the area was probably tender to the touch.

Miscellaneous lesions

Some lesions were of uncertain origin or do not fit into the categories discussed above.

The bones of *Sk75*, an old woman, were unusually small and slender. Unfortunately they were in a fragmented condition and calculation of height had to be based on an estimate of long bone length. The woman was probably no more than 4' 7" tall. Although this is not a classic case of dwarfism, it may suggest some degree of malnutrition or hormonal disfunction during growth.

Sk114, an old man, had an unusually large peroneal tubercle on the right calcaneus. This curved around the *peroneus longus* tendon in life, leaving a hollow tunnel below the tubercle. The condition may have been congenital as the peroneal tubercle is generally very variable in size, or it may have been the result of an injury. The size of the tubercle, together with the lack of subcutaneous soft tissue covering in that part of the heel, would probably have caused some pain and inflammation if hard leather shoes were worn, and this may have contributed to the enlargement of the area.

Sk150, a middle-aged or old male, had hallux valgus bilaterally, as well as osteochondritic lesions in the metatarso-phalangeal joints of the big toes. The lesions may have been a result of this stress-induced condition of the feet.

A smooth eminence (25 x 8mm) was present on the lateral side of the left femur shaft of *Sk186*, the leprous male. Similar lesions have been described by Wells (1971) in Anglo-Saxon skeletons, usually on the right femur, and attributed to muscle compression by the *quadriceps femoris* during strenuous hoeing.

Sk79 had a large cyst hole on the dorsal surface of the right pubis, 12mm in diameter and 6mm deep, with smooth edges. The floor was damaged post-mortem. Similar lesions have been attributed to childbearing, but *Sk79* was probably an old man, so another cause is likely in this case. One possibility is that it was caused by a tumour.

A possible congenital or developmental defect occurred bilaterally on the distal humeri of *Sk225*. There was a small fossa in each of the posterior inferior facets.

Summary and discussion

The 103 contexts of human bone submitted for analysis probably represented a minimum of seventy-two individuals, of which sixty-two were articulated skeletons. These consisted of forty-five adults (eighteen male or ?male, twenty-seven female or ?female) and seventeen children. The disarticulated remains added a further four adults and six children. At roughly a third of the group, the proportion of children to adults is within normal limits for a cemetery population. The age distribution of the juveniles was found to be similar to urban Saxon and rural medieval groups. However, comparison with other Norfolk groups suggests that there is no real pattern to juvenile age distribution other than the probability that smaller bones are more likely to be lost in heavily disturbed cemeteries.

The differences between men and women in the various age categories were unusual. The high number of relatively young women may suggest difficulties with childbirth, and the fact that 13% of the children were newborn infants may provide further support for this suggestion. However, other problems such as poor nutrition in childhood could result in early death. The large number of men in old age could suggest a higher life expectancy for the male population at Ormesby, but the lack of younger men tends to suggest that there were other factors involved. The possibility of fishing accidents in a population living this close to the sea is one which must be taken into account, whilst death away from the home parish, for example in battle, might also result in burial elsewhere. Unfortunately the length of use of this cemetery is not known, so it is not possible to determine whether the high frequencies of men dying in middle and old age was a long term trend in the area.

Metrical analysis suggested that the Ormesby population was closest to medieval rather than Saxon groups in Norfolk. They were comparatively short in stature and had very broad heads, a trait normally associated with post-Saxon groups. Non-metric trait frequencies were compared statistically with other local, regional and national groups. The Ormesby group was found to be closest to a late Saxon/early medieval group in Norwich, Timberhill, and a geographically proximal Saxon group at Caister-on-Sea. However, it was significantly different from another local Saxon group at Burgh Castle. This group has been found to be different in other ways from the people of Caister-on-Sea, perhaps suggesting that one of the two contained more early Saxon or Scandinavian immigrants than the other.

A number of rare traits in this group suggested that there were family relationships within the excavated area, but none of these was buried close to another with the

same trait. Congenital anomalies of both the skeleton and the dentition were similarly difficult to interpret, but again there was a high probability of family relationships across the whole excavated area. Some possible clusters are suggested by the graves themselves, particularly to the west and the east of the area and a few traits appeared in two or more individuals in these groups.

Dental analysis revealed a difference in dental pathology between the sexes: men had greater tooth loss and abscess formation whilst women had more carious lesions. This is probably related to age distribution since the carious teeth of the men had longer to decay and form abscesses or fall out than those of the women. In comparison with other groups the rates of dental disease at Ormesby were relatively high and this is further evidence for a post-Saxon date.

Congenital anomalies affected the lower vertebrae, and were of relatively common types, detached neural arch and spina bifida. The most unusual anomaly was the ankylosis of a navicular and cuneiform in the right foot of a woman.

The normal pattern of degenerative disease was found, with the spine involved more frequently than any other part of the skeleton. However, other frequently affected joints show no particular pattern when local groups are compared. The shoulders, hips, wrists, knees and ankles were all commonly diseased. The ankles were also commonly attacked by diseases associated with physical stress, such as osteochondritis dissecans, ossified haematoma and stress fractures.

Other more unusual arthropathies were found in two individuals. One woman had arthritic changes in almost every joint of both feet and both knees, possibly a result of Reiter's syndrome or psoriatic arthritis, and a man had a symmetrical erosive arthropathy which affected the neck and wrist bones. More men than women had diseases of the spine, particularly Schmorl's nodes. This is a common finding in most groups, but at Ormesby the overall prevalence of the disease was low. One individual showed a more serious manifestation of these lesions, and was probably a victim of Scheuermann's disease.

Although a number of people had signs of a lesion which is commonly linked with iron deficiency anaemia, in most cases these were present in only a limited form. Children were more commonly affected than adults, and they were also likely to have the most gross lesions. In these cases it is possible that the children died either directly or indirectly as a result of the disease, whilst adults who had suffered in childhood had survived, with subsequent remodelling of the earlier pathological changes. No definite examples of other types of dietary deficiency were seen, although one fragmentary child exhibited changes which may have been related to such a disease.

Inflammatory changes to the lower legs occurred with the usual frequency. Although most cases could not be linked to a specific disease, two individuals showed other changes which could have been the result of infections. One old man may have had tuberculosis, although the remains of his skeleton were in poor condition and the disease could not be diagnosed with any certainty. His bent spine could equally have been the result of an injury which probably left him crippled. A middle-aged man probably suffered from lepromatous leprosy, showing the classic symptoms of reduced bone below and inside the nose, inflammatory changes to the legs and septic arthritis in the feet. Inflammatory changes to the femur of a young ?male were suggestive of tertiary syphilis, but the diagnosis could not be confirmed due to the absence of the skull.

Sinusitis was very common, particularly amongst the men. It was often associated with severe dental disease, but other cases were probably attributable to causes such as living in a smoky atmosphere or persistent colds and other infections.

Although a number of people had fractures of the rib cage, collar bone or hand, there were no examples of major long bone fractures in this group. This group of fractures may have been accidental but they are also likely to be the result of physical violence. In connection with this it is interesting to note that all but one occurred on the left side of the body, the most likely area to be hit by a right-handed person.

No malignant tumours were found in this group. The few benign neoplasms found on the heads and the tibiae of a few individuals are unlikely to have caused any obvious symptoms other than slight tenderness below the knee in the case of the osteochondromata. Miscellaneous lesions included deformities of the feet, an anatomic trait possibly associated with heavy physical work, and a large cyst hole in the dorsal surface of a pubic bone.

In general, this group showed a number of similarities with their near-neighbours in Caister-on-Sea and their contemporaries in Norwich. There were no unusual anomalies in the demographic profile of the group and it was probably derived from a normal rural secular population. Some aspects of their lifestyle may have been different from other groups, particularly with regard to dietary stress which seems to have affected them to a very minor degree. However, physical stress, particularly to the joints of the ankles and feet, was a common finding and could be related to the strains put on the ankle in manual farm work or sailing-related occupations. The apparently high life expectancy of the males may be a real trend, but if it were then this group would be different from their contemporaries, who by the medieval period were generally starting to move towards the modern day pattern of greater life expectancy for women.

Very few major injuries or diseases were present in the bones, although of course many of these individuals may have suffered from diseases which never reached the skeleton. Single cases of a few major diseases were identified, but they were clearly not widespread in the group. Dental disease appears to have been the most chronic illness to affect the major part of the group.

Overall, the group was small in stature and broad in head in comparison with earlier groups, but this is a normal result when comparing medieval with Saxon populations. Non-metric traits suggested a probable genetic relationship between a number of individuals, but their wide spacing in the cemetery may suggest a close-knit community or extended family. Over a number of generations, such a family group could easily fill the area excavated.

The most interesting aspect of this study is the similarity of the group to Caister-on-Sea but its difference from Burgh Castle. This highlights the need for further research in comparing the early and middle Saxon populations of East Anglia with their contemporaries in the Germanic homelands and their possible descendants in England.

Radiocarbon dating

by Peter Marshall

Introduction

Two human bone samples from the undated cemetery at Ormesby bypass were processed at the Centre for Isotope Research of the University of Groningen, and measured by Accelerator Mass Spectrometry (AMS), according to the procedures set out in Aerts-Bijma *et al.* (1997; 2001) and van der Plicht *et al.* (2000). The samples were selected from burials which were stratigraphically related with the aim of establishing dates indicative of the earliest and latest use of the burial ground.

The laboratory maintains a continual programme of quality assurance procedures, in addition to participation in international comparisons (Rozanski *et al.* 1992; Scott *et al.* 1988). These tests indicate no significant offsets and demonstrate the validity of the precision quoted.

Results

(Table 19)

The results, given in Table 19, are conventional radiocarbon ages (Stuiver and Polach 1977), and are quoted in accordance with the international standard known as the Trondheim convention (Stuiver and Kra 1986).

Calibration

(Fig. 11)

The radiocarbon determinations have been calibrated with data from Stuiver *et al.* (1998), using OxCal (v3.5) (Bronk Ramsey 1995; 1998). The date ranges have been calculated according to the maximum intercept method (Stuiver and Reimer 1986), and are cited in Table 19 at two sigma (95% confidence). They are quoted in the form recommended by Mook (1986), with the end points rounded outwards to ten years. The probability distributions (Fig. 11) are derived from the usual probability method (Stuiver and Reimer 1993).

Stable isotopes

(Table 19)

This interpretation of the chronological information available for the dating of the Ormesby bypass cemetery assumes that the carbon in the dated collagen was in equilibrium with atmospheric carbon when the individual died and was buried. It is vital therefore to test this assumption and determine the origin of this collagen.

Bone collagen is slowly turned over throughout life. The rate of this turnover is not fully understood, but complete replacement may take ten to thirty years (Ambrose 1993). Thus the collagen component of a person's bones will be a reflection of the total carbon and nitrogen consumed by that individual. As bone collagen is proteinaceous, it derives principally from the protein component of the diet (Ambrose and Norr 1993). Thus the radiocarbon age of this dietary protein is what is measured when dating a skeleton.

An assessment of the sources of the protein component of any person's diet may be ascertained by measuring the carbon and nitrogen stable isotope ratios of the dated individuals (Table 19). Both skeletons from Ormesby show there may be some marine component as the nitrogen values are highly isotopically enriched. Unfortunately the relationship between stable isotopes and diet are difficult to disentangle and not yet fully understood (White and Schwarcz 1989). For example, it is not yet possible to calculate the marine and freshwater fish components from each other (Schoeninger *et al.* 1983).

Alternative age estimates

(Tables 20 and 21)

The carbon and nitrogen stable isotopes have been used to estimate the proportion of marine to terrestrial carbon/nitrogen in each skeleton. This has been done using three different methods: that of Arneborg *et al.* (1999) on carbon stable isotopes, that of Ambrose (1993, 83) on carbon stable isotopes, and the same algorithm on the

Lab No	*Sample No*	*Radiocarbon age (BP)*	*$\delta^{13}C$ (‰)*	*$\delta^{15}N$ (‰)*	*Calibrated date range (95% confidence)*
GrN-25107	ZRS168	790±25	-18.6	16.2	cal AD 1220–1290
Grn-25108	ZRS200	980±25	-19.6	12.5	cal AD 1000–1160

Table 19 Radiocarbon and stable isotope results

Lab No	*Sample No*	*Radiocarbon age (BP)*	*$\delta^{13}C$ (‰)*	*$\delta^{15}N$ (‰)*	*Ambrose (1993) - C*	*Ambrose (1993) - N*	*Arneborg et al. (1999) C*
GrN-25107	ZRS168	790±25	-18.6	16.2	28.6%	96%	28.8%
Grn-25108	ZRS200	980±25	-19.6	12.5	18.1%	46.7%	16.5%

Table 20 Estimates of marine protein component of diet

Lab No	*Sample No*	*Radiocarbon age (BP)*	*Calibrated date range (95% confidence)*			
			terrestrial diet	*Ambrose (1993) C*	*Ambrose (1993) N*	*Arneborg et al. (1999) C*
GrN-25107	ZRS168	790±25	cal AD 1220–1290	cal AD 1280–1390	cal AD 1440–1630	cal AD 1280–1390
GrN-25108	ZRS200	980±25	cal AD 1000–1160	cal AD 1030–1220	cal AD 1180–1290	cal AD 1020–1210

Table 21 Calibrated radiocarbon results based on estimates of marine protein component of diet

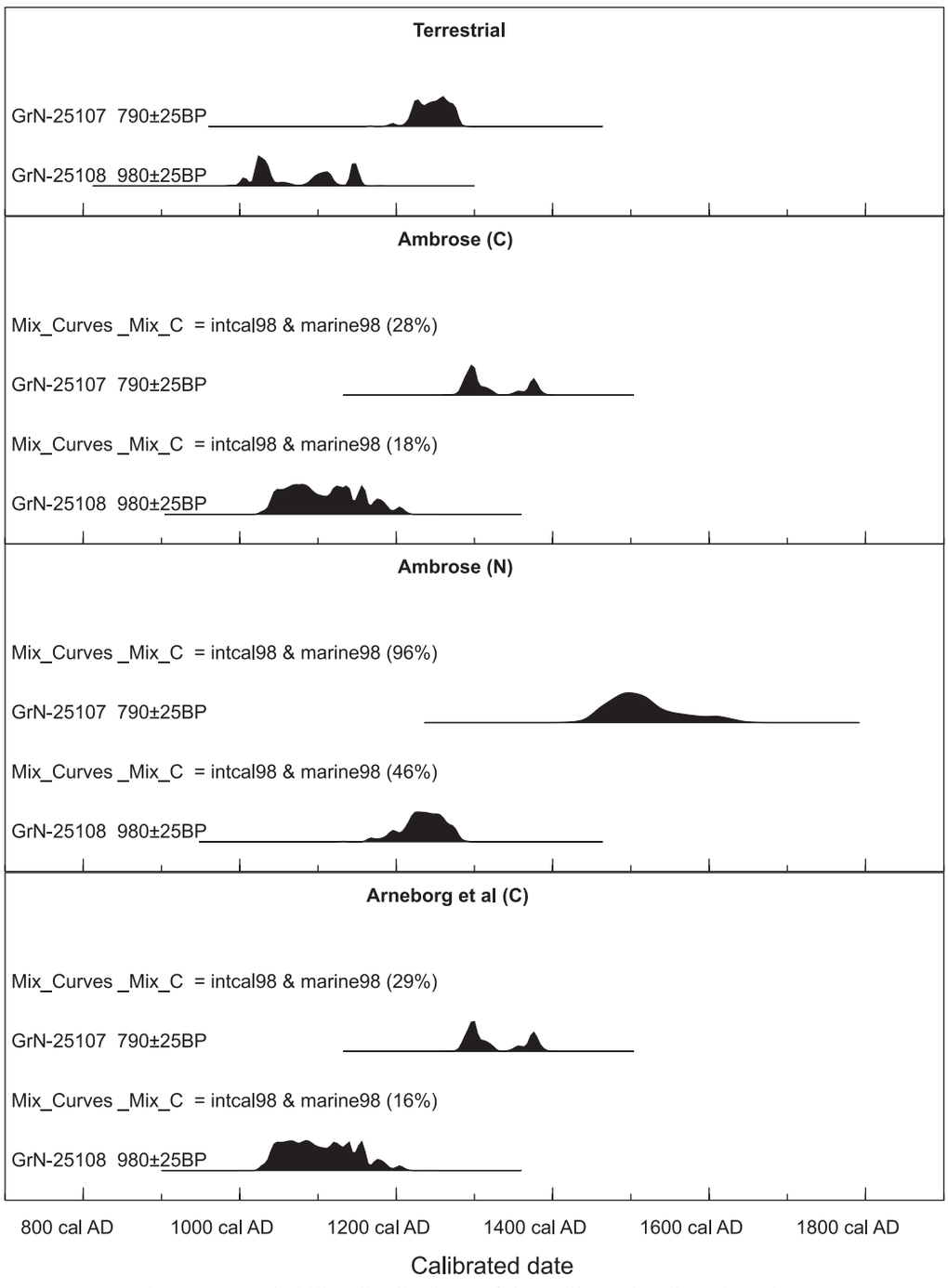

Figure 11 Probability distributions of the calibrated radiocarbon dates

nitrogen values. The results of these three different approaches are given in Table 20.

Using the proportion of marine protein estimated by these approaches, the atomospheric calibration curve has been mixed with the marine calibration curve (Stuiver *et al.* 1998) using a ΔR value of -5±40 for the coastal waters off England (Stuiver and Braziunas 1993) and implemented using the methodology outlined in Bronk Ramsey (1998) (Table 21).

When information from dietary estimates is applied to the calibration of the radiocarbon dates from the site, differences in the dates of the skeleton become apparent. Consequently there are three different interpretations of the stable isotope and radiocarbon data, all of which produce archaeologically significantly different estimates for the date of the two burials.

Chapter 4. General Discussion

Introduction

The presence of a burial ground on the route of the Ormesby bypass was an unexpected discovery which has added to our knowledge of the area in the medieval period as well as specifically to the understanding of populations at this date. This discovery has raised a number of considerations, the most perplexing of which is why a burial ground should be located in this position. In order to try and understand this a number of documentary and cartographic sources have been consulted using the resources available at the following institutions: the Norfolk and Norwich Archaeology Society Library, the Norfolk Records Office and the Heritage Centre at The Forum, Norwich. Aerial photographs were also consulted and included those in the Cambridge University Collection of Air Photographs and the Norfolk Air Photography Library. The Norfolk Historic Environment Record (NHER) was also searched. This research has led to a reconsideration of the possible location of one of Ormesby's churches (St Andrew).

Dating of the burials

The analysis of the metrical traits (the measurable elements) of the skeletons has suggested a population most similar to those from medieval rather than Saxon cemeteries and non-metric traits (observable changes) have indicated a probable genetic relationship between some of the individuals. The medieval date for the burials is also indicated by the results of the radiocarbon dating of two of the burials (*Sk168* and *Sk200*). These have been calibrated taking into consideration the estimates of marine protein within the diet. This is particularly pertinent as, with the location of Ormesby close to the sea, fish and shellfish are likely to have played a major part in the diet. A single possible date range has not been identified, but two of the three calibration methods used have shown similar results (Table 21; Ambrose 1993 and Arneborg *et al*. 1999). These indicate that the burial from the lowest stratigraphic position probably dates from between the early 11th century to the early 13th century, with that from the higher stratigraphic position dating from the late 13th century to the late 14th century. The third method (Table 21; Ambrose 1993) puts both these dates somewhat later with the earliest ranging between the late 12th century and the late 13th century and the latest between the mid 15th century and the early 17th century. All of these confirm that the population represented was medieval in date although there is a possibility that the earliest burials were made a few years prior to the Norman conquest. Burial was still occurring in the late 13th century and possibly into the 17th century, although this late date is not supported by the documentary evidence (see below).

The people

by Sue Anderson

The excavations have provided the opportunity to examine a small sample of the medieval population of Ormesby. The full extent of the cemetery was unfortunately not determined, so the percentage of the original burial group is unknown. However the excavated group is unlikely to represent even as much as 50% of the parishioners who were originally buried here. Add to that the length of use of the cemetery — several centuries at least — and it is clear that the group represents only a very minor proportion of the population during any given generation.

The area excavated shows a degree of reuse, although intercutting of graves is minimal in comparison with urban cemeteries of the period and suggests that land was not at a premium here. The cemetery layout appears to show some planning in the early phases of use, with seven clear row formations running north to south in the excavated area. Later burials generally cut across these rows, which may suggest that the graves were not clearly marked and were not easily distinguished after a few generations. The use of rows may suggest that burial took place in the next convenient piece of unused ground, rather than there being any areas set aside for family plots. If so, the presence of a similar range of non-metric traits in neighbouring skeletons may be fortuitous or could indicate that two individuals from the same family died one after the other, perhaps as a result of illness.

The cemetery was a 'normal' one in terms of age distribution and sex ratio and in comparison with its contemporaries. There was certainly no evidence of segregation by either category. The only slightly unusual aspect was the greater number of older than younger men, and it has been suggested that loss of life at sea might be one reason for this. The stable isotope analysis showed that there was some reliance on fish within the diet of these people. The number of younger women in the group appears quite high, but the overall pattern of female deaths in the group is similar to that seen elsewhere in medieval populations. Death in childbirth may have been a contributing factor, but is unlikely to be the only cause given that in other groups the frequencies of younger men and younger women were often very similar. The cause of death is generally impossible to identify in skeletal material, as so many diseases either kill or cure without ever affecting the bones.

The Ormesby group fits in well with most of its contemporaries in East Anglia, showing many similarities with groups from Norwich and nearby Caister-on-Sea. Both Ormesby and Caister showed significant differences from the population excavated at neighbouring Burgh Castle, perhaps indicating that the latter was derived from different genetic stock (see below).

Pathological conditions identified within the group ranged from the mundane to the severe. Everyday aches and pains of the major joints and back would have been

commonplace, particularly amongst the elderly, and toothache was no doubt a frequent problem. There were generally only minor signs of malnutrition in the young, but in a few cases this may be linked to the cause of death, whether a direct result of starvation or indirectly due to increased vulnerability to infection. Sores and ulcers may have affected some people, seen particularly on the shin where the thinness of the skin makes them more likely to affect the underlying bone. Specific infections were relatively rare in this group, although two of the major killers at the time — leprosy and tuberculosis — both appear to have been present. Leprosy is a disease associated with the close contact of urban living, and it is possible that the man affected in this group was an outsider or had lived in a town or city at some point. A few examples of trauma suggested a low level of violence or accidental injury in comparison with populations excavated in large towns or cities of the period.

The evidence suggests that the people of this parish were a typical secular rural group of the medieval period. Their diet, partly marine derived, was perhaps slightly better than average, and they were less prone to major bone-affecting illness and violence than their urban contemporaries, but their physical appearance would not set them apart. They are important in providing us with an insight into the lives of a rural coastal populace in Norfolk, all too few of which have been available for study in recent years due to poor preservation in the acidic soils of the region.

Scandinavian influence

The possibility that similarity and differences from other medieval populations could indicate a genetic difference has already been noted. Further consideration, particularly of the coastal populations seems to add some weight to this possibility. Study of the placenames of Norfolk shows a distinct cluster of the Scandinavian *–by* endings in Flegg which is thought to indicate Danish peasant settlement of the area (Williamson 2005) while many other parts of Norfolk have little evidence of Scandinavian influence.

The skeletal evidence can be used to propose that the similarity between the Ormesby and Caister-on-Sea skeletons reflects a similar genetic base for the population in this area, while the difference between these two populations and that at Burgh Castle indicates a dissimilarity in populations between the two areas; the burials in Flegg representing a population heavily influenced by a Scandinavian presence, while those in Lothingland may represent the 'native' population largely unaffected by later incomers from the continent.

This study has made similar comparisons with other populations including some from Norwich and York. Again there were similarities in traits between the people buried at Ormesby and these urban populations. The Scandinavian influence on the development of York is well documented, but evidence (outlined in Ayers 2003, 35–52) reflecting such influence in Norwich is less conclusive. These similarities in populations can be used to support the idea of a strong Danish influence in the city.

The churches

Ormesby is known to have had four churches (from west to east, St Michael, St Andrew, St Peter and St Margaret; see Fig. 2) of which two are still in use, St Margaret and St Michael. It is not unusual for a village to have possessed more than one church, particularly in Norfolk, as this situation has been recorded in seventy-nine villages in the county (Batcock 1991, 10). Density of settlement is one reason for this although the close relationship between manorial structure and church foundations is also a well recognised link (summarised by Morris 1983). This area (the hundreds of East and West Flegg) is recorded as having one of the highest populations of the county at the time of Domesday Book (Brown 1984), a situation probably influenced by the very fertile medium loams of the islands which rise above the surrounding marshy alluvium (Darby 1971, 149). The area also possessed a complex manorial arrangement which has not yet been fully understood. It has often been argued that the presence of the Danelaw influenced the development of many small manors, however more recently it has been suggested that ease of cultivation was a more significant factor (Williamson 2003). Whatever the cause, the existence of many small manors with a high density population could have influenced the number of churches present in the area.

Location of the churches

(Fig. 2)

The church of St Margaret is located close to the centre of the modern village and 1km east of the excavated site, St Michael is located 0.8km west while St Peter is located *c*.0.3km east of the excavated area.

To date, the exact location of the fourth church in Ormesby, which was dedicated to St Andrew, has remained uncertain. It is recorded on the NHER as being *c*.0.6km east of the excavated site and 0.5km to the north of both St Peter and St Margaret, in an area presently occupied by 20th-century housing (Fig. 2, St Andrew's church, presumed site). The evidence for this is a record of substantial foundations being uncovered in a garden early in the 20th century. It was initially suggested that these were part of a monastery, but Charles Green later suggested that this could be the site of St Andrew's church.

An alternative location is suggested by an account of an excursion held by the Yarmouth branch of the Norfolk and Norwich Archaeological Society in 1929. It is reported that Mr Messent spoke on the history of Manor Farm House and then continued to inform the group that 'The old church of St Andrew stood in the field opposite, and 200 yards to the south-east was the old church of St Peter'. This has been discounted as erroneous (NHER; Bent 1995), however this reference to St Andrew's church is significant in that it places it in the same location as the burials discussed in this report.

Messent (1931, 28) described the condition of the remains of both ruined churches saying 'The church of St. Andrew has entirely disappeared, but its site is known and the foundations are often come upon when ploughing' and 'The site of the church of St. Peter is known, but all trace of it above ground has gone. In a dry season its foundations are visible'. This suggests that he believed that both churches were in areas under the plough, and indicates a

difference in survival, perhaps reflecting the differing dates of disuse (see below).

It is possible to suggest two potential sites for the location of St Andrew's church; the presumed site towards the centre of the village where foundations were found early in the 20th century and the site of the excavations where a medieval burial ground was discovered. A reconsideration of other material follows. The aim of this research was to see if there was any other evidence which may support the location of a church at the excavation site.

Cartographic evidence
(Plate 6)
The Tithe Map of 1841 (Norfolk Record Office DN/TA 470) (Plate 6) does not show the buildings of St Peter's or St Andrew's churches, it can therefore be presumed that neither had any above ground surviving elements at that time. It does however illustrate an earlier alignment of road running adjacent and to the north of the location of St Peter's church and a small rectangular field surrounding the location of this church. In the tithe apportionment this field is called 'The Old Churchyard' and measured as 2 roods and 26 perches. Opposite Manor Farm (the area of excavation), a second small, slightly trapezoidal, enclosure is marked on the Tithe Map. It is called 'Land in Home Eight Acres' and measured as 1 rood. It can be suggested that this plot once defined the area of St Andrew's churchyard. It is however smaller than all of the other churchyards in Ormesby; the acreage of St Peter's has already been given, St Michael's measured 1 rood and 27 perches and St Margaret's lay in a plot measuring 2 roods and 21 perches. The area previously presumed to be the location of St Andrew's church is a plot on the Tithe Map called 'Middle Four Acres' measuring 3 acres, 2 roods and 3 perches, and containing a building. This seems excessively large for a church and its churchyard, particularly in comparison with the other churchyards in Ormesby.

The Enclosure map (Norfolk Record Office DN/TA 470) is dated to 1845 and is described as encompassing lands 'in the Parishes of Ormesby St Margaret, Ormesby St Michael, Ormesby St Peter, Ormesby St Andrew and Scratby'. The area of St Peter's church and that of the excavation were not separately identified but were both included within a single large plot which was owned by J.E. Lacon, this field now measuring 27 acres, 2 roods and 33 perches.

The 1st edition OS map illustrates that the alignment of the road had changed as it passes St Peter's church, taking a more northerly route (the present route). The two small enclosures are no longer visible having been incorporated into a larger field. The presumed location of St Andrew's church to the north of the village is now partially occupied by a Wesleyan Methodist chapel.

Aerial photographs
Aerial photographs held by Norfolk Landscape Archaeology (NLA) and the Cambridge University Collection of Aerial Photographs (CUCAP) have been consulted. The 1946 photos (NLA) show no evidence of St Peter's church, but the corner of the field in which the excavation took place shows as a different texture, although this may be due to varying agricultural practices. It was in 1976 that the outline of St Peter's church was revealed (CUCAP reference BYJ 25–30). This series of photos also showed a number of field boundaries, one of which appears to define an area around the church, presumably marking the limit of its burial ground. However there is no indication of a similar enclosure around the excavated site.

Photos taken in 1980 appear to show a small enclosure around the excavated site and there is an L-shaped parchmark, the derivation of which may be a wall although it is equally likely to be the result of agricultural practices. The most recent photographs, taken in 1988, show no evidence of either of the two churches or the surrounding field system.

Dates of the churches
The dates of foundation and abandonment of the four churches of Ormesby are not entirely clear. Of the two churches still standing, St Margaret is of a Norman construction as indicated by surviving architectural elements of the nave and the south doorway (Pevsner and Wilson 2002, 628). The earliest architectural features in St Michael date to the 13th century (Pevsner and Wilson 2002, 630), although the NHER record suggests that it may be of Saxon or Norman origin. No above-ground element of St Peter's church survives but the plan, as illustrated by aerial photographs, indicates an early 12th-century date for the earliest visible elements (Batcock 1991, 161). A date cannot be suggested for St Andrew's church as no above-ground structure survives.

All four churches were certainly in use in the last years of the 12th century as the first register of Norwich Cathedral Priory records that in 1198 a number of churches and tithes are given to support the hospital of St Paul, amongst them are the four churches of Ormesby; St Michael, St Peter, St Andrew and St Margaret (Sanders 1939, 87). It is possible that some decline may have already started at this time as in 1205 the four rectories were valued at 30 marks with only one vicar to serve them all (Armstrong 1781, 47).

St Michael and St Margaret remain in use today, however the date of abandonment of the other two churches and how long their remains continued to be visible in the landscape is not entirely clear. This is further confused by antiquarians who do not always make it clear which ruined churches they are referring to; St Andrew, St Peter or both. That all four churches were still being used in the third quarter of the 14th century is indicated by their inclusion in the inventory of church goods of 1368 (Watkin 1947, 47–8). The earliest suggested date for the abandonment of St Andrew is later that century. This is based on the will of William Clere, who died in 1384 leaving money 'to the churches of St Margaret, St Michael and St Peter in Ormesby and 10 Marks to repair the churchyard wall at Ormesby St Andrew's in recompense for the lead which he had taken to his own use' (Cornford 1982). Barbara Cornford goes on to suggest that this evidence indicates that St Andrew's church was already ruinous at the end of the 14th century and that William Clere had benefited from its demolition.

Some antiquaries suggest that both St Peter and St Andrew were still in use in 1591 (Armstrong 1781, 48; Blomefield 1810, 239). This is based on a single piece of documentary evidence: in 1591 the vicar (William Carew) in Ormesby obtained a dispensation from the bishop that he might serve one week in the principal and mother church of Ormesby and the next in any of the others.

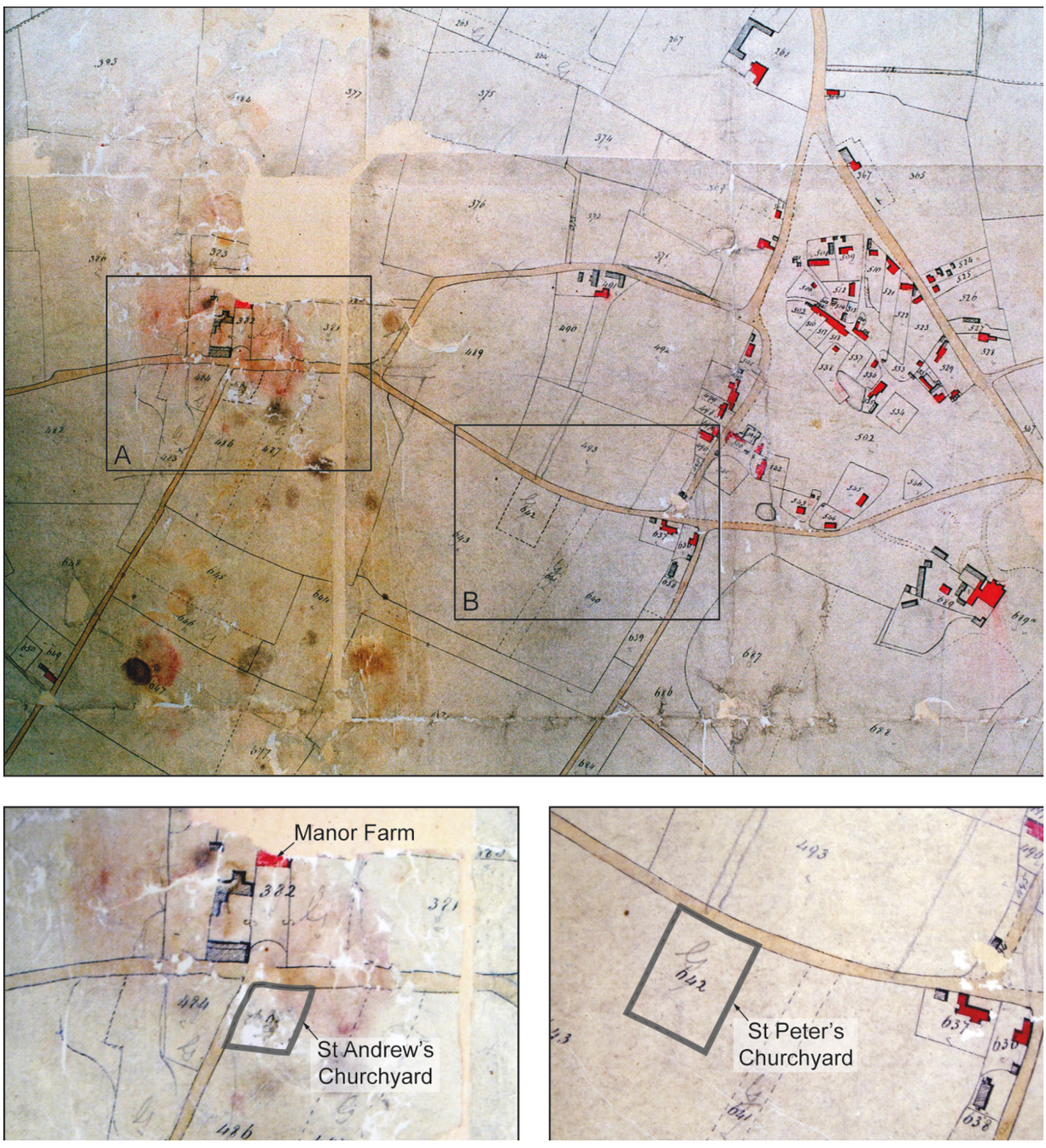

Plate 6 Detail of the Tithe Map (1841). Inset (A) Manor Farm is to the top. Highlighted area is the small plot which could represent the location of St Andrew's church and churchyard. Inset (B) highlighted area shows the plot which was once St Peter's churchyard

Blomefield (1810, 239) identifies St Margaret as the mother church referred to, although it is not made clear how many other churches there were. If it were two then the churches are almost certainly that of St Michael and St Peter, if three then St Andrew is still in use. Other historians refer to both St Peter and St Andrew as disappearing or being in ruins soon after the reformation (Bryant 1899, 42; Cox 1911, 101), although this may be an alternative presentation of the statements by Armstrong and Blomefield.

One of the ruined churches was visible in 1726; Blomefield describes a church he saw as 'thatched and in tolerable repair turned into a barn. The foundations of a round steeple are visible at the west end and in short I think it might with little charge be made fit for service' (Linnell 1951, 74). Blomefield erroneously suggests it might be Scratby church, and also locates it on the north rather than the south side of the road. However the aerial photographs of St Peter taken in the 1970s show the same church as described by Blomefield (Batcock 1991, 161).

On Faden's map of 1797 (Barringer 1989) the site of St Peter's church is marked as 'Old church in ruins', but there is no indication of the location of St Andrew's church suggesting that it was no longer visible. The Tithe Map of 1841 shows neither St Peter or St Andrew indicating the former had also been levelled to below ground level.

However the memory of the location of St Peter lingered, and it is marked on the 1st edition OS 6-inch map of 1884 as 'St Peter's Church (site of)'.

In summary then, Ormesby had four churches before the end of the 12th century, and probably from an earlier date considering the evidence of Norman architecture and the high population at the time of Domesday. These were arranged in a linear pattern along the east–west road leading inland from the coast. During the late 12th to early 13th centuries the evidence suggests that Ormesby started to decline with one vicar serving the four rectories by 1205. This situation appears to have continued for over 150 years as all four churches are mentioned in an inventory of 1368. The will of William Clere suggests that there was a continued reduction in population and prosperity as it indicates that St Andrew's church was in ruins and being stripped of its assets by 1384. The remaining three churches continued in use for the next 200 years, until the end of the 16th century, when St Peter was also abandoned. The abandonment of these two 'central churches' within the village left the two remaining churches (St Margaret and St Michael) located *c.*1.8km apart forming the focus of two distinct areas of settlement. The 200 years between the abandonment of St Andrew and St Peter goes some way to accounting for the lack of references to St Andrew's church both by antiquarians and in more recent studies and observations.

Conclusions

This project revealed a previously unknown burial ground, the excavated part of which included the articulated remains of at least sixty-two individuals. Analysis of the skeletons shows that the population which this burial ground served was typical of a rural medieval population and included some genetic relationships between the individuals. The range of dates for the use of the cemetery (11th–14th centuries) has been indicated by radiocarbon dating.

The location of this burial ground was thought to be somewhat unusual since a cemetery of medieval date should be associated with a church. The evidence has been reviewed and it is now possible to suggest an alternative location for St Andrew's church based on the presence of this cemetery along with indications of a suitable plot of land on the Tithe Map, which is also seen on aerial photographs.

A further concordance exists between the date of the burials and that of St Andrews's church. Two of the three radiocarbon calibration methods indicate that it was an early medieval cemetery which may have continued in use up to the later part of the 14th century, while the documentary evidence hints at demolition of St Andrew's church between 1368 and 1384. This would also coincide with the general decline of population across the county in the second half of the 14th century.

Appendix: Results of Fieldwalking and Watching Briefs

Introduction

Fieldwalking was undertaken along the length of the bypass where notice was given and the conditions were suitable. This involved both the retrieval of visible surface artefacts and metal detecting of the area. This was undertaken in uniform collection units walked at set intervals. The archaeologists were given little forewarning of proposals to strip topsoil so it was not possible to prepare the fields in order to improve fieldwalking conditions. In two areas watching briefs were undertaken during mechanical topsoil stripping. The areas investigated are shown with their site code on Fig. 2, and the finds are listed in Table 22.

Fieldwalking

Norfolk Historic Environment Record Number: 31738 ZRS
Collection unit: 20m x 20m
Walked at 10m intervals
Area: 480m x 20m
Date of work: January 1996

Conditions for fieldwalking varied greatly with some areas having been disturbed by machinery and others remaining under stubble. Conditions to the east of Mill Lane, however, were good. In general the finds recovered are a collection of post-medieval to modern artefacts. The only notable collection of earlier material was the flint assemblage which was made up of pot boilers, flakes and a blade.

Norfolk Historic Environment Record Number: 31773 ZRS
Collection unit: 20m x 20m
Walked at 10m intervals
Area: 40m x 200m running south-east to north-west
Date of work: February 1996

Northern half of the area had been ploughed while the southern half was under stubble.

Norfolk Historic Environment Record Number: 8684 CAJ
Collection unit: 10m x 20m
Walked at 2m intervals
Area: 200m x 20m

Fieldwalking conditions were poor due to deep furrows and the proximity of heavy plant which interfered with the metal detector and prevented its use across much of the site. In order to try and compensate for these factors the fieldwalking was carried out at 2m intervals. In spite of this the quantity of material retrieved was not great. In general it represents a scatter of post-medieval to modern artefacts. The only notable earlier material is represented by nine sherds of glazed red earthenware and three sherds of late medieval transitional ware.

Norfolk Historic Environment Record Number: 24119 ZRS
(not shown on Figure 2)
Area: 150m x 25m

A watching brief took place on this area following the removal of the topsoil. No archaeological deposits or features were identified and no finds were recovered.

	31773 (fieldwalking)	*31773 (watching brief)*	*31738*	*8684*
Ceramic building material	20 x flat roof tile, 1 x pan tile, 1 x floor tile, 9 x brick/tile, 17 x brick	1 x pan tile, 3 x brick, 5 x fired clay	4 x flat roof tile, 3 x pan tile, 11 x brick/tile, 11 x brick	59 x flat roof tile, 6 x pan tile, 31 x brick/tile, 24 x brick
Pottery	1 x Ipswich ware, 2 x Thetford-type ware, 4 x medieval glazed ware, 10 x medieval unglazed ware, 5 x red earthenware, 2 x tin-glazed earthenware, 1 x late post-medieval wares, 3 x stoneware, 2 x 18th–19th century wares, 8 x China, 3 x flower pot	5 x undiagnostic prehistoric wares, 1 x Ipswich ware, 18 x medieval glazed ware, 38 x medieval unglazed ware, 1 x late medieval glazed ware, 1 x late medieval/transitional ware	1 x Romano-British greyware, 1 x medieval unglazed ware, 3 x tin-glazed earthenware, 2 x stoneware, 2 x 18th–19th century wares, 5 x China	1 x late medieval glazed ware, 9 x red earthenware, 2 x tin-glazed earthenware, 2 x slipware, 6 x China
Clay pipe	3 x stem		1 x stem	6 x stems, 1 x bowl
Animal bone		4		
Flint	10 x pot boiler, 1 x flake	1 x pot boiler	10 x pot boiler 4 x flake 1x blade	4 x flake
Lava quern	1	1		
Slate	6		2	
Glass	1 x blue vessel		1 x vessel	1 x vessel
Iron artefacts	3	5	21	
Copper alloy	2 x button 2 x fragments		1	
Lead	1 x droplet		2 x droplet	
Stone			1 x hone fragment	
Slag			3	

Table 22 Fieldwalking: number of finds for each site, by material

The watching brief

Norfolk Historic Environment Record Number: 31773 ZRS

An area 11.8m x 6.8m was subject to a watching brief. This was located *c*.15m to the south of the area of burials and outside the small enclosure noted on the tithe map (see Plate 6). Work consisted of the cleaning and planning of deposits and excavation of a 0.5m wide slot through them. This took place in February 1996 prior to the discovery of the burial ground.

The lowest deposit which lay across most of the area was a mid-brown clay/silt with occasional charcoal flecks, medium flints and lumps of yellow clay (06). Cut through this was a ditch (12), 3.5m wide and 0.8m deep containing pottery of a medieval date (11th–14th centuries). The upper fill of this was a 0.15m deep deposit of greyish yellow clay (03) which was originally thought to be a clay surface. Unfortunately the ditch was not seen clearly in plan as its western edge had been truncated by a more modern feature, and the upper clay fill (03) appeared to spread out beyond the confines of the cut.

To the south of this ditch an area of burning was recorded (07). This sub-oval area was *c*.1.1m wide and over 2m long, extending beyond the area of the watching brief. The material from it was very dark brown clay/silt with frequent charcoal and burnt clay lumps. This was partially sealed by a further deposit of clay.

To the west of this was a heavily truncated linear scatter of large flints and chalk lumps. It is possible that this was the remnant of a wall footing.

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