11 The Bioarchaeology of Anglo-Saxon Yorkshire: present and future perspectives

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The Anglo-Saxon period in Yorkshire – in terms of our knowledge of those questions which bioarchaeological studies are conventionally used to address – remains very much an unknown quantity. We can hardly claim even to know whether these questions are indeed appropriate in the Anglo-Saxon period. To some extent this reflects the nature of the Anglo-Saxon deposits so far encountered, in which preservation of the less durable organic remains has been very limited. The nature of Anglo-Saxon occupation, with a bias towards rural settlements of a kind which have generally left only faint traces in the ground, means that there are no deeply stratified richly organic deposits of the kind revealed in some Roman and Viking Age phases in major urban centres, of which only York is well known in the region.

The Anglo-Saxon period thus presents exceptional challenges to the environmental archaeologist, and ones which closely parallel those for the Iron Age. It is a period for which the kind of assemblages traditionally provided by bioarchaeological studies are most urgently needed, to define environment and land use, resource exploitation, living conditions, trade and exchange, as well as aspects of craft-working and industrial activities. In addition, the period in Yorkshire presents special problems concerning the status of individual rural or ecclesiastical settlements, particularly the nature of York as a possible *wic*.

For the purposes of this paper (and in view of the complexities of the archaeology of the 5th to 11th centuries), we have elected to discuss only such biological material as falls after the end of the Roman period (as generally accepted) and before the first significant waves of Scandinavian invasion in the mid 9th century.

York

Deposits of Anglo-Saxon (or putative Anglo-Saxon) date at a small number of sites in York have been investigated bioarchaeologically, but the evidence recovered is slight so far as invertebrates and plant remains are concerned. There is, however, rather more information from vertebrate remains from one of the sites, 46–54 Fishergate.

Deposits associated with Anglo-Saxon occupation at Fishergate (Allison *et al.* 1996) gave disappointingly little evidence for invertebrates, despite extensive sampling. The samples were, in addition, subjected to large-scale review for biological remains, on the grounds that any substantial evidence of this date would be of the greatest importance in understanding the use of the site and perhaps the wider nature of York at the period. Preservation by anoxic waterlogging was extraordinarily rare, and charred and mineralised material (other than dog coprolites) was not much commoner.

Objects identified as dog coprolites (or fragments of such) were quite numerous at Fishergate, particularly in the earlier Anglo-Saxon phases. Some proved to contain eggs of the intestinal parasitic nematode worms *Trichuris* (whipworm) and (more rarely) *Ascaris* (roundworm), probably present as a result of dogs eating human faeces.

Only two insect assemblages of any useful size were detected. One was a ditch fill with aquatics (insects and ephippia of *Daphnia*, *Ceriodaphnia* and at least one other cladoceran), but there were no indications of more than a few herbaceous plants and thinly-dispersed organic detritus in the surrounding contexts. The second small group of insects was recovered from a pit fill; there were rare occurrences here of a limited fauna associated with human occupation. A modest number of other deposits at Fishergate gave small numbers of parasite eggs (*Trichuris*, *Ascaris*, or both), but only occasionally were the numbers sufficient to give clear evidence of the disposal of faeces. The only other invertebrates were odd records of beetles or fly puparia, and some *Heterodera* type (soil nematode) cysts in one pit.

Plant remains from Anglo-Saxon Fishergate were sparse, and preservation was often only by charring or (in a few cases) through mineralisation. Few food plants were recovered, though barley was present in 27 contexts (21%) and charred hazelnut in 16 (12%). Other cereals included oats and wheat, some of the latter being identified as bread wheat. There was also one context

with uncharred wheat/rye 'bran'. Pulses were represented by mineralised remains of pea and field bean; fruits were few and included apple, sloe, blackberry and elderberry. Two possible sources of oil were linseed and opium poppy, each recorded from single contexts. The remaining taxa included a few weeds and wetland taxa; the rarity of the former is remarkable for an occupation site. Although poor preservation may be an important factor here, even where there was 'waterlogged' preservation, remains of weeds – as remains of invertebrates – were still very scarce.

It is not clear why this site gave so little preservation of uncharred non-vertebrate remains, bearing in mind its low elevation and close proximity to the River Foss. Anoxic waterlogging, although expected to have been widespread in such a situation, was in fact rare; the contrast in quality and quantity of preservation with other, later, riverside sites at 6–8 Pavement and 16–22 Coppergate (Hall *et al.* 1983; Kenward and Hall 1995) is remarkable. It is tempting to suggest that, in addition to the lack of waterlogging, there may have been a very low rate of input of organic matter at Fishergate. Perhaps most waste disposal here was into the river, or perhaps the site was close enough to farms for waste to be removed as manure. Alternatively, if (as discussed by Kemp 1996) this was a trading post, the nature, density, and perhaps timing of occupation may have been such that little waste was produced, the numerous pits perhaps being short-lived cesspits (in which the organic component was slight and able to decay rapidly) or dug originally for some other purpose entirely. Subjectively, the invertebrate and plant remains from Fishergate suggest a low density of occupation, but the evidence relies too heavily on the negative to be reliable.

The vertebrate remains from the Anglo-Saxon deposits at Fishergate add much to the interpretation of the nature of the site based on the excavational and artefactual evidence. One of the most striking features of the vertebrate assemblage is the narrow range of animals represented, with very few birds (wild or domestic) or wild mammals present. The assemblage is dominated by the remains of mature cattle, which appear to have provided the basis of the settlement's subsistence. Sheep and pig were rather less well represented. Analysis of the age-at-death data for the major domesticates reveals specific peaks in slaughter patterns which appear to be the result of a consumer-driven, rather than producer-driven, economy (O'Connor 1994), indicating the affluence of the settlement. The presence of a full range of skeletal elements suggests that cattle arrived on the hoof, whereas for pigs there was significant under-representation of metapodials and first phalanges (lower leg and foot bones) compared with the major meat-bearing bones, suggesting the delivery of dressed carcases at the site. Fish bones, recovered in moderately large numbers, were mostly of eel and other river fish, with some herring, cod, salmon and shad also present. The marine component indicates only limited exploitation of inshore coastal fishing (O'Connor 1991).

At another site in York, the Bedern, the fills of a series of pits cut through late Roman surfaces were investigated by Kenward *et al.* (1986, 268–288). They are discussed here at some length in view of their considerable implications for land-use in central York; the site is within the area of the Roman fortress, little more than 200 m from the Minster, the precursor of which was presumably close by at the time these deposits were forming. Two of these pits were 'bell-shaped', around a metre in depth and diameter, with distinctly undercut sides. One seemed to have been recut. Although the lowest primary fill of this pit was almost barren of invertebrate remains, and yielded only small numbers of plant remains of no particular interpretative value, the upper one (radiocarbon dated to ad 740±80, firmly within the Anglo-Saxon period) gave a large and very unusual assemblage. This deposit was described as a 'peat', probably formed from grasses, sedges or rushes, and contained seeds of *Juncus* spp. (rushes), *Carex* spp. (sedges), *Eleocharis palustris* (spike-rush) and *Ranunculus flammula* (lesser spearwort), strongly suggesting a damp ground/waterside community. Aquatic beetles in modest numbers, together with some caddis cases and *Daphnia* ephippia, indicated that there were periods when the pit held open water. There were many plant-feeding insects, including numerous individuals of the froghopper *Conomelus anceps*, which feeds on *Juncus*. Beetles associated with decomposing plant remains were abundant. It was suggested in the original report (Kenward *et al.* 1986, 273) that these decomposers may have lived in plant litter on the surrounding ground surface, as true synanthropes (species favoured by human activity) were absent.

Re-examination of the species lists (Kenward *et al.* 1986, fiche table 120) with the benefit of hindsight and a revised classification of synanthropes among the beetles suggests alternative origins. *Mycetaea hirta* and *Ptinus fur* were both rather common, and there was distinct indication of a 'house fauna' community including, for example, numerous *Lathridius minutus* group and *Xylodromus concinnus*. *Corticaria serrata*, the most abundant species, is also favoured by artificial habitats including haystacks. This material may have been cleared from a building of some kind which had a limited synanthropic fauna – as might be predicted for Anglo-Saxon York if population density was low and the site lay in an open area (see below). These species seem unlikely all to have invaded a natural accumulation of litter or a heap of material collected by humans, perhaps as poor hay or for spreading on a house floor. It is suggested that strongly established populations of these species must have existed in buildings nearby. Whether floor sweepings or natural litter was concerned, re-interpretation of these remains places a building of some kind containing plant debris or other habitats for house fauna (for example a thatched roof) nearby.

Such a re-interpretation of one component of the fauna does not alter the original conclusion that the land in which this pit stood was 'a largely neglected and somewhat marshy area'. It is very difficult to believe that the whole of the non-synanthropic fauna in this fill was transported over a long distance. In addition, the fills of the last recut of the pit gave an assemblage of insects with a large proportion of aquatics including a range of beetles and numerous *Daphnia* ephippia. Aquatic deposition also seemed likely on the basis of the sediment type. There was little evidence for decomposing matter at this stage, but a range of plant-feeding beetles indicated docks/knotgrasses (*Rumex* spp.) and nettles (*Urtica* spp.), suggesting some disturbance by human activity such as cutting, trampling, or putting livestock out to graze.

The second of the bell-shaped pits at the Bedern gave insect faunas dominated by 'outdoor' forms (primarily plant-feeders) suggesting weedy waste ground, and this was supported by the plant remains. This pit gave a single trichurid (intestinal parasite) egg, not regarded as significant in view of the likely dispersal and redeposition of such remains. There was therefore nothing in the fills of the recut of the first pit, or in the fills of the second one, to suggest dense occupation nearby.

As well as the evidence for wetland plant remains from the 'peat' in one of the pits at the Bedern, there was quite a rich flora from the deposits taken overall, and it included hemp, celery seed, ?summer savory, oats, ?barley, (?bread) wheat, hazelnut, elderberry, and *Rubus* seeds tentatively identified as raspberry and blackberry. A large proportion of the taxa could be classified as weeds of various kinds, and in fact most of the taxa recorded from more than half the samples were weeds. A few probable grassland taxa were present throughout the samples examined; these may indicate nothing more than wasteland grassland habitats in the vicinity, although some might be indicators of imported cut grassland vegetation (as in the case of the especially well-represented group in the 'peat') or even dung.

These pits remain as the best evidence for conditions within the area of the Roman fortress during the Anglo-Saxon period; clearly occupation was sparse and possibly almost rural in character. There has been some suggestion that (despite the radiocarbon date) the deposits are Anglo-Scandinavian in date; if so, they remain extremely significant for different reasons, since this period is also poorly represented in this part of York, despite abundant evidence from some other areas of the city.

The deposits associated with the eighth-century helmet discovered at the Coppergate development site, York (Tweddle 1992) present an interesting dating challenge. The biological remains in the pit may have been of Anglo-Saxon date, or Anglo-Scandinavian date, or both. Two large samples from this important but enigmatic feature were examined, one from the sediment within a lining of oak planks giving an Anglo-Saxon date, and one from between the lining and the natural clays into which the pit was cut. The biota of these deposits were essentially similar, indicating an area of disturbed ground with annual and perennial weeds and an associated insect fauna. There was foul matter, perhaps dung, and litter on surfaces amongst the plants. There was nothing to suggest that the pit had been used for waste disposal, although there were small quantities of plant and animal remains which must have originated in or around buildings. Aquatic and aquatic marginal species seem likely to have arrived as 'background noise' or in floodwater. It was suggested, particularly on the evidence of the invertebrate remains, that the pit was open for a long time, with gradual accumulation of insects. It was perhaps a shallow well (it appeared to have been truncated during earlier building works), dug and lined in the Anglo-Saxon period, in primary use for an unspecified period, then abandoned. During abandonment, and perhaps as late at the Anglo-Scandinavian period, the helmet was dropped or placed in the pit, which was later backfilled with surface deposits from nearby. Although the development of this hypothesis concerning the history of the pit was very much the result of a full integration of all the evidence, stratigraphic, artefactual and biological, the insect remains were a particularly important component, providing the most reliable picture of the surroundings and evidence that the pit was open for a long time.

On the south-west side of the Ouse, assessment of some eighth century layers at North Street unfortunately revealed that there was virtually no preservation of biological remains (Carrott *et al.* 1993); similarly, deposits of fourth to ninth-century date nearby at Rougier Street gave no useful invertebrate remains (Allison *et al.* 1990) and plant remains were sparse and uninformative. Although moderate-sized vertebrate assemblages from deposits of this date were recovered from excavations in both Rougier Street and Wellington Row – material which was apparently similar in character to those reported from late Roman deposits at Tanner Row – they remain unstudied. Similarly, biological remains from deposits dated as broadly Anglo-Saxon from excavations at the Queens Hotel site (1–9 Micklegate) have yet to be studied properly. Lack of funding for work on these sites has undoubtedly inhibited progress in understanding the Anglo-Saxon period in York.

Rural sites

Preservation of biological remains other than bone and charred plant remains on rural sites of most periods, and therefore also for the Anglo-Saxon period, is generally poor, and even charred plant remains tend to occur in rather low concentrations. The durability of charred material means that it easily survives in redeposited material, and it therefore may have limited interpretative value. Evidence for charred plant remains from deposits other than primary contexts is thus particularly prob-

lematic. As a result, by far the greatest volume of bioarchaeological evidence from rural sites of this period is the corpus of vertebrate remains (Table 11.1).

Table 11.1 includes brief summaries of studies of plant and animal remains from these rural sites in Yorkshire. It is clear from this that the only large assemblage of plant and vertebrate remains is that from West Heslerton, a site which has been excavated more or less continuously over a long period and for which a large volume of sediment has been sampled and processed. There is at present no detailed account of the biological evidence, although a full analysis programme funded by English Heritage is under way. Limited information can be gleaned from an assessment report (Powlesland 1996).

Most of the West Heslerton samples examined for plant remains by Carruthers are from fills of *Grubenhäuser* (with further material from a malt kiln and further *Grubenhäuser* studied by S. Mrozowski). Those reported on by Carruthers (in Powlesland 1996) represent 5% of about 3000 samples. Most of this plant material is charred, although one sample contained some waterlogged remains including flax seeds. Charred material mostly comprises cereals (with very little chaff), with other taxa, including further flax and a small range of arable weeds, indicative of cultivation on the light sandy soils downslope of the settlement but above the wetlands in the Vale of Pickering to the north. Evidence from cereals suggests some of the *Grubenhäuser* might have served *inter alia* for grain storage; there may also be some evidence for differences in function between different parts of the site on the basis of the plant remains (see also Powlesland this volume). The presence of heather (perhaps for fuel, bedding or roofing) is taken to indicate the importation of material from the North York Moors, some distance to the north, although charred wood from gorse (Figuerial in Powlesland 1996) may have been growing more locally. To judge from fig. 44 of Powlesland's assessment document (1996), concentrations of remains seem generally to be low.

The vertebrate assemblage from Anglo-Saxon West Heslerton, on the other hand, is very large, comprising over half a million fragments (Berg in Powlesland 1996, 99–100). On the basis of the limited information available in the assessment report, it appears that a wide range of taxa was exploited, in marked contrast to the picture at Fishergate, York (see above). Large quantities, and a wide variety, of birds are represented. More detailed information about age-at-death, biometry, skeletal element representation and spatial patterning of rubbish disposal and craft activities will doubtless emerge as the analysis phase is completed.

Although it lies just outside the limits of the area under discussion, the site at Flixborough (formerly South Humberside, now in north-east Lincolnshire) must be mentioned. Excavations by the Humberside Archaeology Unit (now Humber Archaeology Partnership) in 1989 revealed exceptional remains of an Anglo-Saxon settlement, dating from the mid-seventh to tenth centuries AD. The discoveries included all or part of the foundations of approximately twenty buildings, boundaries, and other structural features, together with an extremely rich collection of artefacts and a vast quantity of animal bones (approximately 35,000 complete bones and a further 140,000 bone fragments). By contrast, preservation of plant remains, even by charring, was limited and invertebrates, other than a few molluscs, were almost non-existent. The wealth of the inhabitants of Flixborough, as indicated by the vast number and quality of the artefacts from the site and the large overall size of the buildings, is suggestive of a high-status centre (Loveluck and Dobney forthcoming).

Analysis of the biological remains is currently in progress, but some preliminary observations can be made. As at West Heslerton, and again in contrast with Fishergate, the range of mammals and birds recovered from Flixborough is broad. As can be seen from Table 11.2, cattle, sheep and pig are well represented and, from the analyses of material from two major contexts, there appear to be differences in their proportions between the middle and late Anglo-Saxon periods of occupation. Birds are particularly well represented, with large numbers of chickens and wild and domestic geese. The presence of numerous crane bones (either the modern European species or an extinct form), together with those of various ducks, wild geese and wading birds, indicates wildfowling, probably on the Trent floodplain directly below the settlement. Bones of freshwater, migratory and marine fish, and the unusual number of cetacean remains (porpoise or dolphin and whale, not as yet identified to species), all reflect access to foodstuffs from the Trent, the Humber estuary, and the open sea. Small numbers of fish remains and fragments of 'whale' have been reported from West Heslerton (Berg in Powlesland 1996, 101). An interesting absence from the Flixborough record to date is that of dog. This is an unusual feature for any occupation site of any date, although evidence of canid gnawing is present on some bone from the site.

Discussion

The Anglo-Saxon period in Yorkshire is poorly known through bioarchaeology, although the remains of plants and animals should have particular potential to address problems in a period when structural and artefactual evidence tends to be thin. The biological remains are of particular value for the investigation of the different facets of the economy of settlements, especially animal husbandry, dietary preferences, exploitation of wild animal and plant resources, craftworking and industrial activities, socio-economic status and trade and exchange links. Data could also be used to establish archaeological criteria for defining the nature, character and status of middle to late Anglo-Saxon settlements within the region.

With the ongoing analytical phases of West Heslerton

Table 11.1: List of sites with known or supposed Anglian deposits in Yorkshire for which bioarchaeological studies have been carried out. The table includes entries for a number of sites for which the amount of evidence is too small to warrant discussion in the text (BS: bulk sieved. GBA: general biological analysis. P: plant remains. I: invertebrate remains. V: vertebrate remains. ?: no known evidence. +: little evidence. ++: some evidence. +++: much evidence. u: unknown. n: not appropriate for category).

Site and reference(s)	Reported date (within Anglian period)	Types of deposits examined for plant/invertebrate remains	Material examined for plant/invertebrate remains	Comments on biological evidence	P	I	V
Beverley: Lurk Lane (McKenna 1991)	A single context, dated late 8th to early 9th century	Primary ditch fill	One BS sample examined.	Small numbers of a limited range of plant taxa, probably mostly from local vegetation; not enough to make a definite interpretation.	+	u	+
Catterick: Richardson's Depot (Huntley 1997; Gidney 1997)	'presumed Saxon'	A single *Grubenhaus* fill	A single sample examined for plant and other biological remains	Mainly charcoal (much of it oak), also heather twigs; some cereal grains but no chaff and no weed seeds; most grains hulled barley, but oats and ?bread wheat also present.	+	?	+
Caythorpe: Gas Pipeline (see reports in Abramson 1996)	'Anglian'	Deposits associated with settlement	No details in published report	Barley and hexaploid wheat 'co-dominant'; the latter may well have been bread wheat. Few weed seeds. A small vertebrate assemblage.	+	?	+
Cottam, nr Sledmere (Carrott *et al.* 1994; Dobney *et al.* 1994; and unpublished student project reports)	'Anglian'	1993 excavations: a variety of deposits investigated 1995 - a single 9th-century deposit (ditch fill)		1993: only a few (?modern) weed seeds and poorly preserved charred cereals in very low concentrations. 1995: a few modern weed seeds and traces of charred cereals including ?oats and also barley Both excavations yielded small vertebrate assemblages with much fragmentation and poor preservation.	+	?	+
Doncaster: North Bridge (Carrott *et al.* 1997)	Excavator's Phase 2, dated '?Saxon'.	A single context, described as a clay dump in pit/river silt.	One 1 kg GBA subsample and a BS sample of about 30 kg	A small assemblage of charred and uncharred plant remains from the GBA subsample, and traces of charred cereals (including cultivated oats) and charred and uncharred hazelnut from a bulk-sieved sample. The GBA assemblage included a few weed taxa and possible grassland plants. The presence of tentatively identified mud-rush (*Juncus gerardi*) seeds perhaps points to wet meadows (with some brackish influence?) nearby, but the assemblage is too small and diverse to be interpreted with any confidence.	+	?	?
Garton Station (nr Driffield) (reports in Stead 1991)	'Anglian'	Corrosion material from inside and outside a hanging bowl, and from inside a cauldron	Three samples examined for pollen	Moderately good pollen preservation; assemblages dominated by grasses and cereals with some *Plantago lanceolata*. Cereals appeared to include wheat and barley types as well as ?rye; one grain of flax and one of field bean. Pollen perhaps includes some from food/drink (though discussion of this with some samples from an Iron Age cauldron appears to consider all the material as Iron Age). Animal bone from grave offerings.	+	n	+
Ribblehead (Donaldson 1977; Rackham 1977)	'9th century'	Deposits from farmhouse kitchen	Charcoal	*Betula* (birch), Pomoideae (hawthorn/apple, etc.), *Corylus* (hazel), *Fraxinus* (ash) and *Prunus* (blackthorn, cherry, plum) charcoal all identified	+	n	n
Sancton I (Green 1993)	'Anglo-Saxon'	Plant impressions on potsherd	38 latex casts, 17 plaster casts of latex impressions and a single charred grain from a broken sherd. Also unidentified plant material (?tempering) noted during examination of potsherds.	Most impressions were of barley and oat grains - the latter probably mostly cultivated oats, though one *A. fatua* identified. Barley was clearly 6-row form (twisted grains). The one charred grain was also barley. One pea/bean hilum fragment impression.	+	n	n

Table 11.1 continued:

Site and reference(s)	Reported date (within Anglian period)	Types of deposits examined for plant/invertebrate remains	Material examined for plant/invertebrate remains	Comments on biological evidence	P	I	V
Thirsk Castle (Brothwell *et al.* 1995)	'?Anglian'	Various features including grave fills		A few charred plant remains of no interpretative value.	+	?	+
Thwing: Paddock Hill, Octon (Carruthers 1993)	'early 10th century'	Includes two middens with mineralised material; separate reports on charcoal and organic matter preserved by metal corrosion	Six samples examined	Small concentrations of charred remains: barley the most abundant grain, with smaller amounts of bread wheat and oats with field beans; moderate numbers of *Brassica/Sinapis* seeds, perhaps a crop.	+	n	n
West Heslerton (Powlesland 1996)		Samples examined by Carruthers mainly from fills of *Grubenhäuser* (and further material from a malt kiln and further *Grubenhäuser* studied by S. Mrozowski)	So far only assessment (mainly by Carruthers) of 5% of about 3000 samples	See main text.	++	?	++ +
Wharram Percy (Stevens 1987)	'Saxon' (fill of *Grubenhaus*)			Small vertebrate assemblage from Group 6 deposits, dominated by cattle fragments.	?	?	+
York: 16-22 Coppergate (unpublished)	Excavator's Phase 2, dated 5th to mid 9th century	Two contexts: 31762 and 31729	A BS sample from 31762 and a GBA from 31729 (2 x 1 kg subsamples)	The BS sample yielded only charcoal; the two subsamples from the GBA sample gave small assemblages of mainly weed taxa with traces of charred oats, uncharred celery seed and elderberry seeds in one, and elderberry in the other.	+	?	?
York: 'Coppergate Helmet pit' (Hall *et al.* 1992)		Pit fill including Anglian helmet and other artefacts			+	+	?
York: 46-54 Fishergate (Allison *et al.* 1996; O'Connor 1991)	Excavator's Period 3; 20 contexts dated late 7th to early 9th century, 73 dated late 7th to mid 9th century, 20 dated late 8th to early ninth century, and 18 dated early ninth to mid ninth century	Mostly feature fills, of which the bulk were pit fills (59 pits represented by 90 contexts), also ditch fills (7 ditches represented by 14 contexts) and post-hole fills (12 contexts)	A total of 188 samples were examined, of which the great majority (139) were bulk-sieved, with a small number of GBA subsamples (47) and two spot samples. Large vertebrate assemblage sieved to 12 and 1 mm.	See main text	++	+	++
York: The Bedern (Hall *et al.* 1986)	Radiocarbon date from one pit fill, of ad 740±80	10 depression/pit fills	12 subsamples from 11 'GBA' samples.	See main text.	+	+	?

and Flixborough under way, a large corpus of baseline biological data will soon be available for the region, allowing us to begin to address the issues outlined above more systematically. Future priorities should encompass a more focused approach to the assemblages from small rural settlements, of which a number have been excavated. More systematic approaches should be employed in recovering bioarchaeological assemblages, particularly vertebrate remains, from these sites. Too many of the assemblages have been poorly recovered, and analysis and reporting have not been undertaken to standards now acceptable. The data are consequently inadequate, inaccessible or both. Priority should be given to ensuring that the analysis of any Anglo-Saxon material is carried

Table 11.2: Preliminary data showing the frequency of major vertebrate taxa from the two contexts from the Anglian site at Flixborough, North East Lincolnshire which have so far been recorded.

Taxa	Middle Saxon (Context 5503)	Late Saxon (Context 3891)
Bos	17.9	34.8
Caprovid	29.8	24.0
Ovis	11.6	6.7
Capra	0.3	0.1
Sus	38.1	24.5
Equus	1.8	9.2

out to an acceptable standard within appropriate research frameworks.

It appears that lifestyles in the Anglo-Saxon period did not generally favour preservation of the more delicate biological remains by anoxic waterlogging, greatly reducing what can be routinely achieved. We consequently need to take new approaches in the future. Firstly, we must ensure that the rare instances of well-preserved Anglo-Saxon waterlogged plant and animal assemblages are exceptionally well recorded in the field and that they are meticulously and extensively sampled. Secondly, we need to develop analytical techniques more appropriate to 'barren' deposits than those now in general use. Stable manure can be recognised with ease in waterlogged deposits (Kenward and Hall 1997), for example, but what traces will remain when humification has been complete? The use of sediment thin-sections (Macphail 1994), of chemical techniques to identify dung derivates (e.g. Evershed *et al.* 1997), of phytolith analysis to recognise concentrations of grass remains, and the identification of sphaerulites derived from herbivore dung (Canti 1997) spring to mind, and perhaps if an array of methods is applied the sum of the evidence will be convincing. Similar approaches may be possible for the identification of the trace evidence of other materials and activities. The current state of ignorance of the period under consideration would surely justify the expense incurred by such intensive study. A recent example of what may be achieved at sites with poor preservation of delicate biological remains is provided by the study of medieval and post-medieval occupation deposits at a site in Doncaster (Carrott *et al.* 1997) where intensive sampling and analysis revealed consistent patterns amongst those sparse remains which had survived and led, for example, to the conclusions that roofs of turf and thatch were present, and that the buildings were not used primarily for domestic purposes.

A thoughtful exercise in predictive modelling may open up many possibilities. The question to be asked is 'what might remain if such-and-such was present or done in the past', rather than 'what do these few poor remains tell us'. Prediction and testing is as applicable to environmental archaeology as to other sciences. If we approach the Anglo-Saxon period, or other intractable archaeological problems, with the traditional baggage of environmental archaeology, the results may inevitably be limited and disappointing; a fresh look at the possibilities, both practical and theoretical, will surely show that there is a way forward.

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