Investigating past environments, farming and food in Leicester, Leicestershire and Rutland: the evidence from plant and animal remains.

Angela Monckton

INTRODUCTION

This paper reviews the evidence from environmental archaeology for past environmental conditions, vegetation, farming and food from the two counties, expanding on an earlier review (Monckton 1995). Many of the sites are also discussed in the 'East Midlands Archaeological Research Frameworks' (Cooper forthcoming), and some of the remains are included in the 'English Heritage Regional Reviews of Environmental Archaeology' (de Moulins and Murphy 2001, Murphy 2001). A gazetteer of sites with relevant evidence is included (Table 5) which lists interim site reports, published evidence, and unpublished reports with a note on the main evidence found by period. Small groups of animal bones have been found on many sites but not all are included here, human bone analysis is not included. Sites are referenced in the text by their numbers from Table 1 as many reports are unpublished. The crops, food plants, cultivated plants and some of the weeds are shown in Table 5. Sites with waterlogged evidence are listed (Table 4).

Environmental archaeology uses the evidence from plant and animal remains, together with other scientific analysis, to contribute to the understanding of the environment, food, farming and living conditions of people in the past. There are two main themes of study throughout prehistory; firstly the changes in the environment and secondly the development of farming and food production. Needless to say, the two themes are interconnected because the activities of people affect the environment and vice versa. Later, as settlements and then towns developed, remains can provide evidence of trade, diet, health, living conditions, and activities within settlements. Hence, urban archaeology is an important third theme where the analysis of these remains contributes to the study of how towns were provided with food and other commodities.

Most of the remains that provide this information are very small (seeds, small bones, fish remains, snails) or microscopic (pollen, insect fragments, sediments) so are only obtained by collecting relevant samples from excavations and analysis of the biological materials recovered. Different methods are used for waterlogged and 'dry' deposits. Sampling is now a routine part of excavations and some watching briefs and if samples are not taken this evidence is lost forever. The information is considered with all other information from sites because it is only by using all available evidence together that reasonable conclusions can be made about the way of life in the past.

SAMPLING

Preservation

Waterlogging which preserves a range of plant and animal remains in anoxic sediments such as silted watercourses can preserve organic remains. Such remains are likely to represent the surrounding environment. Bone and shell are preserved in soils except in acid conditions which cause them to dissolve. Charred plant remains and charcoal survives in most soil conditions, and these are likely to represent gathered foods, crops and crop weeds that provide evidence about agriculture and plant resources exploited. Preservation by mineralisation can occur in mineral rich conditions such as cesspits. These remains together with any from waterlogged deposits in wells and deep pits can represent additional foods and activities. Insects and other remains from this type of deposits can also show conditions in the past.

Sampling waterlogged deposits: Much of the information for the environment is found by sampling waterlogged deposits for pollen, plant macrofossils and insect remains (Fig. 1). Pollen has sometimes been the only material studied because it originates from a wide area and provides evidence of whether the landscape was open or wooded. More recently plant macrofossils (seeds and other plant parts), and insects have been examined as they give evidence of local conditions and land use. For example dung beetles are found on pasture land, while particular groups of beetles are indicators of different flow conditions of water courses. Plant macrofossils are likely to represent the local vegetation and so can assist in the distinction of local and regional pollen. Radiocarbon dating of these deposits is essential.

Bulk sampling: (Fig. 2) Charred plant remains are found on most occupation sites of most periods. They include cereal grains, chaff and weed seeds showing the crops cultivated with evidence of cultivation methods from the weeds present. The proportions of the types of charred plant remains in samples, (i.e. grains, chaff and seeds), can be used to interpret crop related activities such as the stage of crop processing (cf van der Veen 1992). In order to do this sufficient remains must be completely recovered from the samples by wet sieving and flotation. A minimum of 50 items at a concentration of over one item per litre of soil is required for interpretation; therefore samples of around 40 litres in size may be needed. Remains are not always recovered fully by flotation so sorting or reflotation of the residues is often necessary. A range of samples should be taken from datable contexts to show areas of activity. Evidence

Fig. 1. Sampling waterlogged deposits of a palaeochannel at Cossington for pollen, plant macrofossils and insect remains.

Fig. 2. Bulk sampling of prehistoric features in the Trent Valley for charred plant remains.

from animal bone is particularly important to establish the importance of animal husbandry and appropriate deposits should have large bulk samples taken for consistent recovery of smaller bones.

Other samples: Evidence from other remains such as snails, phosphates and sediments should also be collected where appropriate. This can provide additional evidence of land use, for example. Recently new methods of analysis of human bones by study of DNA and stable isotope analysis have been developed to provide evidence of diet and lifestyles in the past, these have not yet been used in this area but have great potential for future work.

PALAEOLITHIC

This long period shows great environmental change from glacial conditions to tundra to woodland and defining and dating these changes is important for the understanding of human occupation.

The earliest known deposits that have provided detailed information about the environment are organic sediments from Brooksby, which contained plant remains and pollen indicating the mild climate before the Anglian Glaciation. In a lower sediment woodland of pine, fir, birch, hazel and oak was indicated, willows and alders were at the waterside with plants of slow flowing water; open ground was represented by heaths, heathers and herbs. An upper deposit contained the same trees but lacked oak and contained more herbs (Rice 1991). The deposits dated from around 470,000 years ago and were thought to be associated with the ancient Bytham River, which existed before the glaciations (Graf 2002, 17). At Wing in Rutland a drift filled basin contained a pollen sequence from about 70,000 years ago. The profile showed the rise of mixed oak forest, the change to temperate hornbeam forest and deterioration to tundra like vegetation. The sequence was dated by comparison with European sites to the last interglacial, the Ipswichian, and the beginning of the last glaciation, the Devensian (Hall 1980). For most of this period animal bone is an important source of evidence for the environment. A deposit at Glaston Rutland has recently been excavated and dates from 30 – 40,000 years ago contained bones including those of hyaena, mammoth and glutton. Bulk sampling and sieving was carried out to recover flint and microfaunal remains (Cooper 2001, Site 1). Other remains include stray finds of mammoth tusks from the gravels, such as at the quarries at Syston and Cossington in the Soar

valley, probably from various phases of the Palaeolithic period (Table 4).

Evidence from the end of the glaciation has been found in waterlogged deposits from palaeochannels (Table 2). A section from Hemington Quarry (channel A) has been dated to around 11,700 BP, and contains remains of caddis fly larvae that now live in cold conditions. Pollen and plants are of reed swamp and tundra (Greenwood forthcoming, Beamish *et al.* 2002). Another section from Hemington Quarry Extension also has cold phase insects present including a species that lives on dwarf willow (Greenwood *pers. comm.*). Other silted palaeochannels of this period have been dated from the Soar where they occur as a result of the major changes in rivers at this date (Brown 1994). At Croft a channel thought to date from the Allerod interstadial, about 11,000 years ago, contained birch and pine pollen, with helianthemum and saxifrage as evidence of the generally open cool conditions (Smith *et al.* forthcoming).

MESOLITHIC

At the start of this period the early postglacial environment is known from palaeochannels in the Trent valley and a peat bed at the Austin Friars Leicester. These show the reed swamp conditions of the valleys and generally open environment with some colonisation by trees (Shackley and Hunt 1984). Evidence for the beginnings of the early woodland is known from Croft where pollen of the profile was dominated by sedges and grasses with a little birch and pine which persisted until at least 9840 BP. After a hiatus in the profile, this was succeeded by birch, hazel and willow woodland as the climate warmed, there was some evidence of open ground from the plant macrofossils. Traces of features representing occupation contained Late Mesolithic flint (Smith *et al.* forthcoming). The early woodland is also indicated at Watermead Park Birstall. Pollen evidence for human impact on the woodland has not yet been found here to compare with that in some Derbyshire pollen profiles. There is a lack of information about food consumed from any occupation deposits, but this pattern has been found across the country.

NEOLITHIC and EARLY BRONZE AGE

Environment

Evidence of the early lime woodland comes from Croft and Narborough Bog (Smith *et al.* forthcoming, Brown 2000). Cereal pollen is known in the region from at least 6000 BP from Lismore Fields Buxton (de Moulins and Murphy 2001). From the two counties the earliest cereal pollen has been found in a Late Neolithic partly cleared profile dating from around 2800 BC from Hemington Quarry, channel C. Insect remains from this channel included dung beetles suggesting the grazing of animals (Beamish *et al.* 2002). Clearance of trees at Sproxton in pre-barrow contexts dated to 3990-3810 BC was found from the evidence of land snails and the micro-morphology of a buried soil which suggested cultivation followed by pasture (Clay 1978).

Neolithic Food and Farming

Sites that have produced charred cereal remains often show greater abundance of nutshell and fruits than cereal remains. This is the case at Willow Farm Castle Donington where a probably Late Neolithic pit contained a cache of crab apples (dated to 2200-1880 BC) with nutshell and some cereal grains (Monckton in prep. Site 3). This type of assemblage has led to the suggestion that there was more reliance on gathered than cultivated food in the Neolithic. However, it has been pointed out (Moffett *et al.* 1989) that uses of cereals as well as the collection of wild food plants were usual aspects of the Neolithic economy. A recent reconsideration of the evidence has agreed with this conclusion and added that although the proportions of wild and cultivated foods is uncertain, nuts and fruits were a greater part of the diet in Neolithic times than in later periods. It has also been suggested that the remains in pits may be related to the use of pits for the storage of nuts that were consumed nearby, or that inclusion of nut shell in pits was a common ceremony at the time (Robinson 2000). A sample from a pit at Syston contained a fruit stone with numerous nutshell fragments (Jarvis unpublished, Site 4) while a pit at Braunstone contained some barley grains and nutshell (Albone 2000, Site 5).

At Burley Road Oakham, small numbers of grains of wheat and barley were found to be more common than the few hazel nutshell fragments in the pits of the circle (Monckton 1998). There is a lack of evidence from settlements in the area to contribute to the debate about sedentism (Jones 2000) and the beginning of farming (Beamish this volume), however cereals are present and must have been cultivated in the area. Should settlements be found, large samples should be taken from other features as well as pits, particularly middens and occupation deposits. Even if remains are at a low concentration in such contexts, they may be more revealing about the economy of the time (Robinson 2000).

Late Neolithic – Earlier Bronze Age

The change in the character of the woodland during the Neolithic has been found at sites such as Croft. Here the post elm decline woodland of lime, oak and hazel dominated by alder, shows a drop in the proportion of lime in a profile dated from 1890-1500 BC which contains traces of cereal pollen and evidence for limited grazing (Smith *et al.* forthcoming). Such palaeochannels provide snapshots of local land use and type of woodland.

Evidence for pastureland in the Trent valley is accumulating although charred cereals have also been found on some sites. The evidence from charred plant remains includes emmer grains and chaff from a pit at Lockington dated to 1875-1645 cal BC while spelt wheat

chaff was identified from a second pit, dated by charcoal to 1425-1260 cal BC, showing this cereal to be present from the Bronze Age (Monckton 2000). This compares with the earliest date quoted for spelt in Eastern England found at Godmanchester at 1671-1420 cal BC (de Moulins and Murphy 2001). Evidence from a palaeo-channel associated with a burnt mound at Willow Farm Castle Donington, (Site 10 and Table 4) has shown the use of the surrounding land as pasture, although some woodland was still present. Some cereal pollen was found, possibly from cultivation in the area. No insects of domestic rubbish or occupation were found, suggesting short-term use of the burnt mound. Evidence for charred cereals was sparse from the burnt mound (Smith, Green and Monckton forthcoming, Site 10), probably reflecting the waterside situation and use of the site, although the purpose is the subject of speculation. Another burnt mound at Watermead Birstall has evidence awaiting analysis.

Remains from burials

Charred plant remains from the cremation cemetery at Eye Kettleby (Site 12) included grassland plants with roots and tubers, hazel nut shell and fruits including sloe and elder, with a few cereal grains and chaff of emmer wheat (Monckton in Finn forthcoming). This was thought to represent a mixture of plant material accidentally charred beneath the pyre, kindling material and perhaps intentional food offerings, similar evidence has been found at other sites in the region. Barrows sampled at Eaton, Oakham, Lockington, Tixover, and Cossington have produced only very sparse charred seeds or cereal remains (Sites 9, 2, 11, 23 and 24). The remains from Sproxton barrow ditch included rye and stinking mayweed and were thought to be from later activity at the site (Paradine in Clay 1978).

LATE BRONZE AGE and IRON AGE

Environment and economy

Evidence from waterlogged palaeochannels in the Soar valley has shown clearance of woodland during the Late Bronze Age and Early Iron Age, and alluviation of Iron Age to Roman date is thought to have complex causes including destabilisation of topsoils by cultivation (Brown *et al.* 1994). Headwater deposits in west Leicestershire at Croft and at Kirby Muxloe show that by the Bronze Age the character of the woodland had changed from the mixed lime woodland of the Neolithic to become less species rich alder woods (Smith *et al.* forthcoming). At Kirby Muxloe clearance of this woodland begins around 1000-700 BC with a dramatic fall in oak pollen followed by deforestation of the valley bottom after 500 BC. The cereal pollen suggests cultivation of cereals at some distance from the site and local use of grassland as pasture is suggested from the insect fauna (Brown, Smith and Greig forthcoming). Mixed farming is suggested although very low concentrations of charred cereal remains were found on the nearby occupation site (Site 16, 29.). Pollen of shrub species there may represent hedgerows. However, areas of woodland remained and exploitation of wood resources for timber and fuel is known from charcoal from sites throughout the period, this often includes scrub or hedge species as at Wanlip (Beamish 1998) also suggesting use of hedges as boundaries.

Although the earliest spelt wheat from this region known at present is of Bronze Age date from Lockington (see above) spelt is not found on all sites at this date. Late Bronze Age contexts at Eye Kettleby have only produced emmer, barley and hazel nutshell, as was the case at Kirby Muxloe (Sites 12, 16). At Ridlington a site of this date had a deposit of barley grains, radiocarbon dated to 1410-1040 BC (Site 13). Cereal pollen is being found in palaeochannels of the Trent valley such as at Willow Farm Castle Donington (Site 10 and Table 4) at this period although cultivation was probably at some distance from these wet sites.

Investigating Iron Age agriculture

The increased number of settlement sites found must show an increase in settled population dependant on farming. It has been noted (de Moulins and Murphy 2001) that there is a lack of cereal evidence from Late Bronze Age settlements in the region for comparison with Iron Age sites to examine changes in agriculture. However, a few are now being found. Spelt cultivation is thought to be part of the strategy of agricultural expansion (van der Veen and O'Connor 1999) and spelt, present from the Bronze Age, becomes common in the Middle Iron Age as found at Humberstone and Wanlip (Pelling 2000; Monckton 1998). In the future, further study of arable weeds may provide evidence for changes in methods of cultivation (c.f. van der Veen 1992). Sites have therefore been sampled in order to recover evidence of the farming economy. The difference in farming economy on sites of different types, sizes and geologies is poorly understood so sampling sites for comparison is particularly important in this period. Analysis of samples is also important because the proportions and ratios of charred grains to chaff and seeds in samples can be used to interpret crop related activities such as the stage of crop processing (van der Veen 1992). Evidence from animal bone is particularly important to establish the importance of animal husbandry, together with evidence for land use from other remains such as snails, phosphates and sediments.

Crops, food and useful plants

From the Middle Iron Age onwards, spelt is the main wheat crop found, which occurs with a little emmer and very occasional grains of bread wheat type. Hulled barley, including six-row barley, is also found on most sites as another crop. Evidence of edible legumes has been found at a number of sites. Hazel nutshell, sloe, haws and elder are often found in small quantities. In contrast, Dragonby, Lincolnshire has produced woad, flax/linseed

and apple in addition (van der Veen 1996): such higher status settlement evidence is lacking here to date. Other charred plant remains found at most sites include arable weed seeds, plants of grassy vegetation and damp ground plants. Most of the two latter types could be weeds of the fields but could represent plant material used as fodder, bedding, roofing or for other purposes.

Crop processing waste interpreted as fine sievings (i.e. chaff and small seeds) cleaned from the grain after dehusking has been found for example at Humberstone (Pelling 2000). This waste is produced because spelt wheat is a hulled wheat which needs to be parched and pounded to free it from the chaff, and if the chaff is burnt it can be preserved by charring. Remains of waste from hand sorting grain (i.e. large weed seeds which remain with the grain after fine sieving) have also been found at Wanlip and other sites (Monckton 1998). Evidence of above ground grain storage has been found at Humberstone of Middle Iron Age date; cleaned spelt grain was found in a posthole of a four-post structure that was interpreted as a granary. It is possible that the grain was stored clean after dehusking, or that the grain was processed by parching nearby the granary after removal from storage in the chaff (as spikelets), some of the grain being charred in the process and accumulating in the postholes (Pelling 2000).

Other types of activity and ritual

A deposit of processed spelt grain was found in an isolated Late Iron Age pit which contained a burial at Rushey Mead Leicester; no evidence of in situ burning was found and the grain appears to be part of the fill of the pit possibly included with the burial (Monckton 2001). In the Late Iron Age ditch at Tixover the deposit with most of the cereal and bone evidence also contained the skeleton of a human infant (Beamish forthcoming, Site 23). At Wanlip, an unusual assemblage of pottery and a saddle quern together with charred remains including cereals was interpreted as a deliberately placed deposit of ritual significance (Beamish 1998).

Animal husbandry

Sites with good bone assemblages have been compared in terms of the relative abundance of domestic animals for Midland sites by Hammon (forthcoming). Cattle are the most abundant at Enderby I (Site 21) (Gouldwell 1992) as found at Crick Northamptonshire. It is suggested by Hammon that this may be because cattle are more suited to lowland wetter environments because of their water requirements and the unsuitability of sheep to wet pasture (cf Grant 1984). Estimated numbers of sheep and cattle are about equal from Humberstone (Charles 2000). Cattle were also necessary to the arable economy for manure and traction (van der Veen and O'Connor 1998). In future, plant and animal remains should be considered together with other evidence from sites in order to draw conclusions about economies.

Changes and local differences

Sites can be compared using the density of plant remains as the number of items per litre of soil sieved, here the density of remains in the best sample from each site, the maximum density, is compared (Table 3). In the early contexts at the farmstead site at Kirby Muxloe (Site16) a low maximum density was found, this might be because cereals were less available and the site was more reliant on a pastoral economy. This may also be the case at Wanlip, although this was more productive having a maximum density of 8 items/litre, with the samples dominated by grain or weed seeds probably as remains from food preparation. At the large settlement at Humberstone, abundant well-preserved spelt grain was found from a four poster and one sample was rich in chaff. Here the maximum density of remains was 9 items/litre of soil (Pelling 2000). These sites generally produced little chaff, which was present in only in a third of the samples at the most. This may be because the chaff was used for fodder or disposed of in some way where it was not preserved by charring. A mixed economy is suggested although cereal remains are less abundant than on the larger Northamptonshire sites such as Crick where a maximum density of 16 items/litre was found with two thirds of the samples containing chaff from Middle Iron Age contexts (Monckton forthcoming).

Recent investigations of Late Iron Age contexts at the farmstead sites at Huncote and Desford and the site at Ashby (Sites 26, 32, 33 and Table 1) have shown high cereal densities in a few samples. A grain rich sample from the latter contained about equal amounts of wheat and barley, the wheat included spelt grains and chaff with bread wheat type grains and some probable emmer and weed seeds (Ciaraldi forthcoming). Hence more abundant remains in the Late Iron Age than in earlier times are now being found on some sites. In contrast, the farmsteads of Enderby I (Clay 1992) and Tixover had low maximum densities (Table 3). Both produced assemblages of animal bone dominated by cattle followed by sheep and pigs, with domestic fowl bones at the former, and a good small mammal fauna at Tixover suggested the presence of scrub or woodland in the vicinity (Gouldwell 1992, Baxter unpublished, Site 23). At both these sites a snail fauna suggesting the presence of grassland probably used as pasture (Sites 21, 23). Only by sampling better-dated sites will the evidence be found to examine if these differences result from settlement type, size, date or geology.

Some sites show higher maximum densities of remains in the Middle Iron Age when compared with the few Bronze Age remains known, although less marked than in Northamptonshire at Crick (Monckton forthcoming). Some sites are now showing high maximum densities in Late Iron Age contexts indicating some agricultural expansion. However, a group of sites has low densities of cereals throughout the Iron Age and may represent sites with mainly pastoral economies (Table 3). They are certainly using cereals, but there is little evidence at present to suggest whether they are producing cereals

themselves on a small scale, or obtaining them from other sites, although the former seems more likely. Chaff is relatively scarce on most sites in the area, perhaps because it was used as fodder, which is more likely on mainly pastoral sites. Cereals do however appear less abundant than in Northamptonshire and further south.

ROMAN: COUNTRYSIDE and TOWNS

Environment and land use

Evidence for the open environment in Roman times was found in waterlogged deposits at Croft from the top of a deposit that was of Iron Age to Roman date (Smith *et al.* forthcoming). Insect remains from a Roman well at Empingham, showed the arable and pastoral character of the landscape (Buckland 1986, 2000) and from pollen from a mire deposit at Stamford Road Oakham which also had evidence of cereal cultivation (Greig forthcoming, Site 31). There is a lack of a long pollen profile extending into this period or palaeochannels from the Trent valley at present, so it is necessary to continue sampling these deposits to provide a picture of local variation in the environment. Woodland exploitation is shown from charcoal analysis from many sites, particularly those associated with metalworking.

Sites with Late Iron Age and Roman samples

It is only by comparing remains across periods that changes in agricultural practice can be found. Farmstead sites with both Late Iron Age and Roman plant remains include the small rural sites of Normanton le Heath 1, Kirby Muxloe and Stamford Road Oakham (Sites 28, 29, 31). These sites have low densities of remains in both periods, while Gimbro Farm (Site 30) has slightly more in the Roman period (Table 1). The sites at Desford and Ashby (Sites 32, 33) both produced grain rich samples of Late Iron Age date and less remains in the Roman period (Table 3). The less productive sites may be so because they rely more on pastoral farming in both periods. Sites that become less productive in the Roman period may have a change of use or be failing in the Roman period.

Roman agriculture

The main cereals cultivated were wheat, mainly spelt with a little emmer and occasional bread wheat type grains; hulled barley, including six-row barley was a second important cereal (Table 3). Wild or cultivated oat is found possibly as a weed of the crops, and rye is found occasionally as, for example, at Causeway Lane Leicester (Monckton 1999). The Roman period is characterised by the finds of abundant burnt wheat chaff, as waste or spent fuel from cereal processing, dumped in pits or ditches, probably because wheat chaff was a favoured fuel for cereal parching. Higher maximum densities of remains found in Roman contexts show the larger scale of disposal of this waste than found in the Iron Age. Examples are at Empingham in the 2nd century ditch, and Scalford Brook near Melton Mowbray, which produced a chaff rich deposit from a gully (Sites 35, 36 and Table 1).

Stinking mayweed is considered to be an indicator of the cultivation of clay soils with improved ploughs and makes its first appearance in the Roman period in the region (de Moulins and Murphy 2001). It was found at Causeway Lane and Crown Hills in Leicester, and at Ashby de la Zouch, Leicestershire (Sites 49, 33, 45). This may be evidence for the extensification of agriculture on the claylands and/or the use of better ploughing equipment in the Roman period (Ciaraldi forthcoming). It has also been suggested that larger breeds of cattle would be needed for ploughing clay soil so a correlation of data with animal bones is needed in future work (O'Connor & van der Veen 1998). Weeds typical of extensive cultivation in contrast to garden type cultivation, have been studied for the North of England by van der Veen (1992). More detailed study of the weed assemblages would be necessary to study aspects of cereal production in this region.

Corn driers and malting kilns

Remains from corn driers show the increase in agricultural production and bulk processing of cereals. Corn driers are very characteristic Roman features which, when found with charred cereals in situ, can provide evidence for the variety of parching and drying processes for which they were used (van der Veen 1989). However, the evidence for such processes as malting is not always clear cut. Corn driers with evidence of cereal remains have been found at Empingham, Ridlington, Appleby Magna, Ketton, and Hamilton (Sites 35, 38, 40, 39, 41). At Empingham, the use of chaff as fuel and the presence of mostly germinated spelt grain was thought to suggest malting (Alvey 2000). Analysis of cereal remains from five corn driers at Ridlington showed their use for a variety of different functions: processing spelt for dehusking, parching malted spelt, drying spelt possible for storage and processing barley for drying or removal of hulls. These were all thought to be activities carried out on the site (Monckton forthcoming, Site 38). At Appleby Magna samples were interpreted as parching of spikelets of spelt probably for dehusking (Jarvis unpublished Site 40). Hence evidence for Roman agricultural production is accumulating in the two counties. Corn driers are not yet known in Derbyshire, Nottinghamshire or Lincolnshire.

Evidence for the provision of cereals to Roman Leicester may be implied from the corn driers found at the edge of the town. Norfolk St. villa produced evidence of spelt chaff used as fuel in a corn drier (Jones 1982; van der Veen 1989), this was probably dehusking waste used for the processing of more cereals. Recent analysis of remains from a corn drier at Crown Hills, probably also a villa site, contains chaff rich samples with more seeds present including stinking mayweed (Jarvis forthcoming, Site 45). Seeds of this plant were also found with cereals in the town at Causeway Lane and may suggest that cereals were being processed for supply to the town.

Table 1: Maximum density of charred plant remains (items per litre of soil) found on Prehistoric to Roman sites.

	0-5 items per litre	6-49 items per litre	>50 items per litre
NEO	2. Burley Rd. Oakham	3. Willow Farm 4. Syston	
BA	12. Eye Kettleby (2.6) *emmer, nutshell*	11. Lockington (22) *spelt wheat*	13. Ridlington (59.0) *barley*
MIA	16. Kirby Muxloe (4.0) *emmer, nutshell*	17. Humberstone (9.5) *spelt and barley* 18. Wanlip (8.1)	
LIA	21. Enderby I (<0.1) 22. Enderby II (0.9) 23. Tixover (2.9) 24. Cossington (0.1) 25. Kirby Muxloe, Carmel (0.3) 28. Normanton I (1.1)* 29. Kirby Muxloe (2.3)* 30. Gimbro Farm (5.2)## 31. Stamford Rd (1.4)*	26. Huncote (19) *chaff* 33. Ashby (32)**	27. Rushey Mead (462) 32. Desford (187)**
ROMAN	28. Normanton I (2.5)* 29. Kirby Muxloe (3.4)* 31. Stamford Rd (2.3)* 32. Desford (1.3) # 37. Drayton Villa II (3.2)	30. Gimbro Farm (9.2)## 33. Ashby (12.6) #	36. Scalford Brook (250) 35. Empingham, (200) 35. Empingham CD (500) 40. Appleby Magna CD (73) 38. Ridlington CD x5 (200+) 44. Norfolk St CD (c100) 45. Crown Hills CD (139)
ROMAN TOWN	51. Bonners Ln (3.3) 52. Oxford St (1.3) 50. Newarke St (4.8)	47. The Shires (38) (*Grassy samples* =108, 148) 49. Causeway Lane. (23) (*Hay sample* =295)	

Key: * = IA and Roman similar, ** = more in IA, # = less in Roman, ## = more in Roman.
CD = corn driers. Number in brackets = actual maximum density (density of the best sample).
These sites are used in Table 3.

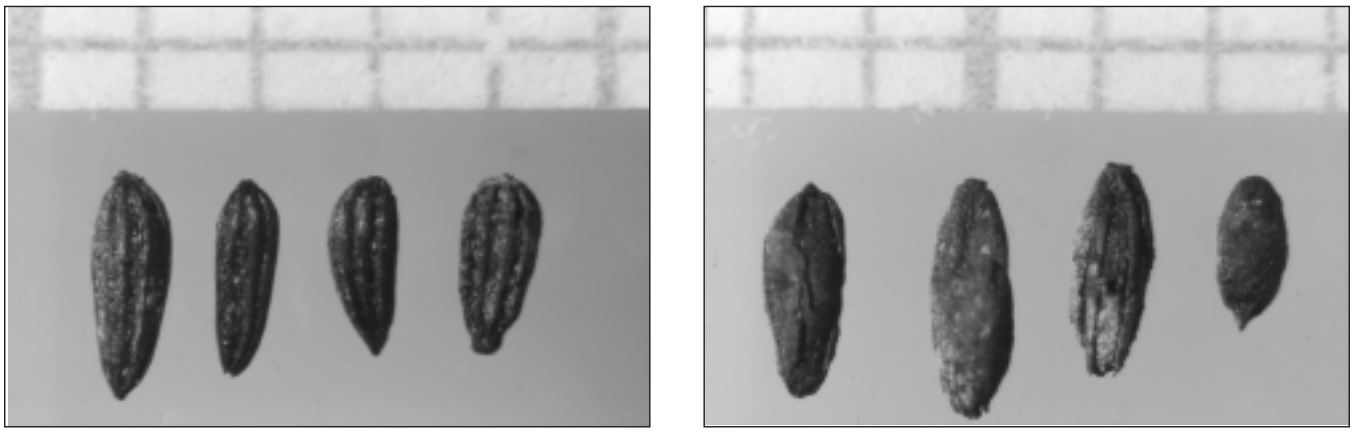
Further evidence for this may be the lack of abundant chaff in samples within the town (Monckton 1999). Retrieval of large groups of such remains is a priority for further study of cereal supply.

Small towns and villas

Trial pitting at Medbourne to uncover the extent of the site did not produce dated well-sealed deposits to sample because of the nature of the investigation, but a few spot samples were taken which still require assessment (Site 43). Foods known from farmstead sites are the cereals and gathered fruits as is the usual case nationally. Evidence from higher status occupation is lacking to compare with such sites as Dragonby, Lincolnshire and Stanwick Villa, Northamptonshire, which have produced a greater variety of foods (van der Veen 1996, Campbell unpublished). Drayton II Villa produced only a scatter of cereal grains from the area of the buildings during evaluation (Site 37). In future if wells or rubbish pits should be found they would have great potential for evidence of diet and activities in the past. The lack of bulk sampling at small towns and villas in the two counties excludes conclusions about agricultural economy or status.

Pastoral farming

A great deal of evidence from animal bones found in the towns shows the meat and animal products available (see below). There are few rural bone assemblages for comparison and their recovery is a future priority. Evidence for pasture from waterlogged deposits is known from this and previous periods. Other evidence for fodder shows the resouces used to feed animals, and remains interpreted as charred hay were found from a sample at Causeway Lane Leicester (Monckton 1999), showing that hay was part of the agricultural economy



a) Ox-eye Daisy
(Scale divisions are 1mm)

b) Crested Dog's-tail grass

Fig. 3a & 3b. Charred seeds from burnt hay from Roman Causeway Lane.

(Fig. 3a & 3b). In recent work at Ashby de la Zouch a sample containing rye with cultivated or wild oat and barley was interpreted as possible fodder, the date is yet to be confirmed (Ciaraldi forthcoming).

Roman Leicester

Major urban excavations in Leicester have provided the opportunity for extensive bulk sampling of sites both inside and outside the town walls and tonnes of soil have been processed and examined from this and later periods (Table 1). Inside the town, samples from excavations in the northeast quarter at the Shires sites, Little Lane and St. Peters Lane, (Lucas and Buckley forthcoming) and at Causeway Lane (Connor and Buckley 1999) can be compared with Newarke Street (Cooper 1994) and the sites in the southern suburb at Bonners Lane and Oxford Street (Sites 51, 52). In the Roman period there is abundant evidence of the foods consumed in the town (Table 5). These include spelt wheat and barley, legumes and leaf beet, fruits such as sloe, wild plum and apple, while coriander, fig and lentil may be imports. Opium poppy, columbine and possible sweet violet were, perhaps, garden plants (Moffett 1993; Monckton 1999).

Other food remains were of a variety of freshwater fish and also herrings and eels (Nicholson 1992; 1999). Abundant oyster shells were thought from their size, shape and infestations to have been brought from the Essex coast; these were from the 2nd century cellar at The Shires Little Lane (Monckton unpublished, Site 47) and later deposits at Causeway Lane (Monckton 1999). Roman cesspits were found at Causeway Lane confirmed by the presence of gut parasites, mineralised seeds and fly puparia (Boyer 1999; Skidmore 1999). Apart from the evidence for domestic occupation, a sample interpreted as the remains of charred hay was found, possibly suggesting the stabling of horses on the site (Monckton 1996; 1999). Pollen samples also suggested the use of hay (Greig 1999). Outside the walls at Newarke Street a cesspit predating the cemetery contained mineralised remains of legumes and other seeds (Monckton 1994). In the southern suburb only a scatter of burnt cereal grains were found in Roman samples, too little to suggest much domestic or cereal related activity (Table 3).

Large assemblages of animal bone have been analysed from the Shires sites and Causeway Lane (Gidney 1991-93, 1999) showing the use of more sheep for meat in the early phases, the use of celtic shorthorn cattle of mature age probably after having been used for milk, and the use of young pigs for meat. The bone provided evidence of butchery practices and also of horn working from abundant horn cores on Causeway Lane. Domestic fowl were consumed, as were their eggs, and wild resources included wild duck, wild goose, red and roe deer and hare. Other large groups of animal bones include those from Great Holme St, where a deposit including cattle skulls was interpreted as primary butchery waste, and raven bones were also present as an urban scavenger (Gouldwell in prep. Site 46). Evidence for dogs of Roman date has been found at, for example. The Shires and York Road (Gidney 1991; Baxter forthcoming). A Roman pit from the High Street cellars excavation has produced the unusual find of the skull of a white tailed sea eagle suggesting that the surroundings of Leicester may have provided a suitable habitat at this time (Baxter 1993). Few rural bone assemblages are known to provide evidence of where the domestic animals were raised; hence the recovery of bone from rural sites for comparison is a priority. The towns have great potential to provide detailed evidence of diet from plant and animal remains, evidence of living conditions, diet, trade, and introduction of new foods from abroad.

SAXON

The excavation of the extensive Saxon site at Eye Kettleby has provided evidence of the crops cultivated. No evidence for the continued use of spelt wheat was found as only free threshing wheat was present. This was most probably bread wheat from the form of the rachis material. Barley was the most common and most abundant cereal. Barley is sometimes thought to be used mainly for animal food but can be used for human consumption, and it is the cereal most tolerant of damp

Table 2: Comparison of maximum density of charred plant remains (items per litre of soil) from Saxon to Post-medieval from different areas of the counties.

	Rural	Leicester	Suburb
SAXON	54. Eye Kettleby (40.3) 55. South St. Oakham (4.9)	49. Causeway Lane (12.5)	53. Bonners Lane (1.0)
E.MED	65. South St. Oakham (6.7) 66. Anstey (91.4) 67. Freeby (37) 68. Saxby (45.4) 69. Garthorpe (0.1) 70. Barrowden (1.9) 71. Claybrook (21)	57. The Shires (50) 56. Causeway Lane (27) 60. Guildhall Lane (50)	61. Bonners Lane (16) 62. Oxford St. (255)
L.MED		59. The Shires (25.8) 77. Causeway Lane (4.4)	74. Bonners Lane (13) 62. Oxford St. (36) 63. York Rd. (8.7)
POST-MED		76. The Shires (>5) more garden plants 77. Causeway Lane (15) few cereals	82. Bonners Lane (292) abundant grain 83. Bowling Green Yard (693)

NB. Numbers in brackets are actual maximum densities (density of the best sample). These sites are used in table 3.

conditions. The presence of a mire near the site may suggest this was a wet area in the past. Another mire at Stamford Road Oakham had pollen evidence from Roman to medieval date which showed less signs of cultivation in the middle of the profile (Greig *et al*. forthcoming). In Leicester, sampling the Saxon building contexts at Bonners Lane produced only a small amount of plant remains including free-threshing wheat and barley. Little was found from a single small pit of Saxon date at Causeway Lane (Table 2).

The type of wheat grown changes from spelt in the Roman period to free-threshing wheat, perhaps as a cultural change or development in agriculture. The intense cultivation of the clay soils continued from its start in the Roman period and is shown from the evidence of the arable weed stinking mayweed, as found at Eye Kettleby (Monckton in Finn forthcoming).

MEDIEVAL and POST-MEDIEVAL

Medieval countryside

Evidence for the open pastoral and cultivated environment was found from silted channels at Hemington Bridges (Cooper and Ripper forthcoming, Smith 2000). Cropston Road, Anstey is a site with a known field system (Courtney and Higgins forthcoming) that has produced evidence for crops and diet of the12th-13th century inhabitants from charred plant remains in refuse found in a boundary ditch. Foods included bread wheat with some rye, oats and barley, hazel nuts as gathered food, and possible edible legumes (Site 66). Bread wheat was favoured for milling to use as flour for bread making although the whole grain was used in frumenty and pottages. The legumes found here were small and together with some evidence for grassy vegetation, may represent food for domestic animals which would have certainly been kept for both meat and traction, particularly ploughing. Unfortunately little animal bone was recovered from the site.

These charred remains contained mainly wheat grains with abundant chaff. Bread wheat threshes free from the chaff easily, so the presence of abundant chaff suggests the wheat was produced nearby. Some of the legumes in the deposit are of the size of cultivated vetch so may suggest that the cereal was grown following a fodder crop or possibly fallow in crop rotation. The weeds include cleavers and corn cockle that are typical of autumn sown crops such as wheat and rye, while stinking mayweed indicates the cultivation of heavy clay soils. The increase in the latter weed in medieval times is thought to be related to the use of the mould board plough (Greig 1991). The deposit may represent partly processed wheat or waste from cereal cleaning possibly for domestic use because the remains were found with domestic rubbish. However agricultural activity is likely on the site and may have been carried out near the buildings. Bread wheat alone was identified here and the lack of evidence for the presence of rivet wheat suggest this may represent a bread wheat crop. The site was consuming and producing crops, some of which may have been for use elsewhere. These remains give a glimpse of what was growing in the village field system.

Other sites sampled include Saxby (Site 68 and Table 4) where the most productive sample was from the 13th-14th century ditch which contained quite abundant

cereal grains, mainly of free threshing wheat. The wheat chaff (rachis) included bread wheat and also rivet wheat, the first from a rural site in the two counties. This contrasts with Anstey and South St Oakham which produced only bread wheat chaff, while Freeby and Barrowden produced no chaff at all (Sites 66, 65, 67, 70 and Table 2). Hence the site at Saxby provides important evidence for the cultivation of rivet wheat as a crop here because both types of wheat have been found in medieval Leicester (Moffett 1993; Monckton 1999). It is not known if they were grown together as a mixed crop or became mixed later in use. Rivet wheat is now known from an increasing number of sites in the Midlands from the Early Medieval period onwards (Moffett 1991) and evidence at present suggests that this crop spread in use after the Norman Conquest. More evidence from rural sites is needed to provide evidence of the supply of food to the towns.

Medieval towns

Before the widespread use of sewers, cesspits were dug in which sewage was dumped and these pits are often a rich source of evidence because the minerals in the sewage cause the remains to become semi-fossilized. These pits may also contain coprolites (semi-fossilized excrement) and tests can reveal the presence of the eggs of gut parasites (Fig. 4a), these together with the preserved maggots of latrine flies leave no doubt about what was being dumped in the pit. Cesspits often contain fruit stones, fruit pips and chewed fish bones (Fig. 4b). Although some Roman cesspits have been found, they were much more common in the medieval and post-medieval periods. Rubbish pits are also a good source of evidence because they often contain burnt cereal grains and seeds which are preserved because they are charred. This type of rubbish may contain accidentally spilled grains burnt in the cooking hearth and then cleaned away into a pit with other rubbish such as meat bones. Rubbish pits and cesspits often contain broken pottery fragments which can be identified to give a date to the food remains found in the pits.

Medieval Leicester

As in the Roman period sites from inside and outside the town walls have been sampled. Inside the town excavations in the northeast quarter at the Shires and Causeway Lane can be compared with the sites in the southern suburb at Bonners Lane, Oxford St, York Rd and Bowling GreenYard (Sites 56-63, 74-83 and Table 4). In the early medieval period of the 12th-13th centuries at Causeway Lane abundant remains from numerous cesspits and rubbish pits show that there was intense occupation at this time. The range of fruits extended from those found in Roman samples to include grape, blackberry, damson, plum, apple and pear, and vegetables included pea, bean and leek (Moffett 1993; Monckton 1999; Table 3). The cereals changed from the hulled wheat of the Roman times to free-threshing wheat which included not only bread wheat which is used today, but rivet wheat which was not so good for bread making but could be used for pottage, a medieval staple food. Rivet wheat also has long straw which is useful for thatching and some remains on sites probably originate from the thatched roofs (Letts 1999). Other foods included abundant fish, with higher frequencies of large sea fish than in the Roman period suggesting the fishing of deeper waters with improved technology (Nicholson 1992). In the suburb at this time charred cereals from domestic rubbish were also found while at Oxford St germinated barley was found which might hint at the use of malted barley for brewing. A waterlogged well also at Oxford St contained leather off cuts and seeds of weld which is a dye plant, which may suggest the trades being carried out in the area (Monckton unpublished, Site 62).

In the Late medieval period there is less domestic evidence from Causeway Lane in the north east of the town. Evidence from rubbish pits at the Shires of larger sheep kept for wool before being used for meat, and calves used as veal suggesting the development of dairy products (Gidney 2000; Albarella 1997). In contrast, the suburb site at Bonners Lane produced abundant domestic rubbish and even evidence of pigs being kept in back yards. This was apparently not always successful as several whole pig skeletons were found in a pit and they are thought to have died of disease (Baxter 1998). Abundant burnt cereal grains and legumes were also found as the remains possibly of animal food as well as human food. Pig keeping was also suggested at Oxford Street from the find of neonatal piglets (Browning unpublished, Site 62). A sample from this site contained abundant grains with weed seeds of stinking mayweed, which was a very troublesome weed of claylands in medieval times when it was known as 'doggefenell'. York Road also shows abundant domestic evidence at this time with the cereals wheat, barley, rye and oats, some legumes and with abundant fruit remains found in a cesspit there (Monckton unpublished, Site 63).

The best waterlogged evidence for the environment in the medieval period was found at the Austin Friars site from ditches which showed the local vegetation from a wide range of plant remains. Evidence of flooding was found from the water snails in the deposits (O'Connor 1998). The relative cleanliness of the site was found from the type of insect remains found. Insect evidence also showed the cultivation of legumes and possibly the storage of cereal grain on the site (Girling 1981). A wide range of food remains included meat, oysters and some fish (Mellor and Pearce 1981) providing a comparison with the secular areas of the town investigated more recently.

Post-medieval Leicester

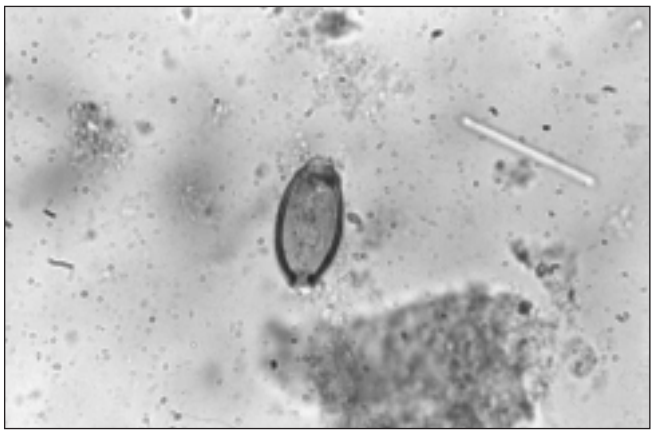
Activity in the suburb increases into the post-medieval period; cesspits at Bonners Lane and the Bowling Green Yard contained very numerous fruit pips of figs and blackberry together with sloe, apple and grape. Rubbish pits contained such abundant charred cereal grains that they must have been waste or accidental loss from some

Table 3: Some Plants from Leicester, Leicestershire and Rutland by period.

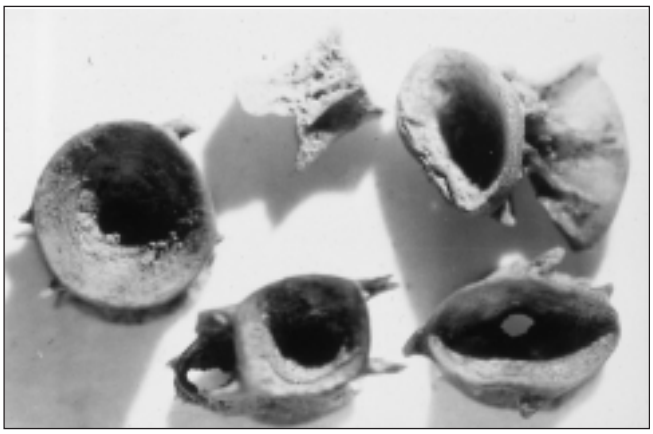
	Neo	BA	MIA	LIA	Rom	Rom urban	Sax	Med urban	Med	PM	
CEREALS											Botanical name
Emmer wheat, grain		++	++	+	+	+					*Triticum dicoccum* Schubl
Emmer wheat, chaff		+	+	+	+	+					*Triticum dicoccum* Schubl
Emmer or Spelt, grain		++	++	++	++	++					*Triticum dicoccum/spelta*
Emmer or Spelt, chaff		+	++	++	++	++	1r	2r			*Triticum dicoccum/spelta*
Spelt wheat, grain			+	+	+	+					*Triticum spelta* L.
Spelt wheat, chaff		+	++	++	++	++					*Triticum spelta* L.
Wheat free-threshing grain	+		+	+	+	+	++	++	++	++	*Triticum* free-threshing
Wheat free-threshing chaff							+	+	++	++	*Triticum* free-threshing ra.
Bread wheat, chaff							+	+	++	++	*Triticum aestivum* s.l. ra.
Rivet wheat, chaff								+	++	+	*Triticum turgidum* type ra.
Barley, grain	++	++	++	++	++	++	++	++	++	++	*Hordeum vulgare* L.
Barley, chaff			++	+	+	+	+	+	+	+	*Hordeum vulgare* L. ra.
Rye				+	+	+	++	+	++**	++	*Secale cereale* L.
Oat				+	+	+	+	+	++	++	*Avena* sp.
GATHERED or GROWN											
Hazel nut shell	++	+	++	+	+	++	+	+	++	+	*Corylus avellana* L.
Fruit stones, Sloes	++		++	+		+	++		++	++	*Prunus* sp.
Bullace and Damson									+		*Prunus domestica* L.
Hawthorn				+	+		+				*Crataegus* sp.
Apple or Crab Apple	+					++			++	++	*Malus* sp.
LEGUME CROPS											
Beans or Peas			+	+	+	++	+	++	++	++	*Vicia/Pisum*
Beans						+			+**	+*	*Vicia faba* L.
Peas						+			+	+	*Pisum sativum* L.
Lentil						+					*Lens culinaris* Medikus.
Cultivated Vetch								+	+	+	*Vicia sativa* ssp *sativa* (L.) Boiss.
GARDEN PLANTS											
Columbine						+				+	*Aquilegia* sp.
Opium Poppy						+			++	+	*Papaver somniferum* L.
Fig						+			+	+	*Ficus carica* L.
Beet						+					*Beta vulgaris* L.
Violet						+			+		*Viola* cf *odorata* L.
Flax or Linseed						+	+		+		*Linum usitatissimum* L.
Grape						+			+	+*	*Vitis vinifera* L.
Wood Strawberry										+	*Fragaria* vesca L.
Coriander						+					*Coriadrum sativum* L.
Dill										+	*Anethum graveolens* L.
Borage										-*	*Borago officinalis* L.
Hop										+	*Humulus lupulus* L.
Pot Marigold										+	*Calendula officinalis* L.
Asparagus										+	*Asparagus officinalis* L.
Leek									+	+	*Allium porrum* L.
CROP WEEDS											
Cleavers			++	+	+	+	+	++	++	+	*Galium aparine* L.
Stinking Mayweed					+	+	+	++	++**	++	*Anthemis cotula* L.
Corn cockle						+		+	+**	++*	*Agrostemma githago* L.
Weed seeds	+	++	++	++	++	++	++	++	++	++	Weed seeds
Number of Sites in period	**3**	**4**	**3**	**13**	**14**	**5**	**4**	**6**	**6**	**3**	**= 61 sites**

Key: Remains are seeds in the broad sense unless stated, taxonomy after Stace (1991).
Remains are of selected plants, mainly charred but including some mineralised fruits and seeds from urban contexts.
* = Present as pollen in urban wells (Greig 1999** and forthcoming*).
+ = Present. ++ = Found on over half the total sites of that period. r = Probable residual items.

commercial use, either for sale as grain or perhaps in other products (Monckton, in Finn forthcoming). Evidence from bone from the site shows the processing of animal skins, adding to the evidence for trading activity in the suburb (Baxter 1998). In the northeast of the town at this time evidence from a rubbish pit at Causeway Lane showed that an improved breed of pig was being introduced (Gidney 1999; 2000). A few large rubbish pits and a well at the Shires contained charred grains of cereals from domestic rubbish and seeds of additional plants such as dill, hops, asparagus and marigold – all useful and were possibly garden plants (Moffett 1993; Table 5). Pollen of grape vine, borage and bean, found in wells at the Shires, possibly also came from garden plants (Greig forthcoming). The fewer larger pits and stone lined well may suggest fewer large



a) egg of parasite of the human gut, whip worm (size about 0.005 mm)



b) fish bones, including some distorted by chewing. (diameter about 4mm)

Fig. 4a and 4b: Remains from sewage in medieval cesspits at The Shires.

properties in the area at this time, with large gardens and at least one such residence is known on High Street from the 17th century (Courtney 2000). After this the northeast quarter was recorded as an area of trees on maps of the 18th century and did not become populated again until Victorian times.

FUTURE WORK

With the implementation of bulk sampling over the last 15 years, a great deal of information and an archive of material has been gathered. This represents a considerable advance over the single Leicestershire site mentioned in the English Heritage review of 1984 (Keeley 1984). However, publication of completed analysis, such as 'The Shires' and 'Leicester's Southern Suburb Sites', is an urgent priority. The problem of funding publication of sites is increasing with the number of sites excavated but is essential to provide 'preservation by record' and publications should include sufficient data to back up conclusions. At the same time we should make efforts to integrate and interpret information which is unfortunately not often possible within the resources available. It is now being recognised that environmental archaeology should not be a separate study but be a part of the archaeological methods used to study sites. At present the Sites and Monuments Records contain little information from environmental archaeology and it would be useful if remains recovered from samples could be recorded as categories on the records, if possible with a summary of results. This would not only benefit specialists and other interested people, but help in the planning process in providing evidence of the archaeological potential and character of areas of the town and country. Finally it is important that sampling should continue as a routine part of archaeological investigations because unless samples are taken and analysed the data is lost forever. Future work adding to this data, using these and new techniques, will fill in gaps in the evidence, pose and contribute to answering local and regional research questions, and provide a more complete picture of life in the past.

Fig. 5. A coprolite from a medieval cesspit at Causeway Lane.

Acknowledgements

I am most grateful to Patrick Clay and Richard Buckley of ULAS for the opportunity to work on their projects, as well as to John Lucas of Leicester City Museums and former staff of the Leicestershire Archaeological Unit. I would like to thank the many people who have assisted with sample processing and reports particularly Ian Baxter, Peter Boyer, Martin Shore and Wayne Jarvis. Thanks are due to the site directors and staff of ULAS and of the other excavators in the area who have contributed to this work, and to the specialists who have supplied copies of their unpublished work. I am particularly grateful to James Greig and Lisa Moffett of Birmingham University for their contributions, advice and help with this work over the years. I would like to thank Marijke van der Veen of Leicester University for helpful comments on a draft of this paper.

Table 4: Waterlogged sites with evidence of the environment.

Site	Date	Reference	Dates	Specialists/Notes/Ref
Wing, Rutland (till and lake clays)	Palaeo	Hall 1980	c70k BP	Ipswichian interglacial. Pollen and plants studied.
Brooksby, Rearsby Brook	Palaeo	Challis and Howard 1999		Peat, wood, shell, organics.
Syston	Palaeo	Bell, Coope et al 1961 quoted in Brown et al 1994.	c37,000BP	Periglacial vegetation from pollen, plants and insect evidence.
Cossington, Platts Lane	Palaeo ?	Ripper et al ULAS Assmt		Mammoth tusks
Syston, Meadow Lane Quarry	Palaeo ?	Higgins ULAS Assmt in progress	9080 BP	Mammoth tusks, organics present to be assessed and dated.
Hemington Quarry (P-ch.A)	Palaeo/LG	Beamish 1995 (TLAHS 69,129) note, Greenwood et al (forth).	11,700 BP	Cold phase caddis and insects, pollen and plants in progress.
Cossington, (P-ch)	Meso	Brown, Keough & Rice 1994	10230-5140 BP	Lateglacial channel followed by alder woodland.
Croft Quarry (P-ch)*	Meso/LG	Brown in Smith, Roseff et al (forth)	c11,000, 9840 BP	Allerod and Early Postglacial channels.
Leicester, West Bridge*	Meso	Shackley and Hunt 1984	9920 BP	Plants pollen and insects of tundra.
Quorn, Mountsorrel by-pass	Palaeo/LG	Brown, Keough & Rice 1994	c28875 BP	No tree pollen, glacial or Early Lateglacial environment.
Hemington (Hicklins Land P-ch 3)	Palaeo/LG	Cooper & Ripper 2000, TLAHS 74, 233-5. Greenwood Assmt 2001	10920 BP	Bug of Dwarf willow, cold phase, plants of reed swamp, pollen sampled.
Birstall, Watermead (P-ch)	Meso	Ripper 1997 (TLAHS 71, 87) note, Greig, Smith Assmt.	9780-7790 BP	Early woodland.
Croft Quarry (P-ch)*	Neo	Hughes & Roseff 1995 (TLAHS 69, 100) interims. Smith, Roseff, et al (forth)	3800-2900 BC	Woodland with lime pollen, plants and insects analysed.
Hemington Quarry (P-ch.C)	Neo	Beamish et al Assmt ULAS. Brown, Smith, Greenwood & Monckton (forth)	2890-2475 BC	Partly cleared at base, cereal pollen throughout profile, insects of grassland and pasture.
Thurmaston (P-ch)	Neo	Mathieson 1975 quoted in Brown, Keough & Rice 1994	4220-3720 BP	Organics and wood.
Birstall (P-Ch)	Neo-EBA	Brown, Keough & Rice 1994	5160-3720 BP	Wood
Kirby Muxloe	Neo/BA	Cooper 1994 (TLAHS 68,162-5) interim. Brown, Greig & Smith (forthcoming)		Early lime woodland, BA first clearance, IA main clearance. Pollen, plants and insects analysed.
Narborough Bog	Neo-BA	Brown 2000, (and forth.)	2950-2050 BC	Partially cleared floodplain in Neo. Long pollen profile in progress.
Eye Kettleby, Nr. Melton (W/L)	Neo/BA?	Greig in Finn (in prep)	in progress	Early woodland pollen and plants.
Cossington, Platts Lane (P-ch)	BA?	Ripper et al Assmt ULAS 2001		Assmt of pollen and plants J.Greig, insects M.Robinson.
Birstall, Watermead (BM)	BA	Ripper 1997 (TLAHS 71, 87-8) Greig, Smith, Assmt.	1040-810 BC	Pollen and insects of meadow and pasture. Human skulls and animal bone near burnt mound.
C-Donington, Willow Fm. (P-ch)	BA	Coward & Ripper 1999 (TLAHS 73,87-91) interim. Smith, Green, Monckton forth.	1145-835 BC	Analysis pollen, insects and plants. Cultivation and pasture, some trees present. Cereal pollen found.
Hemington Quarry (P-ch.D)	LBA-EIA	Beamish et al Assmt ULAS. Smith, Greenwood et al (forth).	1750-690 BC	Open with grassland and pasture evidence. Insects and plants studied.
Croft Quarry (P-ch)*	BA-IA	Smith, Roseff et al forth.	1500 BC-350 AD	Alder wood then open env. Pollen, plants and insect evidence.
Hemington (Hicklins Land P-ch.14)	IA	Cooper ULAS Assmt in progress	2190 BP	Assessment only.
Empingham, Rutland Water. (villa)	Roman	in Cooper N. 2000 Leicester Arch Mono 6: Univ of Leicester.		P.Buckland report on insects of open cultivated env.
Oakham, Stamford Rd (mire)	RB-Med	Hewson 1998 (TLAHS 193) note. Greig and Smith for Ellis et al forth BUFAU Report.	c2000 BP	Pollen of cultivated env, mid profile less evidence of cultivation, then cultivation continued into Med. Insects of pasture.
Hemington Quarry (Ch.B)	Saxon	Beamish et al Assmt ULAS	c700 AD	Plants assessed only.
Owston Abbey (fishponds)	Med	Hayne et al 1988 (BAR, BS, 182ii, 301)		Fish bone IDs, environment from pollen and plants.
Hemington Bridges	Med	Cooper and Ripper 1994 (TLAHS 68, 153) interim, and forth. Smith 2000.	Dendrochronology	Pollen, plants analysed, insects (riffle beetles) of fast flowing water (Greig , Smith in Cooper & Ripper forth.).
Hemington Quarry (Ch.F)	E.Med	Beamish et al Assmt ULAS	c1000 AD	Assmt of plants only
Leicester, West Bridge/PEX site	Med	Higgins 1997 (TLAHS 71, 104) note on evaluation		Waterlogged deposits present
Austin Friars (waterlogged ditch)	L.Med	Mellor & Pearce 1981 # , Girling (AML 3931 and 2526)		Evidence of local env. from plants and insect remains, snails of flooding event, animal bone abundant, some fish, leather preserved.
Groby Pool (sediment)	P-M-Mod	David & Roberts 1990	1800 AD on.	Pollen, open and little woodland, study of documentary evidence.

Key: The range of radiocarbon dates is quoted: BP = before present uncalibrated, BC = calibrated dates. c = other estimates.

Table 5: Gazetteer of sites with evidence from plant and animal remains.

Site	Date	No.	Reference	Bone	Ch.pl.	Ch/Oth	Specialists/Notes/Reference/Other remains.
Glaston, Rutland	U.Palaeo	1	Cooper 2001 (CA 173, 180-4), Thomas and Cooper Assmt ULAS	y			Mammoth, glutton, horse, woolly rhinoceros, hyaena, reindeer, mountain hare, lemming and voles.
Oakham, Burley Rd.*	L.Neo	2	Gouldwell, Monckton in Clay 1998	y	y	y/y	Small nos of wheat and barley grains from pits, less nutshell. Snails and small mammals of nearby woodland.
C-Donington, Willow Fm.South (pit)	Neo?	3	Coward and Ripper 1999 (TLAHS 73, 87-91) interim. and ULAS Assmt.		y+	y	Plant remains Cache of crab apples with nutshell and few cereals. Radiocarbon dating in progress (Monckton in prep. ULAS).
Syston, Melton Rd. (pit)	Neo	4	Meek 1998 (TLAHS 72, 184) note.		y		A fruitstone and abundant hazel nutshell (Jarvis unpubd.) ULAS.
Braunstone, Elmsthorpe Rise (pit)	L.Neo	5	Albone 2000 (TLAHS 74, 224) note.		y		Barley and nutshell
East Goscote, Beedles Quarry	Neo	6	Saville 1976 (TLAHS 51 p29) #	y	y?		Bone and seeds
Husbands Bosworth	Neo	7	ULAS Excavation 2001		?	y	Samples taken.
Sproxton (barrow)	EBA	8	Clay 1981	y	y	y/y	Buried soil with burnt tree-stumps as evid of woodland clearance, land SNAILS of arable then pasture. 3990-3810 BC
Eaton (barrow)	EBA	9	Clay 1981	y	y	y	Charred plants include rye and stinking mayweed, poss later activity.
C-Donington, Willow Fm. (BM & P-ch)	BA	10	Ripper & Coward 1999 (as No.3 above)	y	y (n)	y	See waterlogged. Few charred plant remains (Monckton in prep. ULAS)
Lockington (barrow and pits)	BA	11	Hughes 2000		y++	y/y	Pollen, buried soil, phosphates, Charred plants with early spelt wheat. (Greig, Limbrey, Moss, Moffett, Monckton, 2000)
Eye Kettleby, Nr. Melton (cem. and occ.)	BA	12	Finn 1998 (TLAHS 72, 178) note. Analysis ULAS for Finn et al forth.		y++	y/y	Mainly tubers, wheat incl spelt, barley, few seeds. 70 cremations (Chapman forth.) BA occupation with emmer (Monckton forth.).
Ridlington, Rutland (round-houses)	BA?	13	Beamish 1997 (TLAHS 71,99-101) note.		y++		Barley grain deposit (Monckton forth). Dating awaited, in progress ULAS.
Mountsorrel, Rothley Grange	BA?	14	Pearson Assmt for Cotswold Trust 1993		y(+)		A charred cereal grain and a few uncharred seeds from channel fill, waterlogged plants assessed.
Saxby (a BA pit in med village)	BA	15	Monckton ULAS report		y	y	An emmer grain with charcoal.
Kirby Muxloe (farmstead)	LBA-MIA	16	Cooper 1994 (TLAHS 68, 162-5) interim.	y	y+	y	Plant remains (Monckton unpubd.), barley and emmer grains, v. few cereals remains present.
Humberstone (settlement)	MIA	17	Pelling, Charles, in Charles, Parkinson & Foreman 2000 (TLAHS 74, 113-220)	y++	y+++	y	Cleaned spelt grain, four post granary. Sheep and cattle about equal amounts, few pigs or wild animals.
Wanlip (farmstead)	MIA	18	Monckton, in Beamish 1998	y	y++	y	Spelt with little emmer and few bread wheat grains, 6-row barley, legume frag, hazel nut and sloe.
Breedon on the Hill (hillfort) 1957	IA	19a	Wacher 1964 (Antiq.J. 1964 p122-42)#	y+		y/y	Soils, SNAILS, bone, charcoal (Keeley 1976, AML 2105). Some samples kept in EH archive.
Breedon on the Hill (hillfort) 1946	IA	19b	Kenyon 1950 (TLAHS 26) #	y+		y/y	Animal bone, charcoal, soils.
Melton Mowbray, Kirby Lane (ditches)	IA	20	Dingwall 1998 (TLAHS 72, 1998) note		y	y	Few snails and a charred grass seed (Monckton for BUFAU)
Enderby I (farmstead)	LIA	21	Monckton, Gouldwell, in Clay 1992 (TLAHS 66, 1-82)	y++	y+	y/y	Cattle then sheep, pigs, chicken and hare. V. few cereals, SNAILS of pasture.
Enderby II (farmstead)	IA	22	Meek 1997 (TLAHS 71,88) note; and forth.	y	y+	y	Many samples v.few cereals (Monckton unpubd.) ULAS.
Tixover, Rutland (ditches)	LIA	23	Beamish 1992 (TLAHS 66, 183) interim, Baxter, Monckton for Beamish forth	y++	y++	y/y	Small mammals, SNAILS of pasture, Spelt wheat, weeds, fruits, infant skeleton. Cattle then sheep, few pigs.
Cossington, Platts Lane (r-house)	IA	24	Sturgess 2000 (TLAHS 74, 237) note		y+	y	V.few cereals mainly from round-house (Monckton Assmt. ULAS).
Kirby Muxloe, Carmel (r-h gully)	LIA	25	Higgins 1998 (TLAHS 72, 174) note		y+	y	V.few cereals from round-house (Monckton unpubd.) ULAS.
Huncote (IA farmstead)	LIA	26	Shore 2001 interim (TLAHS 75) and forth.		y++		Some chaff rich samples (Jarvis unpubd.) ULAS.
Leicester, Rushey Mead*	LIA	27	Monckton, in Pollard 2001 (TLAHS 75)	y	y+++	y	Cleaned spelt grain in isolated pit with adult male skeleton.
Normanton le Heath, I (settlement)	IA-Roman	28	Monckton, in Thorpe et al 1994	y	y+	y	Few cereals, more in later phase.
Kirby Muxloe (farmstead)	IA-Roman	29	Cooper 1994 (TLAHS 68, 162) interim. and Cooper (forth)	y	y+	y	Barley and spelt, v. few cereals in many samples, more weeds in Roman than in IA samples (Monckton unpubd.).
C-Donington, Gimbro Farm (encl)	IA-Roman	30	Derrick 2000 (TLAHS 74, 233) note.		y++	y	Few cereals IA and Roman (Jarvis unpubd.) ULAS.
Oakham, Stamford Rd. (ditches)	IA-Roman	31	Hewson 1998 (TLAHS 72, 193) note		y+	y	Few charred cereals (Monckton unpubd.) BUFAU. (see W/L table 2)
Desford (farmstead)	IA-Roman	32	Thomas 2000 (TLAHS 74, 238) note.		y++	y	LIA Barley abundant, few Roman cereals (Jarvis unpubd.) ULAS.
Ashby, by-pass	IA-Roman	33	Ciaraldi, BUFAU Archive 2001		y++		Abundant IA grain, Roman rye possibly fodder.
Humberstone Farm, 1985 and 1987	IA-Roman	34a	Lucas 1986 (TLAHS 60, 78-80) interim. and Lucas 1988 (TLAHS 62, 72-3) note.	y	?	?	Processed samples from 1987 excavation, few remains (Warren in progress)
Normanton II (settlement)	Roman	34b	Trimble 1992 (TLAHS 66, 182) interim.		y(++)		Charred plant remains need analysis (Monckton Assmt. LAU).

Table 1 (contd): Gazetteer of sites with evidence from plant and animal remains.

Site	Date	No.	Reference	Bone	Ch.pl.	Ch/Oth	Specialists/Notes/Reference/Other remains.
Empingham, Rutland Water. (villa, well)	Roman	35	Buckland, Alvey, in Cooper N. 2000, and Buckland 1986.	y	y++	y/y	Insect of open cultivated environment (see W/L table 2). Ditch of 2nd cent with chaff, Corn drier of 4th cent poss malting spelt.
Scalford Brook, Nr. Melton (rural)	Roman	36	Beamish 1991 (TLAHS 65, 102) interim.	y	y++	y	Abundant spelt chaff in a gully (Monckton Assmt. LAU).
Drayton Villa II	Roman	37	Connor 1994 (TLAHS 68, 161) interim.	y(++)	y(+)	y	Abundant sm mammal bone (?owl pellets), scatter of few cereals all needs analysis (Baxter, Monckton Assmt. LAU).
Ridlington, Rutland (corn driers etc)	Roman	38	Beamish 1997 (TLAHS 71, 99-101) note, Beamish ULAS Report 2000 and forth.		y+++	y	Corn driers of different functions, drying/parching spelt and barley, dehusking and poss malting spelt (Monckton forth.).
Ketton, Rutland (corn driers)	Roman	39	Meadows 1999 (TLAHS 73, 119-121) note.		y?		Germinated grain reported. Northants Archaeol Assmt.
Appleby Magna (corn drier)	L.Roman	40	Clarke 2000 (TLAHS 74,231) note.		y+++	y	Corn drier, remains as spikelets (Jarvis unpubd.) ULAS.
Leicester, Hamilton (corn drier)	L.Roman	41	Higgins et al 2001 (TLAHS 75, 133-4) note		y+++	y	Numerous cereal remains, ULAS Assmt only, analysis planned.
High Cross (Roman sm town)	Roman	42	Greenfield & Webster 1965 TLAHS 40, 3-41			y	Charcoal of hazel and oak (Levy 1965).
Medbourne (Roman sm town)	Roman	43	Pollard 1992 (TLAHS 66, 181) note.		?		Few spot samples taken, need assmt. for plant remains.
Leicester, Norfolk St Villa	Roman	44	Mellor and Lucas 1978 interim (TLAHS 66, 179); Lucas forth. Jones 1982.	y++	y++	y	Corn drier with chaff for fuel (see van der Veen 1989), Good animal bone assemblage (Gouldwell forth).
Leicester, Crown Hills (corn drier)	L.Roman	45	Chapman 2000 (TLAHS 74, 228) note.	y	y+++	y	Corn drier with spelt chaff as fuel + stinking mayweed (Jarvis forth.) ULAS.
Leicester, Gt Holme St. (pits, well)	Roman	46	Gouldwell, for Lucas forth.	y++			Deposit of cattle skulls as primary butchery waste, raven as urban scavenger.
Leicester, The Shires (urban)*	Roman	47	Lucas & Buckley 1989 (TLAHS 63, 105) interim. Moffett 1993, Nicholson 1992, Gidney 1991 and archive others.	y/fish	y+++	y/y	Oysters compare with East Coast (Monckton forth) parasite tests (Boyer forth), charcoal (Morgan forth.). Leicester Museums Archive.
Leicester, High St Cellars (pits)	Roman	48	Lucas 1992 (TLAHS 66, 179) interim. Baxter 1993a-c.	y++	y	y	White tailed eagle skull found and published. Other remains assessed only.
Leicester, Causeway Lane (urban)*	Roman	49	Monckton et al in Connor and Buckley 1999. and Monckton 1995.	y/fish	y+++	y/y	Fish, oysters, fruit, cereals, bones, eggshell; burnt hay. Pollen. Flies and parasites from cesspits.
Leicester, Newarke St (cem and earlier)*	Roman	50	Monckton, Baxter in Cooper 1996	y	y++	y	Charred and mineralised plants grape pips and legumes.
Leicester, Bonners Lane (urban)*	Roman	51	Finn 1994 (TLAHS 68, 165) interim. Finn et al forth. ULAS	y	y++	y/y	Animal bone, fish, parasites, few charred plants (Baxter, Nicholson, Boyer, Monckton for Finn forthcoming).
Leicester, Oxford St (urban)	Roman	52	Gossip 1998 (TLAHS 72, 159) note		y+	y	Few cereal remains (Monckton unpubd.) ULAS.
Leicester, Bonners Lane *	Saxon	53	Finn et al Report ULAS (see No. 51)	y	y+	y	Bone (grass snake), few charred plants (Baxter, Monckton forth).
Eye Kettleby, Nr Melton (settle)	Saxon	54	Finn 1998 (as No.12 above), Finn ULAS Report 2000 and Finn forth.	y	y++		Barley most abundant cereal, wheat free-threshing only, stinking mayeed pres, flax pres. Bone report. (Monckton, Knight forth).
Oakham, South Street	Saxon	55	Jones 1995 (TLAHS 69, 118) interim. Baxter in Jones 1996.	y++	y++	y	Free threshing wheat grains, rye and barley with weeds. Planr remains not included in published report (Monckton unpubd).
Leicester, Causeway Lane (urban)*	E.Med	56	Monckton et al in Connor and Buckley 1999.	y/fish	y+++	y/y	Pollen, parasites, fish, woodlice, flies, eggshell, bread wheat and rivet wheat.+++cesspits.
Leicester, The Shires (urban)*	E.Med	57	Moffett 1993, Nicholson 1992, Gidney 1991 and archive others.(see No.47 above)	y/fish	y+++	y/y	Pollen, parasites, oysters (Greig, Boyer, Monckton, in archive). Bone, fish, Bread wheat and rivet wheat.
Leicester, The Shires (urban)*	M.Med	58	Moffett 1993, Nicholson 1992, Gidney 1991 and archive others.(as No.57 above)	y/fish	y+++	y/y	Pollen, parasites, oysters, bone, fish, plant remains (as No 57 above). Bread wheat and rivet wheat.
Leicester, The Shires (urban)*	L.Med	59	Moffett 1993, Nicholson 1992, Gidney 1991 and archive others.(as No.57 above)	y/fish	y+++	y/y	Pollen, parasites, oysters, bone fish, plant remains (as No.57 & above), bread wheat and rivet wheat.
Leicester, Guildhall Lane Undercroft	Med	60	Hagar & Buckley 1990 (TLAHS 64, 99) interim. Boyer, Baxter LAU Reports	y	y+++	y/y	Abundant oats and cereal remains, mineralised seeds from cesspit, requires more detail on cereals and publication. Animal bone report in archive.
Leicester, Bonners Lane (suburb)*	MED	61	Finn et al Report ULAS (as No.51 above)	y/fish	y++	y	Less evidence than in town in E.Med.
Leicester, Oxford St (suburb)	Med	62	Gossip (as No.52 above). Monckton, Browning, in Finn & Gossip forth.	y	y++	y	Germinated barley grain charred. Well + disturbed and wet ground seeds, weld, leather offcuts, legumes, stinking mayweed +++. Neonatal piglets.
Leicester, York Rd (suburb)	Med	63	Gossip 1998 (TLAHS 72, 159) note.	y	y++	y	Cesspit with mineralised fruit stones (Monckton unpubd.) ULAS.
Coleorton (village)	Med	64	Beamish 1993 (TLAHS 67, 76) interim.		y(++)		Numerous wheat and rye grains with weeds, good assemblage which needs analysis (Monckton Assmt. LAU).
Oakham, South Street	E.Med	65	Jones 1995 interim. Baxter in Jones 1996.	y++	y++	y	Bread wheat, rye and barley with weeds (Monckton unpubd).
Anstey, Cropston Rd. (village earthworks)	Med	66	Courtney & Higgins forth (TLAHS 76).		y++	y	Bread wheat, rye, barley and oats, poppy, corn-cockle, stinking mayweed and vetches abund. (Monckton unpubd.) ULAS.
Freeby (village pits and ditches)	Med	67	Thomas 1999 (TLAHS 73, 98) note.		y++	y	Free-threshing wheat grains and weeds (Monckton unpubd.) ULAS.

Table 1 (contd): Gazetteer of sites with evidence from plant and animal remains.

Site	Date	No.	Reference	Bone	Ch.pl.	Ch/Oth	Specialists/Notes/Reference/Other remains.
Saxby (village ditches)	Med	68	Thomas 2001 (TLAHS 75) interim		y++	y	Rivet wheat and weeds (Monckton unpubd.) ULAS.
Garthorpe (village)	Med	69	Gossip 1999 (TLAHS 73, 99) note		y		V.few cereal grains (included in Saxby report, site 68 above).
Barrowden, Main St (building)	Med	70	Meek 1999 (TLAHS 72, 190) note.		y(+)	y	Floor layer with few cereals and open land snails (Monckton unpubd.) ULAS.
Claybrook Hall, Claybrook Parva.	Med	71	Jarvis ULAS Watching Brief 2001	y	y++		Gains of free-threshing wheat, barley and rye, beans, weeds. Bone to be identified by J.Browning.
Owston Abbey (fishponds)	Med	72	Hayne et al (BAR,BS 182ii)	fish		n/y	Fish bones identified, pollen and plants of local environment,
Market Harborough (urban)	Med-P-M	73	Pollard 1992 (TLAHS 66, 180) interim. Baxter 1996 (Circaea 11.2 p.65)	y++	y	y	Horse pathology of draught animals and skinning for hides. Cattle horn cores found. Post-med horse trade discussed.
Leicester, Bonners Lane (suburb)*	L.Med-PM	74	Finn 1994 (TLAHS 68, 165) interim. Finn et al Analysis ULAS (see No. 51 above)	y/fish	y+++	y	Bone, fish, parasites, abund charred plants and mineralised remains (Baxter, Nicholson, Boyer, Monckton in archive).
Austin Friars (friary and W/L)	L.Med-PM	75	Mellor & Pearce 1984 # , Girling (AML 3931 and 2526), O'Connor 1988	y/fish			Evidence from plants and insect remains, snails of flooding event, animal bone abundant, some fish, leather preserved.
Leicester, The Shires (urban)*	P-M	76	Moffett 1993, Nicholson, Gidney 1991-93,and archive others	y/fish	y		Pollen of grape vine (Greig archive 1994), Charred and mineralised remains, bread wheat only, seeds of garden plants.
Leicester, Causeway Lane (urban)	L.Med-PM	77	in Connor & Buckley 1999	y	y	y	Fewer remains from later phases.
Leicester Castle Gardens	Med	78	Buckley 1992 (TLAHS 66,199) interim.		y		V.few charred cereal grains in samples, no further potential.
Leicester Castle Yard	Med	79	Mackie 1995 (TLAHS 69, 119) interim.	y	y		Few mineralised seeds in drain in Yard.
Leicester Cameo Cinema High St	Med	80	Cooper 1993 (TLAHS 67,83.) interim.	y(+)	y(+)		Samples taken by LAU, no resources for processing.
Leicester, Bath Lane	Med	81	Cooper 1993 (TLAHS 67, 88) interim	y(+)	y(+)	y	Samples taken by LAU, no resources for processing.
Leicester, Bonners Lane (suburb)*	P-M	82	Finn 1994 (as No.51 above). Baxter 1998, Monckton forth. for Finn forth. ULAS	y	y+++		Complete pig skeletons evidence of pig keeping and pig epidemic. Evidence of tanners or tawyers trade. Abundant grain for possible trade use, bread and rivet wheat. Cesspits.
Leicester, Bowling Green (suburb)*	P-M	83	Higgins 1997 (TLAHS 71, 104) note.	y	y++		Charred and mineralised plant remains. Rivet wheat, Cesspits. (Monckton unpubd.) ULAS.
Mountsorrel, Market Place	P-M	84	Lucas 1987 (TLAHS 61,1-7) interim	y++	?	y	Sheep feet v.numerous, bone report in progress (Grant et al Leics Univ.). Leather working (saddlery) known on site

KEY: site* = sites in Regional Review (de Moulins and Murphy 2001),
reference # = from Environmental Archaeology Bibliography on English Heritage website,
AML = Ancient Monuments Laboratory Report English Heritage,
Ch pl = charred plant remains,
Ch/Oth = Charcoal, other remains,
n = nutshell,
P-ch = Palaeochannel,
W/L = waterlogged,
TLAHS = Transactions of the Leicestershire Archaeological and Historical Society,
LAU = Leicestershire Archaeological Unit (closed 1995),
ULAS = University of Leicester Archaeological Services,
BUFAU = Birmingham University Field Archaeology Unit,
Assmt = assessment of remains,
unpubd. = unpublished, forth. = forthcoming.

References

Albarella, U., 1997 'Size, Power, Wool and Veal; zooarchaeological evidence for Late Medieval innovations', *in* G. De Boe and F., Verhaeghe (eds.) *Environment and subsistence in Medieval Europe*, IAP Report **9**, Brugge: Zelic.

Alvey, R., and Monckton A., 2000 'Charred plant remains', *in* N. Cooper *The archaeology of RutlandWater: Excavations at Empingham in the Gwash Valley, Rutland, 1967-73 and 1990*, University of Leicester: Archaeology Monographs No. **6**, 139-141.

Baxter, I. L., 1993 a-c 'An eagle skull from excavations of cellars at High St, Leicester', (a.) *Trans. Leics. Archaeol. Hist. Soc.* **67**, 101-105; (b.) *Circaea*, **10/1**, 31-37; (c.) *Circaea*, **10/2**, 7881.

Baxter, I. L., 1995 'Medieval and early post medieval horses from Market Harborough, Leicestershire.' *Circaea* **11/2,** 65-79.

Baxter, I. L., 1998 'Late Medieval tawyer's waste and pig skeletons in Early Post Medieval pits from Bonners Lane, Leicester.' *Anthropozoologica*, **28**, 55-63.

Beamish, M., 1991 ' Excavation of a Romano British site at Scalford Brook, Melton Mowbray, Leicestershire.' (interim note), *Trans. Leics. Archaeol. Hist. Soc.* **65**, 107, **and** Beamish, M., forthcoming 'Scalford Brook Excavation Report', to include: Monckton, A., 'The charred plant remains' and Baxter I. L., 'The animal bone'. University of Leicester Archaeological Services.

Beamish, M., 1992 'Excavation of Prehistoric Sites at Tixover, Leicestershire' (interim note), *Trans. Leics. Archaeol. Hist. Soc.* **66**, 183, **and** Beamish, M., forthcoming 'Tixover Excavation Report', to include: Baxter, I. L., 'The animal bone' and Monckton, A., 'Analysis of charred plant remains and molluscs'. University of Leicester Archaeological Services.

Beamish, M., 1998 'A Middle Iron Age Site at Wanlip, Leicestershire', *Trans. Leics. Archaeol. Hist. Soc.* **72**, 1- 91.

Beamish, M., forthcoming 'Excavations on the Wing to Whatborough Anglian Water pipeline', to include: Monckton, A., 'Charred plant remains from Bronze Age to Roman contexts including Roman corn driers'. ULAS Developer Report.

Boyer, P., 1999 'Eggshell from Causeway Lane', *in* A. Connor and R. Buckley 1999, 344-346.

Boucher, K., 1994 *Loughborough and its Region*. Loughborough University of Technology: Department of Geography.

Brown A. G., Keough M. K., and Rice R. J., 1994 'Floodplain evolution in the East Midlands U.K: the Lateglacial and Flandrian alluvial record from the Soar and Nene valleys', *Phil Trans R. Soc. London* Series A, **348**, 261-293.

Brown, A. G., 2000 'Floodplain vegetation history: Clearings as potential ritual spaces', in A.S. Fairbairne (ed.) *Plants in Neolithic Britain and Beyond*, 49-62. Oxford: Oxbow Books ('Pollen Analysis from Narborough Bog, Leicestershire', noted on p.59).

Brown, A. G., Greig, J., Smith, D. and Cooper L., forthcoming 'Environmental evidence from waterlogged deposits at Kirby Muxloe, Leicestershire.'

Brown, A. G., Smith, D., Greenwood M., Monckton A., forthcoming *in* Beamish, M., forthcoming 'Environmental evidence from palaeochannels at Hemington Quarry, Leicestershire'. ULAS Developer Report.

Buckland, P. C., 1986 'An insect fauna from a Roman well at Empingham, Rutland, Leicestershire', *Trans. Leics. Archaeol. Hist. Soc.* **60**, 16.

Buckley, R. and Lucas, J., forthcoming. *Excavations at The Shires, Leicester: Little Lane and St Peters Lane*, to include: Moffett, L., 'The plant remains'; Greig, J., Pollen; Gidney, L., 'Animal Bones'; Boyer, P., 'Parasite ova'; Morgan, G., Charcoal'; Monckton, A., 'Oysters'; Nicholson, R., 'Fish remains'. Leicester City Museums.

Campbell, G., unpublished 'Assessment of plant remains from Stanwick, Northamptonshire'. English Heritage.

Charles, B. M., Parkinson, A., and Foreman, S., 2000 'A Bronze Age Enclosure and Iron Age Settlement at Elms Farm, Humberstone, Leicestershire', *Trans. Leics. Archaeol. Hist. Soc.* **74**, 113-220.

Ciaraldi, M., forthcoming 'The charred plant remains from the Late Iron Age/Romano British site at Old Park House, Ashby de la Zouch, Leicestershire (XA67-2000).' Birmingham University Field Archaeology Unit.

Clay, P., 1978 *Two Multi-phase barrow sites at Sproxton and Eaton, Leicestershire*. Leicester: Leicestershire Museums Art Galleries and Records Service Archaeological Report **2**.

Clay, P., 1992 'An Iron Age Farmstead at Grove Farm, Enderby, Leicestershire', *Trans. Leics. Archaeol. Hist. Soc.* **66**, 182.

Clay, P., 1998 'Neolithic/Early Bronze Age Pit Circles and their Environs at Burley Rd, Oakham, Rutland', *Proceedings of the Prehistoric Society,* **64**, 293-330.

Connor, A., and Buckley, R., 1999 *Roman and Medieval occupation at Causeway Lane, Leicester*. University of Leicester: Archaeology Monographs No. **5**.

Cooper, L., and Ripper, S., 1994 'Medieval Bridges at Hemington, Leicestershire', *Current Archaeology*, **140.**

Cooper, L. and Ripper S., forthcoming 'Medieval Bridges at Hemington Quarry, Leicestershire', to include: Brown, A. G., 'Sediments', Greig, J. R., 'Plant macrofossils and pollen', and Smith, D.N., 'Analysis of insect remains'. University of Leicester Archaeological Services publication.

Cooper, L., 1996 'A Roman Cemetery at Newarke St. Leicester', *Trans. Leics. Archaeol. Hist. Soc.* **70**, 1-90.

Cooper, N., forthcoming *East Midlands Archaeological Research Frameworks*. Leicester University School of Archaeological Studies. http://www.le.ac.uk/archaeology/east_midlands_research_framework.htm.

Courtney, P. and Higgins T., forthcoming 'Anstey, Leicestershire', *Trans. Leics. Archaeol. Hist. Soc.* **77.**

David, C. and Roberts, N., 1990 'Vegetation change and pollen recruitment in a lowland lake catchment: Groby Pool, Leicestershire', *Hydrobiologia*, **214**, 305-310.

Finn, N., forthcoming 'Excavations at Bonners Lane, Leicester', to include: Baxter, I. L., 'The animal bone', Monckton, A., 'The charred and mineralised plant remains', Nicholson R. A., 'Fish remains', and Boyer P., 'Analysis of parasite ova from cesspits'.

Finn, N., forthcoming 'Excavation of a Bronze Age cremation cemetery and Saxon settlement at Eye Kettleby near Melton Mowbray, Leicestershire', to include: Knight, S., 'Animal bones' and Monckton. A., 'Charred plant remains'.

Greenwood M., forthcoming 'Insect and caddis-fly larvae remains from Lateglacial palaeochannels at Hemington Quarry and Hemington Quarry Extension, Leicestershire'.

Greig, J., 1991 'The British Isles', *in* van Zeist W., Wasylikowa K., and Behre K., (eds.) *Progress in Old World Palaeoethnobotany*. Rotterdam: Balkema.

Greig, J., forthcoming 'Pollen from The Shires Excavation', *in* Buckley, R., and Lucas, J., forthcoming.

Greig, J., 1999 'Pollen from Causeway Lane', *in* A. Connor and R. Buckley 1999, 362-364.

Greig, J., forthcoming 'Pollen from a mire deposit at Eye Kettleby Leicestershire', *in* Finn, N., forthcoming.

Greig, J., and Smith, D., forthcoming. 'Pollen, plant macrofossils and insect remains from Hemington, Leicestershire', *in* Cooper L., and Ripper, S., forthcoming 'Medieval Bridges at Hemington Leicestershire'. University of Leicester Archaeological Services.

Greig, J., Smith, D., and Grinter, P., forthcoming 'Environmental evidence from a valley mire', *in* Ellis, P., Hewson, M. and White R. forthcoming, *Excavations at Stamford Road, Oakham, Leicestershire 1997*. Birmingham University Field Archaeology Unit.

Gidney, L., 1991-93 'Leicester, The Shires 1988 Excavations: Animal Bones.' Ancient Monuments Laboratory Reports: Little Lane Roman phases Report No. 56/91, Little Lane medieval phases Report No. 57/91, St Peters Lane medieval phases Report No. 116/91, Post medieval animal bones Report No. 24/92, Small mammal and bird bones Report No. 92/93. Ancient Monuments Laboratory Reports, English Heritage; London. (Also to be included in R. Buckley and J. Lucas forthcoming).

Gidney, L., 1999 'Animal Bone from Causeway Lane, Leicester', *in* Connor, A., and. Buckley, R., 1999, 310-329.

Gidney, L., 2000 'Economic trends, craft specialisation and social status: bone assemblages from Leicester', *in* P. Rowley-Conwy (ed.) *Animal Bones and Human Societies*. Oxford: Oxbow Books.

Girling, M., 1981 'The Environmental Evidence', *in* J. E. Mellor and T. Pearce (eds.), 169173 and microfiche.

Grant, A., 1984 'Animal husbandry in Wessex and the Thames Valley', *in* B. W. Cunliffe and D. Miles (eds.) *Aspects of the Iron Age in Central Southern Britain.*. Oxford: OUCA Monograph **2**, 102-119.

Gouldwell, A. J., 1992 'Animal bone from Enderby', *in* P. Clay 1992, 58-69.

Gouldwell, A. J., 1998 'Animal Bone from Oakham, Leicestershire', *in* P. Clay 1998, 321-323.

Hammon, A., forthcoming 'The animal bones', *in* G. Hughes and A. Woodward 'Excavation of an Iron Age settlement at Crick, Northamptonshire.' Birmingham University Field Archaeology Unit.

Hall, A. R., 1980 '*Late Pleistocene deposits at Wing, Rutland*', *Phil Trans Royal Soc. Series* B **289**, 135-164.

Hayne, J., Shackley, M., and Wainright, N., 1988 'Environmental analysis of deposits from Owston Abbey Fish Pond', *in* M. Aston (ed.) ' *Medieval fish, fisheries and fishponds in England.*' Oxford: BAR, British Series **182**, 301.

Hughes, G., 2000 '*The Lockington Gold Hoard: An Early Bronze Age Barrow Cemetery at Lockington, Leicestershire'*. Oxford: Oxbow Books.

Jarvis, W., forthcoming 'Charred plant remains from a Late Roman corn drier', *in* S. Chapman 'Excavations at the General Hospital site, Crown Hills, Leicester'. ULAS.

Jones, G., 1982 *Plant remains from the Roman villa at Norfolk St. Leicester,* Ancient Monuments Laboratory Report No. **4973**. English Heritage.

Jones, G., 2000 'Evaluating the importance of cultivation and collecting', *in* A. S., Fairbairne (ed.) *Plants in Neolithic Britain and Beyond, 79*-84. Oxford: Oxbow Books.

Keeley, H., 1984 *A review of environmental archaeology in England*. English Heritage.

Knight, D. and Howard, A., 1994 '*Archaeology and Alluvium in the Trent Valley*.' Nottingham: Trent and Peak Archaeological Trust.

Mellor, J. E. and Pearce T., 1981 '*The Austin Friars, Leicester*.' CBA Research Report **35**. Leicestershire County Council and CBA.

Moffett, L. C., Robinson M. A., and Straker, V., 1989 'Cereals, fruit and nuts: charred plant remains from Neolithic sites in England and Wales and the Neolithic economy', *in* A. Milles, D. Williams and N. Gardiner (eds.) *The beginnings of agriculture*, 243-261. Oxford: BAR International Series **496**.

Moffett, L., 1991 'The archaeobotanical evidence for free-threshing tetraploid wheat in Britain', *in* 'Palaeoethnobotany and Archaeology, International Workgroup for Palaeoethnobotany, 8th Symposium at Nitra-Nove Vozokany 1989', *Acta Interdisciplinaria Archaeologia* **7**. Nitra: Slovac Academy of Sciences.

Moffett, L. C., 1993 'Macrofossil Plant Remains from the Shires Excavation Leicester.' Ancient Monuments Laboratory Report 31/93', English Heritage; (and *in* R. Buckley and J. Lucas forthcoming.)

Moffett, L. C., 2000 'Charred plant remains from the barrow contexts', *in* G. Hughes 2000, 78.

Monckton, A., 1992 'The plant remains and Molluscs from Enderby', *in* P. Clay 1992, 69-78.

Monckton, A., 1994 'The plant remains from Normanton le Heath', *in* R. Thorpe, J. Sharman and P. Clay, 1994, 57-59.

Monckton A., 1995 'Environmental Archaeology in Leicestershire', *Trans. Leics. Archaeol. Hist. Soc.* **69,** 32-41.

Monckton A., 1996 'Evidence for food and fodder from plant remains at Causeway Lane, Leicester, UK', *Circaea* **12/2**, 252-258.

Monckton, A., 1998 'The plant remains and Molluscs from Oakham, Leicestershire', *in* P. Clay 1998, *Proceedings of the Prehistoric Society,* **64**, 323-325.

Monckton, A., 1998 'The charred plant remains from the Middle Iron Age site at Wanlip', in M. Beamish 1998, *Trans. Leics. Archaeol. Hist. Soc.* **72**, 75-84.

Monckton A., 1999 'Oysters from Causeway Lane', *in* A. Connor and R. Buckley, 337-341.

Monckton. A., 1999 'The Plant Remains from Causeway Lane', *in* A. Connor and R. Buckley, 346-362.

Monckton, A., 2000 'Charred plant remains from site V Lockington', *in* G. Hughes 2000, 78-81. Oxford: Oxbow Books.

Monckton, A., 2001 'The charred cereals', *in* R. Pollard 'A Late Iron Age pit at Rushey Mead, Leicester,' *Trans. Leics. Archaeol. Hist. Soc.* ***75,*** 2001, 29-31.

Monckton A., forthcoming 'The charred plant remains', *in* G. Hughes and A. Woodward forthcoming *Excavation of an Iron Age settlement at Crick, Northamptonshire*. Birmingham University Field Archaeology Unit.

Morgan, G. C., 1999 'Charcoal from Causeway Lane', *in* A. Connor and R. Buckley 1999, 364-365.

Moulins, de, D., and Murphy P., 2001 'Review of plant macrofossils from sites in the East of England and the East and West Midlands.' Draft report, English Heritage.

Murphy P., 2001 'Review of wood and macroscopic wood charcoal from archaeological sites in the East and West Midlands and the East of England'. Centre for Archaeology Report 23/2001: English Heritage.

Nicholson, R. A., 1992 'Fish Remains from Excavations at the Shires Leicester', Ancient Monuments Laboratory Report 56/92: English Heritage (and *in* R. Buckley and J. Lucas forthcoming).

Nicholson, R. A., 1999 'Fish Remains from Causeway Lane, Leicester', *in* A. Connor and R. Buckley, 333-337.

O'Connor, T., 1988 'Slums, puddles and ditches', *in* P. Murphy and C. French (eds.) *The Exploitation of Wetlands.* Oxford: BAR (British Series) **186**, 61-76.

Paradine, P. J., 1978 'Plant remains from Sproxton and Eaton', *in* P. Clay, 1978, 23, 43.

Pearson, E., 1993 'Assessment of the environmental remains from an evaluation at Rothley Grange, Mountsorrel, Leicestershire'. Hereford and Worcester County Archaeological Service Report **210**.

Pelling, R., 2000 'Charred and mineralised plant remains' *in* B. M. Charles, A. Parkinson and S. Foreman, *Trans. Leics. Archaeol. Hist. Soc.* **74**, 207-213.

Robinson, M. A., 2000 'Further considerations of Neolithic charred cereals, fruit and nuts', in A.S. Fairbairne (ed.) *Plants in Neolithic Britain and Beyond*, 85-90. Oxford: Oxbow Book.

Smith, D., Roseff, R., Brown, A. G., Butler, S., Hughes G., and Monckton, A., forthcoming 'Archaeological and Environmental investigations of a Late Glacial and Flandrian Valley Sequence on the River Soar at Croft, Leicestershire'. Birmingham University Field Archaeology Unit.

Smith, D., 2000 'Disappearance of Elmid 'Riffle Beetles' from lowland river systems in Britain', *in* R. A. Nicholson and T. P. O'Connor (eds.) *People as an agent of environmental change: Symposium of the Association for Environmental Archaeology* No. **16**. Oxford: Oxbow Books.

Smith, D., Green, F., and Monckton, A., forthcoming ' Environmental evidence from Bronze Age palaeochannels', *in* Coward and Ripper forthcoming 'Excavations at Willow Farm, Castle Donington, Leicestershire'. University of Leicester Archaeological Services Report.

Shackley, M., and Hunt, S. A., 1984 'Palaeoenvironment of a Mesolithic peat bed from the Austin Friars, Leicester', *Trans. Leics. Archaeol. Hist. Soc.* **59**, 1-12.

Skidmore, P., 1999 'Mineralised flies from Causeway Lane', *in* A. Connor and R. Buckley 1999, 341-343.

Thorpe, R., Sharman, J., and Clay, P., 1994 'An Iron Age and Romano-British enclosure at Normanton le Heath, Leicestershire', *Trans. Leics. Archaeol. Hist. Soc.* **68,** 1-63**.**

Veen, van der, M., 1996 'The plant remains', *in* J. May *Dragonby Volume1*, 197-211. Oxford: Oxbow Books.

Veen, van der, M., 1992 *Crop husbandry Regimes*. Sheffield University: Sheffield Archaeological Monograph **3**.

Veen, van der, M., 1989 'Charred grain assemblages from Roman period corn driers in Britain', *Archaeol J.*, 146, 302-319.

Veen, van der, M. and O'Connor, T. P., 1998 'The expansion of agriculture in the Late Iron Age and Roman Britain', *in* J. Bailey (ed.) *Science in Archaeology*, 127-143. English Heritage.