AML Report 4563 P. Murphy Site 726

Ipswich, Suffolk. Part 1: Plant macrofossils from Middle Saxon and earlier contexts.

Introduction

Excavations undertaken by the Suffolk Archaeological Unit at Ipswich in recent years have formed part of a sampling programme designed to investigate the nature and extent of occupation in the Saxon and Medieval town. The areas examined were generally small: only in 1983/4 was a large site available for excavation at School Street, IAS 4801. Consequently at the majority of sites only a few contexts suitable for soil sampling were present, and these often ranged in date from the Middle Saxon to Medieval periods. In these circumstances it is more appropriate to consider the plant remains recovered from the town in terms of overall archaeological periods rather than site by site. This report is concerned with botanical material from Early and Middle Saxon contexts at sites IAS 0802, 3410, 4302, 5202, 5502, 5801, 5901, 5902, 6904, 7402 and 7404. These sites were located on well-drained gravel terrace deposits and the plant remains are mainly carbonised with some mineralised material though waterlogged layers were present at the bases of a few deep features. The site at Bridge Street (IAS 6202) was the only excavation which exposed extensive waterlogged deposits providing suitable preservation conditions for a more diverse range of plant macrofossils. The results from Bridge Street are not directly comparable with those from the other sites and will be published separately. At IAS 4801 more extensive sampling was possible and the results from this site will therefore also be the subject of a separate report.

Sampling and extraction

Central column samples, usually 35 x 35cm, were taken from pits, ditches and other contexts with dry fills. The columns were sub-divided, normally at 10cm. vertical intervals. Carbonised and mineralised plant remains were recovered using a water flotation tank with 1mm. meshes to retain the flots and residues. It was found that finer meshes rapidly became clogged with silt. The use of 1mm. meshes has meant that recovery of the smallest macrofossils (mainly small weed seeds) was incomplete, but this mesh size was quite adequate for recovery of cereal grains, rachis and culm fragments, fruitstones, nutshells and most of the weed seeds. Plant remains were extracted from both flots and residues: most of the mineralised material did not float, but was retained in the residue. The flots were sorted under a binocular microscope at low power.

Plant macrofossils were extracted from smaller samples of waterlogged layers, grading the disaggregated samples in a sieve bank as described by Kenward et al (1980). Additional bulk samples from these deposits were processed in the flotation tank, primarily in order to recover more fruitstones.

Identifications of carbonised plant remains and of macrofossils from waterlogged layers are given in Tables . Fruits, seeds and other plant remains preserved by phosphatic mineralisation are listed in Table. This table includes only these features with a high concentration of mineralised material: other features contained a few, usually unidentifiable, mineralised seeds and stem fragments. Some other uncarbonised seeds from the samples are considered to be recent contaminants. These include 'seeds' of Fumaria officinalis, Spergula arvensis, Chenopodium hybridum, Mercurialis annua, Conium maculatum, Medicago lupulina, Rubus idaeus, Rumex sp, Urtica urens, Stachys sp. and Galium aparine. Such contamination was not common: only at IAS 7404 and 7402 was it prominent. Uncarbonised seeds of Sambucus nigra were ubiquitous. Some of these may be intrusive contaminants, others are probably original constituents of the deposits.

Plant remains from sites IAS 5502 and IAS 7402 were recovered by A.K.G. Jones and N.D. Balaam.

Floristic composition of the assemblages

(a) Crops and edible wild plants

(1) Wheats (Triticum spp.)

Wheat grains are common in most samples. Almost all specimens are of bread wheat-type (Triticum aestivum s.l.): short broad grains with maximum widths just above the steeply-placed embryo, and with rounded cheeks to the ventral furrow. Typical examples from IAS 0802 0052 are illustrated in Plate . Rachis fragments, however, are extemely rare. The internode from IAS 5801 0059 is abraded, but shows the "shield" shape characteristic of T. aestivum. Two conjoint internodes from IAS 5801 0038 also show this feature very clearly. The nodes in this rachis section show very thin ridges of tissue below the glume insert but no trace of the glume bases is visible (Plate)IAS 6904 0051 produced a basal rachis internode attached to the top of the culm, showing longitudinal striations on its convex face.

A grain from IAS 5902 0064 (a 6th-7th century ditch) is tentatively identified as spelt (Triticum spelta) but the only definite identification of a glume wheat was of a very battered fragmentary spikelet fork of Triticum spelta from IAS

6904 0026. This identification of spelt is anomalous in a Middle Saxon context in East Anglia. At Brandon, Suffolk (Murphy 1982) only free-threshing wheats were positively identified, and elsewhere in Ipswich no trace of spelt was found in samples from Middle Saxon deposits. It seems probable that this spelt fork is residual: there were Roman features at IAS 6904, though in fact samples from these produced no cereal remains. However, reworking of other Roman occupation deposits at this site could have resulted in cross-contamination.

(2) Rye (Secale cereale)

Well-preserved grains from IAS 0802 0052 are shown in Plate . Several of these show lines of transverse pericarp cells (Korber-Gröhne 1964, 46), but preservation of such detail is exceptional. Rachis internodes are rare and most examples are very poorly preserved with no trace of marginal pubescence. The example illustrated (Plate) is from IAS 5801 0038.

(3) Barley (Hordeum spp.)

The remains of barley are generally poorly preserved. Most grains have porous 'cokey' surfaces and are badly deformed. No rachis internodes were recovered. Only at site IAS 5801 were large numbers of comparatively well-preserved grains present. Specimens from IAS 5801 0028 are illustrated in Plate . Six grains are shown in dorsal view: three germinated specimens with only traces of the lemma, and three grains with the lemma largely intact, one of which shows a bevelled lemma base. Of the two grains illustrated in ventral view, one is from a median spikelet, one from a lateral spikelet. Asymmetrical lateral grains were distinguished in contexts IAS 0802 0109, 0203, IAS 5801 0019, 0028, IAS 5901 0293, IAS 6904 0018, 0051, IAS 7402 0090, 0281 and IAS 7404 0020. These establish the presence of Hordeum vulgare L. emend Lam. (6-row hulled barley), but the vast majority of grains were too badly deformed for it to be determined whether they were from median or lateral spikelets. Potentially, however, 2-row barley could be represented, for this crop has been identified at the 8th-9th century coastal trading settlement of Dorestad, Netherlands (Van Zeist 1974, 141).

(4) Oats (Avena sp.)

Oat grains occurred at lower frequencies than those of other cereals, and it is probable that a proportion of these grains are from weed species. The only floret base is of Avena sativa-type, showing a broad basal fracture, from IAS 0802 0052.

(5) Pea (Pisum sativum)

Several samples produced carbonised seeds and isolated cotyledons of a size and form resembling this species, but none of these shows any trace of the testa or hilum. These specimens are listed as Pisum/Vicia-type in Table . Positive identifications were made only from mineralised specimens from IAS 5202 0007 (Plate). These consist of mineralised testa fragments bearing short ovate hilums about 2 x 1.2mm. in size. Also illustrated in this Plate are a pea-sized seed in which the cotyledons and radicle are mineralised, with no trace of the testa, and a crushed testa of a pea-sized seed with little trace of any internal tissues.

(6) Horse-bean (Vicia faba var minor)

Small numbers of carbonised seeds and cotyledons were recovered. Dimensions of 11 specimens from sites IAS 0802, 5502, 5801, 5901, 6904 and 7402 were as follows:

	Length (mm)	Cotyledon breadth (mm)	Thickness across cotyledons (mm)
maximum	8.2	6.0	5.8
mean	6.89	5.07	5.18
minimum	5.4	4.3	4.5

The seed surfaces were abraded and no seed retained its hilum. Seeds from IAS 6904 0051 and IAS 5901 0320 are illustrated in Plate .

(7) Flax (Linum usitatissimum)

Carbonised seeds were recovered from only two contexts: IAS 0802 0190 and IAS 5801 0035 (Plate). On some seeds the cell patterning of the testa is well preserved, though most specimens are thickly encrusted with soil particles. All seeds from the present sites are more or less deformed, and measurements have therefore not been made.

(8) Hemp (Cannabis sativa)

A carbonised embryo of a hemp fruit from IAS 0802 0190 is illustrated in Plate . IAS 5202 0007 produced a fragmentary mineralised fruit.

(9) Hop (Humulus lupulus)

Mineralised fruits were recovered from IAS 0802 0203 and IAS 5801 0028.

(10) Fig (Ficus carica)

A single mineralised fig seed came from IAS 5801 0035. It is crushed and partly encrusted with sediment but the dorsal ridge and hilum are clearly distinguishable.

(11) Prunus spp.

Most of the specimens recovered consist only of mineralised internal casts of endocarps (Plate). These are not specifically identifiable, but are of Prunus spinosa/avium size. Carbonised fruitstones include a stone of P. avium from IAS 5502 113 (7.0 x 5.9mm) and fragmentary stones of P. spinosa from IAS 0802 0109 and IAS 5901 0288. Endocarps from waterlogged layers in IAS 5502 0455 are unfortunately rather crushed and deformed but include specimens of Prunus domestica subsp. insititia and some fragmentary endocarps which may be of the subsp. domestica.

(12) Other rosaceous fruits

(Malus sylvestris/domestica)

Well-preserved mineralised apple seeds from IAS 5202 0007 are shown in Plate . A few other specimens were recovered from IAS 5801 0059 and IAS 5502 0455, and an abraded carbonised seed from IAS 5902 0134 is tentatively identified as an apple seed. Fragmentary carbonised fruitstones of hawthorn (Crataegus monogyna) came from IAS 5901 0293, IAS 6904 0018 and 0051. The Rubus fruitstones are of bramble (R. fruticosus) and raspberry (R. idaeus). Strawberry (Fragaria vesca) was identified in IAS 5502 0455.

(13) Elder (Sambucus nigra)

A few carbonised seeds of elder were recovered, but uncarbonised seeds were almost ubiquitous. Some of these could be recent contaminants but elder seeds do appear to be extremely resistant to decay even in aerobic soils, and it is probable that a proportion of these seeds do represent human food refuse.

(14) Hazel (Corylus avellana)

Carbonised nutshell fragments were present in most of the contexts.

(15) ?Dill (cf. Anethum graveolens)

Three umbelliferous fruits from IAS 5502 0455 are tentatively identified as dill.

(b) Weeds and other wild plants

Weeds are represented in these samples by carbonised fruits, seeds and tubers, most of which are likely to have been contaminants of crops, and by seeds from waterlogged and mineralised deposits, which were probably derived largely from ruderal vegetation growing in the vicinity. Only the carbonised material will be considered here. The remaining seeds are of an uniformative and limited range of species common on disturbed and damp ground in settlement areas. Very similar restricted weed seed assemblages are reported by Monk (1980, 128) from Saxon pits at Southampton. Larger samples containing a greater range of wild species were examined from the waterlogged deposits at Bridge Street (IAS 6202), and these provide much more useful information on local vegetation.

The weed flora identified from carbonised seeds includes several species commonly found on light sandy soils: Fumaria officinalis, Raphanus raphanistrum, Spergula arvensis, and Hyoscyamus niger. Seeds of Vicia and Lathyrus (including V. cf. sativa, V. cf. tetrasperma and L. cf. nissolia) are common, occurring in 69% of Middle Saxon contexts. Other frequently-occurring weed species are Agrostemma githago, Chenopodium album, Medicago lupulina-type, Polygonum persicaria, P. lapathifolium, P. convolvulus, Rumex sp, Plantago lanceolata, Galium aparine and Bromus mollis/secalinus. Weeds occurring at lower frequencies comprise Polygonum aviculare, cf. Urtica urens, cf. Convolvulus arvensis, Solanum nigrum, Mentha arvensis/aquatica, Valerianella cf. dentata, Lapsana communis, Lolium temulentum-type and Arrhenatherum elatius var. bulbosum (tubers). There are also some fruits of species characteristic of damp and wet habitats: Eleocharis (cf. palustris), Schoenoplectus sp. and Carex sp. A single capsule of heather, Calluna vulgaris, came from IAS 5902 0134.

Soils in the Ipswich area are predominantly light and sandy and unreclaimed areas of heathland still survive. Keeley and MacPhail (1978) have described a palaeosol from IAS 4302 buried beneath Middle Saxon and later occupation deposits. This was truncated, but showed evidence of podzolisation. On this evidence it seems probable that much of the land available for agriculture around the Middle Saxon town would have been acid and poor in plant nutrients. The presence of weed species characteristic of acid sandy soils, and the frequent occurrence of vetch seeds in the samples is clearly consistent with this, and the presence of a carbonised heather capsule indicates development of at least some heath vegetation in the area. The Eleocharis and Carex nutlets might indicate that cultivation extended onto seasonally damp soils. The nutlets of Schoenoplec tus sp. are likely to be derived from bulrushes collected for use as litter or thatching.

Distribution of plant remains within features

The features fall into three categories:

1. Features in which preservation is solely or almost entirely by carbonisation. The density and distribution of carbonised cereal remains and weed seeds is very variable, though the lowest layers of several pits contain comparatively few macrofossils, perhaps because the bottom fills were formed rapidly by collapse of the pit sides. In some features there is little variation in species composition with depth (e.g. IAS 0802 0052 in which wheat and rye grains predominate in all samples) but in others there are marked fluctuations (e.g. IAS 0802 0109, where rye grains predominate at the base, wheat at the top).

2. Features containing carbonised plant remains with a significant proportion of mineralised seeds and fruitstones (e.g. IAS 5202 0007, IAS 5801 0028, 0035, 0059, IAS 5502 0434, IAS 5901 0238, 0288). In these features the distribution of carbonised and mineralised plant remains is complementary (Fig.). Mineralised material is common at low levels in the pit, often at the base, but carbonised cereals are more abundant at the top. Phosphatic mineralisation is frequently associated with garderobes and cess pits (Green 1979). It therefore appears that these pits were initially used for disposal of sewage and table refuse but were later back-filled with less-organic deposits.

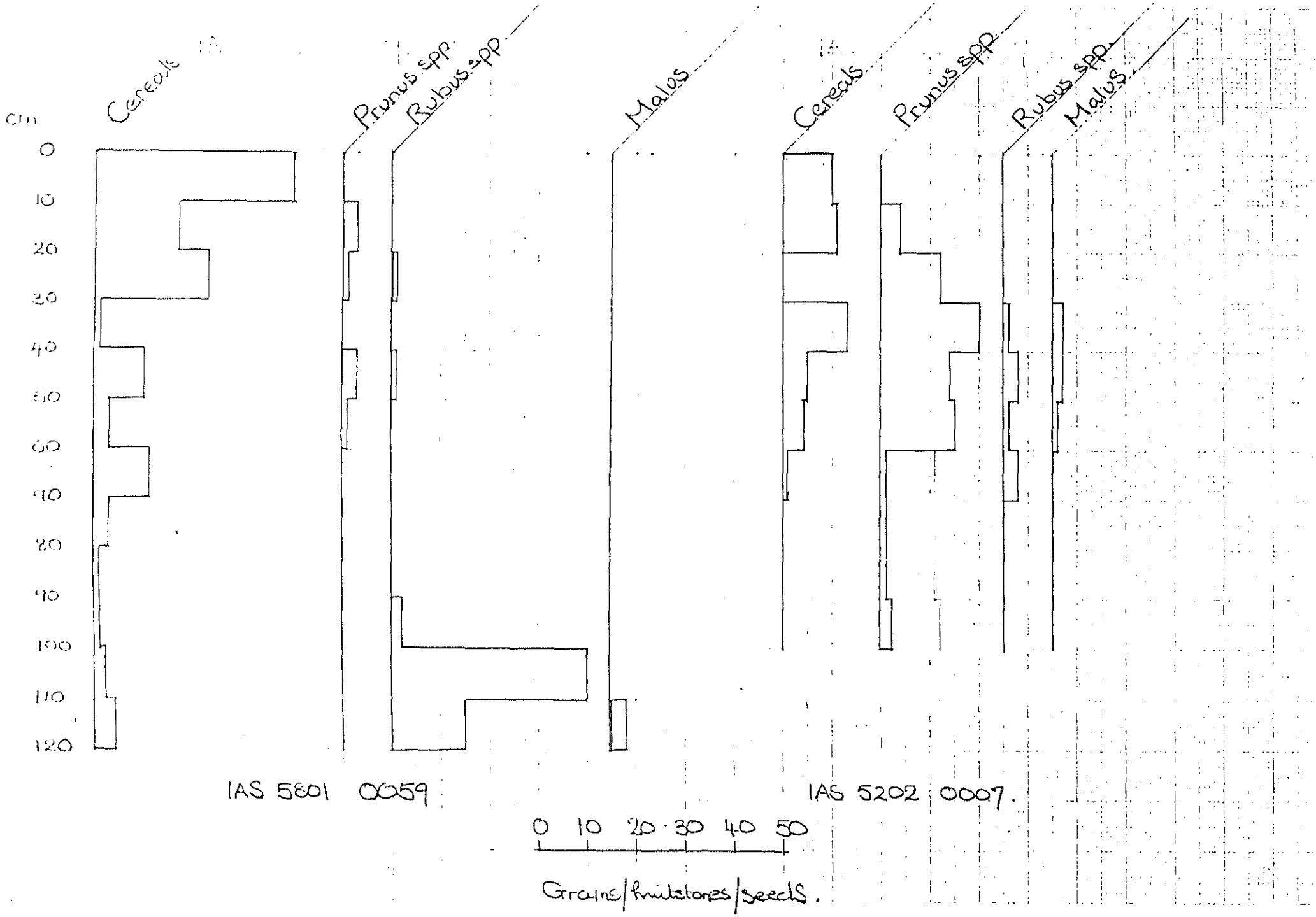
3. Features containing wet or waterlogged deposits. The sites discussed in this report were all on freely-draining terrace gravels, and consequently waterlogged deposits were rare and occurred only in the bases of deep features (IAS 4302 0039, IAS 5502 0455).

Distribution of plant remains between features and sites

Variations in the composition of the assemblages which can be related to particular activities are considered here. Three aspects of variation will be discussed: firstly, variations in the relative proportions of grains and weed seeds; secondly, the distribution of deposits containing germinated grains of barley and other cereals; and thirdly the distribution of mineralised cess-type deposits.

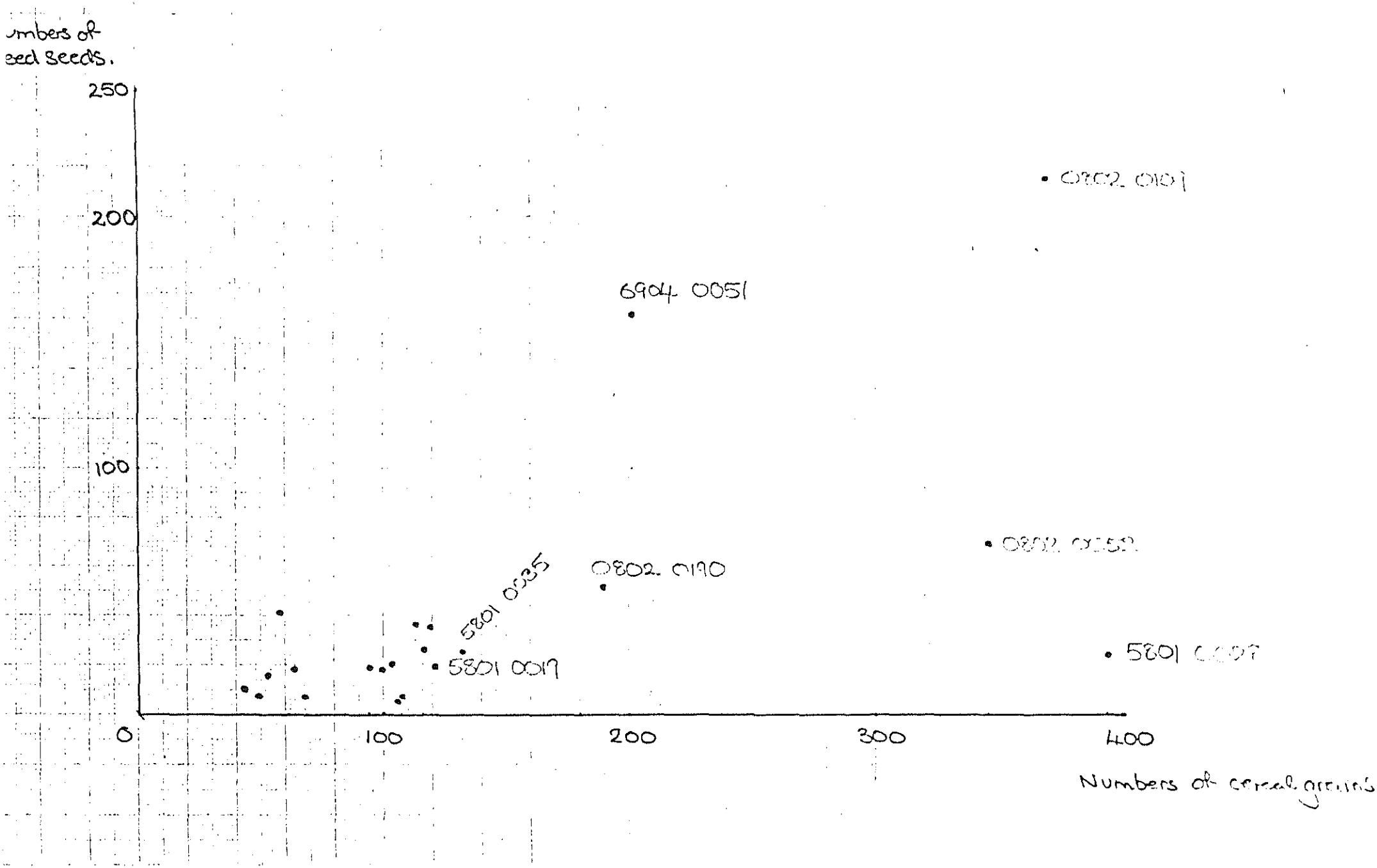
1. Grains and weed seeds

The assemblages of carbonised plant remains from these sites consist predominantly of well-developed cereal grains (not tail-grain) and weed seeds. Rachis and culm


cm
0
10
20
30
40
50
60
70
80
90
100
110
120
Cereals
Prunus spp.
Rubus spp.
Malus
Cereals
Prunus spp.
Rubus spp.
Malus
IAS 5801 0059
IAS 5202 0007.
0 10 20 30 40 50
Grains/fruitstones/seeds.

	IAS 0802 0052	IAS 0802 0109	IAS 5801 0028	IAS 6904 0051
Cereal grains	345	369	394	201
Total weed seeds	69	215	24	161
Grain-sized weed seeds	55	72	19	26
Grain-sized weed seeds as a percentage of total weed seeds	79.7%	33.5%	79.2%	16.1%

Table : Weed seed and cereal grain composition of four large assemblages.


umbers of
eed Seeds.
250
200
100
0
100
200
300
400
Numbers of cereal grains
6904 0051
0802 0190
5801 0035
5801 0017

fragments occur sporadically in very small numbers. No assemblages representing waste material from crop processing were recovered (Hillman 1981, Fig. 6, Stages 1-7). This suggests that cereals were arriving at Ipswich as semi-cleaned grain, having been grown at outlying farming sites.

In Fig. numbers of cereal grains are plotted against numbers of weed seeds for all assemblages containing more than 40 grains. It should be noted that a 1mm. collecting mesh was used, and recovery of the smallest weed seeds was therefore imcomplete. This bias affects all samples equally, however.

In the majority of assemblages weed seeds are rare, but two contexts (IAS 6904 0051, IAS 0802 0109) produced assemblages with a higher proportion of weed seeds. A more detailed break-down of the composition of the four largest assemblages is given in Table . Here grain-sized weed seeds and fruits (Raphanus raphanistrum, Agrostemma githago, Vicia/Lathyrus spp, Polygonum convolvulus, Galium aparine, Bromus sp. and other indeterminate large Gramineae) are considered as a separate category from the remaining seeds. In two large assemblages containing few weed seeds (IAS 0802 0052, IAS 5801 0028) the grain-sized seeds account for about 80% of total weed seeds, but in IAS 0802 0109 and IAS 6904 0051 these grain-sized seeds make up only 16-33% of weed seeds. In other words the 'excess' weed seeds in these two comparatively weed-rich assemblages are largely smaller types, in particular Spergula arvensis and Rumex spp. This may indicate that the batches of cereals from which these two assemblages were derived had not been efficiently sieved to remove fine weed seeds (Hillman 1981, Fig. 6, Stage 7). The remaining assemblages appear to have come from fully-sieved batches of grain. Carbonisation seems to have occurred in all cases during the latest stages of crop processing, during drying for bulk storage and/or during the latest stages of preparation for consumption.

2. Germinated grains

Germination can occur accidentally due to sprouting in the ear in a wet summer or to damp storage conditions, but the presence of sprouted grains can be an indication that grain was being malted for brewing (Hillman 1982, 138-140). Sprouted grains were seen in seven of the Middle Saxon assemblages from Ipswich. Contexts IAS 0802 0052, 0109 and 0190, IAS 5801 0028, IAS 5901 0293 and IAS 6904 0018 produced sprouted barley grains, and sprouted grains of oat came from IAS 0802 0052 and IAS 5801 0028. Single germinated grains of wheat and rye were recovered from IAS 0802 0190 and IAS 5901 0288. Only the assemblage from IAS 5801 0028 contained a high proportion of sprouted grains and these were mostly of barley. The fact that germinated grains of barley are more common than those of other species gives grounds for thinking that most of these grains

were carbonised during the drying of malt: accidental sprouting would have affected all cereals to an equal degree. Barley has historically been the main cereal used for malting in this country.

The assemblage from IAS 5801 0028 provides the best evidence for malting. Sprouted grains from this assemblage are illustrated in Plate . Germination has caused deformation of most grains, but a few specimens from lateral spikelets can be distinguished and it therefore appears that six-row hulled barley is the main crop represented. There is considerable variation in the lengths of sprouts: they extend for up to about three quarters of the grain length but many grains show only the beginnings of sprouting. A lack of uniformity in sprouting does, however, seem to have been characteristic of early medieval malt. At Alms Lane, Norwich good structural evidence for the existence of a brewery site has been obtained, in the form of a steeping pit, malting floor, drying ovens and a millstone, probably used for crushing the dried malt. Deposits of carbonised malt were present in the ovens but these included a high proportion of grains showing only incipient sprouting (Murphy, in preparation). Krzywinski et al (1983, 156) report wide variations in sprout lengths in carbonised malt from Bryggen, Bergen, Norway. It would be surprising if early medieval malting barley showed the degree of uniformity in germination of modern varieties: it is only to be expected that there would have been wide physiological variability.

3. Mineralised plant remains

As noted above, mineralised plant remains, mainly fruitstones of Rubus spp, Prunus spp, seeds of Malus sylvestris/domestica and of Sambucus nigra were most common in the bases of pits. It is thought that these pits were initially used for disposal of sewage and table waste before being back-filled. Pits of this type were sampled at sites IAS 3410, 5502, 5801 and 5901. At other sites the pits sampled contained either no mineralised macrofossils, or only rare poorly-preserved mineralised stem fragments and seeds. It is noticeable that pits with mineralised fruitstones were recorded only from sites close to the north bank of the Orwell and in the centre of the town: at peripheral sites such as IAS 0802 IAS 7404 and 7402 pits of this type were apparently absent. It is possible that this distribution is related to the density of occupation in the town.

The only economic plants identified from mineralised macrofossils apart from soft fruits, nuts and pulses were a fruit of Cannabis sativa, hemp, from IAS 5202 0007 and two fruits of Humulus lupulus, hop, from IAS 0802 0203 and IAS 5801 0028. This latter pit also produced a large cereal deposit including

germinated barley grains, which are believed to represent barley malt. Hops are known to have been used for preserving and flavouring beer from the 9th century onwards on the Continent (Behre 1984, 115). However two identifications of hop fruits do not provide sufficiently strong grounds for suggesting that hopped beer was being produced in Middle Saxon Ipswich. At Bridge Street (IAS 6202) a few hop fruits were recovered from waterfront deposits, of Middle-Late Saxon date,but these could very easily have been naturally dispersed: no large assemblages of hop fruits which would firmly establish the use of hops have yet been recovered at Ipswich.

Conclusions

The cereals and pulses identified in the Middle Saxon samples from Ipswich are bread wheat, rye, six-row hulled barley, oats, horsebeans and peas. Two earlier ditches, IAS 5902 0064 and 0141, dating to the 6th-7th centuries also produced remains of these cereals, together with a spelt-type grain, though in the absence of spikelet fragments definite identification is not possible. A spelt spikelet fork from IAS 6904 0026 is believed to be residual from Roman activity at this site. Other crops and potentially useful wild species from the Middle Saxon samples are flax, hemp, hop, fig, sloe, wild cherry, bullace, apple, haw, bramble, raspberry, strawberry, elderberry and hazel.

All the assemblages of carbonised plant remains examined so far consist of prime grain with varying but generally low proportions of weed seeds, rachis fragments and culm nodes as well as rare pulse seeds, hazel nutshell fragments and fruitstones. No deposits of crop-cleaning waste have been recovered. From this it seems that cereals arrived in Ipswich as batches of semi-cleaned grain and that carbonisation occurred mainly whilst cereals were being prepared for storage by drying, and during the final stages of preparation for consumption.

The carbonised weed seeds include several species characteristic of acid sandy soils and the abundance of vetch seeds suggests that crops were being grown on nitrogen-deficient land. Since soils in the Ipswich area are predominantly of this type it seems likely that crops were being produced by farming settlements at no great distance from the town. The possibility that cereals were imported by sea cannot be excluded but there is no evidence for it. Of the plant remains identified only a single fig seed from IAS 5801 0035 definitely provides evidence for imported foodstuffs.

Germinated barley grains, particularly a large assemblage from IAS 5801 0028, are thought to represent malt carbonised whilst being dried. Concentrations of

mineralised fruitstones and other seeds in the bases of several pits indicate that these features were initially used as cess pits.

In summary, the samples examined so far from Ipswich provide useful information about the plant economy of a 'consumer' settlement. To learn more about the Middle Saxon agrarian economy of this area it will be necessary to study plant remains from 'producer' sites which may be expected to yield more detailed information on crop husbandry and processing methods.

References

Behre, K-E. (1984) 'Aspects of the history of beer-flavouring agents based on fruit finds and written sources', in Van Zeist, W. and Casparie, W.A. (eds). Plant and Ancient Man Studies in palaeoethnobotany. Rotterdam: A.A. Balkema pp.115-122.

Green, F.J. (1979) Phosphatic mineralisation of seeds from archaeological sites. Journal of Arch. Sci. 6, 279-284.

Hillman, G. (1981) Reconstructing Crop Husbandry Practices from charred remains of crops, in Mercer, R. (ed). Farming Practice in British Prehistory. Edinburgh: University Press, pp.123-162.

Hillman, G. (1982) Evidence for spelt malting at Catsgore in Leech, R. Excavations at Catsgore 1970-1973. Bristol: Western Archaeological Trust, pp.137-141.

Keeley, H. and MacPhail, R. (1978) Report on a soil at Ipswich, Suffolk. Ancient Monuments Laboratory Report No.2691.

Kenward, H.K., Hall, A.R. and Jones, A.K.G. (1980) A tested set of techniques for the extraction of plant and animal macrofossils from waterlogged archaeological deposits. Science and Archaeology 22, 3-15.

Korber-Grohne, U. (1964) Bestimmungsschlüssel für subfossile Juncus-Samen und Gramineen-Früchte, in Haarnagel, W. (ed) Probleme der Küstenforschung im Südlichen Nordseegebeit, 7, 32-47. Hildesheim: August Lax.

Krzywinski, K., Fjelldal, S. and Soltvedt, E-C. (1983) Recent palaeoethnobotanica work at the medieval excavations at Bryggen, Bergen, Norway, in Proudfoot, B. (ed) Site, Economy and Environmen British Archaeological Reports International Series 173, 145-169.

Monk, M.A. (1980) The seed remains in Holdsworth, P. Excavations at Melbourne Street, Southampton 1971-76, pp.128-133. CBA Res. Rpt. No.33.

Murphy, P. (1982) Brandon, Suffolk: Carbonised plant remains. Ancient Monuments Laboratory Report No.3637.

Van Zeist, W. (1970) Prehistoric and Early Historic Food Plants in the Netherlands. Palaeohistoria XIV, 42-173.

Site No.	0802	0802	0802	0802	0802	0802	3410
Context No.	0007	0052	0109	0182	0190	0203	0068
Triticum aestivum s.l.	15	118	81	3	48	23	-
Triticum aestivum (rachis nodes)	-	-	-	-	-	-	-
Triticum sp. (basal rachis internode)	-	-	-	-	-	-	-
Triticum spelta-type	-	-	-	-	-	-	-
Triticum spelta L. (spikelet fork)	-	-	-	-	-	-	-
Secale cereale L.	9	86	110	11	19	18	-
Secale cereale L. (rachis nodes)	1	2	-	-	-	-	-
Hordeum spp.	5	17	25	27	20	30	-
Avena sativa L. (floret base)	-	1	-	-	-	-	-
Avena spp.	3	33	10	3	18	9	-
Indeterminate cereal	21	91	143	20	84	39	1
Indeterminate cereal (culm nodes)	-	+	+	+	-	-	-
Vicia faba L. var minor (seeds)	-	-	-	-	1	-	-
Vicia faba L. var minor (cotyledons)	-	1	1cf.	-	-	1cf.	-
Pisum/Vicia-type (seeds)	-	1	-	-	1	1	-
Pisum/Vicia-type (cotyledons)	-	-	-	-	-	1	-
Pulse cotyledon fragments	-	+	-	+	+	+	-
Linum usitatissimum L.	-	-	-	-	6	-	-
Cannabis sativa L.	-	-	-	-	2+1cf.	-	-
Fumaria officinalis L.	-	-	-	-	-	-	-
Raphanus raphanistrum L.	-	-	-	-	-	-	-
Agrostemma githago L.	2	2	2	-	-	-	-
Spergula arvensis L.	-	-	17	-	-	-	-
Chenopodium album L.	-	-	-	-	-	-	-
Chenopodium sp.	-	-	2	1	1	-	-
Atriplex sp.	-	1	4	1	-	-	-
Chenopodiaceae indet.	-	-	13	-	-	2	-
Malva sp.	-	-	-	1	1	-	-
Medicago-lupulina-type	-	-	1	-	-	-	-
Medicago/Trifolium	-	-	-	-	-	-	-
Vicia cf. sativa L.	-	-	-	-	-	-	-
Vicia cf. tetrasperma (L) Schreber	-	-	2	-	-	-	-
Vicia/Lathyrus (seeds)	-	5	22	2	3	-	-
Vicia/Lathyrus (cotyledons)	1	5	42	-	-	-	-
Lathyrus cf. nissolia L.	-	-	-	-	-	-	-
Rubus sp. (fragment)	-	-	+	-	-	-	-
Prunus cf. spinosa L. (fragment)	-	-	+	-	-	-	-
Prunus cf. avium L.	-	-	-	-	-	-	-
Crataegus monogyna Jacq.	-	-	-	-	-	-	-
Malus sylvestris/domestica	-	-	-	-	-	-	-
Polygonum aviculare agg.	-	-	-	-	-	-	-

)007	0113 (171)	0229	0369 (317)	0374	0434	0537 (0095)	0019	0028	0035 (2 columns)	0038	0059	0238	028
9	1	3	3	3	3	8	43	126	47	31	53	21	31
-	-	-	-	-	-	-	-	-	-	2	2	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	1	5	2	4	10	1	3	7	26	4	21	31
-	-	-	-	-	-	-	-	-	-	2	-	-	-
2	3	9	7	2	3	6	42	159	8	8	17	1	10
-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	-	2	1	-	1	3	1	21	10	1	19	2	2
19	11	11	8	9	3	22	34	85	60	39	23	23	39
-	-	+	-	-	-	+	-	+	-	-	+	-	+
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	1	-	-	-	-	-	1	-	1
-	-	-	-	1	-	1	-	1	-	-	-	1	-
1	-	-	-	-	-	-	-	-	-	-	-	-	1
+	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	1	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	2	-	-	-	1
-	-	-	1	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	1	-	-	-	-	-	-	-	2	-	2
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	4	-	-	-	-	-	-	-	1	-	-
2	-	-	-	-	-	-	-	-	1	-	1	-	2
-	-	1	-	-	-	1	-	-	-	-	-	1	1
-	cf.1	-	-	-	-	-	-	1	-	-	-	-	2
-	-	-	-	-	-	-	1	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	1	-	-
-	1	1	-	-	-	2	1	4	1	-	1	-	-
1	-	-	-	-	-	-	1	-	2	-	3	1	1
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	1	-
-	-	-	-	-	-	-	-	-	-	-	-	-	+
-	1	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	2	-	-	-	1	-	-	-	-	-	-

901	8901	8902	8902	8902	8904	8904	8904	7404	7404	7402	7402	7402
293	0320	0064	0134	0141	0018	0026	0051	0005	0020	0090	0237	0281
11	34	14	10	6	26	7	111	3	17	2	1	15
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	1	-	-	-	-	-
-	-	1	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	1	-	-	-	-	-	-
8	19	19	24	12	16	1	19	17	29	1	-	2
-	-	-	-	-	-	-	2	-	-	-	-	-
2	9	7	11	5	5	4	15	10	19	4	1	3
-	-	-	-	-	-	-	-	-	-	-	-	-
1	1	8	11	4	1	1	1	9	4	-	-	1
15	31	18	47	22	10	11	55	68	30	8	2	11
-	-	-	-	-	-	-	+	+	-	-	-	-
-	1	-	-	-	-	-	3	-	-	3	-	-
-	-	-	-	-	1	-	1	-	-	1	-	-
-	-	-	-	-	-	-	-	-	-	1	-	-
-	-	-	-	-	-	1	2	-	-	-	-	1
+	+	+	+	+	-	+	+	+	+	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	1	-	-	-	-	-	-	-
-	-	-	3	-	-	-	-	-	1	-	-	-
-	-	-	-	-	-	-	-	-	1	-	-	-
-	-	-	-	-	2	-	7	-	-	-	-	-
1	6	-	-	-	-	-	5	-	-	-	-	-
1	-	-	-	-	-	-	1	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	1	-	-	-	1	-	1	-	-	1	-	-
-	1	-	2	-	5	1cf.	11	-	-	-	-	-
-	-	-	-	-	-	-	2	-	-	-	-	-
1	-	-	-	-	1	-	3	-	-	-	-	-
-	-	-	1	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
3	1	1	-	1	1	-	-	1	3	-	-	2
-	1	2	-	2	2	-	2	2	1	-	-	1
-	-	-	-	-	-	-	1	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	1	-	-	-	-	-
+	-	-	-	-	+	-	+	-	-	-	-	-
-	-	-	1cf.	-	-	-	-	-	-	-	-	-
-	1	-	-	-	-	-	-	-	-	-	-	-

Polygonum lapathifolium L.	-	-	1	-	-	-	-
Polygonum lapathifolium/persicaria	1	1	-	-	-	-	-
Polygonum convolvulus L.	-	4	2	1	1	-	-
Rumex sp.	-	2	16	2	8	5	-
Polygonaceae indeterminate	-	-	1	1	2	1	-
cf. Urtica urens L.	-	-	-	-	-	-	-
Corylus avellana L. (fragments)	+	+	+	+	+	+	-
Calluna vulgaris (L) Hull (capsule)	-	-	-	-	-	-	-
cf. Convolvulus arvensis L.	-	-	-	-	-	-	-
Hyoscyamus niger L.	-	-	-	-	-	-	-
Solanum nigrum L.	-	-	-	-	-	-	-
Mentha arvensis/aquatica	-	-	-	-	-	-	-
Plantago lanceolata L.	1	-	9	1	1	2	-
Galium aparine L.	2	9	1	3	2	4	-
Sambucus nigra L.	-	-	-	-	+	-	-
Valerianella cf. dentata (L) Poll.	-	-	-	-	-	-	-
Lapsana communis L.	-	-	-	-	-	-	-
Compositae indeterminate	-	-	-	-	-	-	-
Eleocharis sp.	-	4	-	-	2	-	-
Schoenoplectus sp.	-	-	5	-	-	-	-
Carex sp.	-	-	4	-	1	-	-
Cyperaceae indeterminate	-	-	-	-	-	-	-
Lolium temulentum-type	-	-	-	-	2	-	-
Bromus sp.	2	20	9	1	4	2	-
Arrhenatherum elatius var. bulbosum (tubers)	-	-	-	-	-	-	-
Gramineae indeterminate	6	12	14	2	9	6	-
Indeterminate	1	6	69	2	14	13	-
? Charred food residue	-	-	-	-	-	+	-
Sample volume (litres)	49	126	98	24.5	135	61	-

Table : Carbonised plant remains.

-	-	-	-	-	-	-	-	-	-	-			
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	1	-	-	-	-	-	-	-
-	-	-	4	-	-	-	1	-	2	1cf.	-	1	2
-	-	-	3	-	-	-	-	-	1	-	1	1	-
-	-	-	-	-	-	-	-	-	-	-	1	-	1
-	-	-	-	-	-	-	-	-	-	-	-	-	-
+	-	+	+	-	+	+	+	+	+	+	+	+	+
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	1	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	1	-	-	-	2	-	1
1	-	-	-	-	-	-	-	-	-	-	-	1	1
-	-	-	2	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	1	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	1
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	1	1	-	-	-	1	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	2
-	-	-	1	-	-	-	1	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	1	1	-	-	-	1	1	9	3	1	-	-	1
-	-	-	-	-	-	-	-	-	-	cf.	-	-	-
1	1	-	4	-	-	2	-	6	5	1	4	1	-
-	-	1	1	1	2	-	9	4	-	-	10	1	18
-	-	-	-	-	-	-	-	-	-	-	-	-	-
122	60	65	40	55	60	75	116	80	196	98	147	49	135
		(65% sorted)			(75% sorted)								

-	-											
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
6	1	-	1	-	3	-	8	2	2	-	-	-
1	-	-	3	-	3	2	56	-	-	-	-	-
-	-	-	-	1	2	2	6	-	-	-	-	-
-	-	-	-	-	1	-	-	-	-	-	-	-
+	-	-	-	-	+	-	+	+	+	-	-	-
-	-	-	1	-	-	-	-	-	-	-	-	-
-	1	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	1	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	1	-	-	-	-	-
-	-	-	1	-	-	-	3	-	-	-	-	-
-	-	-	1	-	1	1	1	1	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	1	1	-	-	-	-	-
1	-	-	-	-	-	2	11	-	-	-	-	-
-	-	-	-	-	-	-	1	-	-	-	-	-
-	-	-	-	-	-	-	1	-	-	-	-	-
-	-	-	-	-	2	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	4	2	2	1	2	9	1	2	-	-	1
-	-	+	-	+	+	-	-	-	-	-	-	-
-	-	-	3	-	1	-	5	-	2	-	-	-
3	5	2	2	1	12	8	23	-	5	2	1	1
-	-	-	-	-	-	-	-	-	-	-	-	-
126	73	49	61	37	122	98	147	122	147	622	435	475

Site No.	0802	3410	5202	5502	5801	5801	5801	5901	5901
Context No.	0203	0068	0007	0434	0028	0035	0059	0238	0288
Thlaspi arvense L.	-	-	-	-	1	-	-	-	-
Malva sp.	-	-	1	-	-	-	-	-	-
Pisum sativum-type	-	-	5	-	-	-	-	-	-
Vicia/Lathyrus sp.	-	-	3	-	-	-	-	-	-
Rubus fruticosus agg.	-	-	1	-	-	3	-	-	-
Rubus idaeus L.	-	-	-	9	-	-	-	1	-
Rubus sp.	-	97	7	4	-	-	59+fr	2	-
Prunus sp.	-	+	70+fr	2	8	64	8	2	2
Malus sylvestris/domestica	-	-	5	-	-	-	3	-	-
Polygonum aviculare agg.	-	-	-	-	-	-	1	-	-
Polygonum persicaria L.	-	-	-	-	-	2	-	-	-
Rumex sp.	-	-	2cf	-	1	-	-	-	-
Polygonaceae indet.	-	-	1	-	-	-	-	-	-
Cannabis sativa L.	-	-	1	-	-	-	-	-	-
Humulus lupulus L.	1	-	-	-	1	-	-	-	-
Corylus avellana L.	-	-	+	-	-	-	-	-	-
Galeopsis sp.	-	-	1	-	-	-	-	-	-
Lamium sp.	-	-	-	-	2	-	-	-	-
Labiatae indet.	-	-	-	-	-	-	1	-	-
Sambucus nigra L.	+	13	126	4	+	+	+	+	+
Sonchus oleraceus L.	-	-	-	-	-	-	1	-	-
Schoenoplectus sp.	-	-	-	-	-	-	1	-	-
Ficus carica L.	-	-	-	-	-	1	-	-	-
Stem fragments	-	+	+	-	+	-	+	-	+
Buds	-	+	-	-	-	-	-	-	-
Indeterminate seeds etc.	-	12	-	-	5	14	20	2	5

Table : Plant remains preserved by phosphatic mineralisation.

N.B. Some other contexts contained very small quantities of mostly unidentified mineralised plant material, which are not listed here. These are 0802,0007, 0802 0052, 0802 0190, 5801 0019, 5801 0038, 5901 0293, 5901 0320, 5902 0064, 5902 0134

	IAS 4302 0039	IAS 5502 0455
Papaver sp. (cf. P. rhoeas)	-	42
Papaver argemone L.	1	-
Brassica/Sinapis sp.	+	2
Agrostemma githago L.	-	+
Silene sp.	1	-
Caryophyllaceae indet.	3	-
Chenopodium album L.	7	16
Chenopodium glaucum/rubrum	9	-
Atriplex patula/hastata	-	8
Chenopodiaceae indet.	4	6
Rubus spp. (a)	1	408
Fragaria vesca L.	-	27
Prunus sp.	-	3
Prunus spinosa L. (b)	-	5
Prunus domestica subsp. insititia (b)	-	1
Crataegus monogyna Jacq.	-	1
Malus sylvestris/domestica	-	1
cf. Apium graveolens L.	-	1
cf. Anethum graveolens L.	-	3
Umbelliferae indet.	-	5
Polygonum aviculare agg.	-	1
Polygonum lapathifolium/persicaria	3	-
Rumex acetosella agg.	-	2
Rumex sp.	4	1
Urtica urens L.	8	-
Urtica dioica L.	37	7
Hyoscyamus niger L.	2	-
Ballota nigra L.	5	-
Galeopsis sp.	-	1
Sambucus nigra L.	-	3
Valerianella dentata (L) Poll.	-	1
Lapsana communis L.	-	4
Compositae indet.	-	1
Juncus sp.	2	-
Carex sp.	1	1
Eleocharis sp.	3	-
Gramineae indet.	-	1
Indeterminate	7	-
Sample volume (litres)	1	6

Table : Plant remains from waterlogged deposits.

Notes (a) Mainly R. fruticosus with a few R. idaeus.

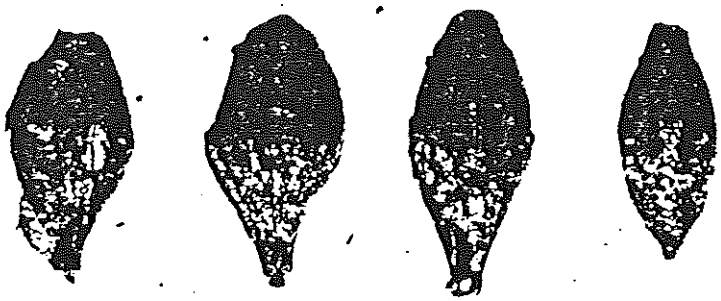
Plate 1 Cereals and other crops

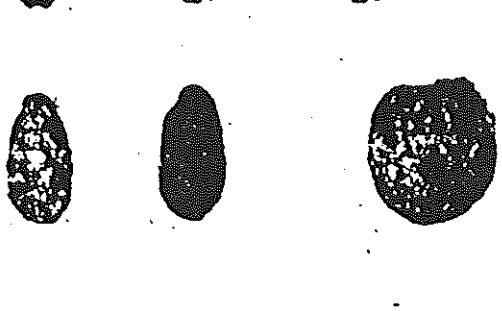
a. Triticum aestivum s.l. Grains (IAS 0502 0052), Rachis fragment (IAS 53
b. Secale cereale Grains (IAS 0502 0052); Rachis fragment (IAS 53
c Hordeum vulgare. Grains, some sprouted (IAS 5301 0028)
d Avena sp (IAS 0802 0052).
e Linum usitatissimum. Seeds Cannabis sativa. Fruit.
f (IAS 0502 0190).

Plate 2: Fruits, nuts and pulses.

a. Malus sylvestris/domestica. Seeds.
b. Prunus sp. Internal casts of endocarps
c. Pisum sativum Seed, embryo, testa fragments with hilum
} mineralised specimens from IAS 5202 0007
a. Vicia faba var minor Seeds. IAS 6904 0051, IAS 5901 0320
e. Corylus avellana. Nutshell fragments. IAS 0802 0052

These plates need tidying up for publication, with lettering + neat scales added).





(E) (F)

Plate 1

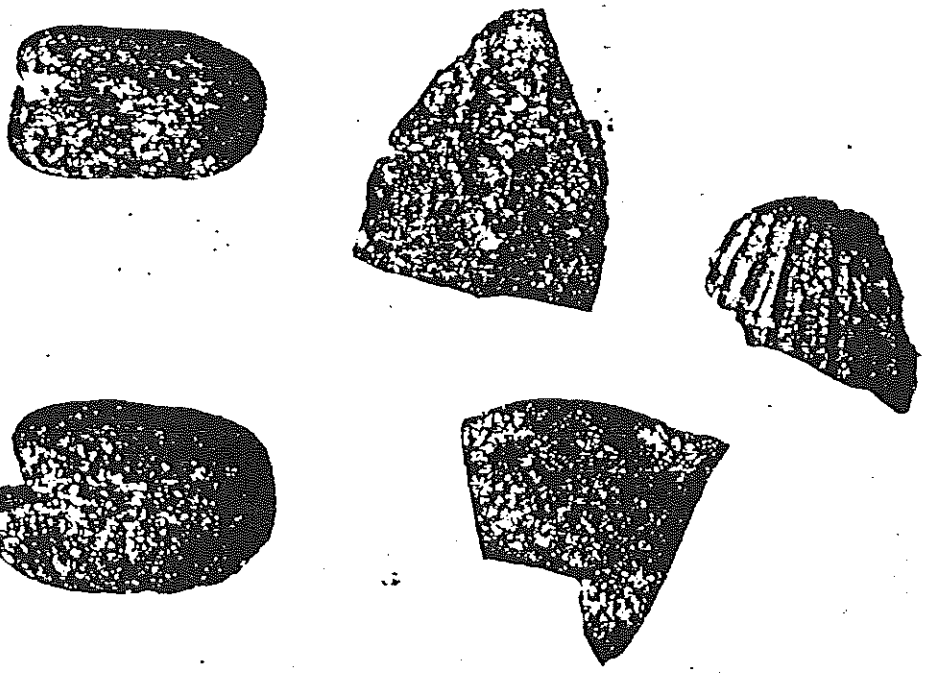


Plate 2