

Ancient Monuments Laboratory
Report 33/91

IPSWICH, SUFFOLK:
PLANT MACROFOSSILS FROM SITES 1AS
3104 (BUTTERMARKET), 1AS 3201 (ABC
CINEMA) AND 1AS 5203 (GREYFRIARS
ROAD)

Peter Murphy BSc MPhil

AML reports are interim reports which make available the results of specialist investigations in advance of full publication. They are not subject to external refereeing and their conclusions may sometimes have to be modified in the light of archaeological information that was not available at the time of the investigation. Readers are therefore asked to consult the author before citing the report in any publication and to consult the final excavation report when available.

Opinions expressed in AML reports are those of the author and are not necessarily those of the Historic Buildings and Monuments Commission for England.

Ancient Monuments Laboratory Report 33/91

IPSWICH, SUFFOLK:
PLANT MACROFOSSILS FROM SITES 1AS
3104 (BUTTERMARKET), 1AS 3201 (ABC
CINEMA) AND 1AS 5203 (GREYFRIARS
ROAD)

Peter Murphy BSc MPhil

Summary

At 1AS 3104 a burnt 11th century cellar produced large deposits of charred malt, of barley and oats, which had been coarsely ground, ready for wort production and brewing. A Middle Saxon Ipswich ware kiln at the site was fuelled with broom and oak. Other contexts sampled were predominantly latrine-pit fills. Samples from pit fills and other features at 1AS 3201 were assessed. Of note was a 10th century pit fill with burnt structural wood, charred whole crab-apples and fused masses of charred hop fruits. The evidence for malting and brewing activities at 3104 and 3201 is discussed. At 1AS 5203 Middle-Late Saxon pits produced very diverse assemblages of charred material considered to be bonfire debris including hedge trimmings, spoilt hay, bracken and heather. Charred sprouted cereals from an 11th century cellar are thought to be spoilt grain rather than malt.

Author's address :-

Peter Murphy BSc MPhil

Centre of East Anglian Studies
University of East Anglia
Norwich
Norfolk

Introduction

During excavations at comparatively dry sites on sand and gravel subsoils at Ipswich, Middle-Late Saxon and medieval pits and other features have been extensively sampled for retrieval of carbonised and mineralised plant material by flotation and bulk sieving (Murphy 1987 and unpublished data). In view of the large body of data previously obtained it was decided that continued extensive bulk sieving and flotation followed by detailed quantitative analysis was likely to produce much redundant information. Instead, although pits were still sampled at these three sites the flots obtained have been initially assessed in detail, together with samples from other types of context capable of yielding new data.

1AS 3104, Buttermarket

Despite the large scale of excavations at this site, sampling was intentionally confined to a comparatively small number of contexts. Extensive sampling of pits was omitted here. Instead, samples were taken principally from contexts of types not previously examined and contexts which earlier work showed to be particularly informative. The sample groups were as follows:

1. Samples of organic stains etc., from the inhumation cemetery. These are being retained for possible future study, but are not considered here.
2. Samples of charred plant remains from early medieval buildings 29, 2022, 2140, 4081. Charred wood and timber from these have been described in Murphy (1990a), and charred grain deposits are described here.
3. Samples from the Middle Saxon kiln 2200, described below.
4. Samples from other contexts, taken for preliminary assessment.

Building 2022 (Late 11th century)

This two-phase rectangular cellared building, 6.7 x 4.7m in its second phase was abandoned following fire damage. Unlike other similar burnt structures from Ipswich charred material (timber, grain etc) was localised within the cellar probably because the fire was extinguished before spreading to the whole building. However within the northern half of the cellar there were extensive spreads of carbonised grain, timber and various other charred wooden objects.

Contexts and samples

A general plan of the charred grain deposits and associated items is given in Fig.1. Samples were taken from a number of locations within each context. 250ml. subsamples from each of these were taken for manual water flotation using 0.5mm collecting meshes, principally in order to remove fine mineral and charcoal dust

from the carbonised plant remains. The flots obtained were initially scanned at low power to assess their contents. No significant variation between samples from the same context was noted so one or two samples per context, usually from its basal layers which might be comparatively unmixed with material from other contexts, were analysed. Flot sub-samples of 25 or 12.5ml. were examined. Charcoal samples have been described in Murphy (1990a).

The contexts sampled were as follows:

- 2112. Carbonised grain contained within wooden barrel 2111 with oak staves (see Murphy 1990a). Samples, collectively numbered 134 were taken, and of these samples from the top 2cm and bottom 2cm of the fill were analysed (Table 1). A sample from the middle of the fill was scanned but seemed similar in composition.
- 2355. Carbonised grain apparently spilling out of the barrel 2111. This was sampled in four quadrants, and the sample from the SW quadrant (66) was analysed, the others being scanned.
- 2356. Carbonised grain below 2355. This was also sampled in quadrants. Sample 392 was analysed and samples 67, 68 and 69 scanned.
- 2126. Carbonised grain above and partly under an area of charred basketry 2252 made from split hazel roundwood with interwoven whole unpeeled willow/osier stems (see Murphy 1990a). Mixed with this deposit were eighteen charred bread rolls with abundant wheat/rye-type periderm fragments (Murphy 1990b). 2126 was sampled in quadrants at several levels. Sample 133 came from under the basketry and was analysed in detail since it was likely to be comparatively unmixed. Other sample flots (52, 63, 390i-iii) were scanned.
- 2476. A thin spread of carbonised grain east of 2126. This was again sampled in quadrants and spits. Sample 393(v) from the bottom spit, NE quadrant was analysed and samples 393 i-ix scanned.

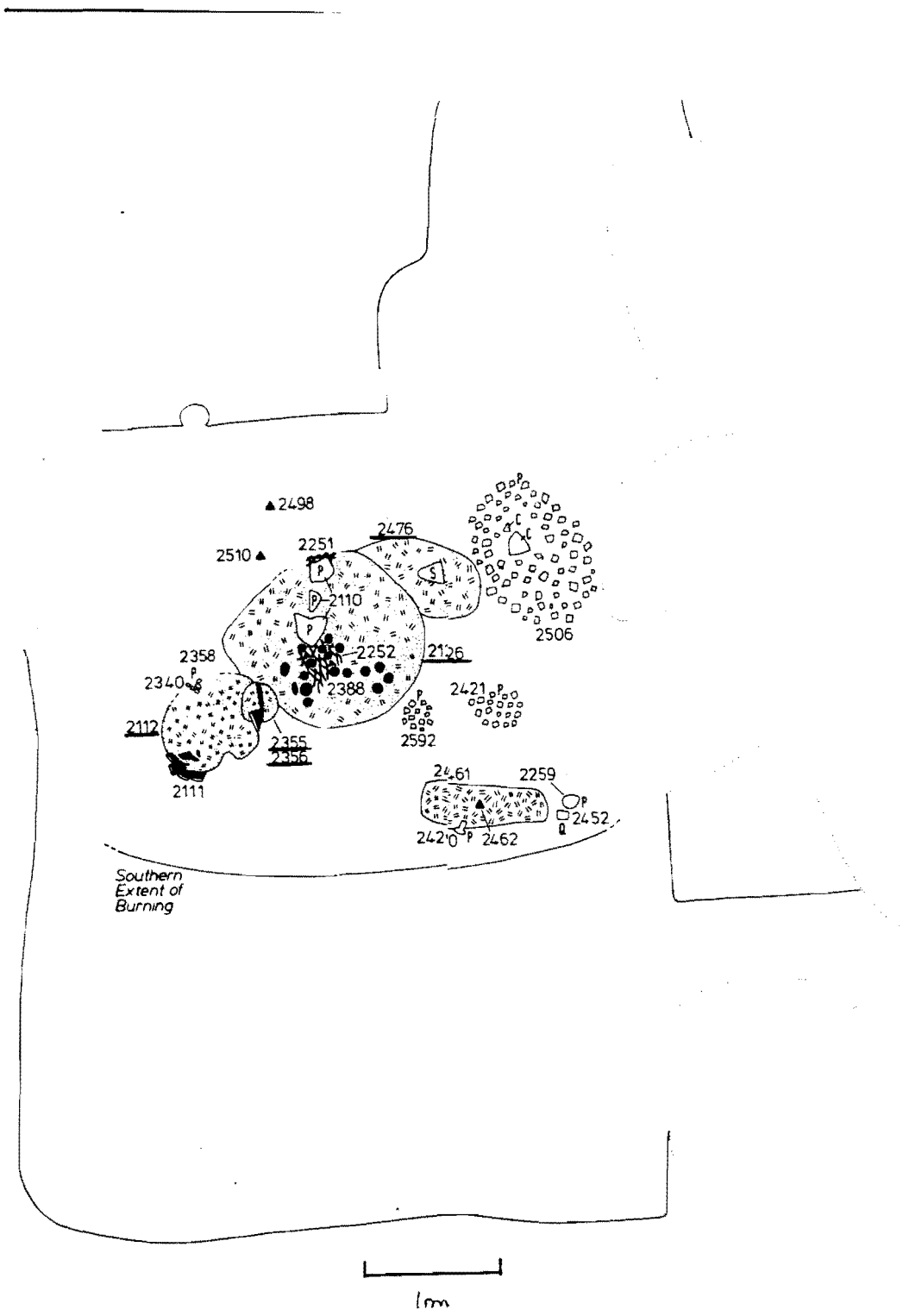


Fig.1 : Plan of cellar 2022, showing areas of charred grain and other materials. Contexts sampled are underlined.

Context No.	2112	2112	2356	2355	2126	2476
Sample No.	134	134	392	66	133	393(v)
<u>Hordeum</u> sp(p) intact grains	3	31	44	7	1	-
embryos	4	9	26	8	-	-
grain apices	118	214	261	182	10	-
<u>Avena</u> sp(p) intact grains	19	47	61	26	148	67
embryos	12	28	38	27	162	122
grain apices	39	73	64	43	525	506
florets with grain	-	-	-	-	8	4
florets with grain bases	-	-	-	-	14	-
empty florets/bases	1	fr	fr	fr	62	20
sterile florets	-	-	-	-	1	-
awn fragments	-	-	-	-	+	-
<u>Triticum aestivum</u> sl.intact grains	-	-	1	-	-	-
<u>Secale cereale</u> L intact grains	1	-	-	-	-	-
Cereal indet intact grains	-	6	8	-	-	-
embryos/'sprouts'	79	143	133	175	54	66
apices	1	15	-	-	-	-
<u>Linum usitatissimum</u> L seeds	-	-	1	-	1	-
<u>Corylus avellana</u> L nutshell frags	-	-	+	-	-	-
<u>Raphanus raphanistrum</u> L siliqua frags	-	-	1	-	-	-
<u>Agrostemma githago</u> L	fr	1	4	2	1	-
<u>Chenopodium album</u> L	2	1	10	17	1	3
Chenopodiaceae indet	6	5	15	13	5	10
<u>Vicia/Lathyrus</u> sp(p) cotyledons	2	1	-	-	-	2
<u>Polygonum aviculare</u> agg.	-	-	-	-	-	1
<u>Polygonum persicaria/lapathifolium</u>	-	-	-	1	1	-
<u>Fallopia convolvulus</u> (L)	2	2	6	7	1	-
<u>Rumex acetosella</u> agg	-	-	-	-	1	-
Polygonaceae indet	-	-	1	2	2	5
Primulaceae indet	-	-	1	-	-	-
<u>Galium aparine</u> L	2	8	2	2	1	1fr
<u>Anthemis cotula</u> L	-	-	-	-	-	5
<u>Centaurea cf cyanus</u> L	1fr	-	4	4	2	2
<u>Lapsana communis</u> L	-	-	1	-	1	3
<u>Bromus mollis/secalinus</u>	1fr	-	-	1fr	9	9
<u>Lolium temulentum</u> - type	-	8	-	3	-	-
<u>Avena fatua</u> - type floret base	1	-	-	-	-	-
Gramineae indet	2	2	15	-	1	1
Indeterminate	1	-	1	1	-	7
Flot volume sorted (ml)	12.5	25	25	12.5	12.5	12.5

Table 1 : Carbonised cereals etc. from IAS 3104, Building 2022

All samples include numerous small fragments and the counts given here are minimum numbers of specimens.

Fragments (abbreviated to fr) are noted only when intact specimens are absent. Taxa are represented by fruits or seeds except where indicated.

Quantification

A very high proportion of the charred plant macrofossils in the flot consisted of fragments. The significance of this is discussed further below, but it obviously created problems in obtaining counts. So far as grains are concerned whole grains were initially counted, together with fragments including grain apices, fragments showing the embryo area and loose cereal 'sprouts' from germinated grains. From these a count of minimum numbers of grains could be obtained though undoubtedly, as with all categories of material in these samples, some specimens were too fragmented to be counted at all. Identical counting methods were, however, used for each sample, and the results should therefore be comparable.

The crop plants

i) Barley (Hordeum sp(p))

Barley was represented in these deposits exclusively by grain : no rachis fragments were seen. Virtually all of the grains had germinated prior to carbonisation. Because of the deformation which this caused and also because intact grains were uncommon it was difficult to ascertain whether a two- or six-row form was represented, though the sample from the base of 2112 included some probable lateral grains. The grains were certainly hulled and some well-preserved lemmas and paleas were present. Most specimens, however, were grain fragments. In some cases this was due to fragmentation during processing but the majority of fracture surfaces were distinctly convex and rounded indicating that breakage occurred before the grains were carbonised.

ii) Oats (Avena sp(p))

Oat grains formed the predominant component of samples from 2126 and 2476 and were fairly common in other contexts. As with the barley the majority of grains were fragmented. There seemed to be a higher proportion of recently broken grains showing sharp fracture surfaces but grains broken before charring were also noted. The intact grains, mostly germinated before charring, frequently showed well preserved hairs on the pericarp. They were generally small compared to apparently similar charred oat deposits from contemporary contexts (eg the cellared building 0676 at Foundation St., IAS 4601, Murphy 1989)

Site	1AS 4601		1AS 3104	
Building	0676		2022	
Context	760		2126	
	length(mm)	breadth(mm)	length(mm)	breadth(mm)
min	3.7	1.3	3.2	1.0
mean	6.05	2.18	4.53	1.52
max	8.0	2.8	6.5	2.0
n	100		50	

Table 2 : Dimensions of Avena grains from two early medieval sites in Ipswich.

The grains from 2126 were quite typical in size for these deposits. Such very marked size differences could be related to the presence of more than one species of Avena, to a 'poor' crop or to size selection during processing.

The oats from 1AS 4601 were all of A.sativa. Those from 1AS 3104, though including a single sucker-mouth floret base of A.fatua-type, were predominantly of cultivated species. Only 2126 contained a relatively large number of well-preserved Avena florets and floret bases. Most of these showed quite broad basal fracture surfaces and were from upper and lower florets of A.sativa but there was a proportion of florets with very narrow basal fractures tending towards a stalked base, which were tentatively referred to the A.strigosa-group. The grain : floret ratio in the samples was variable. In 2126 it was 8.1:1, in 2476 24.0:1 whilst florets were very rare in other contexts. This may be in part a preservational factor, since the florets would have been more likely to burn off the grains in thin peripheral grain spreads like 2476 than in piles of grain such as 2126. Even in 2126, however, the ratio suggests intentional de-hulling prior to storage.

ii) Other crops

Occasional grains of wheat (Triticum aestivum) and rye (Secale cereale) and seeds of flax (Linum usitatissimum) were noted, presumably representing contaminants of barley and oats. 2356 produced a few hazel nutshell fragments (Corylus avellana)

The weed seeds

These are listed in Table 1. The seed assemblages are clearly very restricted numerically and in species diversity and consist almost entirely of large propagules, as would be expected in fully-processed stored crop products.

Discussion

The deposits from 2022 represent cleaned grain products with some impurities. Numerically weed seeds comprise up to 17% of the total count (in 2355) but of course much less than this in terms of weight or volume. Sample composition is summarised in Fig.2 from which oat florets are omitted since variations in their frequency are probably related in part to localised conditions of temperature and oxygenation.

Clearly the samples fall into two groups. In 2122 (top), 2112 (base), 2356 and 2355 the barley : oat grain ratios are 2.08:1, 2.04:1, 2.44:1 and 2.73:1 respectively. In 2126 and 2476 oats vastly predominate, with barley as a trace or entirely absent. It seems reasonable to suppose that these two clear sample groups were derived from two separate batches of cleaned crops, though there was probably some mixing of material during the destruction of the building. Spatially the barley/oat samples came from within the barrel 2111 and from material spilling out of it whereas the oat-dominated samples came from the two spreads of grain to the north-east of the barrel. The consistency of results confirms that the sub-samples analysed, though representing only a minute fraction of the total deposit, are representative.

The fact that almost all grains from these samples had germinated before charring and a high proportion of them had then been broken, again before charring, leaves no doubt that the deposits represent malt. The traditional malting process involved steeping, controlled germination on a malting flour, drying to kill and harden the grain and then grinding prior to mashing (production of the wort for brewing). Whole-grain malt has been reported from medieval hearths and associated contexts at Alms Lane, Norwich (Murphy 1985) and Red Castle Furze, Thetford (Murphy, in prep) but these deposits from 1AS 3104 represent the subsequent stage in the process - the grist produced after the malt had been ground. This process is necessary in order to reduce the endosperm to small fragments with a larger surface area and thereby to facilitate water absorption, enzyme activity and the extraction of sugars and other compounds during mashing. The fineness of grinding depends nowadays on the type of wort-recovery method used but modern adjustable roller mills can produce coarse grits, at around 0.3-0.6mm, down to flour less than 0.15mm (Hough 1985, 54-7). Very fine flour, though providing a large surface area poses problems of wort extraction. Corran (1975,164) quotes Ree's Cyclopaedia (1819-20) thus : "... the flour when immersed in the water and wetted, forms a sort of paste which at first absorbs a considerable portion of water but will not afterwards quit it, so that very little extract is obtained." This can be dealt with by modern mash filters, but for traditional mash tun methods a coarse grist is used (Hough, *ibid*, 63).

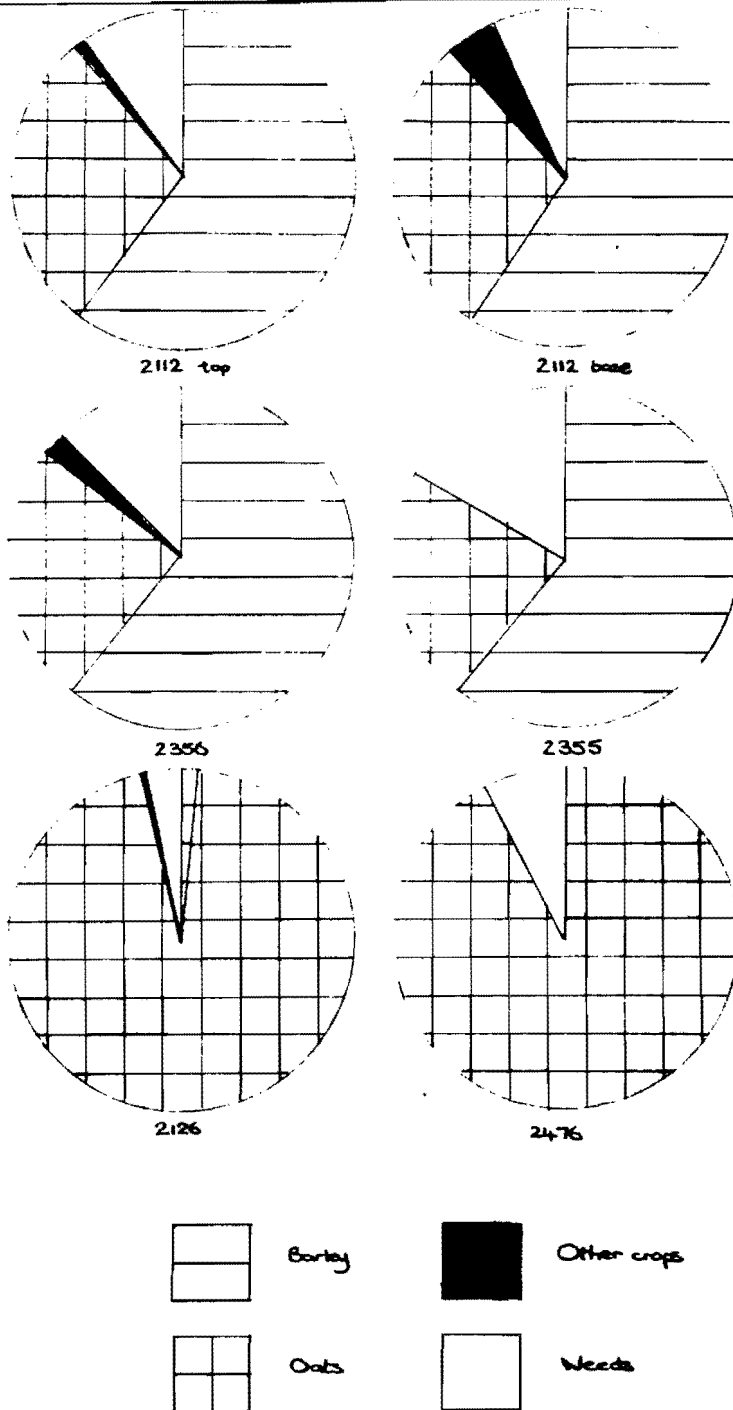


Fig 2 : Summary of sample composition

Calculated as follows:

- Barley = intact grains + apices
- Oats = intact grains + apices + florets containing grains
- Other crops = wheat grains + rye grains + indet cereal grains and apices + flax seeds
- Weeds = weed seeds + (vetch cotyledons/2)

There are grounds for thinking that the mills used to produce the grist represented at 1AS 3104 were coarsely set by modern standards. Evidently the millstones were close enough together to fracture most of the barley grains : the low proportion of whole grains could just represent accidental over-spills which evaded milling. However there are relatively large numbers of intact or recently-broken oat grains in the deposits, implying that the millstones were not close enough to crush all of the more slender oat grains. The unusually small size of intact oat grains from the deposits has been noted above, and it is possible that coarse milling acted as a selective process, crushing the larger oat grains but leaving the smaller ones entire.

Corran (1975,60) notes that in the late 16th century barley malt was coarsely ground and about 10% of unmalted wheat or oats added before mashing. The oats from 1AS 3104, however, were clearly malted and the deposits seem to represent two distinct types of malt : one composed of barley and oats as a roughly 2.5:1 mixture and another consisting almost entirely of oats. Oaten malt was still produced in eighteenth-century England (Findlay 1956,21).

2200 Middle Saxon Ipswich Ware Kiln

Fifty of the charcoal fragments collected by hand from the kiln floor (S57) were identified. Sixteen of them were of mature oak wood (Quercus sp) and thirty four were stems of Ulex/Cytisus sp (gorse or broom). These stems, 5-17mm in diameter, show the oblique rows of vessels in TS characteristic of these plants and some, though not all, are distinctly ring porous, a feature generally more characteristic of broom. A 5kg soil sample from the stoke pit (S50) produced charred young twigs with sharply raised angles, closely matching stems of broom, and no charred spines were seen. Broom, therefore, seems to be the only leguminous shrub represented in these samples.

Other charred macrofossils present, but in very small quantities, include a rye grain (Secale cereale), nutlets of Carex sp and Scirpus sp, a grass caryopsis, unidentified seeds and pinnules of bracken (Pteridium aquilinum). These may represent plant materials used as kindling. A few scraps of burnt bone and mussel shell were also noted.

The use of broom as part of the fuel is interesting and raises general questions about fuel supply to the Middle Saxon pottery industry. In an area where extensive coastal heaths exist harvesting broom as fuel would obviously make economic sense. There is no obvious way of determining whether the kilns were fuelled with wood or charcoal, but it is perfectly possible that broom charcoal could have been produced in heathland clamps.

Other contexts

0.5kg sub-samples were removed for assessment from samples of other deposits. These were as follows:

0897 S12 (Late Saxon pit 0891 : ash layer)

Charcoal common; occasional Triticum and Secale grains; avian eggshell frags; mussel shell frags; bone frags.

0898 S13 (Late Saxon pit 0891 : ash layer)

Charcoal very common; mussel shell frags; fishbones; bone frags.

1056 S15 (Late 15th/early 16th cent Friary garderobe 1057 : basal fill)

Charcoal fairly common; rare cereal grains and rachis frags; uncarbonised S. nigra seeds; mussel shell frags; fishbones; small mammal bones; bone frags; phosphatic concretions.

1156 S22 (Late Saxon pit : basal fill)

Charcoal rare; mineralised stem frags, Rubus fruitstones and Sambucus seeds; mineralised arthropods ; fishbones; matrix largely composed of phosphatic concretions.

2565 S339 (Early medieval pit. 2557 : contents of Thetford ware pot)

Charcoal; rare cereal grains; mineralised stems, wood, Prunus fruitstones and Sambucus seeds; mussel and oyster shell fragments; fishbones; abraded bone fragments; phosphatic concretions.

0897 and 0898, ashy pit fills, were sampled in order to assess whether domestic or industrial waste was represented. The range of food wastes present implies the former. The remaining three contexts, 1056, 1156 and 2565 all include phosphatic concretions with mineralised plant material, fishbones and small bone fragments - all characteristic features of latrine pit fills. The plant macrofossils present comprise a rather limited range of taxa in a poor state of preservation, which do not merit detailed analysis.

1AS 3201, ABC cinema site

This excavation formed a detached part of the Buttermarket site. Sampling was again on a small scale, samples being collected initially from a limited range of features for assessment purposes. Samples of organic/mineral stains from 7th-8th century graves were also taken (0335, 0424). These have been retained but not examined.

0012 Middle Saxon ?well

A 100g sample from a small localised concentration of charred material was floated. It contained charcoal, fruitstones of sloe (Prunus spinosa), apple seeds (Malus sylvestris) and a seed of Vicia/Lathyrus sp.

0055 Early late Saxon pit

A 100g sample of 'organic' deposit contained abundant phosphatic concretions, fragments of mineralised testa and hilum from peas (Pisum sativum) and beans (Vicia faba cf. var minor), unidentified mineralised seeds, stems and wood, some charcoal and fishbones. The dietary residues present are of types common in latrine pits.

0068 Early late Saxon pit

A 100g sample contained a high proportion of phosphatic concretions with mineralised Agrostemma testa, indeterminate mineralised seeds, stems and wood, some charcoal and carbonised cereal grains, abundant mineralised fly puparia, scraps of Mytilus shell, fishbones and bone fragments. The layer appears to represent a latrine deposit.

0104 Middle late Saxon pit

A 1.8kg sample of charred material from the western half of the feature (0326) was floated. Large charcoal fragments and other charred plant remains were abundant, the mineral soil content being low. Materials identified are listed in Tables 3-4.

The charcoal appears to include the remains of structural wood, and closely resembles material from the burnt 11th century cellared buildings at 1AS 3104. The hazel roundwood fragments, some of which show oblique transverse cuts could represent the remains of wattling. Fragments apparently of larger structural wood, mainly oak but including some hazel, ash and ?hawthorn were also common. The sample also produced fragments of thin oak boards or staves with maximum cross-section dimensions of 45 x 6mm; these seem too small to be structural and may have come from a barrel or similar stave-constructed container (cf. context 2111 at 1AS 3104).

One of the hazel roundwood stems had some charred coarse textile fused to its surface and similar textile fragments were common in the finer fractions of the flot. This material seems to represent charred fragments of a sack.

Crab apples (Malus sylvestris) are represented by large fragments of charred fruits, some fractured transversely to reveal the loculi of the carpel and seeds within. Loose fragments of seeds and endocarp tissue occurred in the flot. Two specimens, though fragmented, are measurable. One is 26mm wide, a second \leq 37mm. Some allowance for shrinkage during carbonisation must be made but these fruits do not fall within the size range of cultivated apples and are apparently large crabs. Their surfaces are quite smooth and do not show the wrinkling characteristic of dried apples : these fruits were evidently stored in a fresh state.

The sample also contained fragments of charred material up to about 50mm in size. Some of these are 'cokey' in appearance, others are solidified tarry masses. The structure of plant material included within the matrices of these aggregates has often been obliterated. Some of them show a distinctly porous structure. On first inspection these 'pores' were thought to be solidified gas bubbles but closer examination showed that the voids represent the interiors of fruits or seeds. The clue to the identification of these was provided by the whole and fragmentary fruits of hops, Humulus lupulus, present in the flot. Within some of these the distinctive curved embryo was visible, and similar embryos were noted in some of the interior cavities in the tarry aggregates. Some, or perhaps all, of these aggregates are therefore thought to represent fused masses of hop fruits.

Other crop plant remains from the sample included rye grains and rachis fragments, barley grains and flax seeds in association with some arable weed seeds.

Obviously this pit fill represents re-deposited material, but it would appear that this was derived from fire destruction deposits of broadly similar type to those in the fills of 11th century cellars at 1AS 3104, consisting of charred structural wood with remains of stored crops. In this particular case apples and hops seem to be the main stored products, rather than cereals.

The abundance of hops in this 10th century deposit is of particular interest. At Haithabu the frequency of hop finds increases markedly in the 9th-10th century, and at the same excavation remains of malt were recovered (Behre 1984). The cargo of hops from the Graveney boat (Wilson 1975) is similarly dated to the 10th century. Given the clear continental documentary evidence for hopped beer at this time, and the extensive trading contacts around the North Sea coasts it seems highly probable that the charred hops from this site were intended for use in brewing.

Sample composed of \approx 1/3 roundwood stems, 5-26mm diameter,
 \approx 2/3 larger wood.

Roundwood (50 fragments identified)

<u>Corylus</u> sp (hazel)	47	(5-26mm)	Some oblique transverse cuts. One stem had coarse textile (sacking) adhering to it
<u>Ulex/Cytisus</u> sp (gorse/broom)	1	(6mm)	
Indet diffuse porous	2	(5mm)	

Larger wood (50 fragments identified)

<u>Quercus</u> sp (oak)	32	Large frags including radial board fragments, 70+mm wide x 20+mm thick
<u>Quercus</u> sp (oak)	4	Fragments of thin boards/staves, tangential, max 45 x 6mm
<u>Fraxinus</u> sp (ash)	4	Fragments of mature wood and large roundwood, \approx 60mm
<u>Corylus/cf Corylus</u> sp (hazel)	7	Fragments of mature wood, some badly distorted
Pomoideae (hawthorn group)	1	Fragment of mature wood
Indeterminate	2	Badly distorted

Table 3 : Charcoals from IAS 3201, 0326

<u>Humulus lupulus</u> L	(fruits)	31 + frags
	(fused masses of fruits)	+++
<u>Malus sylvestris</u> Miller	(fruit fragments) equivalent to	4 fruits
<u>Malus</u> sp	(seed fragments)	2
	(endocarp fragments)	+
<u>Linum usitatissimum</u> L	(seeds)	5
Cereal indet	(caryopses)	4
<u>Hordeum</u> sp	(caryopsis)	1
<u>Secale cereale</u> L	(caryopsis)	1
	(rachis nodes)	2
<u>Agrostemma githago</u> L		2 + 1cf
<u>Chenopodium album</u> L		1
<u>Rumex</u> sp(p)		3
<u>Fallopia convolvulus</u> (L)		2
Labiatae indet		1
<u>Trifolium</u> -type		1
cf <u>Sambucus nigra</u> L		1
Indeterminate seeds etc		3
Charred textile		+
Charred vesicular porous material		+++

Table 4 : Other charred macrofossils from IAS 3201, 0326

0148 Late 15th/early 16th century wood-lined pit

Samples of planks (0188, 0192) and an organic layer at the base (0200) were examined, primarily in order to assess whether the fill might relate to any industrial function. The wood samples were heavily mineralised with phosphatic material but their micro-structure was very poorly preserved. A 350g sample of 0200, a dark brown moist loamy deposit, was floated and wet-sieved. The flot included abundant partly mineralised seeds of fig (Ficus carica), fragments of grape seeds (Vitis vinifera), apple seeds (Malus sylvestris) and elder seeds (Sambucus nigra) with scraps of testa from Agrostemma githago and Fallopia convolvulus, and seeds of ruderals including Conium maculatum, Chenopodium album and Rumex sp. Mineralised stem fragments and arthropods (fly puparia, woodlice, beetles) were also present. The residue was mainly composed of phosphatic concretions, chalk and charcoal with fishbones and abraded bone fragments. These macrofossils establish that 0200 was largely composed of human faeces and that the pit, whatever its original function, was last used as a latrine pit.

1AS 5203, Greyfriars Road

Sampling at this site was on a small scale, and was confined to some mid-late Saxon pits and an early medieval cellared building.

Plant macrofossils from Middle and Late Saxon pits

Column samples, 35cm square and sub-divided at 10cm vertical intervals were taken from 0046 and 0596 (Middle Saxon pits), and from 0594 (an Early Late Saxon pit). The flots from the 10cm sub-samples were initially assessed and sub-samples thought to be particularly informative were analysed quantitatively.

0046

A 120cm long column had been collected from the fills of this feature, which included much burnt material, predominantly horizontal layers of ash and charcoal. It was apparent during assessment that the flots contained rich and diverse assemblages of charred plant material, of which three (from 30-40cm, 40-50cm and 80-90cm) were particularly large. Plant remains from these flots are listed in Table 5.

0596

Assessment of the flots from a 100cm long column indicated that the deposits were moderately charcoal-rich, particularly between 40-70cm. Uncarbonised seeds of Sambucus nigra, Chelidonium majus etc., were noted and there were a few mineralised seeds, but preservation was principally by carbonisation. The flots included cereal grains, occasional rachis fragments, fruits and seeds of grassland, ruderal, segetal and scrub taxa with charred stem fragments. The sample from 40-50cm seemed typical and plant material from it is listed in Table 5.

Flots from a sample column of 140cm length, subdivided into 10cm sub-samples were assessed. The upper fills included low densities of charcoal with occasional cereal grains. Samples from below 110cm produced carbonised and mineralised material: mineralised internal casts of Prunus fruitstones, stem fragments, arthropods, small fishbones and abraded bone scraps. These macrofossils establish that the feature was a latrine pit subsequently back-filled with less organic deposits. Detailed examination was not thought appropriate, for very similar assemblages have already been described from other contemporary pit fills in Ipswich (Murphy 1987).

Discussion

The assemblages from 0046 and 0596 are clearly very diverse, including remains of crops and wild plants from several distinct communities. The cereal remains consist predominantly of grains, with very few rachis or awn fragments and must have derived ultimately from batches of fully-processed prime grain. Wild plant communities represented include:

- 1). Heathland. Pteridium aquilinum (bracken), Calluna vulgaris (heather).
- 2). Grassland. Ranunculus spp (buttercups), Vicia/Lathyrus spp (vetches/tares), Medicago-type (medicks etc), Agrimonia eupatoria (agrimony), Plantago lanceolata (ribwort plant) and Gramineae (grasses) - represented by fruits and culms). Beta vulgaris (beet) commonly occurs in tall maritime grassland, on sea-walls etc. Taxa found in wet grassland and marsh include Ranunculus flammula (lesser spearwort), Eleocharis spp (spike-rush) and Carex spp (sedges).
- 3). Scrub and woodland. Rubus fruticosus (bramble), Prunus spp. (bullace, probably sloe), Corylus avellana (hazel), Sambucus nigra (elder). The presence of abundant charcoal, charred young twigs, thorns (possibly of P.spinosa) and charred epidermal and mesocarp tissue implies that this material might represent hedge trimmings rather than food waste. Humulus lupulus (hop) is a common liane of wet woodlands, and the fruits from 0046 might merely be derived from wild plants or could have been utilised.
- 4). Weed communities. Typical segetal plants (eg. Agrostemma githago - corn cockle; Anthemis cotula - stinking mayweed) and ruderals (eg. Malva sylvestris -mallow; Urtica urens - nettle) are both present, the former probably representing contaminants of grain, the latter the local weed flora.

These very heterogeneous assemblages are clearly difficult to interpret functionally but are thought to represent residues from bonfires on which waste plant material (spoilt grain, waste or fouled hay, hedge trimmings, bracken and heather perhaps used as litter or bedding) had been burnt. The assemblages closely resemble those from IAS 4601 pit 0192 which similarly seemed to indicate burning of refuse following a general tidying of the site.

Plant macrofossils from 0356 in early medieval cellar 0064

Four 5kg samples were collected from layer 0356 in this feature. The layer consisted of heterogeneous loamy and sandy deposits including burnt timbers (some only semi-charred) and other carbonised and part-charred plant material. Unlike comparable burnt deposits in cellars of similar date at sites 3104 and 4601 0356 did not directly overlie the cellar floor : beneath it were unburnt loamy and sandy layers indicating that the cellar and perhaps the building over it were disused for some time prior to deposition of 0356. The plant remains from this layer are therefore not definitely interpretable as derived from in situ fire destruction deposits.

Plant remains extracted are listed in Table 6. Cereal grains predominate and barley is the main species. The barley grains are all hulled and asymmetrical grains are present indicating the presence of six-row barley, although most grains are symmetrical. However precise ratios of median : lateral grains cannot be determined due to deformation caused by germination prior to carbonisation. In 0356C 71 of 95 barley grains have definitely sprouted, the remainder either showing no clear signs of sprouting or being very poorly preserved. Some of the oat, wheat and rye grains are also sprouted. Other possible food plants present include bramble, sloe, hazel and elder. Seeds of wild taxa consist of grassland, ruderal and segetal species. Ruderals, especially Urtica dioica are much more common than in cereal deposits from other contemporary cellars at Ipswich. The density of carbonised plant remains in 0356 is very much lower than in these other deposits.

Deposits of charred sprouted barley immediately suggest the possibility of malting at the site, or at least storage of malt and its charring when the building was destroyed by fire. However, there is evidence for disuse of the cellar prior to burning, and the relative abundance of ruderal taxa may imply development of a weed flora around or even within the cellar. It is also noticeable that all cereal taxa, not just barley, include a proportion of sprouted grains. It is therefore possible that the cereals present are derived from batches of cleaned prime grain which had been stored in rather damp conditions, perhaps in the delapidated superstructure above 0064.

Context	0046	0046	0046	0596
Depth(cm)	30-40	40-50	80-90	40-50
<u>Pteridium aquilinum</u> (L) Kuhn.pi	-	-	1	-
<u>Ranunculus acris/repens/bulbosus</u>	2	-	-	-
<u>Ranunculus flammula</u> L	-	1	-	-
<u>Ranunculus</u> sp	-	-	1	-
<u>Agrostemma githago</u> L	6	3	1	-
<u>Chenopodium album</u> L	3	-	1	-
<u>Beta vulgaris</u> L (a)	-	-	-	20
Chenopodiaceae indet	5+fr	2	-	4+fr
<u>Malva sylvestris</u> L	-	-	-	6
<u>Malva</u> sp	1	-	1	-
<u>Vicia/Lathyrus</u> sp(p)	3	-	1	-
<u>Medicago</u> -type	2	2	-	2
Leguminosae indet (b)	-	1+lco	-	-
<u>Rubus fruticosus</u> agg	1	-	-	2
<u>Agrimonia eupatoria</u> L	-	1	-	-
<u>Prunus domestica</u> ssp <u>insititia</u>	1	-	-	-
<u>Prunus</u> sp	fs fr	+	-	-
<u>Malus sylvestris/domestica</u>	s 3+fr	-	-	-
	end	+	-	-
<u>Polygonum persicaria/ lapathifolium</u>	1	1	4	-
<u>Fallopia convolvulus</u> (L)	-	2	2	1
<u>Rumex</u> sp(p)	-	3	-	15
Polygonaceae indet	11	2	-	-
<u>Urtica urens</u> L	1	-	-	-
<u>Humulus lupulus</u> L	3	-	-	-
<u>Corylus avellana</u> L	ns fr	-	-	+
<u>Calluna vulgaris</u> (L) Hull	st fr	+	-	+
<u>Ballota nigra</u> L	1	-	-	-
<u>Plantago lanceolata</u> L	1	1	-	1
<u>Galium aparine</u> L	-	2	-	-
<u>Galium</u> sp	1	-	-	1
<u>Sambucus nigra</u> L	24	16	9	7
<u>Anthemis cotula</u> L	1	-	-	-
Compositae indet	-	-	-	1
<u>Eleocharis palustris/uniglumis</u>	1	-	-	1
<u>Carex</u> sp(p)	3	1	-	3
<u>Bromus mollis/secalinus</u>	4	9	8	-
Gramineae indet	ca 10	3	1	4
Gramineae indet	cn 9+fr	fr	13(d)	8+fr
Cereal indet	ca 9	21	9	26
<u>Triticum aestivum</u> sl	ca 8	22	2	18
<u>Hordeum vulgare</u> L emend Lam	ca 2	55(c)	7(c)	15
<u>Hordeum</u> sp	ri fr	-	-	1
<u>Secale cereale</u> L	ca 1	22	5	6
<u>Secale cereale</u> L	rn 2+fr	1	3	-
<u>Avena</u> sp(p)	ca 3	23(c)	2	6
<u>Avena</u> sp	a fr	+	-	-
Indeterminate fruits/seeds etc	23	14	2	15
Stems	+	+	+	+
Thorns	13	5	2	+
Epidermal and mesocarp tissue (e)	+	+	+	-
String (charred)	+	-	-	-
Insects	-	+	+	-
Molluscs etc (f)	+	+	-	-
% flot sorted	50	25	25	100

Table 5 : Carbonised plant remains from Middle Saxon pits at 1AS
5203

Taxa are represented by fruits or seeds unless otherwise indicated.
Abbreviations: a-awn; ca-caryopsis; cn-culm node; co-cotyledon; end-
endocarp tissue; fr-fragments; fs-fruitstone; ns-
nutshell; pi-pinnule; ri-rachis internode; rn-rachis
node; s-seed; st-stem.

Notes: (a) fruit aggregates (b) Large-seeded (c) Includes germinated
grains; (d) Large cf. Phragmites. Also leaves (e) From large
succulent fruits; (f) Includes partly burnt shells of Clausilia sp.,
Hydrobia ulvae, Littorina sp, Rissoa sp and forams.

Context		0356A	0356B	0356C	0356D
Cereal indet	ca fr	+	+	+	+
	ca	6	1	19	67
	cn	-	-	-	1
<u>Hordeum</u> sp(p)	ca	14	1	95	315
<u>Triticum aestivum</u> sl.	ca	4	-	11	53
<u>Avena</u> sp(p)	ca	3	-	12	34
	fb	-	-	1	-
<u>Secale cereale</u> L	ca	-	-	1	6
<u>Ranunculus acris/repens/bulbosus</u>		-	1	5	-
<u>Raphanus raphanistrum</u> L sil fr		-	-	-	2
<u>Thlaspi arvense</u> L		-	-	-	1
<u>Reseda</u> sp		-	1	3	2
<u>Stellaria media</u> -type		-	2	-	-
<u>Stellaria graminea/palustris</u>		-	-	1	-
<u>Agrostemma githago</u> L		-	1	2	3
<u>Chenopodium album</u> L		-	fr	54+fr	4
Chenopodiaceae indet		1	fr	fr	2
<u>Malva</u> sp		-	-	-	1
<u>Vicia/Lathyrus</u> sp(p)		-	-	2	2+lco
<u>Trifolium</u> -type		-	-	1	-
<u>Rubus fruticosus</u> agg		1	-	-	-
<u>Prunus spinosa</u> L		-	-	1	-
Umbelliferae indet		-	-	-	1
<u>Polygonum aviculare</u> agg		-	-	2	-
<u>Polygonum persicaria/lapathifolium</u>		-	2	1	1
<u>Fallopia convolvulus</u> (1)		-	-	5	2
<u>Rumex acetosella</u> agg		-	-	1	1
<u>Rumex</u> sp(p)		1	1	1	-
Polygonaceae indet		-	-	1	-
<u>Urtica dioica</u> L		-	6	26	1
<u>Corylus avellana</u> L ns fr		+	+	+	+
<u>Hyoscyamus niger</u> L		-	-	1	-
<u>Galeopsis tetrahit/speciosa</u>		-	-	1	-
<u>Galium aparine</u> L		1	-	-	-
<u>Sambucus nigra</u> L		-	2	1	-
<u>Anthemis cotula</u> L		-	-	1cf	2
<u>Centaurea cf cyanus</u> L		-	-	-	1
<u>Eleocharis</u> sp		1	-	1	1
<u>Carex</u> sp		-	1	3	-
<u>Bromus mollis/secalinus</u>		-	-	-	1
Indet seeds etc		-	-	18	3
% flot sorted		100	50	100	25

Table 6 : Carbonised cereals, seeds etc., from IAS 5203, cellared building 0064, Layer 0356.

All samples 5kg. Taxa are represented by fruits or seeds except where indicated.

Abbreviations : ca-caryopses; cn-culm node; fb-floret base; fr-fragments; ns-nutshell; sil-siliqua.

References

- Behre, K-E (1984) Zur Geschichte der Bierwürzen nach Fruchtfunden und schriftlichen Quellen, in Van Zeist, W and Casparie, W.A. (eds) Plants and Ancient Man, pp. 115-122. Plants and Ancient Man, pp.155-122. A.A. Balkema : Rotterdam/Boston.
- Corran, H.A. (1975) A History of Brewing. David and Charles : Newton Abbot/London.
- Findlay, W.M. (1956) Oats : Their cultivation and use from ancient times to the present day Oliver and Boyd : Edinburgh/London
- Hough, J.S. (1985) The Biotechnology of Malting and Brewing Cambridge University Press.
- Murphy, P. (1985) The Plant Remains, in Atkin, M. (1985) Excavations on Alms Lane (Site 302N) East Anglian Archaeology 26, 228-234 Norwich Survey : Norwich
- Murphy, P. (1987) Ipswich, Suffolk : Plant macrofossils from Middle Saxon to Early Medieval contexts at sites 1AS 4201, 4601, 4801 and 5701 AM Lab Report Series 225/87 HBMC : London
- Murphy, P. (1990a) Buttermarket, Ipswich, Suffolk (1AS 3104) : Charcoal. AM Lab Report Series 74/90 HBMC : London.
- Murphy, P. (1990b) Buttermarket, Ipswich, Suffolk (1AS 3104): Carbonised loaves. AM Lab Report Series 75/90. HBMC : London
- Wilson, D.G. (1975) Plant remains from the Graveney Boat and the early history of Humulus lupulus L in W. Europe. New Phytologist 75, 627-648