Ancient Monuments Laboratory
Report 225/87

IPSWICH, SUFFOLK: PLANT MACROFOSSILS FROM MIDDLE SAXON TO EARLY MEDIEVAL CONTEXTS AT SITES IAS 4201, 4601, 4801 AND 5701.

Peter Murphy BSc MPhil

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(with a contribution by Dr M. Robinson)

Summary

Plant macrofossils, predominantly carbonised and mineralised, from Middle Saxon to medieval contexts at these four sites are listed, described and discussed. Noteworthy samples came from a Middle Saxon pit, 0192, and a burnt early Medieval cellar, 0676, both at site 4601. 0192 produced abundant carbonised remains of grassland plants, arable weeds, cereal cleaning waste and brushwood in association with charred insects (dung beetles and phytophages), and other burnt animal remains. The remains of grassland plants (interpreted as hay) and dung beetles show that livestock were kept in the vicinity. The cellar 0676 contained very large deposits of cleaned oats (Avena sativa). Charcoal from this feature provided information on the building's structure.

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Ipswich, Suffolk: Plant macrofossils from Middle Saxon to Early Medieval contexts at sites IAS 4201, 4601, 4801 and 5701.

Introduction

In this report plant macrofossils recovered by machine flotation and laboratory processing from Middle and Late Saxon, and early Medieval contexts at these four sites are listed and discussed. This completes analysis of all samples collected before the excavation at St Peter's Street in 1986/7. Reports are presented in a form suitable for inclusion in the site archive, but final synthesis and full discussion of the results will not be undertaken until the current programme of excavations in Ipswich is completed. Methods used for retrieval were as detailed in an earlier report (Murphy, undated), though further details of retrieval methods are given where appropriate.

Plant macrofossils from pits at St Nicholas Street (IAS 4201)

Four samples, from pits 36 (0044), 42 (0049), 73 (0069) and 40 (0070), were examined. The first three contexts were of late Saxon date, and pit 40 was of early medieval date. The samples were disaggregated by soaking in NaOH solution and then graded in a sieve bank with a minimum mesh size of 250 microns, before sorting under a binocular microscope at low power. Their contents are summarised in Table 1. Full quantitative analysis of macrofossils present was not undertaken, but the presence and relative abundance of taxa is noted in Tables 1 and 2.

The samples from 0069 and 0070 were highly organic and included a wide range of biota. They are closely comparable to samples from 11th century cess pits at the Magistrates' Courts site, Norwich (450N) (Murphy, in press): indeed they represent a category of deposit which has been investigated at a number of medieval urban sites. Characteristic features of such cess deposits are the presence of mineralised faecal concretions with plant residues thought to have passed through the human gut (here, fruits and seeds of opium poppy (Papaver somniferum), strawberry (Fragaria vesca), blackberry (Rubus fruticosus), apple (Malus sp), and celery (Apium graveolens). Testa fragments of the corn-cockle (Agrostemma githago)) and cereal periderm fragments (bran) indicate the presence in 0069 of residues from weed-contaminated wholemeal flour. Other food plants include sloe (Prunus spinosa), bullace (Prunus domestica subsp. insititia), hop (Humulus lupulus) and carbonised cereals including rye (Secale cereale). Most of the remaining macrofossils identified could have come from local weed, grassland and wetland vegetation.

The small samples from 0044 and 0049 also include some mineralised material, and could again represent cess deposits.

Table 1: IAS 4201: Macrofossils from soil samples

0044 (0.5kg)
Rare small mineralised faecal concretions; rare mineralised plant macrofossils (Rubus fruticosus, Sambucus nigra, stem fragments); one carbonised grain of Hordeum sp; rare small charcoal fragments; rare small chips of mammal bone.

0049 (0.4kg)
Mineralised faecal concretions; rare mineralised plant macrofossils (Sambucus nigra, cf. Lamium sp, cf. Polygonum sp, indeterminate fragments, stem fragments); indeterminate carbonised cereal grain; rare small charcoal fragments; mineralised fly puparia etc; rare small bone fragments.

0069 (10kg)
Large, common mineralised faecal concretions; abundant plant macrofossils preserved by waterlogging and mineralisation including mosses, stems, seeds, fruitstones etc. (see Table 2); fly puparia, beetle elytra and woodlice remains common; shells and fragments of Littorina, Ostrea, Mytilus and indet. helicid; avian eggshell fragments; animal hairs; some bones of fish and small mammal with many lower limb and foot bones of sheep/goat.

0070 (1 kg)
Mineralised faecal concretions; abundant plant macrofossils preserved by waterlogging and mineralisation, mainly seeds and fruitstones (see Table 2); fly puparia, beetle elytra, and woodlice remains; occasional fishbones and small chips of mammal bone.

Plant macrofossils from Foundation Street (IAS 4601) and School Street (IAS 4801)

These two major excavations were close to one another and it therefore seems appropriate to consider the plant remains retrieved from the two sites together: in this way comparison of results from contemporary features of similar type is simplified. The samples collected came from Middle Saxon pits and wells, Late Saxon pits, wells, ovens and other contexts, Early Medieval pits and cellared buildings and from graves associated with the monastic church at IAS 4801.

Central column samples, 35cm square, and sub-divided at 10cm. vertical intervals, were taken from selected major features for machine flotation. These column samples were supplemented with samples taken for laboratory analysis. Dry soil samples were processed in the laboratory by manual water flotation and wet-sieving with 0.5mm. meshes, whilst waterlogged samples were processed using the methods of Kenward et al (1980). Further details of processing methods are given below where necessary.

Middle Saxon features (c.650-c.850 AD)

Plant remains were retrieved from column samples from pits 0192 and 0648 at IAS 4601 and from the upper fills of well 1571/1668 at IAS 4801 by machine flotation, and a bulk sample from the base of 1668 was processed in the laboratory.

(a) Pit 0192 (IAS 4601)

Carbonised and mineralised plant macrofossils from this pit are listed in Table 3. The fills of this feature also produced an unusually wide range of animal macrofossils. Full quantitative analysis and complete identification of all these macrofossils has not been undertaken but some of them are relevant to the interpretation of the plant material. The distribution of animal macrofossils, with identifications where appropriate, is therefore summarised below.

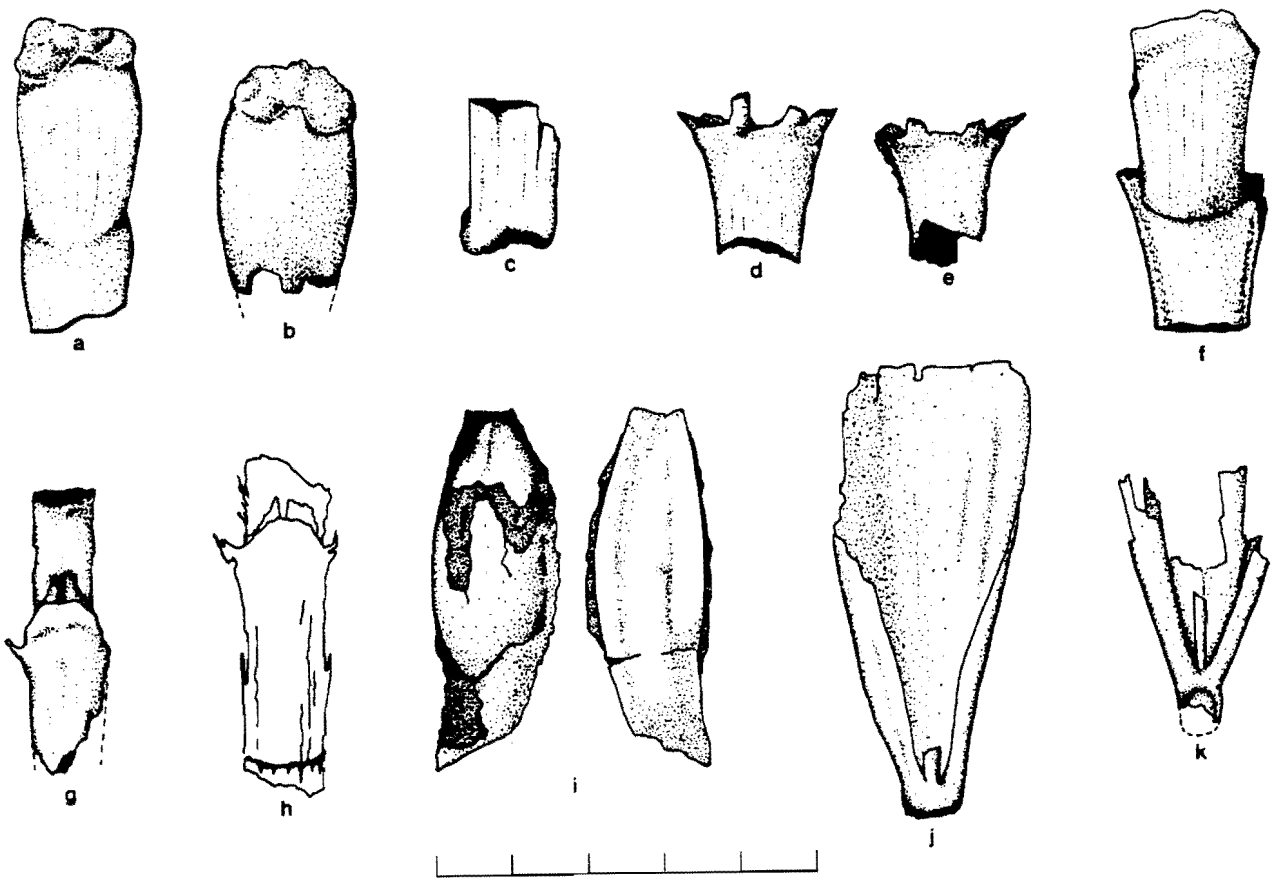


Fig : Remains of inflorescence bracts and rachis.

a	Triticum aestivum s.l.	Rachis fragment. IAS 5801 0038.
b	Triticum aestivum s.l.	Damaged rachis internode. IAS 4801 0306.
c	Triticum sp.	Glume base. IAS 4801 0309.
d,e	Hordeum vulgare	Rachis nodes. IAS 4601 0192.
f	Hordeum cf. vulgare	Rachis fragment. IAS 4801 1668.
g	Secale cereale	Rachis fragment. IAS 4601 0192.
h	Secale cereale	Rachis fragment, not carbonised. IAS 4801 0376.
i	Linum usitatissimum	Seed in capsule segment. IAS 4601 0677.
j	Avena sativa	Empty floret. IAS 4601 0760.
k	Avena fatua-type	Floret base. IAS 4601 0192.

Scale graduated in mm.

Depth (cm)	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100-110	110-120	130-140	140-150	150-160	160-170
Caltha palustris L.	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-
Ranunculus acris/repens/bulbosus	-	-	3	-	5	-	-	-	-	-	-	-	-	-	-	-
Ranunculus cf. flammula L.	-	-	-	3	1	1	-	-	-	-	-	-	-	-	-	-
Raphanus raphanistrum L. si fr	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-
Thlaspi arvense L.	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
cf. Reseda sp.	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Lychnis flos-cuculi L.	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Agrostemma githago L.	-	-	-	1	1fr	-	-	-	-	-	-	-	-	-	-	-
Stellaria media-type	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Chenopodium album L.	-	2	8	28	56	5	1	-	-	2	-	-	-	-	9	-
Chenopodium hybridum L.	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Chenopodium sp.	-	-	-	8	9	-	-	-	-	-	-	-	-	-	2	-
Beta vulgaris L. fl	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-
Atriplex patula/hastata	1	2	2	8	10	2	1	-	-	-	-	-	-	-	1	-
Chenopodiaceae indet.	1	3	14	-	6	3	3	3	-	-	-	-	-	-	2	-
Malva sylvestris L.	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-
Malva sp.	2	1	8	14	12	6	3	-	1	-	-	-	-	-	3	-
Medicago/Lotus/Trifolium spp. (a)	4	14	46	108	81	4	-	1	-	-	-	-	-	3	6	-
Vicia/Lathyrus spp.	1s+5co	12s+35co	7s+6co	6s+4co	9s+7co	5s+7co	6co	2s+1co	1	-	-	-	-	-	5s+4co	-
Vicia faba L. var. minor	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Leguminosae (large-seeded) (b)	-	-	2co	1s+1co	-	-	-	-	-	-	-	-	-	-	1	-
Rubus fruticosus agg.	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
Rubus sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1(m)	-
Potentilla sp.	-	-	-	-	1cf	-	-	-	-	-	-	-	-	-	-	-
Prunus spinosa L.	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Prunus sp. (m)	-	-	-	-	-	-	-	-	-	-	-	8	9	+++fr	-	++fr
Malus sylvestris/domestica	-	-	-	-	1	-	-	-	-	-	-	-	13(m)	1	-	1cf
Umbelliferae indet.	-	-	2	1	-	-	-	1	-	-	-	-	-	-	-	-
Polygonum aviculare agg.	4	15	8	11	28	-	2	-	-	-	-	-	-	-	5	-
Polygonum persicaria/lapathifolium	-	-	7	11	15	1	2	-	-	-	-	-	-	-	-	-
Polygonum convolvulus L.	-	10+fr	8+fr	17	17	4	4+fr	1	-	1	-	-	1	1	5+fr	-
Polygonum sp.	2	4	-	-	4	1	4	3	-	-	-	-	-	-	7	-
Rumex sp.	11	83	57	59	69	42	57	2	2	-	-	-	-	1	12	1
Polygonaceae indet.	-	14	-	-	7	4	7	2	-	-	-	-	-	-	-	-
Corylus avellana L. ns fr	+	+	+	+	+	+	+	+	+	+	-	-	+	+	+	-
Rhinanthus minor s.l.	1	-	2	6	2	-	-	-	1cf	-	-	-	-	-	-	-
Prunella vulgaris L.	-	-	-	-	-	1+1cf	-	-	-	-	-	-	-	-	-	-
Stachys sp.	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Galeopsis sp.	-	-	-	2	2	-	-	-	-	-	-	-	-	-	1	-
Labiatae indet.	-	1	1	4	2	-	-	-	-	-	-	-	-	-	1	-
Plantago lanceolata L.	-	1	12	23	9	10	-	-	1	-	-	-	-	-	1	-
Galium aparine L.	-	4	4	2	1	2	1	-	-	-	-	-	-	-	-	-
Galium sp.	-	-	2	1	1	2	-	-	-	-	-	-	-	-	-	-
Sambucus nigra L.	1	37	33	40	58	16	23	6	18	6	-	-	-	-	12	1(m)
Anthemis cotula L.	1	-	-	-	6	-	-	-	-	-	-	-	-	-	1+1cf	-
Cirsium/Carduus sp.	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Centaurea cf. nigra L.	1	-	4	8	5	1	-	-	-	-	-	-	-	-	-	1
Lapsana communis L.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Compositae indet.	-	-	1	6	-	-	-	1	-	-	-	-	-	-	2	-
Juncus sp. cp	-	-	2	6	7	-	-	-	-	-	-	-	-	-	1	-
Sparganium sp.	-	-	2cf	1cf	4	-	-	-	-	-	-	-	-	-	1	-
Eleocharis palustris/uniglumis	3	11	28	69	37	2	3	1	-	1	1	-	-	-	7	-
Scirpus maritimus L.	-	-	-	-	1	cf2	-	-	-	-	-	-	-	-	-	-
Carex spp.	1	17	8	11	13	3	2	1	-	1	-	-	-	-	1	-
Sieglingia decumbens (L) Bernh.	-	2cf	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Bromus mollis/secalinus	1+1cf	2	6	16	18	-	2	-	fr	-	-	1	-	1	-	-
Avena sp. ca	1	5	5	8	7	3	-	-	-	-	-	-	-	-	1	-
Avena sp. fb	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-
Avena fatua-type fb	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Gramineae indet. ca	-	3	14	20	16	5	1	-	1	1	1	-	-	-	3	-
Grass/cereal cn (c)	+	+	++	++	++	-	+	+	-	+	-	-	-	-	+	+
Triticum aestivum/compactum ca	3	4	3	5	2	2	3	2	-	-	1	1	-	1	-	2
Triticum aestivum/compactum rn	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-
Secale cereale L. ca	4	13	6	12	10	5	3	3	-	-	-	-	-	-	7	-
Secale cereale L. rn	-	1	6	27	6	2	1	-	-	-	-	-	-	-	2	-
Hordeum vulgare L. emend Lam ca	-	-	-	11	15	-	-	-	-	-	-	-	-	-	-	-
Hordeum vulgare rn	-	1	1	31	15	-	-	-	-	-	-	-	-	-	4	-
Hordeum sp. ca	3	7	10	-	-	7	4	2	1	1	1	-	-	-	3	-
Cereal indet. ca	5	19	18	22	-	15	10	4	3	8	-	4	1	-	12	2
Indeterminate fruits, seeds etc.	12	46	52	115	78	38	10	5	2	4	1	2+2(m)	1+4(m)	6+4(m)	12	2
Tuber	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Stems	+	+	+	+	+	+	+	-	+	-	-	-	-	+	+	-
Thorns	-	-	+	+	+	+	+	-	+	+	-	-	-	+	+	-
Catkin	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
Buds	-	+	+	+	+	-	-	-	-	-	-	-	-	-	+	-
Mosses	-	+	-	+	-	-	-	-	-	+	-	-	-	-	-	-

Table 3: Plant macrofossils from pit 0192 (Site 4601).

Taxa are represented by carbonised fruits or seeds except where indicated.
Abbreviations: ca - caryopses; cn - culm nodes; co - cotyledons; cp - capsules with seeds; fb - floret bases; fr - fragments; fl - "fruit lids"; m - mineralised; ns - nutshells; rn - rachis nodes; s - seeds.

Animal macrofossils

Bone

Entire and fragmentary bones of fish, birds and mammals were present throughout the fills of the feature. Both burnt and unburnt bone was present. Burnt bone was generally rare towards the base of the pit, except at 150-160cm. Most of the burnt bone is white or grey in colour though black bone charcoal was fairly common at 30-50cm. indicating burning in oxygen-deficient conditions.

Avian eggshell

Small fragments were recovered from 140-150 and 160-170cm.

Marine mollusc shell

Shells and fragments, mostly of Ostrea edulis and Mytilus edulis, with rare Cerastoderma sp, Hydrobia ulvae, Littorina spp. and Nucella lapillus were retrieved from all levels of the pit. Shells discoloured by burning were frequent in the top 60cm. of the feature and at 150-160cm. The small marine gastropods, together with barnacles and large foraminifers, which were also noted in the samples, may have reached the site incidentally with edible shellfish.

Land molluscs

Rare shells including Cecilioides acicula, Vallonia spp. and Trichia spp. were noted. Some of these are grey in colour due to partial burning.

Charred insects

The following taxa were identified by Dr Mark Robinson:

30-40cm.	Onthophilus striatus (For.)	1 individual
	cf. Histeridae indet.	1 "
	Aphodius sp.	1 "
	Ceuthorhynchinae indet.	1 "
40-50cm.	Aphodius cf. foetidus (Hbst)	2 "
	cf. Aphodius sp.	1 "
60-70cm.	Kissiter minimus (Aub.)	1 "

Dr Robinson notes: "Species of Aphodius live in dung, especially of large herbivores. They do not occur in manure heaps; they are species which live in individual animal droppings in the field. O. striatus (a member of the Histeridae) lives in a variety of decaying plant and animal remains including herbivore droppings. Kissiter minimus occurs at the roots of grassland plants,

while Ceuthorhynchinae are phytophagous on a wide range of herbs".

Mineralised insects

Mineralised insects, mostly fly puparia, were frequent in association with mineralised plant material in most samples below 110cm.

Coprolites, concretions etc.

Mineralised coprolites occurred in samples between 10 and 120cm. An intact stool from 50-60cm. is 65 x 27 x 26mm. Like the other fragmentary examples it is pale buff in colour with an open porous structure. Bone fragments in the fragmentary specimens are up to 20mm. in length, suggesting that they are canine droppings.

In samples below 140cm. amorphous phosphatic concretions including plant tissue occurred.

Samples from 30-50 and 150-160cm. produced masses of charred porous material containing charred plant tissue including grass or cereal culm. This might be charred herbivore dung.

Charred leather

Small fragments of charred leather came from samples at 30-50cm. and a possible fragment was noted in that from 140-150cm.

Charred textile

The sample from 30-40cm. contained many small fragments of coarse charred textile and a few charred threads came from that at 40-50cm.

Discussion

The distribution of plant macrofossils in the column sample from this feature is similar to that in many other Middle Saxon pits from Ipswich in that mineralised plant macrofossils are fairly frequent in most of the lower fills whereas carbonised plant material predominates in the upper fill. As in other comparable features this is thought to indicate initial use of the pit as a cess pit and subsequent back-filling with other types of refuse. Mineralised plant remains from the lower fills include fruitstones of Rubus sp. (blackberry?), Prunus sp. (sloe?) and seeds of Malus sylvestris/domestica (apple) and Sambucus nigra (elder). These mineralised macrofossils are both sparse and poorly preserved, but their association with mineralised phosphatic concretions and fly puparia is consistent with interpretation of these lower fills as being partly composed of human sewage.

The carbonised plant material from the pit is, however, different from any other Middle Saxon assemblages so far examined. These generally consist predominantly of cereal grains with rare rachis fragments and weed seeds. In pit 192 the carbonised macrofossils comprise mainly fruits and seeds of weeds and grassland plants with abundant charred grass/cereal culm, some cereal remains including both grains and rachis, and remains of scrub plants. Two episodes of disposal of charred material are indicated by concentrations of carbonised plant remains at 150-160cm. and 0-70cm.

The carbonised cereal remains are mainly of rye (Secale cereale) and barley (Hordeum vulgare) with some bread/club wheat (Triticum aestivum/compactum) and possibly cultivated oats (Avena sp). A single bean seed (Vicia faba var. minor) came from the sample at 40-50cm. Rachis fragments are unusually frequent, in some samples more so than grains. The generally high rachis node:cereal grain ratio implies that the assemblages include a component of cereal processing waste. The numerous seeds and fruits of weeds from these samples probably came from the same source: taxa identified include Raphanus raphanistrum, Thlaspi arvense, Agrostemma githago, Stellaria media-type, Chenopodium album, C. hybridum, Atriplex patula/hastata, Malva sylvestris, Polygonum aviculare, P. persicaria/lapathifolium, P. convolvulus, Rumex spp, Galeopsis sp, Galium aparine, Anthemis cotula, Cirsium/Carduus sp, Lapsana communis, Bromus mollis/secalinus and Avena fatua-type. Fruits and seeds of most of these taxa have previously been found in association with cereals in Middle Saxon pits at other sites in Ipswich (Murphy, undated).

The wide range of carbonised fruits and seeds of grassland and wetland plants in the samples from pit 192 is, however, unusual. These include Caltha palustris, Ranunculus acris/repens/bulbosus, R. cf. flammula, Lychnis flos-cuculi, Medicago/Lotus/Trifolium-type, Vicia/Lathyrus spp, Rhinanthus minor, Prunella vulgaris, Plantago lanceolata, Centaurea cf. nigra, Juncus sp, Sparganium sp, Eleocharis palustris/uniglumis, Carex spp, Sieglingia decumbens and other Gramineae. This list of taxa includes plants characteristic of damp hay-meadows (cf. Greig 1984) and it strongly suggests, together with the abundance of charred grass culm in the samples, that burnt hay was discarded in the pit. Very similar assemblages of charred seeds from grassland/wetland plants occurred in Roman deposits at Culver Street, Colchester (Murphy, in prep.) and were likewise interpreted as charred hay.

Charred remains of scrub plants also occurred in the samples. Fruitstones of Rubus fruticosus (bramble) and sloe (Prunus spinosa) and fairly abundant seeds of elder (Sambucus nigra) were associated with twigs and rosaceous thorns,

implying that they may have been carbonised whilst brushwood was being burnt, rather than representing human food refuse. The carbonised nutshell fragments of hazel (Corylus avellana) and seed of apple (Malus sylvestris/domestica) may have come from either source.

Finally, a few remains of two coastal plants were identified: 'fruit lids' of Beta vulgaris (beet) and nutlets of Scirpus maritimus (sea club rush). The former is a characteristic plant of sea-banks, the latter occurs in shallow water at the margins of tidal rivers.

In summary, then, it is clear that the carbonised plant material from pit 192 came from a variety of sources: it includes cereal crop processing waste, hay and brushwood. The charred or partly burnt animal macrofossils associated with this carbonised plant material include bone, marine and land mollusc shells, insects including phytophages and dung beetles and probable charred herbivore dung, besides charred leather and textile. Organic refuse from the site and its surroundings was evidently collected and burnt, apparently on two occasions. Pit 192 was a convenient place in which to dump the charred residue. The plant remains can very tentatively be interpreted as indicating that this tidying-up took place in autumn - i.e. at a time when ripe fruits of bramble, sloe and elder were on the bushes. From the point of view of the economy of Middle Saxon Ipswich, however, the most significant reliable result from this feature is the presence of charred hay and dung beetles, showing quite clearly that stock were kept in the vicinity.

(b) Pit 0648 (IAS 4601): Table 4

The samples from below 150cm. contained quite large quantities of mainly fragmentary mineralised fruitstones of Rubus fruticosus (bramble) and R. idaeus (raspberry) with mineralised internal casts of Prunus (sloe/cherry) fruitstones and a seed of elder (Sambucus nigra) (Table 4). These mineralised macrofossils seem to indicate initial use of the feature as a cess pit. The fills between 100 and 150cm. produced only a very thin scatter of carbonised cereal grains, hazel nutshells and mineralised macrofossils, perhaps indicating rapid intentional back-filling.

(c) Well 1571/1668 (IAS 4801): Table 5

A column sample was taken for machine flotation from the top 190cm. of this feature, and a further bulk sample was collected from below the water

Depth (cm)		100-110	110-120	120-130	130-140	140-150	150-160	160-170
Triticum sp.	(a)	4	-	-	-	-	-	1
Secale cereale L	(a)	-	-	-	-	-	-	2
Hordeum sp.	(a)	1	-	-	-	-	-	-
Cereal indet.	(a)	4	-	1	1	-	1	1
Leguminosae indet.	(a,b)	-	-	-	-	-	-	1
Corylus avellana L		+	-	-	-	-	+	-
Rubus fruticosus agg.	(c)	-	4	-	-	-	++	+++
Rubus idaeus L	(c)	-	-	-	-	-	+	+
Prunus sp.	(d)	4	-	-	-	-	-	fr
Hyoscyamus niger L		-	-	-	-	-	-	1
Sambucus nigra L		-	-	-	-	-	1	2
Bromus mollis/secalinus	(a)	-	-	-	-	-	-	1
Stem fragments		+	-	-	-	-	+	+
Indeterminate		2	-	-	-	-	frags	5

Table 4: Plant macrofossils from pit 0648 (Site IAS 4601)

Taxa are represented by fruits or seeds except where indicated.

Notes: (a) Carbonised; (b) Large cotyledon fragment; (c) Mostly fragmentary, and hence not quantifiable;
(d) Mineralised internal casts of endocarps.

Depth (cm)		0-10	40-50	80-90	120-130	160-170	180-190	c.300(
Triticum aestivum/compactum	ca	15	1	38	13	7	2	7
Secale cereale L.	ca	4	-	29	9	9	3	1
Secale cereale L.	m	-	-	-	-	-	1	1
Hordeum sp.	ca	9(a)	-	-	2	-	-	1
Hordeum sp.	rn (b)	-	-	-	-	-	-	2
Avena sp.	ca	-	-	4	-	-	1	1
Cereal indet.	ca	7	1	49	22	86	25	16
Raphanus raphanistrum L.		fr	-	-	-	fr	-	-
Agrostemma githago L.		-	-	-	-	1	-	-
Chenopodium album L.		-	-	4	-	-	-	-
Atriplex patula/hastata		-	-	-	1	-	-	-
Chenopodiaceae indet.		-	1	-	-	-	-	-
Malva sp.		2	-	-	-	-	-	-
cf. Linum sp.		-	-	-	-	-	fr	-
Vicia/Lathyrus sp.		1s+1co	2co	6	3s+1co	-	-	-
Leguminosae indet.	(c)	1	-	3co	1co+1fr	fr	2co	-
Polygonum aviculare agg.		1	-	-	-	-	-	-
Polygonum convolvulus L.		1	-	-	-	-	1	2
Polygonum persicaria/lapathifolium		-	-	-	-	2	-	-
Polygonum sp.		-	-	fr	-	-	-	-
Rumex sp.		1	-	-	1	2	2	2
Polygonaceae indet.		-	-	2	-	-	-	-
Corylus avellana L.		+	-	+	+	-	+	-
Plantago lanceolata L.		-	1	-	-	-	-	1
Galium aparine L.		-	1	1	-	-	-	1
Sambucus nigra L.		-	-	-	1	-	-	1uc
Lapsana communis L.		-	-	-	-	1	-	-
Eleocharis palustris/uniglumis		1	-	-	1	-	-	-
Bromus mollis/secalinus		-	-	7	1	-	1	2
Gramineae indet.		-	-	1	-	3	-	-
Grass/cereal	ca	1	-	-	-	-	-	-
Grass/cereal	cn	1	-	1	-	-	-	2
Indeterminate seeds etc.		1	2	5	3+2m	4	2+1m	7+1m
Bud		-	1	-	-	-	-	-
Stem frags.	(d)	-	-	+	+	+	-	-

Table 5: Plant macrofossils from well 1668 (Site 4801)

Taxa are represented by carbonised fruits or seeds except where indicated. Charcoal very common in all samples.

Abbreviations: ca - caryopses; cn - culm node; co - cotyledon; fr - fragment; m - mineralised; s - seed.

Notes: (a) Apparently all median grains; germinated. (b) Glume bases not well preserve but cf. six-row. (c) Large-seeded. (d) Including monocot (grass?) stem. (e) A soil sample (18.4kg) was examined in the laboratory. It came from below the

level at a depth of c.300cm. in layer 1668. Samples were examined from 40cm. vertical intervals in the upper fills. These samples contained unusually large amounts of charcoal associated with charred cereal grains, occasional rachis fragments and weed seeds (Table 5). Mineralised seeds were present but very rare. The sample from near the base of the well was wet when excavated, and oak timbers were fairly well preserved at this level. However there was no preservation of smaller plant macrofossils by waterlogging. It appears that the water level has fluctuated and the lowest fills have dried out sufficiently from time to time for humification of most plant material to occur. Conditions were, however, evidently adequate for preservation of timber. Apart from carbonised plant material the sample from c.300cm. produced only one uncarbonised elder seed and an indeterminate mineralised seed.

Late Saxon features (c.850 - c.1000AD)

Plant remains from Middle Saxon contexts at a number of Ipswich sites had previously been studied, but Late Saxon material had received comparatively little attention. Only the Late Saxon waterfront deposits at Bridge Street were extensively sampled (Murphy 1983). At IAS 4601 and 4801, therefore, samples were collected from several Late Saxon pits and wells to assess whether the macrofossils from these features differ significantly from the Middle Saxon material. Column samples were taken for machine flotation from the 'Early Late Saxon' pits 0002 and 0668 at IAS 4601 and 0270 and 0309 at IAS 4801, dating to c.850 - c.900AD; and from 'Middle Late Saxon' pits 0306 and 0366 at IAS 4801, dating to c.900-1000AD. Further samples from other Late Saxon features were collected for laboratory analysis.

(a) 'Early Late Saxon' pits 0002, 0668, 0270, 0309 (Tables 6-9)

The column samples from these features produced carbonised remains of cereals (Triticum aestivum/compactum, Secale cereale, Hordeum sp, Avena sp), pulses (including Vicia faba var. minor), nutshells (Corylus avellana), possibly flax (Linum sp) and weed seeds with mineralised seeds and fruitstones of Rubus fruticosus, R. idaeus, Malus sp. and Prunus sp. All these crops and edible wild plants have previously been reported from Middle Saxon contexts. No 'exotic' crops are present. Cereal grains are usually the main carbonised macrofossils: no deposits of carbonised crop processing waste were found. The column samples show a distribution of macrofossils similar to that in Middle Saxon pits: carbonised plant material is often more common in the upper fills of pits whilst mineralised seeds may be

Depth (cm)	0-10	10-20	20-30	30-40	80-90	90-100	100-110	110-120
Triticum sp.	1	4	5	4	4	2	-	-
Secale cereale L.	2	3	2	5	5	5	2	1
Hordeum sp.	1	2	5	2	2	7	1	6
Avena sp.	-	-	-	-	-	1	-	-
Cereal indet.	13	17	8	6	8	10	5	3
Malva sp.	-	1	-	-	-	-	-	-
cf. Linum sp.	-	-	-	-	1	-	-	-
Medicago-type	-	-	-	-	-	1	-	-
Vicia/Lathyrus sp.	-	2co	1s	2s+2co	-	-	-	-
Leguminosae indet. (a)	1	-	-	-	-	-	-	-
Corylus avellana L.	+	+	+	+	+	-	-	-
cf. Polygonum convolvulus L.	-	-	1	-	-	-	-	-
Rumex sp.	1	-	-	-	-	-	-	-
Plantago lanceolata L.	-	-	1	-	-	-	-	-
Galium aparine L.	fr	-	fr	fr	fr	-	-	-
Eleocharis sp.	-	-	-	-	-	1	-	-
cf. Bromus sp.	-	1	-	-	-	-	-	-
Gramineae indet.	-	1	-	2	-	-	-	-
Grass/cereal culm nodes	fr	-	-	fr	-	1	fr	-
Indet. seeds etc.	1	5	1	3	-	1+frs	-	-

Table 6: Plant macrofossils from pit 0002 (Site 4601)

Taxa are represented by carbonised fruits or seeds except where indicated.
Material from this feature is generally poorly preserved.

Abbreviations: co - cotyledons; fr - fragments; s - seeds.
Note: (a) Fragment of large cotyledon.
NB. No samples between 40-80cm.

Depth (cm)		80-90	90-100	100-110	110-120	120-130	130-140	140-15
Triticum aestivum/compactum	ca.	152	183	158	32	+(c)	4	14
Triticum sp.	rn.	-	1(d)	-	-	-	-	-
Secale cereale L.	ca.	18	17	21	3	+(c)	-	-
Secale cereale L.	rn.	-	2	-	-	-	-	-
Hordeum sp.	ca.	11	10	7	2	+(c)	-	-
Avena sp.	ca.	3	2	1	1cf	-	-	-
Cereal indet.	ca.	61	60	32	14	-	2	4+1n
Cereal indet.	sp.	+	-	-	-	-	-	-
Raphanus raphanistrum L.	si.fr.	-	-	-	-	-	1	-
Agrostemma githago L.		2	1	-	-	-	-	-
Chenopodium album L.		-	-	-	-	-	1	-
Atriplex patula/hastata		1	-	-	-	-	-	-
Malva sp.		-	-	1	-	-	-	-
Medicago-type		3	-	-	-	-	1	-
Vicia faba L. var. minor		-	-	1	-	-	-	-
Leguminosae indet.	(a)	1	-	1	-	-	-	-
Rubus spp.	m. (b)	1	-	-	-	+++	2	-
cf. Malus sp.	m.	-	-	1	-	-	-	1
Prunus sp.	m.	-	-	-	-	-	-	80+fr
Corylus avellana L.		+	-	+	+	-	-	+
Rumex sp.		7+1m	-	1+1m	-	-	-	-
Polygonum convolvulus L.		-	1	1	-	-	-	-
Sambucus nigra L.		1+1cf	-	1+1m	-	-	1	3
Eleocharis palustris/uniglumis		4	-	-	-	-	-	-
Bromus mollis/secalinus		5	1	-	-	-	-	-
Grass/cereal culm nodes		+	2	-	-	-	-	-
Stem frags	m.	-	-	-	-	+	-	-
Indet. seeds etc.		2	1	2	-	3	-	4

Table 7: Plant macrofossils from pit 0668 (Site 4601)

Taxa are represented by carbonised fruits or seeds except where indicated.
Abbreviations: ca - caryopses; fr - fragments; m - mineralised; rn - rachis nodes; si - siliqua; sp - 'sprouts'.
Notes: (a) Fragment of large cotyledon. (b) R. fruticosus with some R. idaeus; mostly fragmentary and therefore unquantifiable. (c) Most specimens coated with mineralised concretions - recovered from residue. Many fragments not easily quantifiable. (d) This seems to be from near the base of the ear. Hexaploid features are the absence of glume remnants, lack of swelling below glume insert. In former, however, the internode does not show the typical 'shield' shape.

Depth (cm)		0-10	10-20	20-30	30-40	40-50	50-60	60-70
Triticum aestivum/compactum	ca.	6	3	5	3	2	4	-
Secale cereale L.	ca.	2	3	2	-	2	1	1
Secale cereale L.	rn.	-	-	-	-	-	1	-
Hordeum sp.	ca.	1	-	-	-	1	-	2
Avena sp.	ca.	-	2	5	4	6	1	-
Cereal indet.	ca.	6	9	8	4	6	3	6
Thlaspi arvense L.		1m	1m	-	-	-	-	-
Agrostemma githago L.		-	-	-	1cf	-	-	1
Chenopodium album L.		2	3	3	-	-	-	-
Atriplex patula/hastata		-	-	-	-	-	-	1
Chenopodiaceae indet.		-	1	-	1	1m	1	-
cf. Malva sp.		-	-	-	-	-	-	1cf
Prunus sp.		-	-	-	-	fr	-	-
Umbelliferae indet.		1m	-	-	2m	-	-	-
Vicia/Lathyrus sp.		-	1	-	-	-	-	-
Medicago spp.		-	1	1cf	-	-	-	-
Leguminosae indet.	(a)	fr	-	4co	-	-	3co	-
Polygonum convolvulus L.		-	-	1	-	-	-	1
Polygonum sp.		-	-	1	-	-	-	-
Rumex sp.		1m	1	1	-	-	-	1
Polygonaceae indet.		-	-	-	3m	2+4m	-	-
Corylus avellana L.		-	+	-	+	-	-	+
Galeopsis tetrahit/speciosa		-	-	-	-	1m	-	-
Plantago lanceolata L.		-	1	-	-	-	-	-
Anthemis cotula L.		-	-	-	3	-	-	-
Eleocharis sp.		-	1cf	-	-	-	-	-
Bromus mollis/secalinus		2	3	1	1	2	-	-
Gramineae indet.		-	1	2	-	-	-	-
Grass/cereal	cn.	-	1	-	-	-	-	-
Monocot (?grass)	c.fr.	-	-	+	+	+	-	-
Indet. stems		-	+	-	-	-	-	-
Indet. bud		-	-	-	1	1	-	-
Indet. seeds etc.		1+5m	1	8+5m	4+20m	1+11m	1+7m	3m

Table 8: Plant macrofossils from pit 0270 (Site 4801)

Taxa are represented by carbonised fruits or seeds except where indicated.
Abbreviations: c - culm; ca - caryopses; cn - culm node; co - cotyledon;
fr - fragment; m - mineralised; rn - rachis nodes.
Note: (a) Large-seeded.

Depth (cm)		0-10	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100-110	110-120	120-130	130-140	140-150	150-160	160-170
Triticum aestivum/compactum	ca.	1	5	1	1	1	1	-	2	2	-	-	-	-	-	-	-
Triticum sp.	gb.(a)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Secale cereale L.	ca.	1	2	3	3	8	3	2	2	3	2+1cf	-	1	-	-	1	-
Secale cereale L.	rn.	-	-	1	2	1	-	-	-	-	-	2	1	1	1	1	-
Hordeum sp.	ca.	5	10(b)	8	8	8	11	2	2	5	3	1	-	-	-	-	-
Hordeum sp.	rn.	-	-	-	-	-	-	1(c)	-	-	-	-	-	-	-	-	-
Avena sp.	ca.	-	-	1	1	4	1	1+1cf	4	1	-	1	-	-	-	-	-
Cereal indet.	ca.	18	13	13	19	15	17	8	6	4	3	-	3	3	-	5	1
Atriplex patula/hastata		-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Chenopodiaceae indet.		-	2	1	-	-	-	-	-	-	-	1uc	-	-	-	-	-
Malva sp.		-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-
Vicia/Lathyrus sp.		-	-	-	-	-	1	1	2	-	-	1	-	-	-	-	-
Leguminosae indet.	(d)	-	fr	-	-	-	-	-	-	-	-	-	fr	-	-	-	-
Rubus fruticosus agg.	uc.	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Rubus idaeus L.	uc.	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-
Rubus sp.	uc.	-	-	-	-	-	-	-	-	-	-	3uc	27	4	-	1	5
Polygonum lapathifolium/persicaria		3	2	1	-	-	2	-	-	-	-	-	-	-	-	-	-
Polygonum lapathifolium L.		-	-	-	-	-	-	-	-	-	-	1uc	-	-	-	-	-
Polygonum convolvulus L.		-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Rumex sp.		3	-	2	1	2	-	-	-	-	-	-	1+1uc	-	-	-	-
Polygonaceae indet.		-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
Corylus avellana L.		+	-	-	+	-	-	+	+	-	-	-	-	-	-	-	-
cf. Galeopsis sp.		-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Plantago lanceolata L.		-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-
Galium aparine L.		-	-	-	-	1	-	1cf	-	-	-	-	-	-	-	-	-
Sambucus nigra L.	uc.	1+fr	1(c)+5	15+fr	9+fr	25+fr	4+fr	8+fr	4+fr	5+fr	2+fr	4+fr	-	2	-	-	1
Lapsana communis L.		-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-
Eleocharis palustris/uniglumis		-	1cf	1	-	-	-	-	1	-	-	-	-	-	-	-	-
Carex sp.		-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Bromus mollis/secalinus		1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Gramineae indet.		1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Gramineae/cereal	cn.	-	-	-	-	-	-	-	1fr	-	-	-	-	-	-	-	-
Indeterminate seeds etc.		1	1	3	2	2	1	-	1	1	1	-	-	-	1	-	1
Buds		-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thorns		-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-

Table 9: Plant macrofossils from pit 0309 (Site 4801)

Taxa are represented by carbonised fruits or seeds except where indicated.
Sample apparently not collected at 10-20cm.
Abbreviations: ca - caryopses; cn - culm nodes; fr - fragments; gb - glume base; uc - uncarbonised.

Notes: (a) T. dicoccum or T. spelta-type? (b) Including lateral grains.
(c) H. vulgare-type. (d) Large-seeded.

Cereal (caryopses and periderm frags)		+++
Secale cereale L.	(rachis nodes)	++
Cereal/large grass (culm fragments)		++
Pteridium aquilinum (L) Kuhn	(pinnules + stem)	++
Papaver argemone L.	(seeds)	+
Thlaspi arvense L.	(seeds)	+
Agrostemma githago L.	(seeds)	+++
Stellaria media-type	(seeds)	+
Spergula arvensis L.	(seeds)	+
Scleranthus annuus L.	(fruits)	+
Chenopodium album L.	(seeds)	+++
Atriplex patula/hastata	(seeds)	+
Rubus fruticosus agg.	(fruitstones)	+
Rubus-type	(thorn)	+
Trifolium sp.	(calyces)	+
Polygonum aviculare agg.	(nutlets + perianth)	+++
Polygonum convolvulus L.	(nutlets)	++
Rumex sp(p)	(nutlets)	+
Myosotis sp.	(nutlet)	+
Euphrasia/Odontites sp.	(seeds)	+
Sambucus nigra L.	(seeds)	+
Anthemis cotula L.	(fruits)	++
Lapsana communis L.	(fruits)	+
Compositae indet.	(fruits)	+
Bromus sp.	(caryopses)	+
Gramineae indet.	(caryopses)	++
Indeterminate seeds etc.		+
Monocot. and dicot. stem fragments		++
Mosses		+

Table 10: Plant macrofossils from 0376 (Site 4801): 0.5kg sample.

Macrofossils from this sample have not been counted: the cereal remains in particular show varying degrees of fragmentation and degradation. Thus the relative numbers of surviving grains, rachis nodes and culm fragments may not necessarily be related to their original proportions.

distributed thinly throughout the fills but are only common in some of the lower fills. This seems to indicate primary use of pits of both periods as cess pits, with a later backfilling of less organic material. In summary these 'Early Late Saxon' pits produced material which shows no clear differences from Middle Saxon material.

Soil samples from Early Late Saxon pit 2738 (2896) and well 2872 (2891) at IAS 4801 produced similar sparse mixed assemblages of carbonised and mineralised material. However pit 300 (376) at this site contained structured waterlogged organic deposits with abundant plant macrofossils, wood, charcoal and insects (Table 10). In this deposit uncarbonised cereal remains are common. They comprise numerous culm fragments with fragments of rye rachis and whole and fragmentary cereal periderm. Seeds of arable weeds are frequent. Small grass caryopses and calyces of Trifolium sp(p) are also fairly common, together with mosses, fragments of bracken frond, and rare remains of elder and bramble. The presence of all elements of cereal plants seems to suggest that material from unprocessed cereal crops became incorporated into this pit fill, where it was mixed with macrofossils derived from grass or hay and with bracken. Clearly this assemblage is in marked contrast to the contemporary carbonised assemblages from the same site, which consist almost entirely of grains: it implies that some cereals were reaching the site on the ear, though the carbonised material in isolation would indicate that cereals arrived mainly or entirely as cleaned prime grain.

(b) 'Middle Late Saxon' pits (c.900-1000AD) 0306 and 0366 (Tables 11-12)

Column samples from these two pits produced a similar range of plant macrofossils to those from the 'Early Late Saxon' pits. In 0306, however, seeds of flax (Linum cf. usitatissimum) are relatively common. Another distinctive feature of this column sample is the presence of mineralised fruitstones and seeds with mineralised testa fragments of beans (Vicia faba var. minor) and mineralised phosphatic concretions containing Agrostemma testa and cereal periderm throughout the fill. Indeed these macrofossils derived from human faeces are more abundant in the upper fill than the lower. The pit evidently continued in use as a cess pit until completely filled.

Early medieval pits (c.1000-1150AD) 0415, 0902(4601) and 0808(4801) Tables 13-15)

The two pits of this period sampled at IAS 4601 contained a similar range of taxa to the Late Saxon pits with, again, a concentration of mineralised

Depth (cm)		0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Triticum aestivum/compactum	ca.	4	-	1	6	1	2	1	1
Triticum aestivum/compactum	rn.	-	-	-	1	-	-	-	-
cf. Triticum sp.	ri.	-	-	1	-	-	-	-	-
Secale cereale L.	ca.	2	5	1	2	-	6	1	2
Secale cereale L.	rn.	-	4	4	3	-	-	-	-
Hordeum sp.	ca.	3	1	3	3	1	3	2(a)	-
Hordeum sp.	rn.	-	-	-	-	-	-	1cf	-
Avena sp.	ca.	4	16	12	5	1	2	-	-
Cereal indet.	ca.	11	11	23	18	1	9	5	1
Cereal indet.	ri.	-	-	-	1	-	-	-	-
Agrostemma githago L.		1	-	-	1fr+1cf	-	1	-	-
Chenopodiaceae indet.		-	-	2m	-	3m	-	-	-
Linum cf. usitatissimum L.		2	3	2+2cf	-	-	1	-	-
Vicia faba L. var minor	s.	1	-	-	-	-	-	-	-
Vicia faba L. var minor	t.(b)	-	+	?	?	-	?	-	-
Vicia/Lathyrus sp.	co.	-	-	-	-	-	-	2cf	-
Leguminosae indet.	(c)	-	-	1+1co	-	-	-	-	-
Rubus fruticosus agg.	m.	-	-	3	2	-	8	-	-
Rubus sp.	m.	-	-	-	2+fr	2+fr	-	-	-
Prunus spp.	m.(d)	15+fr	20+fr	7+fr	2+fr	2	13+fr	-	1(e)
Malus sylvestris/domestica		-	frm	1+5m	7+fr	-	-	-	-
Umbelliferae indet.		-	-	-	-	-	2m	-	-
Polygonum lapathifolium/persicaria		-	-	1	-	-	1	1	-
Rumex sp.		-	-	2	-	1m	2	1	-
Polygonaceae indet.		-	-	-	-	-	1m	-	-
cf. Stachys sp.		-	-	-	-	-	1m	-	-
Plantago lanceolata L.		-	1	-	-	-	1	-	-
Galium sp.		-	1	-	1	-	-	-	-
Sambucus nigra L.	m.	4	1	16	7+fr	-	2	3	-
Lapsana communis L.		-	-	-	1	-	-	-	-
Compositae indet.		-	-	-	1m	-	-	-	-
Carex sp.		1cf	-	-	-	-	1cfm	-	-
Bromus mollis/secalinus		-	-	1	5+1cf	1	2	-	-
Gramineae indet.		-	-	-	1	1	3	1	-
Grass/cereal culm		-	2cn	+	-	-	-	-	-
Indeterminate seeds etc.	(f)	1	1	5	8	3	1	-	-
Indet. stems	m.(g)	-	+	+	+	+	+	-	-
Indet. bract		-	-	+	-	-	-	-	-
Concretions	m.(h)	+	+	+	+	+	+(e)	+	-
Indet. charred material		-	-	-	-	-	-	-	+

Table 11: Plant macrofossils from pit 0306 (Site 4801).

Taxa are represented by carbonised fruits or seeds except where indicated.
Mineralised insects and woodlice common.

Abbreviations: ca - caryopses; cn - culm nodes; co - cotyledons; fr - fragments; m - mineralised; ri - rachis internode; rn - rachis nodes; s - seed.

Notes: (a) One germinated grain. (b) Mineralised testa frags, with hilum in sample from 10-20cm. (c) Large-seeded. (d) Internal casts of endocarps; mostly P. avium or P. spinosa size, but some P. domestica subsp. insitita. (e) Apparent mineralised fungal hyphae. (f) Carbonised only: many indet. mineralised seeds etc. (g) Monocot. and dicot. (h) Mineralised phosphatic concretions with A. githago testa, cereal periderm, indet. epidermis and testa.

Depth (cm)	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Triticum aestivum/compactum	3	1	4	-	2	1	-	-	1	1
Secale cereale L.	-	1	-	-	-	1	-	-	-	1
Hordeum sp.	1	2(a)	1	-	-	1	-	1	-	-
Avena sp.	-	2	-	-	-	2	-	1	-	3
Cereal indet.	7+1m	4	2	2	3	2	2	2	4	4
Raphanus raphanistrum L.	-	-	-	-	-	-	-	-	1	-
Agrostemma githago L.	-	-	-	-	-	-	1	1	-	-
Chenopodium album L.	2	-	-	-	-	-	-	1	-	-
Chenopodiaceae indet.	1	-	-	-	-	-	-	-	-	-
Medicago-type	-	-	-	-	-	-	1	-	-	-
Leguminosae indet. (b)	-	2fr	fr	-	-	-	-	-	-	-
Polygonum sp.	2fr	-	-	-	-	-	-	-	-	-
Rumex sp.	-	-	-	-	1	-	-	-	-	-
Polygonaceae indet.	1m	-	-	-	-	-	-	-	-	-
Corylus avellana L.	+	-	+	-	-	-	+	-	-	-
Sambucus nigra L. uc.	-	-	1	-	-	-	-	-	-	-
Bromus mollis/secalinus	-	-	-	-	3	-	-	-	-	-
Gramineae indet.	-	2	-	-	1	-	-	-	1	2
Grass/cereal cfr.	-	-	-	-	-	fr	-	-	-	-
Indeterminate seeds etc.	1m	-	-	-	-	1	-	-	-	1
Bud	-	1	-	-	-	-	-	-	-	-

Table 12: Plant macrofossils from pit 0366 (Site 4801)

Taxa are represented by carbonised fruits or seeds except where indicated.
Abbreviations: cfr - culm fragment; fr - fragment; m - mineralised; uc - uncarbonised.
Notes: (a) One lateral grain. (b) Large-seeded.

Depth (cm)		140-150	150-160	160-170	170-180	180-190	190-200	200-210
Triticum aestivum/compactum		1	1	2	3	2	2	2
Secale cereale L.	ca.	20	7	4	5	4	1	6
Secale cereale L.	rn.	1	2	-	-	-	-	-
Hordeum sp.	(a)	28	10	1	15	11	11	14
Avena sp.		31	20	6	5	9	1cf	4
Cereal indet.		124	55	15	19	13	6	9
Ranunculus acris/repens/bulbosus		-	-	-	-	-	-	1
Raphanus raphanistrum L.		6	1	-	-	-	-	-
Silene sp.		3	-	-	-	-	-	-
Agrostemma githago L.		-	1	-	-	2(b)	-	-
Scleranthus cf. annuus L.		-	-	-	-	-	-	1
Chenopodium album L.	uc.	2	-	-	-	1	-	4uc
Chenopodiaceae indet.		-	-	-	-	-	1uc	-
Conium maculatum L.	uc.	-	-	-	-	-	-	3uc
Vicia/Lathyrus sp.		3s+1co	2	3s+1co	fr	-	-	-
Vicia faba L. var minor		-	-	-	1	-	-	-
Leguminosae indet.	(c)	3fr	1s	-	-	-	-	-
Rubus fruticosus agg.	uc.	-	-	-	-	2	-	+++(d)
Rubus idaeus L.	uc.	-	-	-	-	-	-	+(d)
Polygonum aviculare agg.		-	-	1	1	-	-	-
Rumex sp.		2	1	-	-	-	1+1uc	-
Corylus avellana L.	fr.	+	-	-	-	+	+	-
Hyoscyamus niger L.	uc.	-	-	-	-	-	-	1uc
Galium sp.		-	1	-	-	-	-	-
Sambucus nigra		-	-	1uc	-	2	1+1uc	++(d)uc
Valerianella sp.		-	-	-	-	-	-	1
Centaurea sp.		2	-	-	1	-	-	-
Eleocharis palustris/uniglumis		-	-	-	-	-	1	-
Carex sp.		1	-	-	-	-	-	1uc
Bromus mollis/secalinus		5	-	-	1	-	-	2
Gramineae indet.		3	3	-	-	-	-	-
Grass/cereal	cn.	1	1	-	-	-	-	-
Stems	uc.	-	-	-	-	+	+	-
Indeterminate seeds etc.		3	1	-	1	-	2+1uc	5+2uc

Table 13: Plant macrofossils from pit 0415 (Site 4601)

Taxa are represented by carbonised fruits or seeds except where indicated.

Abbreviations: ca - caryopses; cn - culm nodes; fr - fragments; rn - rachis nodes; uc - uncarbonised (mineralised or preserved by waterlogging).

Notes: (a) Including germinated grains. (b) Also testa fragments in faecal-type concretions. (c) Large-seeded taxa. (d) Numerous fragments making quantification impossible.

Depth (cm)		140-150	150-160	160-170	170-180	180-190	190-200
Triticum aestivum/compactum		2	-	-	-	2	4
Secale cereale L.		-	2	-	2	-	1
Hordeum sp.		3	3	2	-	-	2
Avena sp.		-	-	-	-	-	1cf
Cereal indet.	ca.	12	5	4	-	1	1
Cereal indet.	rn.	-	-	-	-	1	-
Agrostemma githago L.		1	-	-	-	-	-
Chenopodium album L.	uc.	-	-	-	-	-	18
Chenopodiaceae indet.	uc.	-	-	-	-	-	3
Malva sp.		-	-	1	-	-	-
Leguminosae indet.	co.fr.	+	-	-	-	-	-
Rubus fruticosus agg.	uc.	-	-	-	-	-	+++(a)
Prunus domestica ssp. insititia	uc.	-	-	-	-	-	15+fr
Prunus sp.	uc.	-	-	-	4	-	4
Umbelliferae indet.		-	-	-	-	-	1
Rumex sp.		1	-	-	-	-	1
Polygonaceae indet.		-	-	-	1	-	-
cf. Lithospermum sp.	uc.	1	-	-	-	-	2
Hyoscyamus niger L.	uc.	-	-	-	-	-	3
Labiatae indet.	uc.	-	-	-	-	-	8
Sambucus nigra L.	uc.	1	-	-	-	-	16
Bromus mollis/secalinus		-	-	1	-	1	-
Gramineae indet.		1	-	-	-	-	-
Indet. stem frags.	uc.	+	+	+	-	-	+
Indet. seeds etc.		-	-	-	1	-	5uc

Table 14: Plant macrofossils from pit 0902 (Site 4601)

Taxa are represented by carbonised fruits or seeds except where indicated.
Abbreviations: ca - caryopses; co - cotyledons; fr - fragments; rn - rachis nodes;
uc - uncarbonised (mineralised or preserved by waterlogging).
Notes: (a) Including many fragments.

Depth (cm)		0-10	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100-110	110-120
Triticum aestivum/compactum	ca.	12	3	2	3	1	-	2	13	16	4	-
Secale cereale L.	ca.	2	6	6	4	4	1	6	5	12	2	-
Secale cereale L.	rn.	-	-	1	1	-	-	2	-	-	-	-
Hordeum sp.	ca.	4(a)	5	10	7	7	10	15	13(a)	26	18	2
Avena sp.	ca.	12	-	4	3	6	13	25	25	34(a)	8	4
Cereal indet.	ca.	26	9	24	11	25	48	109	82	145	78	12
Ranunculus sp.		-	-	-	-	-	-	-	cf1m	-	-	-
Raphanus raphanistrum L.		-	fr	-	-	-	-	2+fr	1+fr	1c+4m	2m	1m
Silene sp.		1cf	-	-	-	-	-	-	1m	-	-	-
Agrostemma githago L.		-	-	-	-	-	-	fr	-	cf2+1m	-	1
Scleranthus annuus L.		-	1	-	-	-	-	-	-	1	-	-
Chenopodiaceae indet.		-	-	-	-	-	-	2m	-	-	2m	-
Malva sp.		-	-	-	1cf	-	-	1c+1m	1	22m	6m	-
Linum sp.		-	-	-	-	-	-	-	-	1	-	-
Vicia faba L. var minor		-	-	-	1	?1co	2+1co	1	-	-	-	-
Vicia/Lathyrus sp.		1s+?2fr	1	1	-	1+2co	3	5s+2co	6s+5co	6s+1co	2s+1co	-
Lathyrus sp.		-	1	-	-	-	-	-	-	-	-	-
Leguminosae indet.	(b)	2fr	-	2co	1	1	-	2co	2co+fr	3s+fr	fr	3co
Crataegus sp.		-	-	1	-	-	-	-	-	-	-	-
Malus sylvestris/domestica		-	-	-	-	-	-	-	-	2m	-	-
Umbelliferae indet.		-	-	-	-	-	1m	-	-	3m	-	-
Polygonum lapathifolium L.		-	-	-	-	-	-	-	-	1m	-	-
Polygonum lapathifolium/persicaria		-	-	-	-	1	-	-	-	-	-	-
Polygonum sp.		-	1	-	-	-	-	-	-	-	-	-
Rumex sp.		-	-	-	-	-	-	1m	2	1m	fr	-
Polygonaceae indet.		1	-	-	-	-	-	1	-	1m	2m+1c	-
Lithospermum arvense L.		-	-	-	-	-	-	-	-	cf2m	cf1m	-
Solanaceae indet.		-	-	-	-	-	-	-	-	-	1m	-
Labiatae indet.		-	-	-	-	-	-	-	1m	-	-	-
Corylus avellana L.		+	+	-	-	+	-	+	+	+	+	+
Plantago lanceolata L.		-	-	-	-	-	-	-	1	-	-	-
Galium aparine L.		-	-	-	-	1	-	-	-	-	-	-
Sambucus nigra L.		-	1m	2c	-	1m	1m	1c+2m	-	3m+fr	3m	-
Anthemis cotula L.		-	-	-	-	-	-	-	-	(c)	-	-
Cirsium/Carduus sp.		-	-	-	-	-	-	-	-	1	-	-
Centaurea cf. cyanus L.		-	-	-	-	-	1	1	-	3fr	-	-
Compositae indet.		-	-	-	-	-	-	-	-	2m	1m	-
Carex sp.		-	-	-	-	-	-	-	1	-	-	-
Scirpus sp.		-	-	-	-	-	-	1	-	-	-	-
Bromus mollis/secalinus		1	1cf	1	-	-	3	3	2	1	2	1
Gramineae indet.		-	-	-	-	-	-	2	2	2	3	-
Grass/cereal	cn.	-	-	1	-	-	fr	1	1	-	2	1
Indeterminate seeds etc.		1	2	3	-	-	5c+2m	5c+5m	4c+7m	1c+20m	2c+17m	4m
Indet. bract		-	-	1	-	-	-	-	-	-	-	-
Indet. bud		-	-	-	-	-	-	-	-	1	-	-
Indet. stem		-	-	-	-	-	-	-	+	-	-	-

Table 15: Plant macrofossils from pit 0808 (Site 4801)

Taxa are represented by carbonised fruits or seeds except where indicated.
Only 50% of the flot from each sample was sorted.
Abbreviations: c - carbonised; ca - caryopses; co - cotyledons; cn - culm nodes; fr - fragments; m - mineralised; rn - rachis nodes; s - seeds.
Notes: (a) Some germinated grains. (b) Large-seeded. (c) Intact fruiting head with numerous cypselas.

macrofossils in their lower fills. The results from pit 0808 at IAS 4801 are, again, similar, though this feature included an unusually dense concentration of carbonised cereals.

Early medieval cellared buildings

Cellared buildings have been recorded at several sites in Ipswich. Since the cellars were dug into fairly well-drained terrace gravels soil conditions are not suitable for the preservation of uncharred organic materials. Identifiable remains of unburnt timbers are not preserved in these conditions and the back-filling of the cellars is thought to consist generally of spoil and domestic refuse unrelated to their original functions. However, at School Street, Foundation Street and St Peter's Street buildings of this type destroyed by fire have been excavated, and these provide an opportunity to gain information on their construction and function. Of the buildings so far examined 0676 at Foundation Street is the most fully excavated and extensively sampled.

(a) Building 0676 (Site IAS 4601)

Methods of sampling and retrieval

Samples of varying size were collected from discrete areas of charcoal and charred cereals within the cellar fill. The samples consisted largely or entirely of charred plant material with little mineral soil and sub-sampling was clearly necessary. It was not practicable, or indeed useful, to identify all the charcoal fragments present, but an attempt was made to isolate for identification all fragments which could be interpreted with greater or lesser certainty as the remains of structural wood, fittings or wooden artefacts. Fragments larger than 25mm, apparently from major structural components, were first separated by dry sieving and the finer fraction of each sample was then sorted through, picking out fragments of young stems and any cut or worked pieces of charred wood. Only these fragments were identified, but other small charcoal fragments from the samples have been retained for possible future study.

Having removed charcoal for identification, a 250ml. sub-sample of matrix was taken from each sample apart from the smaller samples which consisted of charcoal with little or no soil matrix. Manual water flotation and wet-sieving with 0.5mm. meshes was then used to separate carbonised cereals and seeds from the mineral fraction of these sub-samples. The dried flots and residues were sorted under a binocular microscope at low power, though the

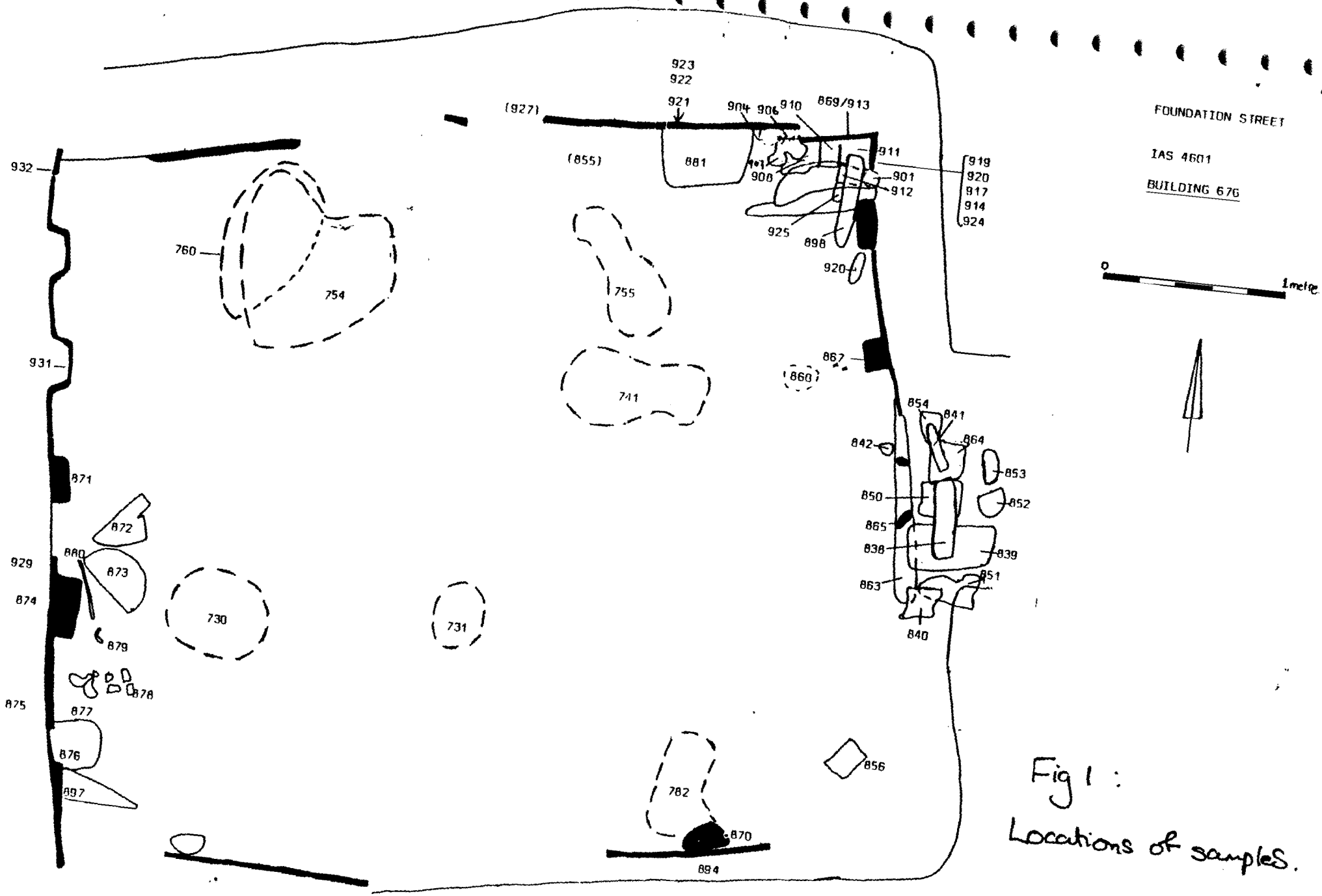


Fig 1 : Locations of samples.

richest samples were further sub-divided and only partly sorted: for example, 25% of the 250ml. sub-samples from 0754 produced over 800 cereal grains besides chaff and weed seeds.

Charcoal

Identifications of fragments larger than 25mm, young stems and other cut or worked pieces of charred wood are given in Table 16. It should be noted that samples thought during excavation to consist of charcoal from one discrete timber frequently proved to contain charcoal of more than one species with a range of stem diameters. The descriptions given in Table 16 refer to the charcoal from the sample rather than the areas of charcoal distinguished and planned during excavation. The fragments identified can be divided into five main categories:

1) Fragments from large wood

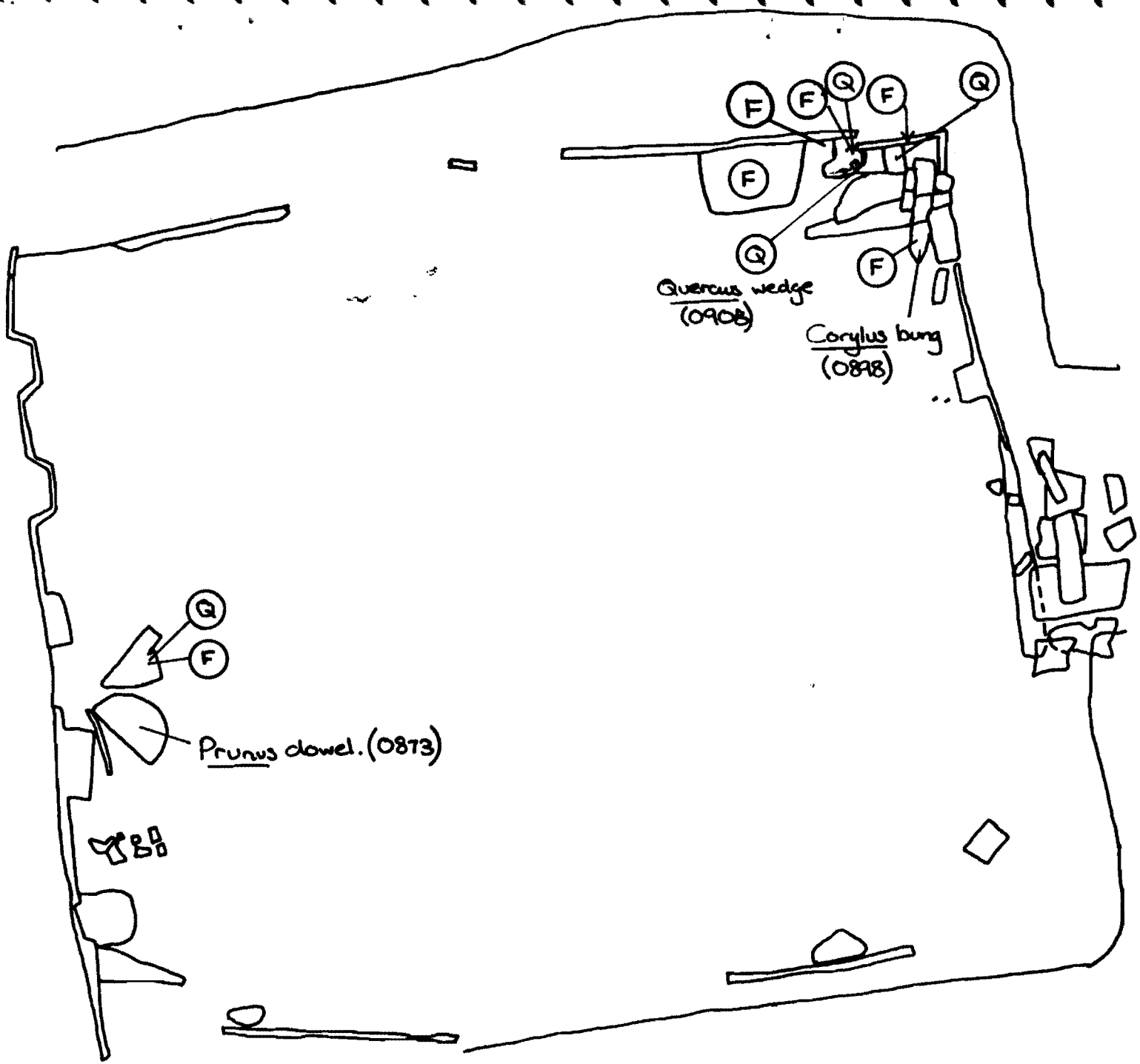
Fragments of mature wood cut originally from trunks or large branches are almost entirely of oak (Quercus sp). This seems to have been the main structural wood used in the building for the stairway, vertical posts and planking. Pieces of oak charcoal up to 110mm. in size were present in the samples but most of the fragments have split along the medullary rays and consequently the original size and shape of the timbers from which these fragments came can be reconstructed only from the field descriptions. Fragments of ash branches (Fraxinus sp) came from 0914 and an unspecified location (0677). These latter examples were c.100mm. in diameter and extensively bored by insects. The sample labelled 0677 also produced some fragments of ?Alnus (alder) branches. Context 0877 consisted of apparently non-structural fragments of hazel branches (Corylus sp), again badly bored.

2) Thick boards/planks

Areas of charcoal thought to represent boards or planks were described during excavation. Fragments, mostly split after sampling, came from several samples. These are all of oak (Quercus sp) and are all radial or near-radial.

3) Thin radial boards or staves

Contexts 0872, 0881, 0898, 0904, 0907 and 0913 contained fragments of radial boards or staves of ash (Fraxinus sp), 4-7mm. thick. One fragment from 0904 gives a complete cross-section across one of them: it is 40 x 6mm. Even allowing for shrinkage during charring these seem too thin to be from structural wood and are more likely to represent staves from small barrels, buckets or some similar type of stave-built wooden container. Slightly thicker but otherwise similar fragments thought to be from radial oak staves (Quercus sp) came from 0872, 0907, 0908 and 0910. These are 7-c.15mm. thick.



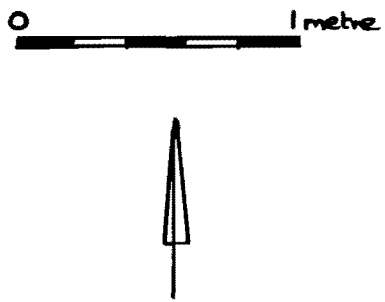


Fig 2.
Locations of thin radial boards of ash (F) and oak (Q).
Contexts 0872, 0881, 0898, 0904, 0907, 0908, 0910, 091
Also other worked pieces of wood.

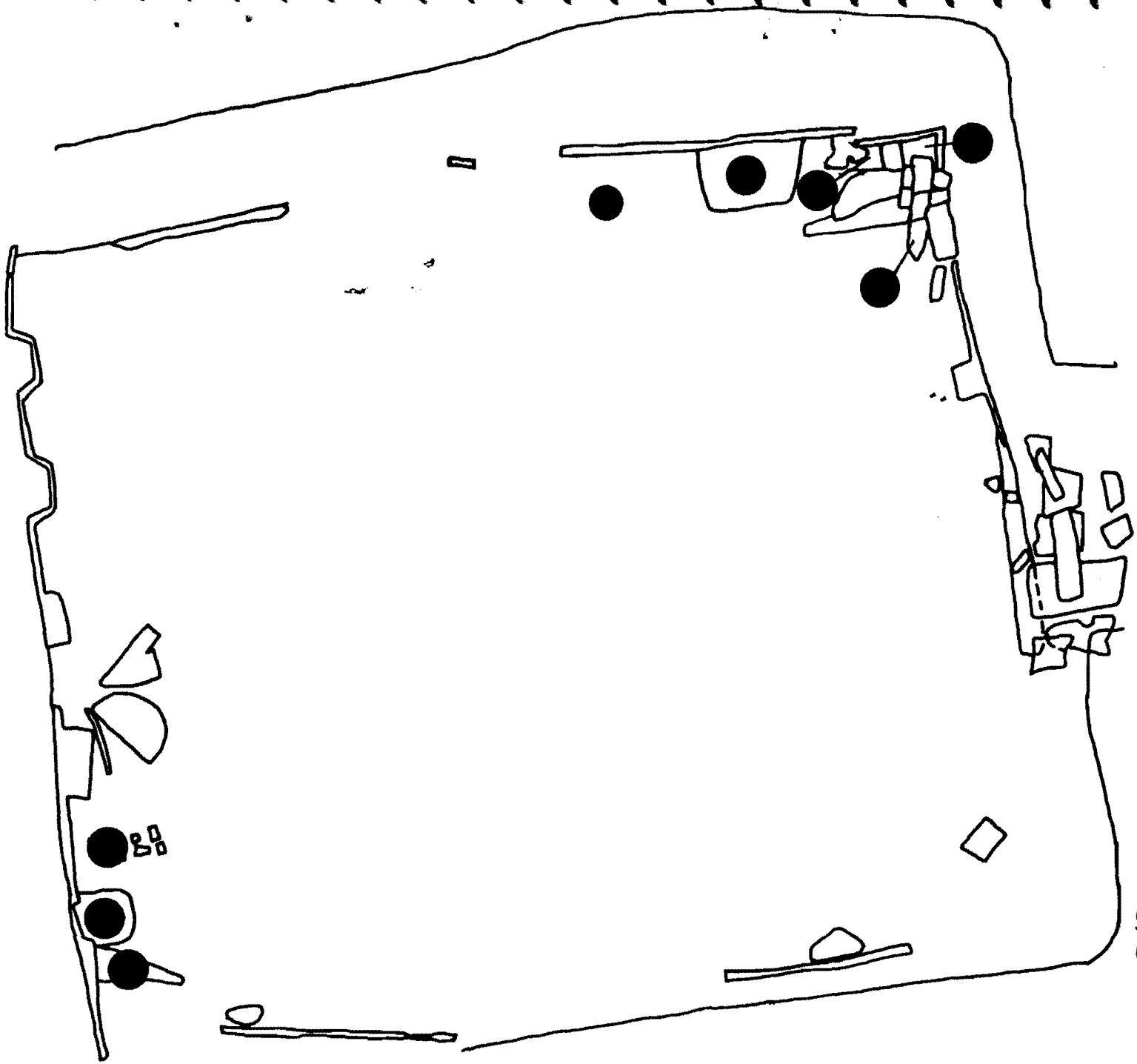


Fig 3.

Locations of samples containing twigs and branches of Fraxinus, Prunus, Corylus, Crataegus-gp, conifer.
Contexts 0855, 0876, 0877, 0881, 0897, 0898, 0908, 0914

ıtext no.	Taxon	Comments
'7	Quercus sp.	Large fragments of mature wood. Some possible fragments of boards, near-radially split, 30mm+ thick.
ıcation		
ıpecified)	Fraxinus sp.	Fragments of branches c.100mm diameter. Insect borings.
	Prunus sp.	12mm diam. straight twig with transverse oblique cut.
	?Alnus sp.	Fragments, stem diameter indeterminate.
25	Quercus sp.	Fragments of mature wood and branches.
38	Quercus sp.	Fragments of mature wood.
39	Quercus sp.	Very large fragments of mature wood (up to c.110mm) from large timber.
40	Quercus sp.	Fragments of mature wood.
41	Quercus sp.	Fragments of mature wood.
42	Quercus sp.	Fragments of mature wood.
60	Quercus sp.	Fragments of mature wood.
61	Quercus sp.	Fragments of mature wood.
62	Quercus sp.	Fragments of mature wood.
64	Quercus sp.	Fragments of mature wood.
65	Conifer	Twigs, c.14mm diameter.
	Crataegus-group	Twigs, c.13-21mm diameter.
63	Quercus sp.	Fragments of mature wood, including possible fragment of radial board, 17mm+ thick.
69	Quercus sp.	Fragments of mature wood.
70	Quercus sp.	Fragments of mature wood and branches (diameter indeterminate).
71	Quercus sp.	Fragments of mature wood.
72	Quercus sp.	Fragments of thin radial boards or ?staves, c.7-9mm thick.
	Fraxinus sp.	Fragment of thin radial board or ?stave, c.7mm thick.
73	Quercus sp.	Fragments of mature wood.
	?Prunus sp.	Dowel made from mature wood, c.10mm diameter.
74	Quercus sp.	Fragments of mature wood.
	Indet. diffuse porous	Fragment of mature wood.
76	Corylus sp.	Twig, c.12mm diameter and larger fragment.
0876	Prunus sp.	Twig, c.16mm diameter.
0877	Corylus sp.	Fragments of branches, diameter indeterminate. Badly insect-bored.
0878	Quercus sp.	Fragments of mature wood.
0880	Quercus sp.	Fragments of mature wood. Insect borings.
0881	Fraxinus sp.	Fragments of thin radial boards or ?staves, c.5-7mm thick.
	Corylus sp.	Twigs, 4-13mm diameter.
	Indet. diffuse porous	Twig, 5mm diameter.
0897	Quercus sp.	Fragments of mature wood.
	Corylus sp.	Twigs. 10-c.30mm diameter. Some centrally split, some oblique transverse cuts.
0898	Quercus sp.	Fragments of mature wood, including some possible board fragments.
	Fraxinus sp.	Fragments of thin radial boards or ?staves, c.4-7mm thick. Insect borings.
	Corylus sp.	Twig fragment.
	?Corylus sp.	Wooden object, possibly a bung. (Definite identification not possible without destroying the item.)
	Indet. diffuse porous	Twig, c.6mm diameter.
0904	Quercus sp.	Fragments of mature wood, including some possible fragments of radial boards.
	Fraxinus sp.	Fragments of thin radial boards or ?staves, c.4-7mm thick. One fragment is 40mm wide - apparently its original width.
0907	Quercus sp.	Fragments of mature wood, including some possible fragments of radial boards. Also fragments of thin radial boards or ?staves, c.6-10mm thick.
	Fraxinus sp.	Fragments of thin radial boards or ?staves, c.4-6mm thick.
0908	Quercus sp.	Fragments of mature wood, including radial boards c.15mm thick. Wedge with a burred tip.
0908	Indet. diffuse porous	Twig, c.6mm diameter.
0910	Quercus sp.	Radial board fragments, varying thickness c.7-11mm.
0911	Quercus sp.	Mature wood fragments.
0912	Quercus sp.	Mature wood fragments.
0913	Quercus sp.	Mature wood fragments.
	Fraxinus sp.	Fragments of thin radial boards or ?staves, c.4-6mm thick.
0914	Fraxinus sp.	Fragments of branches, diameter indeterminate.

Table 16: IAS 4601; Charcoal identifications from cellared building 0676.

Most of these 'stave' fragments were found in the north-east corner of the building, though examples also occurred in sample 0872 at its west end (Fig. 2).

4) Twigs

Twigs of sloe/bullace (Prunus sp), hawthorn group (Crataegus group), hazel (Corylus sp) and conifer were identified. The hazel twigs from 0897 came from stems 10-c.30mm. in diameter. Some had been centrally split before charring and some fragments show oblique transverse cuts. These twig fragments appear to represent charred remains of wattling. The remaining twigs could be from wattling, but equally could have been brought into the building for other purposes, perhaps as kindling. There are two distinct groups of samples with twig fragments, in the north-east and south-west corners of the building (Fig. 3).

5) Various wooden artefacts

A charred wooden bung was associated with ash 'staves' in the sample from 0898, providing further evidence for thinking that these 'staves' represent the remains of barrels. It seems to be of hazel (Corylus sp) but cannot be fully identified without fracturing it. Fragments apparently of a dowel, c.10mm. in diameter, probably of Prunus sp, came from 0873. Finally 0908 produced the tip of a wedge of oak (Quercus sp), with a conspicuously burred tip.

The crop plants

Apart from carbonised cereals, the only crop represented is Linum cf. usitatissimum. A few somewhat deformed seeds were present and sample 0677, from the general fill of the cellar, contained a seed fused during charring to its capsule segment. Occasional grains of Hordeum sp, Triticum aestivum sl. and grains and rachis nodes of Secale cereale were also recovered. However remains of these crops all occur at very low frequencies and are clearly no more than contaminants of oats (Avena sp), which are abundant in almost all samples.

None of the well-preserved Avena floret bases shows the A. fatua-type 'sucker-mouth' basal articulation, though there are a very few fragmentary or damaged specimens which could tentatively be identified as wild-type. Most of the floret bases show either broad basal fracture surfaces and are from A. sativa lower florets, or are rather more slender and match upper florets of this species. The grains, though including a fairly large proportion of specimens deformed during charring, mostly have convex sides. They are usually relatively broad and have a large mean length (Table).

Samples 0879 and 0880, however, include a higher proportion of 'tail grains' from secondary and tertiary florets.

	Length (mm)	Breadth (mm)	100 x L/B
min	3.7	1.3	158
mean	6.05	2.18	277
max	8.0	2.8	356

Table : Measurements and L:B index for 100 grains from 0760.

Thickness measurements were not made because many grains are slightly 'puffed' along the vertical furrow.

From these characteristics Avena sativa L. is the only species whose presence can definitely be established. If other Avena spp. are present they can only represent minor contaminants.

Wild plants

Taxa identified are listed in Table 17. Most of the large cereal samples from 0676 are from batches of crops which had been fully cleaned before storage. These produced few weed seeds, though in samples from the south-west corner of the cellar (0879, 0880, 0897) there was a slightly wider range of taxa. By far the most abundant weed species overall is Anthemis cotula, a plant particularly characteristic of heavy clay soils. Occasional fruits of Ranunculus flammula, Carex sp. and Eleocharis sp. were also identified, and these could indicate damp soil conditions. The samples also contained fruits and seeds of weed plants prevalent on dry sandy soils, including Raphanus raphanistrum, Spergula arvensis and Rumex acetosella. The remaining weed taxa are widely distributed on a variety of soil types: these comprise Brassica sp, Agrostemma githago, Stellaria media-type, Chenopodium album, Atriplex patula/hastata, Vicia and Lathyrus spp, Polygonum spp, Rumex sp, Hyoscyamus niger, Plantago lanceolata, Tripleurospermum maritimum, Centaurea sp, Lapsana communis and Bromus mollis/secalinus. This mixture of weed ecotypes suggests that cereals grown at more than one locality are represented in these samples. Occasional seeds and nutshell fragments of elder (Sambucus nigra) and hazel (Corylus avellana) occurred in the cereal samples, suggesting that fruits and nuts may also have been stored in the cellar.

Composition and spatial distribution of cereal assemblages

The distribution of cereal samples and the density of cereal grains (nos. of grains/250ml. of soil matrix) are summarised in Fig. 4. The samples with the highest density of cereal grains (predominantly oats, Avena spp) came from conspicuous spreads of charred cereals across the cellar floor (0730, 0731, 0741, 0753, 0754, 0755, 0760, 0782) and in its north-east corner (0869, 0901). These samples contained between 420 and 3488 grains per 250ml. of soil. They are remarkably uniform in composition, consisting largely of oat grains and florets with occasional grains of other cereals, flax seeds and weed seeds. The floret base: grain ratio is quite high, but variable. This ratio has probably been influenced by differential preservation during charring. The commonest weed is Anthemis cotula, fruits of which are frequently aggregated in more-or-less complete capitula. Seeds of Brassica sp. also occur, together with siliqua fragments. Other weed seeds and oat awns are rare. It thus appears that the oat grains were mostly still in their husks when stored, but the crop had been efficiently cleaned, leaving few fine impurities but some intact seed heads and pods of weeds which subsequently fragmented.

Most of the remaining samples from all parts of the cellar produced assemblages of similar composition but with lower grain densities. Virtually all samples examined contained some cereal remains, representing presumably chance spillages from cleaned batches of oats.

Three samples, however, are conspicuously different in composition: 0879, 0880 and 0897 from close to the southern edge of the cellar's west wall. 0879 and 0880 contain a higher proportion of weed seeds and awn fragments. The oat grains present are small and some had sprouted prior to carbonisation. Many of the florets are sterile. 0897 produced only sterile florets with no grains, but a few weed seeds. These three samples clearly include sievings from grain cleaning - tail-grains, husks, awns and weed seeds. This could perhaps indicate that some grain-cleaning took place in the cellar, or possibly that crop waste was intentionally brought in. The sprouted grains from 0879 and 0880 suggest locally damp conditions in this part of the cellar.

The cellar fill also produced a horse-shoe and a spur (K. Wade, pers.comm.), strongly suggesting that the oats from this feature were intended for use as horse-fodder. No charred dung or litter was noted in the samples examined, and there is thus no evidence that the cellar was actually a stable; it is

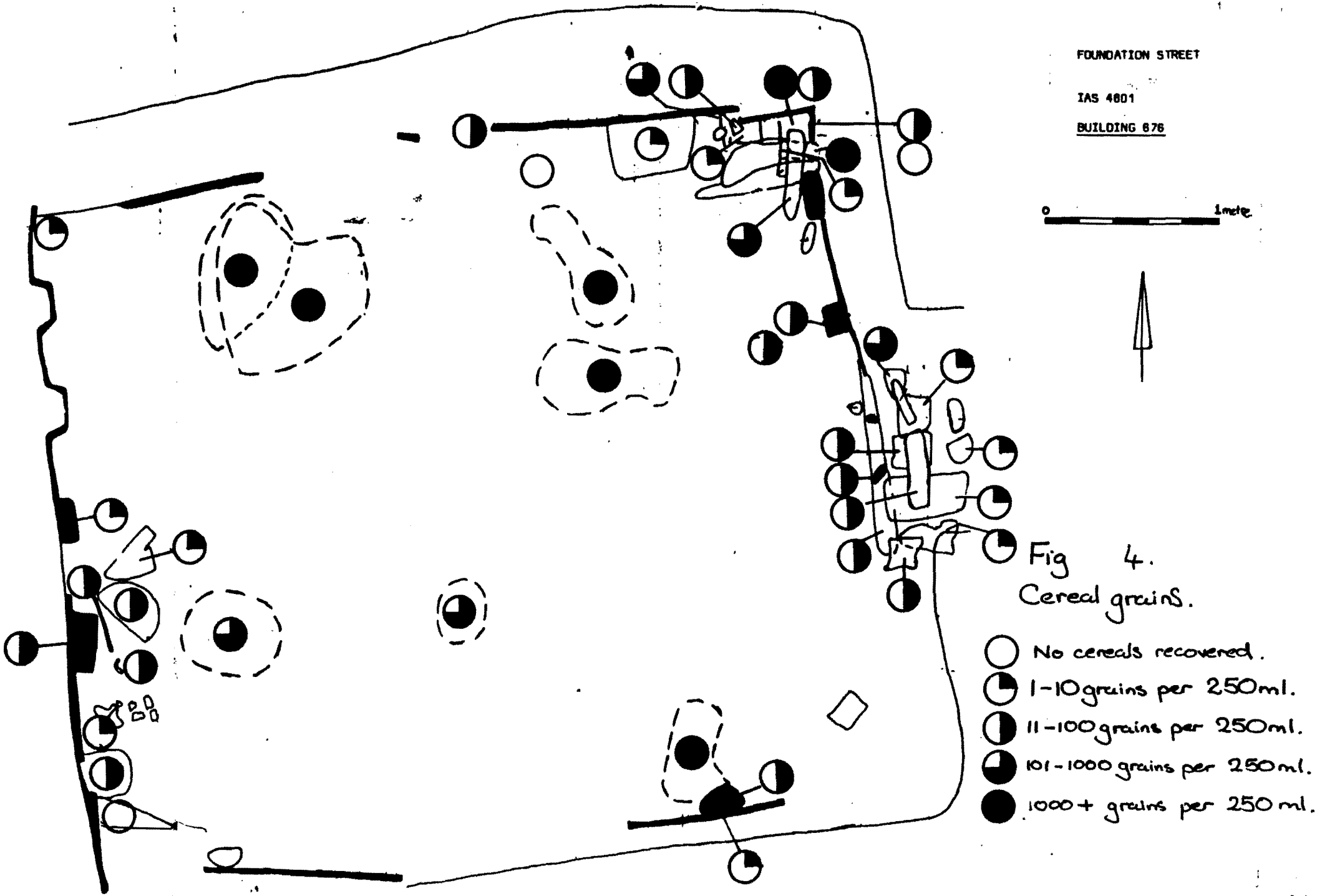


Fig 4.
Cereal grains.

- No cereals recovered.
- 1-10 grains per 250ml.
- 11-100 grains per 250ml.
- 101-1000 grains per 250ml.
- 1000+ grains per 250ml.

Context no.		0677	0730	0731	0741	0753	0754	0755	0760	0782	0838	0839	0840	0850	0851	0852	0854	0855	0860	0863	0864	0865	0867	0869	0870	0871	0872	0873	0874	0876	0877	0879	0880	0881	0894	0897	0898	0901
Cereal indet.	ca.fr.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	-	+	+	+	-	+	+	+	+	-	+	+
	ca.	45	20	20	38	49	58	41	32	14	8	1	2	10	-	1	3	-	10	3	-	8	3	24	1	-	-	-	4	-	-	1	3	1	1	-	18	17
Avena sp(p)	ca.	497	189	162	494	307	764	349	724	253	4	4	31	75	3	8	100	-	80	26	-	46	30	220	20	4	1	12	26	19	1	33(f)	43(f)	5	3	-	72	270
	ca+flo.	42	-	3	11	6	49	7	42	39	-	1	-	-	-	-	2	-	2	1	-	1	-	11	1	-	-	-	3	-	-	7	2	-	-	-	1	39
	flo.	143	35	21	59	26	117	56	142	132	-	-	-	8	-	1	9	-	9	3	-	1	3	107	-	-	-	8	7	2	-	7	6	-	-	-	11	84
	st.flo.(e)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9(g)	1(g)	-	-	21(g)	-	-
	a.fr.	+	+	+	-	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	+	+	-	-	++	+	-	-	-	-	+
Hordeum sp.	ca.	-	-	1fr	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Triticum aestivum s.l.	ca.	-	-	-	1	-	-	-	2	1	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Secale cereale L.	ca.	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	ri.	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Linum cf. usitatissimum L.	s+cap.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Linum sp.	s.	-	-	-	-	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ranunculus flammula L.		-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brassica sp.	s.	-	-	-	3	6	1	2	3	5	-	-	-	-	-	-	-	-	1	-	-	-	-	4	-	-	-	-	-	-	-	cf3	-	-	-	cf1	-	2
Brassica sp.	s+sil.	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Raphanus raphanistrum L.	sil.fr.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	1	-	4	1	-	-	3	-	-
Agrostemma githago L.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	1	-	-	-	-	-
Stellaria media-type		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Spergula arvensis L.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	3	1	-	-	1	-	-
Chenopodium album L.	(a)	-	-	-	-	-	2	-	3	-	-	-	-	-	-	-	-	-	4	-	1	2	-	-	-	-	1	6	-	-	-	46	16	-	-	12	-	3
Chenopodium sp.	(a)	-	3	-	-	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Atriplex patula/hastata		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-
Chenopodiaceae indet.	(b)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	4	-	-	-	2	1	-
Vicia sp.	s.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Vicia/Lathyrus sp.	co.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	-	-	-	-	1	-	-	-	-	-
Leguminosae indet.	(c)co.	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Umbelliferae indet.		-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polygonum aviculare agg.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Polygonum persicaria/lapathifolium		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	-	-	-	-	-
Polygonum convolvulus L.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	fr	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Rumex acetosella agg.		-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	1	-	-	-	5	1	-	-	-	-	1
Rumex sp.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	1	-	-	-	1	1	-
Corylus avellana L.	ns.fr.	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-
Hyoscyamus niger L.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Plantago lanceolata L.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	fr	-	-	-	-	-	-
Sambucus nigra L.		-	-	-	-	-	-	-	-	-	fr	-	fr	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Anthemis cotula L.	(d)	23(+7)	9	8	25	23(12)	22(4)	12	61(93)	3(21)	-	-	-	2	-	-	5	-	-	-	-	-	-	14(5)	1	-	1	9	-	-	-	53	8	1	-	7	1	13(25)
Tripleurospermum maritimum (L) Koch.		-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Centaurea sp.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-
Lapsana communis L.		-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	1	-	-
Compositae indet.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1	-	-
Eleocharis sp.		-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Carex sp.		-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromus mollis/secalinus		-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	1	-	2	5	-	-	-	-	-
Gramineae indet.		1	4	1	-	-	4	2	3	3	-	-	1	3	-	-	1	-	-	-	1	-	1	2	-	-	-	2	-	-	-	5	-	-	-	-	-	-
Indet. seeds etc.		-	1	1	-	-	3	5	2	4	1	-	-	2	-	-	2	-	1	-	-	-	1	1	-	-	1	5	-	-	-	6	4	-	-	5	1	1
% flot sorted		25	50	25	25	25	25	25	25	25	100	100	100	100	100	100	100	100	100	100	100	100	100	25	100	100	100	100	100	100	100	100	100	100	100	50	25

Table 17: Carbonised cereals, seeds etc. from [illegible] building 0676.

(see next page for notes)

Context no.		0904	0907	0908	0912	0913	0920	0927	0932
Cereal indet.	ca.fr.	+	+	+	+	+	+	+	-
	ca.	18	10	1	1	8	-	7	-
Avena sp(p)	ca.	233	65	2	4	64	35	8	3
	ca+flo.	17	5	-	-	2	-	-	-
	flo.	52	19	-	-	13	4	-	-
	st.flo.(e	-	-	-	-	-	-	-	-
	a.fr.	+	-	-	-	-	+	-	-
Hordeum sp.	ca.	-	-	-	-	-	-	-	-
Triticum aestivum s.l.	ca.	-	-	-	-	-	-	-	1
Secale cereale L.	ca.	-	-	-	-	-	-	-	-
	ri.	-	-	-	-	-	-	-	-
Linum cf. usitatissimum L.	s+cap.	-	-	-	-	-	-	-	-
Linum sp.	s.	-	-	-	-	-	-	-	-
Ranunculus flammula L.		-	-	-	-	-	-	-	-
Brassica sp.	s.	-	-	-	1	-	1	-	-
Brassica sp.	s+sil.	-	-	-	-	-	-	-	-
Raphanus raphanistrum L.	sil.fr.	1	-	-	-	-	-	-	-
Agrostemma githago L.		-	-	-	-	-	-	-	-
Stellaria media-type		-	-	-	-	-	-	-	-
Spergula arvensis L.		-	-	-	-	-	-	-	-
Chenopodium album L.	(a)	2	-	-	-	-	3	-	-
Chenopodium sp.	(a)	-	-	-	-	-	-	-	-
Atriplex patula/hastata		-	-	-	-	-	-	-	-
Chenopodiaceae indet.	(b)	-	1	-	-	-	-	-	-
Vicia sp.	s.	-	-	-	-	-	-	-	-
Vicia/Lathyrus sp.	co.	-	-	-	-	-	-	-	-
Leguminosae indet.	(c)co.	-	-	-	-	-	-	-	-
Umbelliferae indet.		-	-	-	-	-	-	-	-
Polygonum aviculare agg.		-	-	-	-	-	-	-	-
Polygonum persicaria/lapathifolium		1	-	-	-	-	1	1	-
Polygonum convolvulus L.		-	-	-	-	-	-	-	-
Rumex acetosella agg.		-	-	-	-	-	-	-	-
Rumex sp.		-	-	-	-	-	-	-	-
Corylus avellana L.	ns.fr.	-	-	-	-	-	-	-	-
Hyoscyamus niger L.		-	-	-	-	-	-	-	-
Plantago lanceolata L.		-	-	-	-	-	-	-	-
Sambucus nigra L.		1	-	-	-	-	-	-	-
Anthemis cotula L.	(d)	11	2	-	-	4	2	-	1
Tripleurospermum maritimum (L) Koch.		-	-	-	-	-	-	-	-
Centaurea sp.		-	-	-	-	-	-	-	-
Lapsana communis L.		-	-	-	-	-	-	-	-
Compositae indet.		-	-	-	1	-	-	-	-
Eleocharis sp.		-	1	-	-	-	-	-	-
Carex sp.		-	-	-	-	-	-	-	-
Bromus mollis/secalinus		-	-	-	-	-	-	-	-
Gramineae indet.		-	-	-	-	-	-	-	-
Indet. seeds etc.		2	-	1	-	-	1	-	-
% flot sorted		100	100	100	100	100	100	100	100

Table 17: **(cont.)**

Taxa are represented by fruits or seeds except where indicated. Sample size 250ml.

Abbreviations: afr - awn fragments; ca - caryopses; cap - capsule fragment; co - cotyledon; flo - floret; fr - fragment; ns - nutshell; ri - rachis internode; s - seed; sil - siliqua; st flo - sterile floret.

Notes: (a) Numbers estimated from whole and fragmentary seeds. (b) No testas. (c) Large-seeded. (d) Figures in brackets refer to aggregates of fruits (fragmentary capitula) 0760 included a near intact capitulum of ripe fruits. (e) Distinguished only 0879, 0880, 0897. (f) Generally small grains, including germinated examples. (g) Further fragmentary examples.

Sub-samples of soil matrix from the following contexts produced no cereals or seeds: 0825, 0924.

more likely to have served as storage space for fodder and tack. Some indication of the value of horses at this time is given by the fact that the oats had been very carefully cleaned, removing virtually all contaminants. Buurman (1983) has reported similar very clean deposits of oats, (again associated with horse-shoes) from a 14th century context at the Priory of Postel, 's-Hertogenbosch, Netherlands.

Conclusions

The main structural timber used in the cellar was oak, though charred branches of ash and ?alder are also present and may have formed part of the superstructure. The building included wattle panels of hazel. Other charred wood from the cellar floor, of hazel, Prunus, hawthorn-group and conifer, cannot be related to the structure with certainty. Thin 'staves' of ash and oak, and a bung probably of hazel, are thought to represent remains of small barrels, or similar containers.

The dense spreads of cereals across the cellar floor and in its north-east corner consist largely of oats: fully-cleaned prime grain still mostly husked but including a few contaminants. These comprise grains and rachis fragments of barley, bread wheat and rye, seeds and capsules of flax and weed seeds. The mixture of weed ecotypes suggests that batches of oats from different sources were mixed during processing prior to storage. Three samples of crop cleaning waste are present, but the significance of these is uncertain. The presence of horse-shoes and a spur in the cellar fill strongly suggest that the oats represent stored horse-fodder.

(b) Plant macrofossils from two early medieval cellared buildings at IAS 4801.

Samples were collected for laboratory analysis and machine flotation from the cellared buildings 2376 and 2486. 2376 had been destroyed by fire and its fills included abundant charcoal; 2486 was unburnt but a sample was taken from an apparent 'occupation layer' within it. Sampling at these two buildings was much less extensive than at the similar cellared building 0676 at site IAS 4601. The bulk samples were processed by the standard method in the flotation tank. Plant material was extracted from the laboratory samples by repeated flotation and washover, with a 0.5mm. collecting mesh and the non-floating residues were wet-sieved in a 1mm. mesh. Plant remains extracted and identified are listed in Table 18.

Building no.		2376	2376	2376	2376	2486
Context no.		2304	2401	2538	2549	2543
Triticum aestivum/compactum	ca.	5	8	2	1	-
Secale cereale L.	ca.	2	-	-	-	-
Secale cereale L.	rn.	-	-	1	-	-
Hordeum sp. (hulled)	ca.	1	2	12	2	-
Avena sp.	ca.	1	1+1cf	5	-	1
Avena sp.	fb.	-	-	-	1	-
Indet. cereal	ca.	5+fr	2+fr	8+fr	6+fr	5
Indet. cereal/large grass	cfr.	-	-	fr	-	-
Brassica sp.		-	-	1	-	-
Raphanus raphanistrum L.		-	-	1	-	-
Agrostemma githago L.		-	-	1	-	-
Chenopodium album L.		1	7	14	1	-
Chenopodium sp.		-	-	1	-	-
Atriplex patula/hastata		-	2	16	-	-
Chenopodiaceae indet.		-	1	5	-	1(m)
Malva sp.		1	6	-	-	-
Medicago-type		-	-	1	-	-
Vicia/Lathyrus spp.		-	-	3+2co	-	1
Rubus fruticosus agg.		-	1	1	-	-
Rumex sp.		-	1	-	-	-
Polygonum aviculare agg.		-	1	3	-	-
Polygonum convolvulus L.		1	-	1	-	-
Polygonum sp.		-	-	1	-	-
Polygonaceae indet.		-	-	2	-	-
Calluna vulgaris (L) Hull	cp.	-	-	1	-	-
Galium aparine L.		-	1	-	-	-
Sambucus nigra L.		1(uc)	-	2	fr(uc)	(b)
Anthemis cotula L.		-	-	-	-	1
Lapsana communis L.		-	-	-	-	1(m)
Eleocharis sp.		1	-	-	-	-
Bromus sp.		-	1	fr	-	-
Gramineae indet.		-	2	2	-	-
Indet. stem fragments		-	+	-	-	-
Indet. seeds etc.		4	10	4+1(m)	1(m)	2
Indeterminate (a)		-	-	+	-	-
Sample wt (kg)		6	5	(c)	(c)	5

Table 18: Cereals, fruits, seeds etc. from buildings 2376 and 2486.

Taxa are represented by carbonised fruits or seeds where indicated.

Abbreviations: ca - caryopses; cfr - culm fragments; cp - capsule;
fb - floret base; fr - fragments; m - mineralised;
rn - rachis node; uc - uncarbonised.

Notes: (a) Indeterminate fragments of charred porous material with indeterminate scraps of charred plant tissue.

(b) Uncarbonised seeds very abundant, but not counted.

(c) These samples were processed in the flotation tank.
Sample volumes were approximate.

Building 2486

The sample from 2543 contained abundant uncarbonised seeds of elder (Sambucus nigra) with some mineralised weed seeds and a thin scatter of carbonised cereals and weed seeds. It also produced mineralised fly puparia, shells and fragments of the edible marine molluscs Littorina littorea, Mytilus edulis and Ostrea edulis, fishbones, small mammal bones and large fragments of large mammal bone. From these characteristics the layer is probably best interpreted as an accumulation of refuse, thrown into the disused cellar, upon which elder bushes and weeds grew, rather than being an occupation layer related to the use of the building.

Building 2376

All samples from this building contained small quantities of carbonised cereals (Triticum aestivum/compactum, Secale cereale, Hordeum sp. and Avena sp) associated with a range of common arable weeds. Carbonised fruitstones of bramble (Rubus fruticosus) and carbonised seeds of elder (Sambucus nigra) were also identified, together with a capsule of heather (Calluna vulgaris). The density of cereals in these deposits is very much lower than in the fills of 0676 at IAS 4601, and it is therefore unclear whether the use of this cellar for cereal storage is indicated, or whether the assemblages simply represent small-scale spillages of cereals from domestic activities. The sample from 2304 comprised the fill of an intact storage pot within the cellar. Besides carbonised plant material this sample produced scraps of Ostrea and Mytilus shell, mineralised woodlice, fragments of large mammal bone, small mammal bones and abundant amphibian bones. It would appear that after the fire the cellar acted as a trap for small mammals and amphibians, and the storage jar, in which rain water no doubt accumulated, was a suitable damp refuge for the amphibians. At the same time burnt debris from the vicinity fell or was washed into the jar. There is no reason to suppose that its fill was at all related to its original function. Amphibian and small mammal bones also occurred in 2401.

The charcoal from this cellar, unlike that from 0676, is in comparatively small fragments: in most cases it is not possible to reconstruct the original shape and size of the structural components represented. Consequently it has not been examined in detail. However charcoal of Quercus sp. (oak) clearly predominates, Fraxinus sp. (ash) charcoal is frequent and hazel/alder (Corylus/Alnus sp) and other diffuse porous charcoals also occur. The oak and ash charcoals are mainly from mature wood, though some twig fragments

of these woods were found in the sample from 2538. Many of the charcoal fragments show insect borings. Twiggy charcoal, mainly of hazel/alder, is more common in 2304.

Implications for future work

Sampling at sites IAS 4601 and 4801 was reasonably extensive, given the resources and time available for analysis. The results, taken in conjunction with those from earlier sites, giving a good basis for assessing what should be done at future excavations.

1) Middle Saxon contexts

Column samples from Middle Saxon pits and wells did not produce macrofossils of any crop plants not already identified from this period in Ipswich, and most of the assemblages were similar in composition to those from previously-studied features. However, pit 192 at 4601 did produce useful new results relating to livestock farming. There was no obvious indication during excavation that this pit would produce anything out of the ordinary. The implication is that further column sampling of Middle Saxon pits is necessary, but that full quantitative analysis of the flots is not: they should be carefully scanned and only those samples producing new information should be studied in full.

No Middle Saxon structured waterlogged deposits or early (pre-7th century) deposits were excavated at this site, but obviously if such deposits do occur at future excavations they are likely to repay detailed study.

2) Late Saxon to Early Medieval pits

The results from pits of these periods were not very informative. Similar limited assemblages of carbonised and mineralised macrofossils have come from contemporary pits at Norwich (Murphy 1985) and Colchester (Murphy, in preparation). It was necessary to look at a selection of such features from Ipswich to check that nothing unusual was present, but having done so further work cannot really be justified.

3) Early Medieval cellared buildings

The assemblages of well-preserved macrofossils from burnt cellared buildings at Ipswich are every bit as informative as those from the Boudiccan destruction deposits at Colchester (cf.Murphy 1984). Extensive sampling is clearly necessary.

Appendix A: Samples from the monastic cemetery at IAS 4801

Various small samples of organic and other materials were collected during the excavation of graves, notes on which are given here. In some cases chemical analysis would provide further information, should this be thought worthwhile.

0735 (0740)

Small sample of black/very dark brown hard concretion in a grey-brown sand matrix from around the vertebrae of skeleton 0740. This appears to be a ferrimanganiferous concretion, possibly replacing organic material, but its structure is amorphous.

0957

Sample from below coffin. It contains chalk fragments; large charcoal fragments; some iron-replaced wood fragments; rare carbonised buds and germinated cereal grains (including Avena sp); mineralised seeds and ?phosphatic concretions; burnt Buccinum shell fragments; rare fishbones; bird and mammal bone fragments (some burnt). The wood (presumably from the coffin) has been replaced by corrosion products of ?nails, fragments of which survive. The remainder of the sample is clearly mixed in character, incorporating some earlier domestic refuse.

1361

Grey-brown powder from base of coffin. Includes some grass phytoliths. Possibly a chemical precipitate formed by reaction of lime with biogenic phosphates etc. from the decay of the corpse.

1377

Darker greyish-brown powder with white inclusions (chalk, mortar?), small black ferrimanganiferous concretions, charcoal flecks. One carbonised oat grain (Avena sp) noted. Grass/cereal phytoliths common. The sample appears to include some ash from burning of cereals or grasses, with some inorganic concretions.

1415

Sample from below skeleton. Black to reddish brown amorphous concretions in coarse sandy matrix. Probably ferrimanganiferous.

1460

Fragments of laminated pale buff coloured material in a sandy clay matrix. An ill-defined cellular structure survives.

1482

Metal-replaced wood fragments in coarse sandy matrix. Some black and reddish-brown ferrimanganiferous concretions. Also indeterminate fibrous plant material.

1779

White powder from grave. Lime or gypsum.

1888

Grey-brown powder from beneath coffin. Similar to 1361.

1926

Grey (moist) loamy concretions. Not wood, as described on bag.

2368/2379

Small soil sample containing charcoal flecks and shreds of plant tissue. Indeterminate.

Appendix B: Macrofossils from miscellaneous soil samples from sites IAS 4601 and IAS 4801.

Most of these samples have simply been scanned to assess their overall composition, and many were not considered to be of archaeological or botanical significance, containing few macrofossils or merely duplicating information already gained from other sites or contexts. Plant macrofossils thought to be of relevance are listed and discussed in the main text.

IAS 4601: Macrofossils from soil samples (excluding those from 0677).

0415 (5kg)
Small mineralised faecal concretions; plant macrofossils preserved by waterlogging and mineralisation, including seeds, plant fibres etc; fly puparia and beetle elytra; small fragments of mammal bone.

0432 (5kg)
Mineralised faecal concretions (with Agrostemma testa); rare plant macrofossils preserved by waterlogging and mineralisation, including poorly-preserved seeds, mosses etc.; carbonised cereals, nutshells etc.; charcoal; rare beetle elytra; rare scraps of marine mollusc shell; fishbone and small fragments of mammal bone.

0473 (5kg)
Mineralised faecal concretions; mineralised plant remains including wood, fruitstones, bean testa and seeds; carbonised cereals and weed seeds; charcoal; mineralised woodlice and fly puparia; small fishbones very common; fragments of large mammal bone.

0648 (5kg)
Small mineralised faecal concretions; rare mineralised plant remains including bean testa and seeds; carbonised cereal grain; charcoal; mineralised woodlice and fly puparia; scraps of Mytilus shell; fishbones common; fragments of large mammal bone.

0654 (5kg)
Large ferrimanganiferous concretions (these made complete disaggregation impossible); rare carbonised cereals and uncarbonised Sambucus seeds; rare fishbone and large mammal bone fragments.

0668 (5kg)
Large abundant mineralised faecal concretions; rare mineralised plant macrofossils including fruitstones, pulse testa, seeds etc; carbonised nutshells, cereal and pulses; charcoal; mineralised fly puparia and woodlice; fragments of Ostrea and Mytilus shell; fishbones, small mammal bones and large mammal bone fragments.

1121 (5kg)
Rare carbonised nutshells, cereals and seeds; charcoal; rare fishbone and mammal bone fragments.

1122 (5kg)
Large abundant mineralised faecal concretions; abundant plant macrofossils preserved by waterlogging and mineralisation, including fruitstones, pulses, seeds etc.; carbonised cereal; charcoal; mineralised fly puparia, woodlice and beetles; scraps of Mytilus shell; rare fishbones and mammal bone fragments.

IAS 4601 (Charcoal samples, excluding those from 0677.)
Only fragments >25mm. identified.

0491	Quercus sp.	Mature wood fragments.
	Fraxinus sp.	Twigs (embedded in daub).
0548	Quercus sp.	Mature wood fragments.
0699	Quercus sp.	Large fragments of mature wood, including fragments of radial boards c.28mm. thick. Some branch fragments.
	Fraxinus sp.	Handle of tool? Fragments from a round cross-sectioned piece of wood, c.28mm. diameter, cut from mature wood.
0857	Quercus sp.	Fragments of mature wood.

IAS 4801: Macrofossils from soil samples.
0274 (1.7kg)
Rare carbonised cereals and seeds; charcoal; fragments of Mytilus and Ostrea shell; small mammal and fishbone fragments.

0284 (2.6kg)
Rare carbonised cereals, Corylus nutshells and seeds; charcoal fairly common; fragments of Mytilus and Cerastoderma shell; fishbones; mammal bone fragments (many burnt).

0296

Small fragments of indeterminate replaced wood in brown sandy concretions.

0376 (0.5kg)

Abundant plant macrofossils preserved by waterlogging including cereals, weed seeds, poorly preserved mosses etc.; some wood fragments; charcoal; insect remains, mostly beetles; small scraps of marine molluscs; small scraps of mammal bone.

0380 (0.22kg)

Rare small charcoal fragments; uncharred Rubus fruitstone; rare mineralised arthropods; shells and fragments of Vallonia sp, Ostrea and Mytilus; small chips of bone.

0734 (0.6kg)

Carbonised seeds common, some cereals, Calluna florets; large charcoal fragments fairly common; small scraps of burnt mammal bone.

0822 (0.2kg)

Large charcoal fragments common; rare carbonised cereals and seeds.

1015 (2.0kg)

Some soil concretions; charcoal common; rare carbonised cereal grains, seeds and Corylus nutshell; Mytilus shell fragments; rare fishbone and scraps of mammal bone (some burnt).

1138 (7.4kg)

Very small mineralised ?faecal concretion; rare charcoal, carbonised cereal grains, seeds and Corylus nutshell; fragments of Ostrea and Mytilus shell; fragments of mammal bone (some burnt).

1583 (15.3kg)

Mineralised faecal concretions common; mineralised fruitstones, seeds, stems; abundant large charcoal fragments; carbonised grass/cereal culm nodes and bases, cereal grains and rachis, Pteridium pinnules, Corylus nutshell and seeds; mineralised fly puparia, beetles and woodlice; scraps of Ostrea and Mytilus shell; fishbone; small mammal bone; fragments of large mammal bone (some burnt).

1650 (5.0kg)
Small rare mineralised faecal concretions; charcoal; carbonised cereals, Corylus nutshells and seeds; shells and fragments of Pupilla, Buccinum, Ostrea, Mytilus; fishbone; amphibian and small mammal bone, with scraps of large mammal bone.

1668 (18.4kg)
Small soil concretions; charcoal, rare carbonised cereals and weed seeds; rare mineralised seeds; Ostrea and Mytilus shells and fragments; fishbone; fragments of mammal bone (some burnt).

2304 (6.0kg)
Charcoal common; some carbonised cereals and seeds; mineralised woodlice; scraps of Ostrea and Mytilus shell; amphibian bone extremely common; some small mammal bone and scraps of large mammal bone.

2399 (charcoal sample)
Quercus sp. Fragments of mature wood; 15mm. diameter dowel.
Fraxinus sp. Fragments of mature wood and branches.

2401 (5kg)
Abundant large charcoal fragments; carbonised cereals and seeds; amphibian and small mammal bone, with large mammal bone fragments (some burnt).

2543 (5kg)
Charcoal; carbonised cereals and seeds; mineralised seeds, Sambucus very common; mineralised fly puparia; shells and fragments of Littorina, Mytilus and Ostrea; fishbones; small mammal bone and large fragments of large mammal bone.

2837 (2kg)
Black ferrimanganiferous concretions; white concretions; black replaced wood fragments; charcoal flecks; carbonised cereals.

2838 (2.4kg)
Black ferrimanganiferous concretions; some black replaced wood; charcoal flecks.

2891 (1.8kg)
Charcoal quite common; carbonised cereals and seeds; some small mineralised concretions; rare small fragments of bird and mammal bone.

2896 (3.2kg)
Small mineralised faecal concretions; mineralised fruitstones and seeds; charcoal, carbonised cereals and seeds; mineralised fly puparia and woodlice; fishbones (some in concretions); small fragments of large mammal bone.

2905 (2.3kg)
Large charcoal fragments very common; carbonised cereals, nutshells, seeds; burnt fragments of large mammal bone.

Site IAS 5701

At this site column samples were collected from four Middle and Late Saxon features (0017, 0127, 0166 and 0190) for machine flotation, as described in previous reports, and soil samples for laboratory analysis were taken from Late Saxon and early Medieval pits and wells. One of the column samples, from Middle Saxon pit 0017, has been examined in detail, together with the soil samples.

(a) Pit 0017

Plant macrofossils from this feature are listed in Table 19. Carbonised plant remains, mainly cereals, predominate. The distribution of plant remains within the feature is similar to that noted in other Middle Saxon pits from Ipswich (see above): the lower layers contain few macrofossils, perhaps due to rapid collapse and infilling. Sample composition is also typical. Carbonised grains predominate, with a few rachis fragments, weed seeds, nutshells and seeds of wetland plants. The cereals represented are Triticum aestivum/compactum (bread/club wheat), Secale cereale (rye), Hordeum sp. (barley) and Avena sp. (oats). The abundance of oat grains is unusual. Unfortunately, in the absence of floret bases, specific identification is not possible, thought the grains are generally very small and slender and many are deformed as a result of germination.

(b) Late Saxon and early medieval features

Samples from early late Saxon and early medieval wells and pits were examined. The organic samples were processed using the method of Kenward et al (1980). Samples from well-drained gravel-based deposits were processed by manual flotation/washover using a 0.5mm. collecting mesh before wet-sieving the non-floating residue in a 1mm. mesh. The contents of the samples are described in Table . Full quantitative analysis of macrofossils present was not undertaken but a list of taxa present with some indication of their relative abundance is given in Table 21.

The two samples from early late Saxon wells (0033 and 0088) were organic with wood, and 0033 also included twigs and thorns. Remains of cultivated plants are virtually absent, apart from rare carbonised cereal grains and rachis fragments. There is no evidence for extensive secondary use of these wells as cess or rubbish pits. Fruits and seeds of common weed taxa are common, which might suggest the surrounding area was abandoned and

Depth (cm)		10-20	20-30	40-50	50-60	60-70	70-80
Triticum aestivum/compactum	ca.	1	-	5	6	1	1
Secale cereale L.	ca.	4	9	1	1	-	-
Secale cereale L.	rn.	-	1	2	-	-	-
Hordeum sp.	ca.	2	5(a)	1	3	3	-
Avena sp. (b)	ca.	144	6	15	16	6	2
Avena sp.	flo.fr.	-	2	-	-	-	-
Cereal indet.	ca.	18	17	6	4	4	-
Agrostemma githago L.		-	2	1cf	-	-	-
Chenopodium album L.		-	2	-	2	-	-
Atriplex patula/hastata		3	-	-	-	-	1
Chenopodiaceae indet.		-	1	-	1m	-	-
Malva sp.		-	-	-	1m	-	-
Vicia/Lathyrus sp.		2s+2co	3s+3co	-	-	-	-
Leguminosae indet.		-	1s+1co(c)	-	2(d)	fr(c)	-
Polygonum aviculare agg.		-	1	-	-	-	-
Polygonum convolvulus L.		2	-	-	-	-	-
Rumex sp.		-	4	2+1m	-	-	1
Polygonaceae indet.		1	-	-	-	1	-
Corylus avellana L.		-	-	+	+	-	-
Galium aparine L.		1	-	-	1fr	-	-
Sambucus nigra L.		-	-	1uc	-	-	-
Anthemis cotula L.		-	1	-	-	-	-
Eleocharis palustris/uniglumis		1	2	-	-	-	-
Scirpus sp.		-	1	-	-	-	-
Bromus mollis/secalinus		6	2cf	1	-	1	-
Gramineae indet.		1	-	-	-	-	-
Indet. bud		-	-	-	1	-	-
Indet. stem fragments (e)		+	-	+	-	-	-
Charred ?leather		-	-	-	-	+	-
Indet. seeds etc.		-	10	-	-	-	-

Table 19: Plant macrofossils from pit 0017 (Site 5701)

Taxa are represented by carbonised fruits or seeds except where indicated.
No samples from 0-10 and 30-40cm.
Abbreviations: ca - caryopses; co - cotyledons; flo - florets; fr - fragments; m - mineralised; rn - rachis nodes; s - seeds; uc - uncarbonised.
Notes: (a) Including grains from lateral spikelets. (b) Generally small slender grains, many germinated before carbonisation. (c) Large-seeded forms. (d) Small seeds. (e) Including monocot. (grass?) stem.

overgrown whilst the lowest fills accumulated. There are a few remains of wetland plants and a single fruit of the halophyte Triglochin maritima.

The sample from the early medieval well 0085 also produced an assemblage in which weed seeds are frequent. However, the presence of mineralised faecal concretions with plant residues probably derived from human faeces (testa fragments of Agrostemma githago and fruits and seeds of raspberry (Rubus idaeus), blackberry (Rubus fruticosus), apple (Malus sp) and fig (Ficus carica)) strongly suggests a secondary use of this feature as a cess pit.

The remaining samples from pits produced only sparse assemblages, which are not readily interpretable.

Table 20: IAS 5701: Macrofossils from soil samples.

0033 (5kg)
Plant macrofossils preserved by waterlogging (twigs, thorns, seeds etc. - see Table); rare charcoal, carbonised grain of Triticum sp; fly puparia, beetle elytra, woodlice remains; scraps of Ostrea shell; abundant amphibian bone, rare small mammal bone, fishbone and fragments of large mammal bone; scrap of thread from textile.

0085 (1kg)
Large common mineralised faecal concretions; plant macrofossils preserved by mineralisation and waterlogging including wood, stems, twigs, seeds etc. (see Table); charcoal; fly puparia (mostly mineralised) and beetle elytra common; scraps of barnacles and Mytilus shell; avian eggshell; fishbones, rare scraps of large mammal bone.

0088 (5kg)
Some plant macrofossils preserved by waterlogging, but in poor condition (Table); carbonised cereals and seeds; rare insect remains; rare mammal bone fragments and amphibian bone.

0119 (3.8kg)
Rare carbonised cereals, nutshells and seeds (Table); rare charcoal; very rare mineralised seed fragments; scrap of Mytilus shell; rare fishbone and mammal bone fragments.

0127 (190-200cm) (5kg)
Small, rare faecal concretions; rare carbonised cereals, nutshells and seeds; charcoal; rare mineralised seeds; scraps of Ostrea and Mytilus shell; mineralised fly puparia and woodlice; fishbone, bird and mammal bone fragments.

	0033	0085	0088	0119	0127
Papaver argemone L.	+	-	-	-	-
Brassica sp.	+	-	-	-	-
Agrostemma githago L.	-	+(a)	-	-	-
Stellaria media-type	+	-	-	-	-
Malva sylvestris L. (b)	-	-	-	+	-
Malva sp.	-	+	-	-	-
Filipendula ulmaria (L) Maxim.	+	-	-	-	-
Rubus idaeus L.	-	+	-	-	-
Rubus fruticosus agg.	-	++	-	-	-
Malus sylvestris/domestica	-	+	-	-	-
Chenopodium album L.	+++	+++	++	-	-
Chenopodium rubrum/glaucum	-	-	+	-	-
Atriplex patula/hastata	+	-	-	-	-
Torilis sp.	+	-	-	-	-
Aethusa cynapium L.	-	-	+	-	-
Umbelliferae indet.	-	+	-	-	-
Polygonum aviculare agg.	+	-	-	-	-
Polygonum convolvulus L.	-	-	+(cf)	+(b)	-
Rumex acetosella agg.	-	+	-	-	-
Rumex sp.	++	+	+	-	-
Urtica urens L.	++	-	++	-	-
Urtica dioica L.	++	-	+	-	-
Humulus lupulus L.	-	+	-	-	-
Corylus avellana L. (b)	-	-	-	+	+
Anagallis arvensis-type	+	-	-	-	-
Hyoscyamus niger L.	-	+	+	-	-
Lamium sp.	+	-	-	-	-
Labiatae indet.	-	+	-	-	+
Plantago lanceolata L. (b)	-	-	+	-	-
Sambucus nigra L.	+	-	-	-	+
Compositae indet.	-	+	-	-	-
Ficus carica L.	-	+	-	-	-
Triglochin maritima L.	+	-	-	-	-
Juncus sp.	-	+	-	-	-
Eleocharis sp.	+	+	-	-	-
Triticum aestivum s.l. (b)	+	-	-	-	-
Hordeum sp. (b)	-	-	+	-	-
Hordeum sp. (b)(c)	-	-	+	-	-
Secale cereale L. (b)	-	+	-	+	-
Avena sp. (b)	-	-	-	-	+
Cereal indet. (b)	-	-	+	+	-
Cereal indet. (d)	-	+	-	-	-
Gramineae indet.	+	+	+(b)	-	+
Indeterminate (seeds etc)	+	++(e)	+	+	+
Buds	-	+	-	-	-
Thorns	+++	-	-	-	-
Twigs	+	+	-	-	-
Stems	-	+	-	-	+
Wood	+	+	+	-	-
Charcoal	+	+	+	+	+

Table 21: Plant macrofossils from contexts 0033, 0085, 0088, 0119 and 0127

Taxa are represented by fruits or seeds except where indicated.

+ - present; ++ - common; +++ - abundant.

Notes: (a) Fragmentary. (b) Carbonised. (c) Rachis node. (d) Mineralised.
(e) Numerous incompletely mineralised seeds etc.

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