Bridge Street, Ipswich: Environmental and Economic Studies

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1. Introduction

Studies of the agrarian economy and environment of Saxon and medieval Ipswich have hitherto been restricted by the nature of preservation conditions for biological material at the sites excavated, which have mainly been on well-drained terrace gravels and sands. These sites have produced useful assemblages of mammal and fish bone, marine molluscs and charred plant remains, but waterlogged deposits were rare (confined to the bases of deep pits and wells), and the assemblages of biological remains which they contained are thought to be derived from very restricted catchments. The excavations at Bridge Street have provided the first opportunity for extensive examination of waterlogged fluvial deposits and associated layers of dumped refuse. The investigations reported below are there- fore in the first place a pilot study designed to assess the potential of the waterfront deposits of the Orwell and thereby to focus attention at future waterfront excavations on specific unresolved questions and on particularly informative types of deposit. In this respect the Bridge Street excavation was closely comparable to that at Whitefriars Street, Norwich (416N) (Ayres and Murphy, forthcoming), a trench cut through Late Saxon and Medieval bank deposits of the Wensum. Comparisons will be drawn below between these two sites.

2. Methods

With the exception of the wood and large bones (which were collected by hand) the plant and animal remains discussed below were extracted from soil samples. Four column samples, sub-divided by layer or depth as appropriate were taken (214, 262, 406, 490). In addition several subsidiary samples were retained from further deposits which were thought to be of potential interest. The columns comprised two parallel series of samples: large samples for bulk sieving on site and smaller samples for laboratory analysis. The extraction methods used in the study of macrofossils from the site were those of Kenward et al (1980). Methods used for extracting microfossils (pollen, diatoms) are described below.

4. Mollusca

The mollusc shells from the site fall into two main groups: small shells of marine, brackish-water, freshwater and terrestrial species, which were incorporated into the deposits largely by natural processes, and shells of large edible marine shellfish representing dumped food refuse. Shells and fragments greater than 2mm were recovered by means of bulk-sieving on site. Smaller shells and fragments (together with some large specimens) were extracted from smaller soil samples by wet-sieving in a 0.5mm mesh in the laboratory. Mollusca were identified with reference to Kerney and Cameron (1979), Macan (1969), McMillan (1968) and Tebble (1966) and the identifications were confirmed by comparison with modern reference specimens.

The shells recovered are very variable in their state of preservation.Some are extremely abraded and fragmentary. The valves of Nucula and Musculus, however, retain their periostraca (as do most Mytilus valves) and context 446 contained some articulated valves of very immature Musculus, about 2mm in length. Abraded and polished iron-stained molluscshell fragments were present in 447, 257 and 250. These are thought to be derived fossils from Pleistocene Crag deposits.

1. The local molluscan fauna

The deposits at the site include a mixture of species from aquatic habitats of varying salinity and from marsh and terrestrial habitats. The large shells of edible species were clearly imported to the site for consumption and consequently provide no information on local habitats. Discounting these edible molluscs, intertidal species predominate in the majority of samples. At least three species of Littorina are present, representing habitats from the splash zone to the low intertidal zone of fucoid seaweeds (Yonge 1949, 122-125). Hydrobia spp. are also common, particularly in the later deposits. Other intertidal and shallow sublittoral gastropods include Rissoa sp., Nassarius reticulatus, Retusa sp. and Phytia myosotis. Small marine bivalves include both infaunal species (Nucula, Cerastoderma) and epifaunal molluscs (Musculus).Valves and fragments of Musculus and Nucula were recovered only from the basal, largely inorganic, sandy and silty deposits in columns 406 and 262 (447, 446, 257). From their lithology and biological remains these appear to be shore deposits incorporating some dumped refuse.

Freshwater molluscs (Bithynia spp. Lymnaea sp., Bathyomphalus contortus, Anisus leucostoma and Pisidium sp.) are generally rare. Only in 447 are freshwater taxa at all common, and only a few dense elements of a freshwater fauna (calcified opercula of Bithynia and Pisidium valves) have become incorporated into this deposit. Marsh species (Lymnaea truncatula, Vertigo antivertigo) occur sporadically; these presumably colonised damp ground and impersistent pools and puddles along the shore above the splash zone. Exclusively terrestrial snails are also present and include the synanthropic species Helix aspersa with a few specimens of Discus rotundatus and Trichia hispida.

The mollusca from these smaller samples thus give some indication of the range of habitats present in the vicinity, but detailed reconstruction of habitat change is precluded both by the small size of the assemblages and by the fact that a substantial allochthonous element is undoubtedly present. However, the extreme rarity of freshwater species in deposits later than the Middle Saxon and the rise in frequency of Hydrobia ulvae in later deposits are worth noting.

? Higher sea level→increased penetration by sea water.

Period

			Middle Saxon				Late Saxon				11th/ 12th/ 12thc	13thc	13th(	
Column sample No.	490	490	490	406	406	406	406	406	406	406	262	262	262	-
Context No.	447	489	487	447	446	403	402	399	383	381	257	250	226	162
Littorina littorea (L)	-	-	-	-	2*	-	-	-	-	-	-	2	-	-
Littorina saxatilis (Olivi)	-	-	-	-	2	-	-	-	-	-	2	4	5	3
Littorina littoralis (L)	-	-	-	-	-	-	-	-	-	-	-	2	-	-
Littorina sp.	-	-	+*	+*	1	+	-	1(g)	-	-	2	2	-	-
Hydrobia ventrosa (Montagu)	-	-	-	-	-	-	5	-	-	-	24	5	17	-
Hydrobia ulvae (Pennant)	1	-	-	-	4	1	3	3	-	-	6	16	18	1
cf. Pseudamnicola confusa (Frauenfeld)	-	-	-	-	-	-	-	-	-	-	2	-	-	-
Bithynia tentaculata (L)	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Bithynia sp.	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Bithynia sp. (opercula)	-	-	-	9	-	-	-	-	-	-	-	-	1	-
Rissoa sp.	-	-	-	-	-	3	-	cf.2	-	-	-	-	-	-
Buccinum undatum L.	-	-	-	-	1*	-	-	-	1*	-	-	4*	1*	1*
Buccinum undatum (operculum)	-	-	-	-	-	-	-	-	-	-	-	+	+	-
Nassarius reticulatus (L) var. nitida	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Retusa sp.	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Phytia myosotis (Draparnaud)	-	-	-	-	-	1(f)	-	-	-	-	-	1	1	-
Lymnaea truncatula (Muller)	3	-	-	1	-	-	-	-	-	-	2	4	-	2
Lymnaea sp.	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Bathyomphalus contortus (L)	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Anisus leucostoma Millet	-	-	-	-	-	-	-	-	-	-	1	1	-	-
Vertigo antivertigo (Draparnaud)	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Discus rotundatus (Muller)	1	-	-	1	-	-	-	-	-	-	-	-	-	-
Trichia hispida (L)	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Helix aspersa (Muller)	-	-	-	-	-	-	-	+	-	-	+	-	-	-
Helicid (aperture fragments)	-	-	-	-	-	-	-	-	-	-	-	-	+	-

Indet.gastropod whorl frags (c.f. Calliostoma)	-	-	-	+	-	-	+	-	-	-	-	-	-	-
Indet. gastropod	-	-	-	4(b)	1	-	-	-	-	-	2(h)	-	-	-
Nucula sp.	-	-	-	-	+(a)	1	-	-	-	-	+	-	-	-
Mytilus edulis L.	1*	3*	+*	+*	36*	9*	+*	6+	+*	+*	6*	7*	-	+*
Musculus sp.	-	-	-	-	9(e)	3	-	-	-	-	+	-	-	-
Ostrea edulis L.	+*	-	-	+*	3*+3(c)	4*	1*	4*	+*	+*	2*+1	1*	2*	1*
Chalmys sp.	-	-	-	-	-	-	-	-	+*	-	+*	-	-	-
Cerastoderma sp.	-	-	-	+*	+*	+*	-	+*	-	-	+*	1(i)	1*	+*
Pisidium sp.	-	-	-	3(a)	-	-	-	-	-	-	-	-	-	
Indeterminate bivalve	-	-	-	-	1	2	-	-	-	-	1	-	-	-
Abraded frags of Crag mollusca	-	-	-	+	-	-	-	-	-	-	+	+	-	-
Sample wt (kg)	1	1	1	2	1	1	1	1	1	1	2	1	1	1

Table : Mollusca recovered by wet-sieving with 0.5mm mesh

+ - nonapical or non-hinge fragments
* - large specimens, probably imported to site for consumption

(a) Abraded hinge fragments
(b) Apices
(c) 3 mature valves + 3 immature upper valves
(d) Fragments of cremulate margin
(e) 5 hinge fragments + 2 individuals with paired valves (c.2 mm in length)
(f) Immature. Apertural ridges and teeth poorly developed
(g) Columella
(h) One apex, one large columella
(i) Immature valve

2. Shellfish consumption

Counts of shells of the five main edible species recovered by bulk-sieving are given in Table and the results are summarised in Table . The two principle bivalve shellfish are oysters (Ostrea edulis) and mussels (Mytilus edulis). There are some fluctuations in the relative abundance of these species, but it is not clear whether these are of any significance. Whelks (Buccinum undatum) are rare in pre-11th century deposits, but common thereafter. This may reflect increasing exploitation of offshore shellfish grounds; the whelk is a sublittoral species and is nowadays caught using baited pots shot from small vessels offshore. Shells of the two remaining intertidal species, the cockle (Cerastoderma edule) and the edible winkle (Littorina littorea), were rare in deposits of all site phases and do not appear to have been of great economic importance at any period. The counts obtained from the earlier site phases at bridge Street are very similar to those from Mid-Late Saxon contexts at Stoke (1tS 7402) and Brook Street (1AS 5502) (Jones, forthcoming).

Large shells of some other mollusca were also recovered by bulk sieving (see note to Table) and it is possible that some of these (eg. Chlamys sp., Nucella lapillus) may have been consumed. If so, such species were of only minor importance.

Table : Shell-counts for edible mollusca recovered by bulk-sieving.

Besides the edible mollusca listed here the samples processed by bulk sieving produced shells of Chlamys sp., Macoma balthica, Scrobicularia plana, Musculus sp., Hydrobia ulvae, Littorina saxatilis, Littorina littoralis, Gibbula sp., Nassarius reticulatus, Nucella lapillus, planorbids, Succinea sp., helicids and other unidentified taxa. These have all been retained for possible future study, but have not been examined in detail nor counted for this report. Immature specimens of the edible species which are clearly too small for consumption are likewise omitted, (eg. Buccinum shells less then 3cm in height). The shells of Mytilus edulis (mussel) were frequently very fragmentary and in the case of this species the counts given are estimates based on hinge fragments.

	Mid – Late Saxon						
Column No.	490	490	490	490	490	406	406
Context No.	447	489	459	487	445	403	403
Depth (cm)	(50-60)	(40-50)	(20-30)	(10-20)	(0-10)	(80-90)	(70-80)
Ostrea edulis	1	3	-	-	2	12	14
Mytilus edulis	3	9	3	3	3	48	24
Cerastoderma edule	2	2	1	-	2	-	-
Buccinum undatum	-	-	-	-	-	-	-
Littorina littorea	-	-	-	1	1	1	2

	Late Saxon									
Column No.	406	406	406	406	406	406	406	262	262	262
Context No.	402	399	399	383	381	380	380	255	255	251
Depth (cm)	(60-70)	(50-60)	(40-50)	(30-40)	(20-30)	(10-20)	(0-10)	(0-10)	(10-15)	(0-10)
Ostrea edulis	1	32	45	16	26	16	13	48	33	1
Mytilus edulis	12	7	9	5	1	1	2	15	34	6
Cerastoderma edule	2	-	-	1	-	-	1	6	1	2
Buccinum undatum	-	-	-	-	-	-	-	2	1	-
Littorina littorea	1	1	1	1	-	3	1	2	2	-

11th /early 12th century

Column No.	262	262	262	262
Context No.	250	250	248	248
Depth (cm)	(10-20)	(0-10)	(0-10)	(10-20)
Ostrea edulis	23	25	26	16
Mytilus edulis	45	47	14	8
Cerastoderma edule	3	4	2	2
Buccinum undatum	7	13	16	18
Littorina littorea	-	1	1	-

12th/early 13th century

Column No.	262	262	262	262
Context No.	247	247	226	226
Depth (cm)	(0-10)	(10-20)	(10-15)	(0-10)
Ostrea edulis	40	24	3	19
Mytilus edulis	19	14	8	8
Cerastodema edule	1	1	-	-
Buccinum undatum	17	12	24.	6
Littorina littorea	-	-	-	1

13th century

Column No.	225	225	225	225	225	225		214	214	214	214	214	214	214
Context No.	153	153	153	153	153	153		177/192	177	176	176	176	176	168/174
Depth (cm)	(50-60)	(40-50)	(30-40)	(20-30)	(10-20)		(0-10)	(70-80)	(60-70)	(40-50)	(30-40)	(20-30)	(10-20)	(0-10)
Ostrea edulis	8	9	1	4	4		2	13	4	4	4	12	1	7
Mytilus edulis	4	1	1	2	1		1	2	1_	1	1	1	1	2
Cerastoderma edule	1	1	1	-	1		1	-	1	-	1	1	-	1
Buccinum undatum	1	1	1	2	1		1	3	4	1	4	2		1
Littorina littorea	-	1	1	-	-		-	1	-	-	-	-	1	2

17th century

Context No.	164
Ostrea edulis	23
Mytilus edulis	7
Cerastoderma edule	1
Buccinum undatum	5
Littorina littorea	1

	Mid-Late Saxon	Late Saxon	11th- early 12th c.	12th- early 13th c.	13th century	17th century
Ostrea edulis	16	116	45	43	37	12
Mytilus edulis	47	46	57	25	11	4
Cerastoderma edule	4	7	6	1	5	1
Buccinum undatum	0	3	54	59	24	5
Littorina littorea	5	12	2	1	6	1

Table : Synopsis of the edible molluscs (minimum numbers of individuals) recovered by bulk-sieving

6. Crustacea and other aquatic invertebrates

Besides the invertebrate groups discussed in detail above, samples examined in the laboratory produced remains of some other invertebrates, principally crustaceans. Most have not been specifically identified, but their distribution is summarised in Table. In column 406 the distribution of microscopic crustacea appears to be related to conditions of deposition. Ostracod carapaces, frequently articulated, were particularly common in the lower deposits, which included a high proportion of fluvial sands and silts. Ephippia of Cladlocera, however, were not observed in these deposits, but were abundant in the upper deposits of the column, formed apparently in conditions where periodic drying occurred. Fragments of Balanus plates were present in most samples, and these presumably reached the site attached to mollusc shell, sea-weeds, wood etc.

Exoskeleton fragments from decapod crustaceans were recovered from samples of three contexts examined in the laboratory (250, 257, 402) and further fragments were extracted from contexts 164, 168/174, 176, 177, 177/192, 226, 247, 248, 250, 251, 255 and 399 by bulk-sieving. No exoskeleton fragments were observed in pre-Late Saxon deposits. Most of the fragments are of chelae from chelipeds but carapace and other limb fragments are also present. From their size and surface patterning almost all of the fragments are thought to be from small specimens of the shore crab Carcinus maenas. Cast exoskeletons of this crab are a familiar constituent of strand-lines. A large robust fragment of a dactylus from a cheliped, extracted from the 17th century well-fill 164, is probably of the edible crab Cancer pagurus and is the only specimen suggesting a crab fishery.

Echinoids are represented by a single spine from 257 and by an intact test of Echinocyamus pusillus recovered by bulk-sieving from 176, a thirteenth century context. The former is iron-stained, and may perhaps be a derived Crag fossil, but the latter shows no staining and is quite unbraided. E. pusillus is common on British coasts on course sandy gravelly bottoms in shallow depths (Mortensen, 1977, 316)

Mortensen, T. (1977) Handbook of the Echinoderms of the British Isles Rotterdam.

Period		Middle Saxon					Late Saxon			11th/ 12thc.	12th/ 13thc.	13thc
Column sample no.		406	406	406	406	406	406	406	262	262	262	-
Context No.		447	446	403	402	399	383	381	257	250	226	162
Bryozoa	(on Ostrea frags.)	-	-	-	-	-	-	-	-	+	-	-
Cladocera	(ephippia)	-	-	-	+	+	+	-	+	+	+	-
Ostracoda	(carapaces)	+	+	+	+	+	-	-	+	+	+	+
Cirripedia	(Balanus frags)	+	+	+	-	+	-	+	+	+	+	+
Decapoda	(carapace frags)	-	-	-	+	-	-	-	+	+	-	-
(chela frags)		-	-	-	-	-	-	-	-	+	-	-
Frags of caddis-fly larval cases		+	-	-	-	-	-	-	-	-	-	-
Echinoid radiole	(? derived fossil)	-	-	-	-	-	-	-	+	-	-	-

Table : Remains of crustacea and other aquatic invertebrates present in laboratory samples

8a. Avian eggshell

Shell fragments were present in the majority of samples processed by bulk sieving. No intact or partly intact eggs were observed and there were no obvious concentrations of fragments. A fairly uniform scatter of fragments in refuse deposits seems to be represented. Identification of fragmentary eggshell presents considerable difficulties, though Keepax (1977) has used scanning electron microscopy and metrical studies to obtain identifications. Application of such time-consuming techniques was not thought to be justified with the Ipswich material, though a representative sample of fragments from each soil sample has been retained for possible future study.

Keepax, C. (1977) 'Identification of Avian Eggshell from Archaeological sites, and the potential use of the Scanning Electron Microscope.' Ancient Monuments Lab. Report 62/77.

12. Plant macrofossils (excluding wood and mosses)

Plant remains were extracted from the disaggregated organic fractions of 1-2 kg soil samples in the laboratory using a rack of sieves as described in Kenward et al. (1980). The fine fraction (<500 u) was not totally sorted, but only scanned undert he microscope. It commonly contained abundant Juncus seeds and rare seeds of Papaver, Typha, Arenaria, Hypericum and small-seeded (often under-developed) Chenopodium. These, and possibly some other small-seeded taxa, are therefore under-estimated (consistently) throughout. It was considered that to sort completely this fine fraction would have added greatly to the time spent without adding significant information.

The flots and residues from bulk-sieving were dried prior to sorting. No attempt was made to extract plant remains smaller than 2mm: the flots and residues were graded in a 2mm mesh sieve prior to sorting and only the coarse fraction was examined. The fine fraction has, however, been retained for possible future study.

Plant macrofossils recovered are listed in Tables and

Crop plants and other utilised species

The distribution of seeds and fruits of plants of actual or potential economic importance is summarised in Table . The species list includes cereals (wheat, barley, rye, oats),pulses (horse-bean, pea), nuts (hazelnut, walnut),succulent fruits (plum, bullace, sloe, cherry, haw, strawberry, blackberry, raspberry, apple, medlar, elderberry, grape), possible vegetables (wild celery, wild carrot), herbs and flavourings (dill, hop), oil plants (opium poppy, flax) and fibre crops (hemp, flax). There is little change through time in the range of species represented through certain crops, notably medlar (Mespilus germanica), grape (Vitis vinifera) and walnut (Juglans regia) were not recovered from deposits definitely pre-dating the 13th century. This could indicate that these crops were late introductions to the Ipswich area, though both grape and walnut have been identified in pre-Conquest deposits at Whitefriars Street, Norwich (Ayers and Murphy, forthcoming), and their absence at Bridge Street may therefore merely be related to local factors. In most other respects the range of crops and potentially edible wild species from these two sites is very similar, differing only with respect to such minor cultivars as Calendula officinalis (pot marigold) one fruit of which occurred at Whitefriars.

As at any urban site, taphonomic studies are complicated by the potentially very wide range of sources from which the crop plant remains in these dumped refuse

	Mid-Late Saxon	Late Saxon	llth/e 12th century	12th/e 13th century	13th century
Triticum aestivum (bread wheat)	+	+	+	+	+
Hordeum sp. (barley)	+	+	+	+	+
Secale cereale (rye)	+	+	+	+	+
Avena sp.(wild/cultivated oats)	-	+	+	+	+
Avena sativa (cultivated oats)	-	-	-	-	+
Vicia faba var. minor (horse-bean)	+	+	-	-	+
Pisum sativum (pea)	-	+	-	-	+
Corylus avellana (hazelnut)	+	+	+	+	+
Juglans regia (walnut)	-	-	-	+	+
Prunus domestica ssp. domestica (plum)	+	+	+	+	+
Prunus domestica ssp. institia (bullace)	+	+	+	+	+
Prunus spinosa (sloe)	+	+	+	+	+
Prunus avium-type (cherry)	-	+	+	+	+
Crataegus monogyna (hawthorn)	+	-	-	-	-
Fragaria vesca (strawberry)	-	+	+	-	-
Rubus fruticosus (blackberry)	+	+	+	+	+
Rubus idaeus (raspberry)	-	+	-	-	-
Malus sylvestris (apple)	-	+	+	-	+
Mespilus germanica (medlar)	-	-	-	-	+
Sambucus nigra (elderberry)	+	+	+	+	+
Vitis vinifera (grape)	-	-	-	-	+
Apium graveolens (wild celery)	+	+	+	-	_
Daucus carota (wild carrot)	+	-	-	-	-
Anethum graveolens (dill)	-	+	-	-	-
Humulus lupulus (hop)	+	+	-	+	-
Papaver somniferum (opium poppy)	+	+	-	-	+
Cannabis sativa (hemp)	+	+	+	+	+
Linum usitatissimum (flax)	+	+	+	+	+

Table : Synopsis of the distribution of crop plants and some other utilised species

		Mid-Late Saxon	Late Saxon	llth/12th century	12th/13th century	13th century
Charred	cereal caryopses	0.4	3.9	4.0	4.5	25.6
	rachis fragments	0	0	0	0	0.2
	culm nodes	0.1	0	0	0	0.8
Charred pulse seeds		0	0.2	0.5	0	1.5
Prunus fruitstones		1.5	9.6	37.2	7.2	1.8
Malus sylvestris seeds		0	1.6	4.5	0.5	0.1
Rubus fruticosus fruitstones		0.5	5.0	36.0	8.7	0.8
Other fruitstones, seeds etc. from succulent fruits		0.1	0.4	1.5	1.0	0.2
Linum usitatissimum seeds		0	0	1.0	0.2	0.3
Cannabis sativa fruits		0.2	0.3	8.2	15.7	1.7
Humulus lupulus fruits		0.1	0.2	0	0.5	0
No of samples per phase		8	11	4	4	14

Table : Mean numbers of fruits or seeds recovered per sample by bulk sieving

Almost all samples comprised a 20x20x10cm (4000 cm^3) block of soil. Nutshells, being very fragmentary, are not included in this table.

deposits may be derived (Table). Some variations in the relative frequencies and absolute abundance of different crop species are, however, distinguishable.

Considering first the cereal remains, it is clear that 13th century samples processed by bulk sieving contained markedly more charred caryopses per sample (mean : 25.6) than did samples from earlier phases (mean :< 5.0), and also somewhat more rachis fragments and culm nodes. The only laboratory samples producing large quantities of uncharred cereal remains (mainly culm nodes and rye rachis nodes with abundant arable weedseeds) was also of 13th century date (162). This suggests an increase in the processing or utilisation of cereals in the vicinity at this time. The consistently high frequency of charred oat grains from the bulk-sieved 13th century samples is notable, but difficult to explain in terms of specific activities. Similarly, 11th/12th century bulk-sieved samples contained far more fruitstones than samples of other phases, but again explanation is difficult, except perhaps in terms of increased disposal of domestic food refuse. The abundance of hemp fruits in 12th/13th century bulk-sieved and laboratory samples presents similar difficulties in interpretation. At Whitefriars Street, Norwich high frequencies of hemp and flax seeds in pre-urban site phases were thought to indicate possible retting in the river. Such an explanation seems less probable here, since retting fouls the water and is therefore unlikely to have been done close to a major settlement.

In short, although there are variations in the frequencies of different crop plants between phases, and fairly consistent results have been obtained between samples within phases, the significance of these variations is difficult to explain.

The wild plants

Fruits and seeds of wild plants from these samples fall into seven main categories: aquatics, wetland plants (littoral, reedswamp, marsh, wet meadow and carr species), halophytes, heath plants, segetals (crop weeds), ruderals (disturbed ground species) and scrub or woodland plants. The ruderals and segetals are numerically the most important component of the assemblages, but the remaining species provide some information on the vegetation of the surrounding area. No attempt has been made to reconstruct in detail the types of plant association represented (cf. Van Zeist 1974), since the assemblages are clearly very mixed and contain a substantial allochthonous element - seeds derived from a variety of sources by both natural and anthropogenic processes.

Remains of aquatic plants are rare in samples from this site: only four taxa have been identified (Ranunculus subgenus Batrachium, Alisma plantago-aquatica, Ruppia sp. and Zannichellia palustris). Ruppia and Zannichellia are particularly

characteristic of brackish water where there is little current, and commonly occur in drainage ditches on reclaimed land (Van Zeist 1974, 339; Petch and Swann 1968, 225). Alisma, however, is typically a freshwater aquatic (Petch and Swann 1968, 221). The low frequencies of fruits from these aquatics unfortunately rule out attempts to detect any changes in the salinity of local bodies of water.

Wetland plants, indicating the proximity of a range of habitats from shallow-water littoral conditions and reedswamp to marsh, fen and wet meadow are better-represented. The most abundant and consistently present wetland taxa are Eleocharis sp. and Carex sp., but a wide range of herbs has also been identified, including Ranunculus flammula, Ranunculus sceleratus, Thalictrum flavum, Hypericum sp., Lychnis flos-cuculi, Montia fontana, Filipendula ulmaria, Oemanthe fistulosa Pedicularis palustris, Polygonum hydropiper, Mentha cf. aquatica, Lycopus europaeus and Eupatorium cannabinum. Fruits of Typha and Phragmites culm nodes are relatively rare, and reedswamp may not have been present locally. Fruits of alder (Alnus sp.) and of a common line of alder carr, the hop (Humulus lapulus), also occur only at low frequencies suggesting that carr was absent from the immediate vicinity. In summary, the samples from all -periods appear to indicate a local shade-free wetland vegetation dominated by sedges and spike-rush with some wetland herbs. Comparable results were obtained from Late Saxon riverbank deposits at Whitefriars, Norwich (Ayres and Murphy, forthcoming). Apparently at both sites the use of raw materials from reedswamp and carr and soil disturbance had resulted to a large extent in the obliteration of natural local wetland communities.

Seeds of a number of halophytes'were identified.Apium graveolens is the commonest notably in 447. In East Anglia today wild celery occurs in marshes near the sea and in ditches in reclaimed land (Petch and Swann 1968, 161). Also present, at lower frequencies, were fruits and seeds of Suaeda maritima (herbaceous seablite). Daucus carota (wild carrot) and Triglochin maritima (sea arrow-grass), Triglochin and Suaeda are both salt-marsh species and Daucus commonly occurs in turf on sea banks. Suaeda is common only in one 11th/early 12th century sample (250); apart from this it is represented, as are Triglochin and Daucus, by only small numbers of seeds.

It seems probable that most of the scanty remains of heathland plants represent material brought to the site for use as thatch or litter. Remains of heather (Calluna vulgaris) were not observed in pre-13th century samples, but in 162 and 226 capsules, seeds and shoots with imbricate leaves were present. Pinnules of bracken (Pteridium aquilinum) were more widely distributed, but in no samples were they at all abundant. Seeds of two further species are probably derived from dry acid grassland or heath: Arenaria serpyllifolia and Linum catharticum.

Some of the segetals identified also have affinities for dry sandy soils, (eg. Spergula arvensis, Scleranthus cf. annuus), but the majority show no particular soil requirements other than their adaptation to disturbed conditions. Indeed, many weed species identified at Bridge Street could have grown equally well as segetals in local arable fields or as ruderals in the immediate vicinity of the site. For this reason it seems appropriate to concentrate attention on a single 13th century deposit (162) which consists largely of straw fragments of cereal rachis and seeds of segetals apparently with little admixture of plant remains from other sources. The uncharred rachis nodes from this deposit appear to be all of rye (Secale cereale.) Seeds or weeds associated with this rye crop were
identified as follows:

	Nos	% of weeds
Papaver rhoeas (poppy)	1	0.5
Papaver argemone (prickly-headed poppy)	2	1.0
Raphanus raphanistrum (wild radish)	1	0.5
Brassica sp. (cabbage-type)	4	2.1
Agrostemma githago (corn-cockle)	1	0.5
Spergula arvensis (corn-spurrey)	4	2.1
Chenopodium album (fat-hen)	21	11.0
Chenopodium rubrum/qlaucum (goosefoot)	1	0.5
Atriplex sp. (orache)	5	2.6
Chenopodiaceae indet.	7	3.7
Polygonum convolvulus (black bindweed)	1	0.5
Polygonum cf. lapathifolium (pale persicaria)	4	2.1
Polygonum aviculare (knotgrass)	1	0.5
Rumex sp. (dock)	12	6.3
Urtica urens (small nettle)	23	12.0
Solanum nigrum (black nightshade)	6	3.1
Galeopsis tetrahit/speciosa (hemp-nettle)	1.	0.5
Anthemis cotula .(stinking mayweed)	85	44.5
Chrysanthemum segetum (corn marigold)	7	3.7
Centaurea cyanus (corn flower)	3	1.6
Sonchus arvensis (field milk thistle)	1	0.5
	191	

The range of species present is quite characteristic of medieval cereal crops, but the abundance of Anthemis cotula is particularly notable. A.cotula is common in several other samples from the site and indeed was absent from only two of the fourteen samples examined in the laboratory. Nowadays, it is more frequent on heavy clay soils in East Anglia (Petch and Swann 1968, 210). Its association here

		Mid-Late Saxon			Late Saxon		
	447	446	403	402	399	383	381
Chenopodium album	14.9	27.1	27.8	7.3	4.0	4.2	6.8
Chenopodium rubrum/glaucum	0.7	0.8	0.7	51.8	56.7	4.0	4.5
Chenopodium ficifolium	0	0	0	0.1	0	0.3	0
Chenopodium cf. murale	1.4	0.8	3.8	1.0	13.6	12.4	41.3
Atriplex patula/hastata	16.3	9.3	6.0	4.2	2.9	1.0	1.0
Indeterminate Chenopodiaceae	5.7	7.6	7.5	3.5	4.6	4.5	11.3
Rumex spp (not acetosella or maritima)	39.7	36.4	30.1	1.0	1.5	1.8	1.9
Solanum nigrum	4.3	0	0.7	22.6	0.5	0.3	1.4
Urtica urens	7.8	5.9	2.3	5.4	13.3	70.6	27.4
Urtica dioica	9.2	11.9	21.1	3.0	2.9	1.0	4.4
Total no of fruits/seeds	141	118	133	793	653	622	591

Bridge Street, Ipswich: Percentage frequencies of the principle ruderals in samples from column 406

Only the ten principle ruderal taxa are considered. The percentages are calculated from the total number of seeds of these ten taxa.

with segetals more characteristic of sandy acid soils (eg. Chrysanthemum segetum, Spergula arvensis) seems to suggest that it was formerly a more prevalent weed on the sandy soils of the Ipswich area.

The predominant element in most seed assemblages from the site is of seeds from ruderal herbs, characteristic of nutrient-rich disturbed conditions such as dung-hills etc. Most abundant are the Chenopodiaceae (Chenopodium album, C.rubrum/glaucum, C.ficifolium, C cf. murale, C.hybridum, Atriplex patula/hastata), Urtica dioica, Urtica urens, Solanum nigrum and Rumex spp (excluding maritimus and acetosella) Some other ruderal species including Malva sylvestris-type, Conium maculatum, Aethusacynapium, Euphorbia helioscopia, Hyoscyamus niger and Arctium sp. are also present. Seeds of such species are normally abundant in urban archaeological deposits. At this site, however, there are some marked changes through time in the species composition of the ruderal flora, most notably in samples from column 406. (Table Fig). In the mid-late Saxon layers the commonest taxa are Atriplex patula/hastata, Rumex spp., Chenopodium album and Urtica dioica whereas in higher levels Solanum nigrum, Chenopodium rubrum/glaucum, Urtica urens and Chenopodium cf. murale are more abundant. The complimentary pattern of variations in frequency of nutlets of Urtica dioica (a perennial) and Urtica urens (an annual) is also notable. In layers 447, 446 and 403 U.urens declines steadily from 7.8% to 2.3% of seeds of the main ruderal species, whilst U.dioica increases its frequency from 9.2% to 21.1%. This appears to be an example of replacement over a number of years of an annual species by a perennial, following an initial disturbance and nitrate-enrichment of the soil, as discussed by Robinson (1979). The re-expansion of Urtica urens in higher layers, reaching 70.6% of the main ruderals by layer 383, seems to indicate renewed and probably more extensive soil disturbance associated presumably with the dumping of soil and domestic refuse to raise the level of the river bank. The significance of the fluctuations in frequencies of seeds of the other taxa - predominantly annuals - is less easily assessed: little information seems to be available on the particular habitat requirements of such ruderal taxa, other than they they are typically 'dung-hill' species.

A further group of ruderals - species associated with trodden ground - also show some fluctuations in frequencies but only relatively small numbers of seeds are present. The two main species in this group are Polygonum aviculare and Plantago major.

The final group of plants distinguished here consists of shrubs and trees. Species identified from macrofossils other than wood are Ilex aquifolium (holly) Rubus idaeus (raspberry), Rubus fruticosus (bramble), Prunus spinosa (sloe) Malus sylvestris

(apple), Alnus glutinosa (alder) and Corylus avellana (hazel). Some of these may not have been present locally: the fruitstones, nuts and seeds from these deposits may merely represent food-refuse or specimens brought to the site by natural processes. In some cases, however, macrofossils other than fruitstones are also present (eg. holly leaves) and it seems probable that here trees and bushes were present at the site itself.

Conclusions and prospects for future work

As has been noted in the introduction above, the work undertaken at this site was seen as a pilot study to assess the potential value of the macrofossil assemblages from waterfront deposits at Ipswich. To achieve this end fairly extensive sampling was clearly required. A minimum range of crop plants has been established and some information on local vegetation has been gained. More detailed interpretation of the human activities represented has, however, proved elusive. The problem lies principally in the nature of the contexts available for sampling: almost all are dumped layers, incorporating food refuse and other plant wastes with some sediment of fluvial origin. These deposits do not contain a completely random mixture of macrofossils: there are clear variations in frequencies of various cultivars and wild taxa between phases. Nevertheless the assemblages are sufficiently mixed to present considerable problems of interpretation. Experience gained at both this site and Whitefriars Street, Norwich indicates that continued extensive sampling of such deposits is unlikely to be profitable, and that at future waterfront excavations sampling needs to be concentrated much more specifically on contexts whose function or origin is clear. This approach will provide an opportunity to attempt a more detailed reconstruction of the plant economy of Saxon and medieval Ipswich.

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Content	447	489 (30-40cm)	487 (10-20cm)	447	446	403	402	399	383
Column sample No.	490	490	490	406	406	406	406	406	406
Date		Mid- to Late-Saxon						Late Saxon	
Pteridium aquilinum (L) Kuhn (pinnmles)	+	-	-	+	-	+	+	+	+
Ranunculus acris/repens-type	2	-	5	8	7	10	6	6	2
Ranunculus flammula L.	1	-	-	-	12	18	-	3	-
Ranunculus sceleratus L.	2	1	-	28	-	-	3	8	3
Ranunculus subg. Batrachium	-	-	-	6	-	-	-	1	-
Thalictrum flavum L.	-	-	-	1	-	-	1	-	-
Papaver rhoeas L.	-	-	-	cf.1	-	-	1	1	-
Papaver argemone L.	-	-	1	1	-	-	2	2	-
Papaver somniferum L.	-	-	-	-	-	-	-	1	1
? Papaveraceae indet.	-	-	-	38	-	-	-	-	-
Brassica sp.	-	-	-	-	12	13	5	1fr.	6
Raphanus raphanistrum L. (siliqua frags)	-	-	-	-	-	1	1fr.	1	1
Thlaspi arvense L.	-	-	-	-	-	-	-	-	-
Cruciferae indet.	-	-	-	-	-	-	-	2	-
Reseda luteola L.	-	-	-	-	-	2	11	3	-
Hypericum sp.	-	-	-	1	-	-	-	-	-
Silene alba (Miller) Krause	-	-	-	-	1	-	-	-	-
Silene cf. maritima With	-	-	-	-	-	-	-	-	-
Lychnis flos-cuculi L.	-	-	-	-	1	-	-	1	-
Agrostemma githago L.	-	-	-	-	-	frags	5	4+fr.	2+fr.
Stellaria media-type	-	-	-	7	2	5	11	11	2
Stellaria graminea L.	-	-	-	-	-	5	1	1	-
Arenaria serpyllifolia L.	-	-	1	-	-	-	-	-	-
Spergula arvensis L.	1	-	-	2	12	27	1	1	4
Scleranthus cf. annuus L.	-	-	-	-	-	-	1	1	-
Spergularia sp.	-	-	-	-	-	-	-	-	-

381	257	250 10-20cm	226 10-15cm	162
406	262	262 11th/12thc	262 12th/13thc	- 13thc
-	+	+	+	+
1	2	-	4	3
2	2	1	-	1
-	9	2	7	-
1	-	-	1	-
-	-	-	-	-
-	1	-	-	1
2	-	-	-	2
-	-	2	-	-
-	-	-	-	-
-	2	4+fr	1	4
-	l+fr	lfr	1	lfr
1	-	lfr	-	-
1	1	-	-	-
-	2	1	-	-
1	-	-	-	-
-	-	-	-	-
-	-	3	-	-
-	-	-	-	-
1ch	3+fr	9fr	fr	1
2	7	14	3	-
2	2	-	-	-
-	-	-	-	-
2	-	1	1	4
-	1	-	1	-
-	-	-	1	-

Caryophyllaceae indet.	-	-	-	-	3	3	-	5	-
Montia fontana L. ssp. chondrosperma	-	-	lfr.	2	-	-	-	-	-
Chenopodium album L.	39	3	4	21	32	37	58	26	26
Chenopodium rubrum/glaucum	30	-	2	1	1	1	411	370	25
Chenopodium ficifolium Sm.	1	-	-	-	-	-	1	-	2
Chenopodium cf. murale L.	76	5	8	2	1	5	8	89	77
Chenopodium hybridum L.	-	-	-	-	-	-	-	-	-
Atriplex patula/hastata	14	1	-	23	11	8	33	19	6
Suaeda maritima (L) Dumort	-	-	-	-	-	1	-	-	-
Chenopodiceae indet.	6	2	2	8	9	10	28	30	28
Malva sylvestris-type	-	-	-	6	5	1	-	4	9
Linum usitatissimum L. (seeds)	-	-	-	4	-	-	1	1	1
Linum usitatissimum L. (capsul frags)	-	-	-	-	-	-	+	+	-
Linum catharticum L.	-	-	-	1	-	-	1	2	-
Ilex aquifolium L (fruitstone)	-	-	-	1	-	-	-	-	-
Ilex aquifolium L. (leaf frags)	-	-	-	-	-	-	+	+	-
Vicia faba L. var minor (charred)	1	-	-	-	-	-	-	-	-
Pisum sativum L. (charred cotyledon)	-	-	-	-	-	-	-	1	-
Leguminosae indet.	-	-	-	-	2	-	-	-	-
Filipendula ulmaria (L) Maxim	1	-	-	-	6	3	2	3	-
Rubus idaeus L.	-	-	-	-	-	-	-	1	-
Rubus fruticosus agg.	2	-	-	5	1	-	19	25	25
Rubus sp.	-	-	-	-	-	1	-	-	-
Rubus sp. ? (thorn)	-	-	-	-	-	-	+	-	-
Potentilla cf. re.tans L.	-	-	-	-	-	1	-	-	-
Potentilla sp.	-	-	1	-	1	1	3	-	-
Fragaria vesca L.	-	-	-	-	-	-	2	-	3
Agrimonia cf. eupatoria L.	-	-	-	-	-	-	1	-	-
Aphanes arvensis/microcarpa	-	-	-	3	8	5	10	-	-
Prunus spinosa L (fruitstone)	1	-	-	cf.1	-	cf.1	2	l+fr.	2
Prunus spinosa L ? (thorn)	-	-	-	-	-	-	+	-	-

-	-	-	1	1
-	-	-	-	-
40	19	54	45	21
27	15	5	47	1
-	-	-	-	-
244	2	25	6	1
-	-	-	1	-
6	26	32	40	5
-	1	13	2	-
67	7	9	22	7
5	1	3	4	-
-	2fr	7	-	6
-	-	+	+	.
-	-	-	-	-
-	-	-	-	-
-	-	+	+	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	1	-	-	-
-	1	-	-	-
21	12	23	19	2
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	1	-	-
-	-	-	-	-
2	-	5	-	-
1	2	-	2	-
-	-	+	-	-

Prunus domestica L. ssp domestica	-	-	-	-	-	-	-	-	-
Prunus cf. avium L.	-	-	-	-	-	-	-	-	-
Prunus sp.	1	-	-	-	-	-	-	-	-
Malus sylvestris Miller	-	-	-	-	-	-	2	2	3
Rosaceae indet. (thorns)	-	-	-	-	+	-	-	+	-
Epilobium hirsutum -type	-	-	-	1	2	1	-	-	-
Torilis sp.	-	-	-	-	-	-	-	3	-
Conium maculatum L.	-	-	-	-	-	-	-	1	-
Apium graveolens L.	cf.1	-	-	88	-	3	5	6	cf.1
cf. Oenanthe sp.	-	-	-	-	-	1	-	-	-
Oenanthe fistulosa L.	-	1	-	-	-	-	-	-	-
Aethusa cynapium L.	-	-	-	-	-	1	-	-	-
Daucus carota L.	-	-	-	-	-	1	-	-	-
Anethum graveolens L.	-	-	-	-	-	-	1	-	-

-	-	2	-	-	
-	-	3	-	-	
-	-	-	1	-	
-	-	-	-	-	
-	-	-	-	+	
-	-	-	-	-	
-	2	1	1	-	
-	-	-	-	-	
-	cf3	1	-	-	
-	-	-	-	-	
-	-	-	1	-	
-	-	-	-	-	
-	-	-	-	-	
-	-	-	-	-	

Context	447 (30-40cm)	489 (10-20cm)	487	447	446	403
Column sample No.	490	490	490	406	406	406
Date		Mid - to Late - Saxon				
Umbelliferae indet.	-	-	-	1	1	2
Euphorbia helioscopia L.	-	-	-	-	-	_
Polygonum aviculare agg.	7	-	1	11	10	26
Polygonum cf. lapathifolium L.	4	-	-	1	3+fr	5
Polygonum hydropiper L.	-	-	-	-	2	-
Polygonum convolvulus L.	2	1	1	lfr	5	13
Polygonum sp.	-	-	-	-	2	3
Rumex acetosella agg.	3	1	4	5	11	13
Rumex maritimus L.(with perianths)	-	-	-	-	-	-
Rumex sp.	4	2	1	52	40	39
Rumex sp. (damaged perianths)	1	-	-	4	3	1
Polygonaceae indet.	1	-	-	-	-	-
Urtica urens L.	3	-	2	11	7	3
Urtica dioica L.	3	-	3	13	14	28
Humulus lupulus L.	-	-	-	-	3	9
Cannabis sativa L.	-	-	-	-	-	-
Alnus glutinosa (L) Gaertn	-	-	-	1	-	1
Corylus avellana L. (nutshell frags)	+	+	+	+	+	+
Calluna vulgaris (L) Hull(capsules and/or leaves)	-	-	-	-	-	-
Calluna vulgaris (L) Hull (seeds)	-	-	-	-	-	-
Anagallis arvenis-type	-	-	-	3	2	-
Hyoscyamus niger L.	1	-	-	lfr	-	-
Solanum nigrum L.	46	2	2	6	-	1
Pedicularis palustris L.	-	-	-	-	-	1
Euphrasia/Odontites sp.	-	-	-	-	-	1
Mentha arvensis/aquatica	-	-	-	5	-	3
Lycopus europaeus L.	-	1	-	-	-	-
Stachys sp.	-	-	-	-	-	-
Prunella vulgaris L.	-	-	-	1	5	7
Ballota nigra L.	-	-	-	1	5	3
Lamium cf. amplexicaule L.	-	-	-	-	-	-
Galeopsis tetrahit/speciosa	-	-	-	-	1	-
Teucrium sp.	-	-	-	-	-	1
Labiatae indet.	-	-	-	-	-	1
Plantogo major L.	-	-	-	-	1	3
Plantogo cf. lanceolata L.	-	-	-	-	1	-
Sambucus nigra L.	-	-	-	-	3	7
cf. Valerianella sp.	-	1fr	-	-	-	-

402	399	383	381	257	250	226	162
					10-20cm	10-15crn	
406	406	406	406	262	262	262	-
		Late Saxon			11/12th	C12/13thC	13thC
3	-	1	1	-	-	-	-
-	-	-	-	-	-	1	-
5	13	17	18	22	8	5	1
1	1	4	-	2	1	4	4
-	-	-	-	-	-	-	
6	2	-	2+fr	2	1	1	1
-	-	4	3	--	1	2	
9	8	1	6	3	10	2	-
-	6	-	-	-	-	-	-
8	8	11	11	6	7	4	10
-	2	-	1	1	-	-	2
-	-	-	-	-	-	-	-
43	87	439	162	2	12	26	23
24	19	6	26	15	12	8	-
3	3	-	-	6	-	-	-
-	-	-	-	-	-	14	2
-	-	-	-	-	-	-	-
+	+	+	+	+	+	+	-
-	-	-	-	-	-	2	9+l vs
-	-	-	-	-	-	-	4
3	1	-	-	-	-	2	-
-	1	-	-	1	1	8	-
179	3	2	8	cf .1	6	9	6
-	-	-	-	-	-	-	-
5	-	-	6	-	-	2	-
-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-
4	-	5	-	2	-	1	cf.1
-	-	1	3	10	3	7	-
-	-	7	21	-	-	-	-
-	-	-	-	2	1	-	1
-	-	1	-	-	-	-	
-	5	1	-	-	2	-	1
-	-	-	-	-	1	-	-
-	-	-	-	-	-	-	-
4	6	4	6	11	14	5	1
-	-	-	-	-	-	-	-

Eupatorium cannabinum L.	-	-	-	-	-	1
Anthemis cotula L.	7	-	-	3+c.f.2	6	5
Chrysanthemum segetum L.	-	-	-	-	-	-
Arctium sp.	-	-	-	-	-	-
Cirsium sp.	-	-	-	-	-	1
Carduus sp.	-	-	-	-	-	-
Cirsium/Carduus sp.	-	-	-	-	3	-
Onopordum acanthium L.	-	-	-	-	-	-
Centaurea cyanus L.	-	-	-	-	-	-
Centaura sp. (frags)	-	-	-	-	-	2
Lapsana communis L.	-	-	-	-	5	7
Leontodon sp.	-	-	-	-	-	1
Sonchus arvensis L.	-	-	-	1	-	-
Sonchus oleraceus L.	1	-	-	-	-	-
Sonchus asper (L) Hill	1	-	-	3	2	5
Compositae indet.	lfr	-	-	-	2	1
Alisrma plantago-aquatica L.	1	-	-	-	1	1
Alismataceae indet.	-	-	-	-	-	-
Triglochin maritima L.	-	-	-	4	2	4
Ru.pia sp.	-	-	-	-	-	-
Zannichellia palustris L.	-	-	-	10	-	-
Juncus spp.	+	-	+	+	+	+
Typha sp.	-	-	2	2	-	-
Eleocharis sp.	7	2	6	8	25	24
Scripus/Schoenoplectus	6	-	1	10	4	1
Isolepis setacea (L) R.Br.	-	-	-	-	-	1
Carex sp.	7	-	4	11	20	14
Cyperaceae indet.	-	-	-	-	-	-
Phragmites australis (Cav)Steudel (culm nodes)	-	-	-	-	-	-
Gramineae indet.	-	-	-	1	11	7
Cereal indet. (culm nodes)	-	-	-	-	3	+
Cereal indet. (charred caryopses)	-	-	-	-	-	1

-	-	c f . 2	-	-	-	-	-
11	31	18	3	16	37	15	85
-	-	-	-	-	-	-	7
-	1	-	-	-	-	-	-
-	1	-	-	-	-	1	-
1	-	-	-	-	1	3	-
-	-	-	-	4	-	-	-
-	-	-	-	1	-	-	-
-	-	5	-	-	10	-	3
-	lfr	6f r	1	3	-	lfr	-
1	2	7	4	3	7	-	lfr
-	-	-	-	-	1	-	-
5	'	-	-	1	-	-	1
6	1	-	-	1	-	-	-
2	-	-	-	-	-	1	-
2	1	1	1	1	-	1	-
-	-	-	-	-	-	2	-
-	-	-	1	-	-	-	-
-	1	3	-	3	1	-	-
-	1	-	-	1	-	-	-
-	-	-	-	-	2	-	
+	+	+	+	-	4	-	-
12	6	3	9	11	1	6	3
1	-	1	2	-	1	1	-
-	-	-	1	-	1	-	-
11	14	-	14	7	2	4	-
1	1	1	-	-	-	-	2
-	4	4	-	-	-	-	-
lch+2	6	lch+3	-	11	lch+1	lch+1	20
-	-	-	-	3	-	-	18
-	3	2	3	-	1	2	-

Context	447	489 (30-40cm)	487 (10-20cm)	447	446
Column sample No.	490	490	490	406	406
Date	Mid - to Late - Saxon				
Secale cereale L (charred caryopses)	-	-	-	-	-
Triticum aestivum/compactum (charred caryopses)	-	-	-	-	-
Hordeum sp. (charred caryopses)	-	-	-	-	-
Avena sp.	-	-	-	-	-
Secale cereale L (rachis nodes)	-	-	-	-	8
Secale/Triticum rachis nodes)	-	-	-	-	-
Leaf fragments	-	-	-	-	-
Buds	5	-	-	3	1
Indeterminate seeds, fruits etc.	9	-	9	21	25
Sample weight (kg)	1	1	1	2	1

Table: Plant macrofossils extracted in the laboratory

Taxa are represented by fruits or seeds unless otherwise indicated

403	402	399	383	381	257	250	226	162
						10-20cm	10-15cm	
406	406	406	406	406	262	262	262	-
	Late Saxon					11/12thC	12/13thC	13thC
-	cf.1	1	1	1	3	-	-	-
1	2	3	-	-	1	-	1	1
-	1	-	-	1	-	1	-	-
-	-	-	-	-	-	-	_	1
5	5	3	10	-	lch	-	-	25
-	-	-	-	-	-	-	-	3
-	+	-	-	-	-	+	-	-
2	-	-	-	-	2	2	1	-
27	27	32	10	29	28	6	13	18
1	1	1	1	1	2	1	1	1

Table : Remains of crop plants and edible wild species recovered by bulk sieving.

Flots and residues from bulk sieving were dried, and the fraction> 2mm was sorted. This produced, in addition to the cultivars listed here, some stem and leaf fragments (e.g. of heather, bracken and holly), buds, thorns of Crataegus/Prunus spinosa type, and some of the larger weed seeds (eg. Agrostemma githago, Raphanus raphanistrum). These have been retained, but are not listed in this Table and will not be considered further.

Table (Sheet 1). Mid-Late Saxon.

Column no.	490	490	490	490	490	490	406	406	
Context no.	447	489	489	489	487	445	403	403	Presence
Depth (cm)	(50-60)	(40-50)	(30-40)	(20-30)	(10-20)	(0-10)	(80-90)	(70-80)	
Triticum aestivum (caryopses)	-	-	-	-	-	-	1	-	1
Triticum aestivum (rachis fragments)	-	-	-	-	-	-	-	-	-
Hordeum sp. (caryopses)	-	-	-	-	-	-	-	1	1
Secale cereale (caryopses)	-	-	-	-	-	-	1	-	1
Avena sp. (caryopses)	-	-	-	-	-	-	-	-	-
Tier-ia sativa (florets)	-	-	-	-	-	-	-	-	-
Indeterminate cereal caryopses	-	-	-	-	-	-	-	-	-
Indeterminate cereal culm nodes	-	-	-	-	-	-	-	1	1
Vicia faba var. minor (seeds)	-	-	-	-	-	-	-	-	-
cf Pisum sativumTTEids/cotyledons)	-	-	-	-	-	-	-	-	-
Leguminosae indet. (seeds/cotyledons)	-	-	-	-	-	-	-	-	-
Prunus domestica subsp. domestica	-	-	-	-	-	-	-	1	1
Prunus domestica subsp. insititia	-	-	-	-	-	-	1	1	2
Prunus spinosa	4	4	-	-	-	-	-	1	3
Prunus avium-type	-	-	-	-	-	-	-	-	-
Malus sylvestris	-	-	-	-	-	-	-	-	-
Crataegus monogyna fruitstones,	1	-	-	-	-	-	-	-	1
Rubus fruticosus seeds etc.	-	2	-	-	-	-	1	1	3
Mespilus germanica	-	-	-	-	-	-	-	-	-
Sambucus nigra	-	-	-	-	-	-	-	-	-
Vitis vinifera	-	-	-	-	-	-	-	-	-
Corylus avellana nutshell fragments	++	++	+	+	+	+	++	+	8
Juglans regia	-	-	-	-	-	-	-	-	-
Linum usitatissimum (seeds)	-	-	-	-	-	-	-	-	-
Cannabis sativa (fruits)	-	-	-	-	-	-	1	1	2
Humulus lupulus(fruits)	-	-	-	-	-	-	1	-	1

Table (Sheet 2). Late Saxon.

Column no.	406	406	406	406	406	406	406	262	262	262	262	
Context no.	402	399	383	383	381	380	380	259	255	255	251	Presence
Depth (cm)	(60-70)	(50-60)	(40-50)	(30-40)	(20-30)	(10-20)	(0-10)	(-)	(0-10)	(10-15)	(0-10)	
Triticum aestivum (caryopses)	-	-	1	-	-	1	1	1	-	-	-	4
Triticum aestivum (rachis fragments)	-	-	-	-	-	-	-	-	-	-	-	-
Hordeum sp. (caryopses)	1	-	2	2	3	-	3	-	-	-	-	5
Secale cereale (caryopses)	3	2	1	1	1	1	-	-	-	-	-	6
Avena sp. (caryopses)	-	1	6	2	1	-	-	-	-	-	2	5
Tiiet-Ta sativa (florets)	-	-	-	-	-	-	-	-	-	-	-	-
MiTerminate cereal caryopses	-	1	-	-	1	1	3	-	-	-	1	5
Indeterminate cereal culm nodes	-	-	-	-	-	-	-	-	-	-	-	-
Vicia faba var. minor (seeds)	-	1	-	-	-	-	-	-	-	-	-	1
cf Pisum sativumFiids/cotyledons)	-	-	-	lco	-	-	-	-	-	-	-	1
Leguminosae indet. (seeds/cotyledons)	-	-	-	-	-	-	-	-	-	-	-	-
Prunus domestica subsp. domestics	-	2	2	2	8+fr.	-	lfr.	1	lfr.	-	6+fr.	8
Prunus domestica subsp. insititia	-	2	-	-	-	-	-	-	-	-	-	1
Prunus spinosa	9	14	8	19	2	-	-	-	2	1	19	8
Prunus avium-type Fruit-	-	-	-	-	-	-	-	-	-	-	7	1
Malus sylvestris stones,	1	4	-	9	-	-	1	3	1	-	-	6
Crataegus monogyna seeds	-	-	-	-	-	-	-	-	-	-	-	-
Rubus fruticosus etc.	12	7	6	15	1	-	-	-	4	1	9	8
Mespilus germanica	-	-	-	-	-	-	-	-	-	-	-	-
Sambucus nigra	1	-	-	-	-	-	-	-	-	-	3	2
Vitis vinifera	-	-	-	-	-	-	-	-	-	-	-	-
Corylus avellana nutshell	+	++	++	++	+	+	+	+	++	+	++	11
Juglans regia fragments	-	-	-	-	-	-	-	-	-	-	-	-
Linum usitatissimum (seeds)	-	-	-	-	-	-	-	-	-	-	-	-
Cannabis sativa (fruits)	-	-	-	2	-	-	-	-	-	-	1	2
Humulus lupulus (fruits)	-	2	-	-	-	-	-	-	-	-	-	1

Table (Sheet 3). 11th/ early 12th century

(d)

Column no.	262	262	2 62	262	
Context no.	250	250	248	248	Presence
Depth (cm)	(10-20)	(0-10)	(10-20)	(0-10)	
Triticum aestivum (caryopses)	1	-	-	-	1
Triticum aestivum (rachis fragments)	-	-	-	-	-
Hordeum sp. (caryopses)	-	1	1	-	2
Secale cereale (caryopses)	2	1	-	2	3
Avena sp. (caryopses)	2	2	-	3	3
Avena sativa (florets)	-	-	-	-	-
Indeterminate cereal caryopses	1	-	-	-	1
Indeterminate cereal culm nodes	-	-	-	-	-
Vicia faba var. minor (seeds)	-	-	-	-	-
cf Pisum sativumTias/cotyledons)	-	-	-	-	-
Leguminosae indet. (seeds/cotyledons)	1	-	-	-	1
Prunus domestica subsp. domestica'	2+fr.	6	2	1	4
Prunus domestica subsp. insititia	5	2	2	1	4
Prunus spinosa	25	46	18	22	4
Prunus avium-type	4	6	5	2	4
Malus sylvestris	5	6	7	-	3
Crataegus monogyna	-	-	-	-	-
Rubus fruticosus	46	23	62	13	4
Mespilus germanica	-	-	-	-	-
Sambucus nigra	2	1	3	-	3
Vitis vinifera	-	-	-	-	-
Corylus avellana	++	++	+	+	4
Nutshell Fragments					
Juglans regia	-	-	-	-	-
Linum usitatissimum (seeds)	1	-	3	-	2
Cannabis sativa (fruits)	1	1	13	1+18fr.	4
Humulus lupulus (fruits)	-	-	-	-	-

fruitstones, seeds etc.

Table (Sheet 4). 12th/early 13th century.

(e)

Column no.	262	262	262	262	
Context no.	247	247	226	226	Presence
Depth (cm)	(0-10)	(10-20)	(0-10)	(10-15)	
Triticum aestivum (caryopses)	2	3	-	-	2
Triticum aestivum (rachis fragments)	-	-	-	-	-
Hordeum sp. (caryopses)	1	-	1	-	2
Se-ca e cereale(caryopses)	-	1	1	-	2
Avena sp. (caryopses)	1	-	3	-	2
Avena sativa (florets)	-	-	-	-	-
Indeterminate cereal caryopses	2	2	1	-	3
Indeterminate cereal culm nodes	-	-	-	-	-
Vicia faba var. minor (seeds)	-	-	-	-	-
cf Pisum sativum (seeds/cotyledons)	-	-	-	-	-
Leguminosae indet. (seeds/cotyledons)	-	-	-	-	-
Prunus domestica subsp. domestica-	1	-	fr.	fr.	3
Prunus domestica subsp. insititia	-	2	-	1	2
Prunus spinosa	3	7	4	7	4
Prunus avium-type	-	-	fr.	1	2
Malus sylvestris	-	-	2	-	1
Crataegus monogyna ,fruitstones,	-	-	-	-	-
Rubus fruticosus seeds etc.	9	3	13	10	4
Mespilus germanica	-	-	-	-	-
Sambucus nigra	-	1	-	1	2
Vitis vinifera	-	-	-	-	-
Corylus avellana nutshell fragunts	-	+	+	+	3
Juglans regia	-	-	?(abraded)	-	1
Linum usitatissimum (seeds)	-	1	-	-	1
Cannabis sativa (fruits)	8fr.	13fr.	16fr.	26fr.	4
Humulus lupulus (fruits)	1	-	1	-	2

Table (Sheet 5). 13th century.

(f)

Column no.	225	225	225	225	225	225	214	214	214	214	214	214	214	214
Context no.	153	153	153	153	153	153	177/192	177	176	176	176	176	176	174
Depth (cm)	(50-60)	(40-50)	(30-40)	(20-30)	(10-20)	(0-10)	(70-80)	(60-70)	(50-60)	(40-50)	(30-40)	(20-30)	(10-20)	(0-10)
Triticum aestivum (caryopses)	1	3	1	-	4	-	-	1	-	3	1	-	2	79
Triticum aestivum (rachis fragments)	-	-	-	-	1	-	-	-	-	1	-	-	-	1
Hordeum sp. (caryopses)	1	-	5	-	6	-	1	-	1	1	1	4	-	8
Seca e cereale (caryopses)	2	3	3	2	1	-	-	-	-	3	2	2	3	3
Avena sp. (caryopses)	1	3	8	11	36	-	1	3	6	4	5	3	1	60
IN.FeFla sativa (florets)	-	1	-	-	2	1	-	-	-	1	1	-	-	4
Indeterminate cereal caryopses	2	1	8	9	7	-	-	1	1	2	-	1	1	28
Indeterminate cereal culm nodes	-	1	-	-	2	-	-	-	-	1	-	-	2	5
Vicia faba var. minor (seeds)	-	-	-	-	c.f.1	-	-	-	-	-	-	-	-	-
cf Pisum sativumTis/cotyledons)	-	-	-	-	-	-	-	1	-	-	2	-	-	4
Leguminosae indet. (seeds/cotyledons)	1	-	1	-	-	-	-	-	-	-	-	2	2	7
Prunus domestica subsp. Domestica fr.	-	-	-	1	-	1	-	-	-	-	1	-	-	
Prunus domestica subsp. insititia	-	-	-	-	-	-	-	-	-	1	-	lfr.	-	-
Prunus spinosa	-	2	-	-	1	1	1	-	1	-	-	-	1	-
Prunus avium-type fruit-	-	1	-	3	2	1	-	fr.	-	1	-	1	2	-
Malus sylvestris stones,	-	-	-	-	-	-	1	-	1	-	-	-	-	-
Crataegus monogyna seeds	-	-	_	-	-	-	-	-	-	-	-	-	-	- -
Rubus fruticosus etc.	2	-	-	-	-	-	1	1	1	3	3	-	2	-
Mespilus germanica	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Sambucus nigra	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Vitis vinifera	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Corylus avellana nutshell frag	-	+	+	+	+	+	+	+	-	+	+	++	+	+
Juglans regia	-	-	+	+	-	-	-	-	-	-	+	+	+	+
Linum usitatissimum (seeds)	-	-	-	-	-	-	3	-	1	-	-	-	-	-
Cannabis sativa (fruits)	3	1	2	1	-	-	5	1	-	4	2	4	1	-
Humulus lupu us (fruits)	-	-	-	-	-	-	-	-	-	-	-	-	-	-

13 Bridge Street, Ipswich (IAS 6202) Wood.

Large quantities of wood and timber were recovered during excavation, both in situ as components of revetments and other structures, and also as isolated pieces from dismantled or collapsed revetments. Sections were cut from the principle pieces of wood and these were retained for examination. The wood was initially sorted into oak and non-oak, and oak wood suitable for dendrochronology was separated. Of the remaining material only wood from well-defined structures has been identified. This is listed in Table 3. The structures will be discussed in turn, before considering some aspects of the overall significance of the wood from the site.

The structures.

(1) Mid-Late Saxon structures (404, 386, 448, 405/439).
Characteristics of the wood from these structures are summarised in Table 1. The most obvious feature is the absence of large timber and the extensive use of untrimmed stakes, posts and horizontals. In order of abundance this untrimmed wood comprises hazel, oak, holly, ash, birch, alder, sloe (?) and elm. Centrally split posts of hazel and sloe (?) were also used. The only squared pieces are of oak (0386 0420) and birch (0404 0434)*, and these are not cut from large timber.

(2) Late Saxon structures (258/275, 384, 500)
Compared to the Mid-Late Saxon revetments, the Late Saxon structures show a markedly increased use of squared beams, planks and stakes, mainly of oak and ash (Table 2). Some of these are cut from somewhat more substantial stems up to about 30cm. in diameter. Untrimmed wood cut from stems less than 10cm. in diameter continued to form a substantial component of the revetments, and this consists, in order of abundance, of ash, hazel, oak, hawthorn-group, birch, alder, willow, sloe (?) and holly.

254 11th/early 12th century revetment.
This revetment consisted of mainly large thick vertically-set planks. The three samples examined were of oak, radially split or sawn from

Footnote. *Omitted from Table. Size not determinable.
Also 0404 0433: sample mislaid.

Table 1: Wood identified from Mid-Late Saxon structures

Fragmentary samples whose dimensions could not be determined are omit:ed. Sizes refer to the original stem from which the wood recovered on site had been cut. Taxa are listed in order of abundance.

		Round (or part-trimmed) stakes, posts, horizontals etc.		Squared & split beams, posts etc.	
		>10cm.	<10cm.	>10cm.	<10cm.
Corylus sp.	(hazel)	1	10	-	1
Quercus sp.	(oak)	4	6	1	-
Ilex sp.	(holly)	-	5	-	-
Fraxinus sp.	(ash)	1	3	-	-
Betula sp.	(birch)	-	3	-	-
Alnus sp.	(alder)	-	1	-	-
Prunus sp.	(sloe etc.)	-	1	1	-
Ulmus sp.	(elm)	-	1	-	-
Other diffuse porous		-	2	-	-

Table 2: Wood identified from Late Saxon structures (384, 500, 258/275)

This table includes a total of 93 samples (some were deleted since they were very fragmentary or consisted only of bark). Sizes refer to the original stem from which the wood recovered on site had been cut. Taxa are listed in order of abundance.

	Round (or part-trimmed) stakes, posts, horizontals etc.		Squared beams, planks, stakes etc.	
	>10cm.	<10cm.	>10cm.	<10cm.
Quercus sp. (oak)	2	10	11	3
Fraxinus sp. (ash)	2	12	3	-
Corylus sp. (hazel)	-	11	1	1
Crataegus-group (hawthorn group)	-	7	-	-
Betula sp. (birch)	1	4	-	-
Alnus sp. (alder)	-	2	-	
Salix sp. (willow/sallow)	-	2	-	-
Populus sp. (poplar)	-	-	1	-
Salix/Populus sp. (willow/poplar)	-	1	-	-
Prunus sp. (sloe etc.)	1	1	-	-
Ilex sp. (holly)	-	1	-	-
Other diffuse porous	1	12	-	1

large timber (256, 268, 269). In addition several vertical and slanting posts were sampled. 348 was a segment of oak; 343 a trimmed post of oak and 346 an untrimmed post of birch (Betula sp.).

204 12th/13th century waterfront structure.
204 comprised a horizontal beam of oak (Quercus sp.) (labelled 204), centrally split from a timber of about 18cm. diameter, associated with three untrimmed ash (Fraxinus sp.) stakes, about 6cm. in diameter, (206, 207, 209) and a further split beam of oak (208) from a timber of about 15cm. diameter.

499 12th/13th century waterfront structure.
The timbers sampled from this structure comprised an untrimmed oak (Quercus sp.) post, about 21cm. in diameter, (341): an untrimmed post of ash (Fraxinus sp.), 9.5cm. in diameter (342); and two roughly-squared posts of oak, 201 and 340. 201 was crudely trimmed to a point.

175 Collapsed 13th century quay.
This structure consisted mainly of slanting remnants of planks. Samples of nos. 178-189, 193, 194, 196, 229-239 and 242-245 were taken. These are all of oak (Quercus sp.) and had all been sawn or split radially from large timbers. They vary in size from about 4.5 x lcm. to 21 x 3cm. A few show a wedge-shaped cross-section but the majority have been trimmed to a more rectangular shape. These planks had been pegged to a horizontal pole (197), and plank 179 includes a 2cm. diameter peg-hole. 197 was of alder (Alnus sp.). It had been split centrally from a stem of about 10cm. diameter and very roughly trimmed to an approximately rectangular cross-section.*

498 14th/15th century waterfront structure.
The wood from this structure was rather poorly preserved with signs of rotting, cracking and deformation. The majority of the samples are of oak (Quercus sp.), from horizontal beams and vertical posts, either untrimmed, halved or quartered. Even allowing for deformation, these do not seem to be carefully worked. In addition there is a horizontal untrimmed beam possibly of the Crataegus-group, 134; a vertical post of holly (Ilex sp.), 215; and a horizontal plank of pine (Pinus sp.), 142. This is the only conifer wood identified from a structure at the site and has been plain-sawn (ie. sawn tangentially).

* Planks 0236 and 0237 had masses of fibrous material adhering to their surfaces. This has the appearance of caulking and could perhaps indicate that re-use of boat strakes in the waterfront.

170 14th/15th century timber revetment for wall 169.
The samples are from a horizontal beam, squared from a small timber of alder (Alnus sp.), about 23cm. in diameter (223); and four thick radially-split or sawn oak planks (218 -221) .*

373/379 16th/17th century well.
This well was constructed with conspicuously large timbers. The horizontal planks lining the shaft were of willow (Salix sp.) (468, 471, 472, 474, 476, 483, 485). These are up to 28 x 5cm. in cross-sectional dimensions, and have been plain-sawn. The pieces of well-collar (463, 465, 470) are also of willow. Small squared upright posts of oak (480, 484) were also present, together with large untrimmed stakes of ash (Fraxinus sp.) and the Crataegus-group (377, 378).

Discussion.

Figs 1 and 2 summarise the overall composition of the wood samples from Bridge Street. These diagrams illustrate one marked difference between wood from pre- and post-11th century structures: in the earlier period a relatively wide range of woods was used, whereas subsequently oak was by far the most important wood employed. This is largely a consequence of a change in the type of wood in use: the earlier structures included a high proportion of untrimmed poles and stakes under about 10cm. in diameter and probably produced by coppicing, but in the later medieval period plank-built revetments with squared posts and braces often cut from larger timber predominated. This shift away from 'renewable' woodland resources, probably of local origin, towards the use of timber may merely be peculiar to this site, but if repeated elsewhere in Ipswich could be related to wider changes in the economic status of the town.

It is worth considering whether the Mid-Late and Late Saxon wood can give any indication of local woodland structure and composition. It is certainly possible to distinguish a minimum range of trees which were allowed to develop stems greater than 10cm. in diameter. Amongst this larger wood oak predominates (18 samples) with ash in second place (6). There are also a few large stems of hazel (2), birch (1), poplar (1) and Prunus sp. (2). From this it appears that the main standard trees were oak and ash, though a few trees of other species also grew to some size, a pattern which conforms with the later medieval emphasis on oak and ash for timber production known from documentary sources

Footnote. *219 is also of oak, but the sample is not from a plank, as described in the list supplied).

(Rackham 1980, 145). All other wood from these pre-11th century phases consists of straight lengths of young growth, which could hardly have been produced in quantity other than by coppicing, pollarding or from suckers. Detailed ageing by ring-counting has not been attempted, although the poles and stakes of ash (a ring-porous wood whose age is quickly determinable) from Late Saxon structures are for the most part between 5 and 7cm. in diameter and show about 10-18 years growth. There are also, however, some very young ash stems about 4 years old and some extremely slow-grown wood. In order of abundance the Mid-Late and Late Saxon poles and stakes cut from stems less than 10cm. in diameter consist of hazel (21), oak (16), ash (15), hawthorn-group (i.e. hawthorn/rowan/whitebeam/pear/apple) (7), birch (7), holly (6), alder (3), willow (2), Prunus sp. (2), willow/poplar (1) and elm (1). The figures may give some crude impression of the species composition of the underwood, although it seems very likely that wood from more than one type of woodland is present, perhaps including fen alder-woods with some sallows or willows and woodland on dry sandy acid soils with birch and holly.

The increased use of oak timber in the form of squared posts, beams and planks in the later structures has already been noted, and indeed the 13th century collapsed revetment 0175 consisted almost entirely of oak planks, in all cases radially cut or split. Some woods other than oak continued in use, however: 254 included an untrimmed 10cm. diameter post of birch and untrimmed ash stakes and posts were used in 204 and 499. The planks in 175 were pegged to a horizontal beam of alder. Samples from the 14th/15th century structures were also mainly of oak.

The only coniferous softwood from a structural context at the site is a deal plank (Pinus sp.) from a 14th/15th century revetment (0498 0142), although a second plank of pine came from layer 127. Both samples have dentate ray tracheids and large single window-like crossfield pits in the ray parenchyma. They are thus of the red deal type, which includes P. sylvestris (Scots Pine) as well as Austrian and Corsican pines (Jane 1956, 305). (142 shows a relatively sharp transition from early to late wood, giving a superficial resemblance to larch). Scots pine is, of course, by far the most likely species to be represented here.

It seems quite probable that these pine samples represent imported timber. Rackham (1980, 151) considers that coniferous softwoods did not grow in England during the earlier middle ages, and notes the 13th century trade in softwood boards from the Baltic, known as Estrychbord and bord de Rygold,

and from Hamburg and Norway. Examples from a 13th century door at Lakenheath, Suffolk are ¾ inch (about 2cm.) thick, as is the plank 0142 from Bridge Street. These softwood samples raise the whole question of imported timber, for oak boards were also imported from the Baltic in the Middle Ages. There is no way of determining how much, if any, of the oak from Bridge Street is of foreign origin, but the possibility obviously has some bearing on dendrochronology at the site.

The latest structure sampled at the site was a 16th/17th century well. This was constructed mainly of Salix sp. (willow) and is the only example of the use of willow as timber at the site. Oak is a relatively minor component of this well comprising only two small squared upright posts.

References

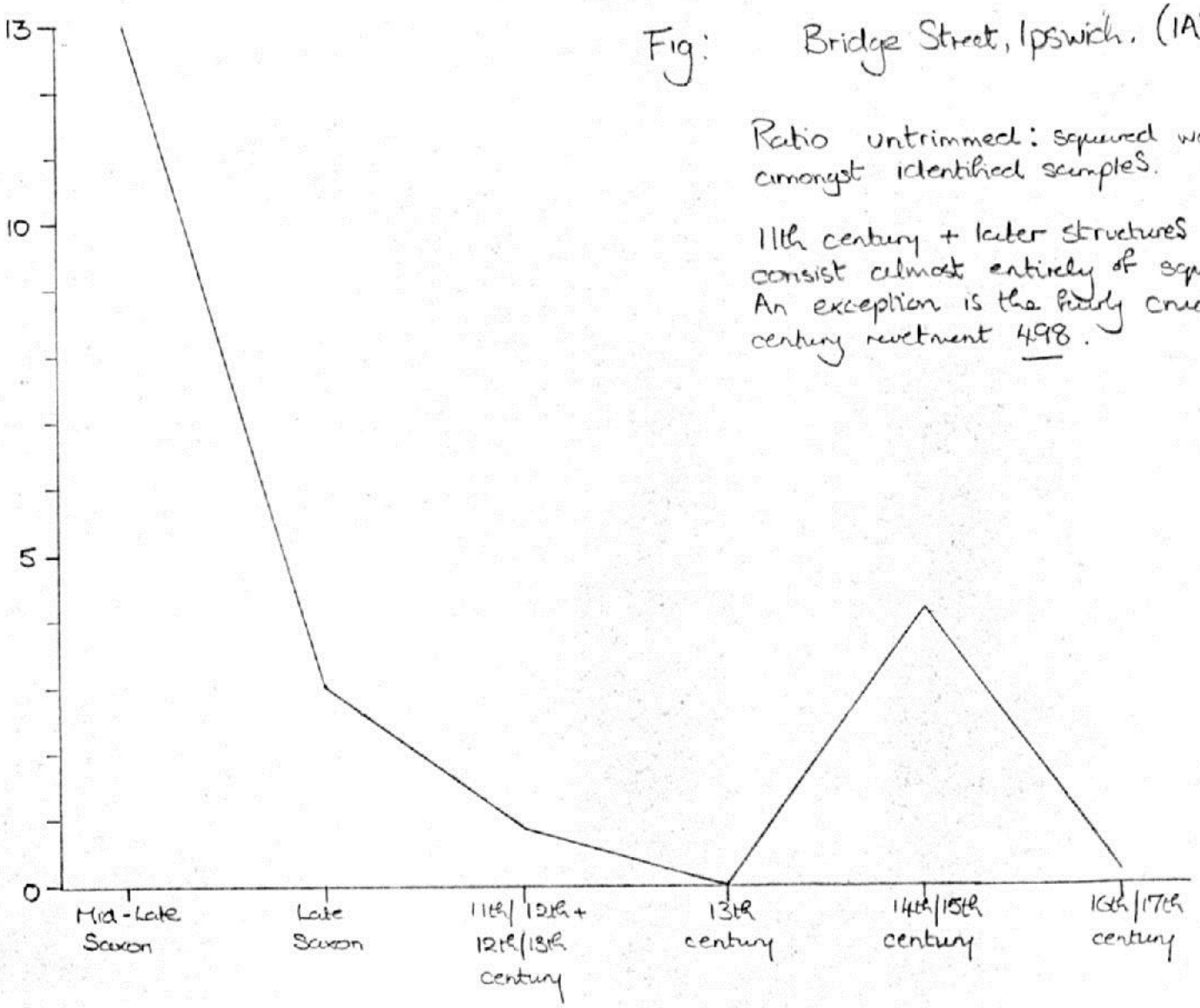
Jane, F.W. (1956) The Structure of Wood. London.

Rackham, O. (1980) Ancient woodland: Its history, vegetation and uses in England. London.

Fig: Bridge Street, Ipswich. (IAS 6202).

Ratio untrimmed : squared wood amongst identified samples.

11th century + later structures generally consist almost entirely of squared parts, planks etc. An exception is the hastily crudely-built 14th/15th century revetment 498.



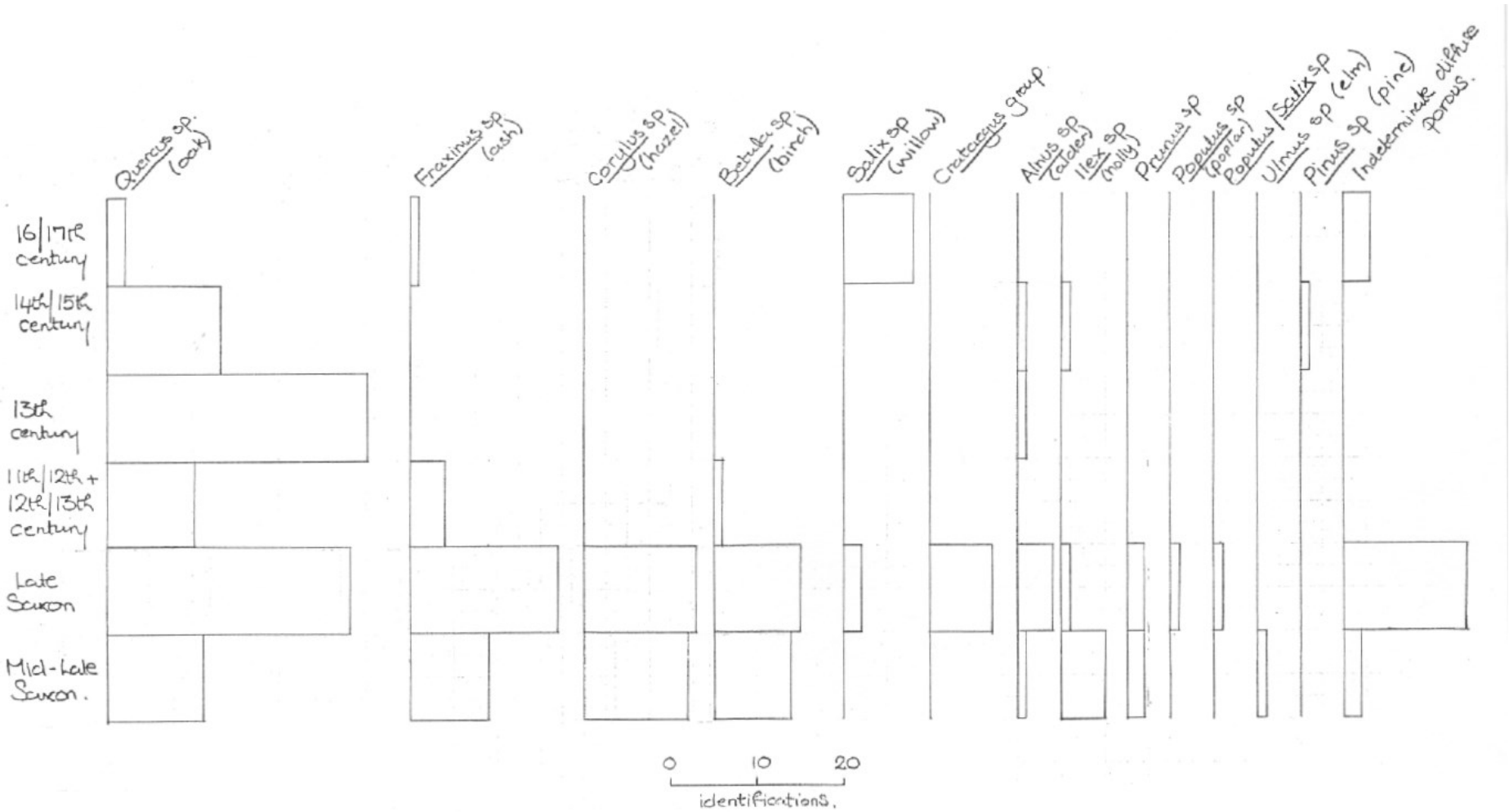


Fig Bridge Street, Ipswich. Wood identifications

Mid-Late Saxon (continued)

Structure No.	Sample No.	Description		Taxon
0405/439	0442	Round post	8.5cm.	Corylus sp.
	0443	Round post	8cm.	Ilex sp.
	0444	Round post	5.5cm.	Quercus sp.
	0449	Round post (part-trimmed)	7cm.	Corylus sp.
0405/0439	0450	Round post	9cm.	Corylus sp.
	0451	Round post (part-trimmed)	7cm.	Ilex sp.
	0452	Round post	6.5cm.	Indet. diffuse porous.
	0453	Round post	8.5cm.	Prunus sp.
	0454	Round post	8cm.	Ilex sp.
0448	0455	Round post	7.5cm.	Quercus sp.
	0456	Round post	9cm.	Alnus sp.
	0457	Round post (trimmed)	6.5cm.	Betula sp.
	0458	Round post	4.5cm.	Corylus sp.
	0461	Round horizontal	7cm.	Corylus sp.
	0462	Round post	5cm.	? Prunus sp.

Late Saxon

Structure No.	Sample No.	Description		Taxon
0384	0387	Round stake	4.5cm.	Alnus sp.
	0388	Round stake	4cm.	Alnus sp.
	0389	Round stake	3cm.	Betula sp.
	0390	Round stake	5cm.	Quercus sp.
0500	0397	Round post	4cm.	Betula sp.
	0415	Round post	5.5cm.	Fraxinus sp.
	0416	Round post	6cm.	Fraxinus sp.
	0417	Round post	5cm.	Betula sp.
	0418	Square-cut post	(16cm.)	Quercus sp.
	0419	Round post	7cm.	Salix/Populus
0258/0275	0270	Round post	5cm.	Corylus sp.
	0271	Square-cut post	(30cm.)	Quercus sp.
	0272	Round post	4.5cm.	Corylus sp.
	0273	Round post	4cm.	Crataegus
	0274	Square-cut post	(16cm.)	Fraxinus sp.
	0276	Round stake	4cm.	Corylus sp.

Table 3: List of identified wood from structures.

For each sample a brief description and cross-sectional diameter are given. The diameters of samples which do not show a complete section across the stem have been estimated where possible. These figures are given in brackets. Measurements are accurate only to the nearest 0.5cm. Frequently the sections are not even approximately circular, but more oval, and here a rough mean figure between the longer and shorter diameters is given.

Mid-Late Saxon

Structure No.	Sample No.	Description		Taxon
0386	0391	Round post	6cm.	Quercus sp.
	0392	Round post	6cm.	Quercus sp.
	0393	Round post	5cm.	Ilex sp.
	0394	Round post	6.5cm.	Betula sp.
	0395	Round post	5.5cm.	Quercus sp.
	0396	Round post	6cm.	Fraxinus sp.
	0408	Round post	7cm.	Corylus sp.
	0410	Round post	5cm.	Fraxinus sp.
	0411	Split post	-	Prunus sp.
	0413	Round post	5.5cm.	Corylus sp.
	0420	Roughly-trimmed horizontal	(10cm.)	Quercus sp.
	0421	Round post	10cm.	Quercus sp.
	0422	Round post	12cm.	Quercus sp.
	0423	Round upright	5cm.	Corylus sp.
	0424	Round post	8cm.	Betula sp.
	0425	Round post	llcm.	Fraxinus sp.
	0426	Round upright	5.5cm.	Ilex sp.
	0438	Round post	8cm.	Ulmus sp.
0404	0428	Round post frag (split)	(9cm.)	Corylus sp.
	0429	Round post	18cm.	Quercus sp.
	0432	Round post	4.5cm.	Corylus sp.
	0434	Thick plank/beam	-	Betula sp.
	0437	Round post	9cm.	Corylus sp.
	0495	Round post	10.5cm.	Corylus sp.
	0496	Round post	5.5cm.	Quercus sp.
0405/439	0440	Round post	9.5cm.	Fraxinus sp.
	0441	Round post	11cm.	Quercus sp.

*0433 lost.

Late Saxon (continued)

Structure No.	Sample No.	Description		Taxon
0258/0275	0277	Round stake	3.5cm.	Fraxinus sp
	0278	Round stake	4.5cm.	Indet. diffuse porous
	0279	Round stake	5cm.	Corylus sp.
	0280	Round stake	3cm.	Corylus sp.
	0285	Round post (part-squared)	(13)cm.	Quercus sp.
	0286	Square-cut post	7cm.	Quercus sp.
	0287	Round stake (part-squared)	6cm.	Fraxinus sp
	0288	Square-cut post	-	Quercus sp.
	0289	Square-cut post (frags)	-	Quercus sp.
	0290	Squared plank (?)	-	Quercus sp.
	0292	Branch fragment	6.5cm	? Betula sp
	0294	Round post	10cm.	Fraxinus sp
	0295	Square-cut post	(25)cm.	Quercus sp.
	0296	Round-post	8.5cm.	Prunus sp.
	0297	Round post	10.5cm.	Fraxinus sp
	0298	Squared post	-	Quercus sp.
	0299	Round post (frag)	-	Quercus sp.
	0300	Squared post	(18cm)	Fraxinus sp
	0301	Round post	10cm.	Prunus sp.
	0302	Roughly-squared post	5.5cm	Quercus sp.
	0303	Round post	(22cm.)	Betula sp
	0304	Round post	7cm.	Fraxinus sp
	0306	Roughly squared post	9.5cm.	Crataegus-group
	0307	Round post	9cm	Betula sp
	0308	Round post (part squared)	6.5cm.	? Crataegus-group
	0309	Round post (part-squared)	6cm.	Corylus sp.
	0310	Squared 'plank'	8cm.	Quercus sp.
	0311	Round post	9cm.	Fraxinus sp
	(0312)	Bark frags only		
	0313	Round post	7cm	Crataegus-group
	0315	Round post	8.5cm	? Ilex sp.
	0316	Round horizontal	6.5cm	Crataegus-group
	0317	Round horizontal	6.5cm	Quercus sp.
	0318	Round post	4cm	Corylus sp.

Structure No.	Sample No.	Description		Taxon
0258/0275	0319	Squared post	-	Quercus sp.
	0320	Round post	9cm.	? Ilex sp.
	0321	Round post (part-squared)	7cm.	Fraxinus sp
	0322	Round post	2.5cm.	Fraxinus sp
	0323	Round post	3.5cm.	Corylus sp.
	0324	Round post	12cm.	Quercus sp.
	0325	Round post	3cm.	? Crataegus-group
	0326	Small branch	2.5	Crataegus-group
	0327	Round post	8cm	Ilex sp.
	0328	Horizontal timber-(round)	6cm	Quercus sp.
	0329	Round post	7cm	Fraxinus sp
	0330	Horizontal timber-(round)	8.5cm.	Quercus sp.
	0331	Round post	9cm.	Corylus sp.
	0332	Horizontal timber (round)	6cm.	Quercus sp.
	0333	Slanting plank	-	Alnus sp.
	0334	Round post	7.5cm	Quercus sp.
	0335	Squared post	-	? Corylus sp.
	0336	Round post	12cm	? Crataegus-group
	0337	Round post	3cm.	Quercus sp.
	0338	Round post	9.5cm	Quercus sp.
	0339	Round post	9cm	Quercus sp.
	0344	Round post	5cm.	Corylus sp.
	0345	Roughly post frag	-	Quercus sp.
	0347	Round post	7.5cm	Corylus sp.
	0349	Round post	5cm.	Salix sp.
	0350	Round post	10cm.	? Tilia sp.
	0351	Squared post	(17)cm.	Fraxinus sp
	0352	Squared post	24cm.	Quercus sp.
	0353	Round post	7.5cm	? Betula sp.
	0354	Round post	5cm	Quercus sp.
	0355	Round post	8cm	Fraxinus sp
	0356	Squared post	(10cm)	Corylus sp.
	0357	Round post	6cm	Corylus sp.
	0358	Squared post	-	Populus.sp
	0359	Round post	7cm.	Indet.diffuse porous.

Late Saxon (continued)

Structure No.	Sample No.	Description		Taxon
0258/0275	0360	Round post	6cm.	Crataegus-group
	0361	Round post	-	Sample lost
	0362	Round post	5cm.	Crataegus-group
	0363	Squared post	-	Quercus sp.
	0364	Round post	7cm	? Corylus sp.
	0365	Round post	3cm.	Fraxinus sp.
	0366	Round post	4cm.	? Ilex sp.
	0367	Round post	5.5cm.	Salix sp.
	0368	Squared post	5.5cm.	Alnus sp.
	0369	Squared post	-	Quercus sp.
	0370	Round post	6cm.	Fraxinus sp.
	0371	Round post	6.5cm.	Corylus sp.

11th/early 12th century

Structure No.	Sample No.	Description		Taxon
0254	0256	Plank	-	Quercus sp.
	0268	Plank	-	Quercus sp.
	0269	Plank	-	Quercus sp.
	0343	Squared post	(18cm.)	Quercus sp.
	0346	Round post	10cm.	Betula sp.
	0348	Round post (frag)		Quercus sp.

12th/13th century

Structure No.	Sample No.	Description		Taxon
0204	0204	Horizontal split beam	(18cm.)	Quercus sp.
	0206	Round post	6cm.	Fraxinus sp.
	0207	Round post	6cm.	Fraxinus sp.
	0208	Split post	(16cm.)	Quercus sp.
	0209	Round post	6cm.	Fraxinus sp.
0499	0201	Squared post	-	Quercus sp.
	0340	Squared post	-	Quercus sp.
	0341	Round post	21cm.	Quercus sp.
	0342	Horizontal round	9.5cm.	Fraxinus sp.

Structure No.	Sample No.	Description	Taxon
0175	0178	Plank	Quercus sp.
	0179	Plank	Quercus sp.
	0180	Plank	Quercus sp.
	0181	Plank	Quercus sp.
	0182	Plank	Quercus sp.
	0183	Plank	Quercus sp.
	0184	Plank	Quercus sp.
	0185	Plank	Quercus sp.
	0186	Plank	Quercus sp.
	0187	Plank	Quercus sp.
	0188	Plank	Quercus sp.
	0189	Plank	Quercus sp.
	0193	Plank	Quercus sp.
	0194	Plank	Quercus sp.
	0196	Plank	Quercus sp.
	0197	Horizontal beam	Alnus sp.
	0229	Plank	Quercus sp.
	0230	Plank	Quercus sp.
	0231	Plank	Quercus sp.
	0232	Plank	Quercus sp.
	0233	Plank	Quercus sp.
	0234	Plank	Quercus sp.
	0235	Plank	Quercus sp.
	0236	Plank	Quercus sp.
	0237	Plank	Quercus sp.
	0238	Plank	Quercus sp.
	0239	Plank	Quercus sp.
	0242	Plank	Quercus sp.
	0243	Plank	Quercus sp.
	0244	Plank	Quercus sp.
	0245	Plank	Quercus sp.

14th/15th century

Structure No.	Sample No.	Description		Taxon
0170	0218	Horizontal plank		Quercus sp.
	0219	Horizontal plank		Quercus sp.
	0220	Horizontal plank		Quercus sp.
	0221	Horizontal plank		Quercus sp.
	0223	Horizontal squared beam		Alnus sp.
0498	0133	Horizontal round	(12cm.)	Quercus sp.
	0134	Horizontal round	12.5cm.	? Crataegus-group
	0135	Horizontal round	(9cm.)	Quercus sp.
	0136	Horizontal squared		Quercus sp.
	0137	Split post	7cm.	Quercus sp.
	0139	Squared post		Quercus sp.
	0142	Horizontal plank (plain-sawn)		Pinus sp.
	0143	Slanting round	11cm.	Quercus sp.
	0144	Vertical (squared)		Quercus sp.
	0190	Split post	(11cm.)	Quercus sp.
	0191	Split post	(10cm.)	Quercus sp.
	0215	Round post	9cm.	Ilex sp.

16th/17th century

Structure No.	Sample No.	Description	Taxon
0373/0379	0377	Round stake	Fraxinus sp.
	0378	Round stake	? Crataegus-group
	0463	Well collar	? Salix sp.
	0465	Well collar	Salix sp.
	0468	Plank	Salix sp.
	0470	Well collar	Salix sp.
	0471	Plank	Salix sp.
	0472	Plank (frag)	Salix sp.
	0474	Plank	Salix sp.
	0476	Plank	Salix sp.
	0480	Squared post	Quercus sp.
	0483	Plank	? Salix sp.
	0484	Squared post	Quercus sp.
	0485	Plank	Salix sp.

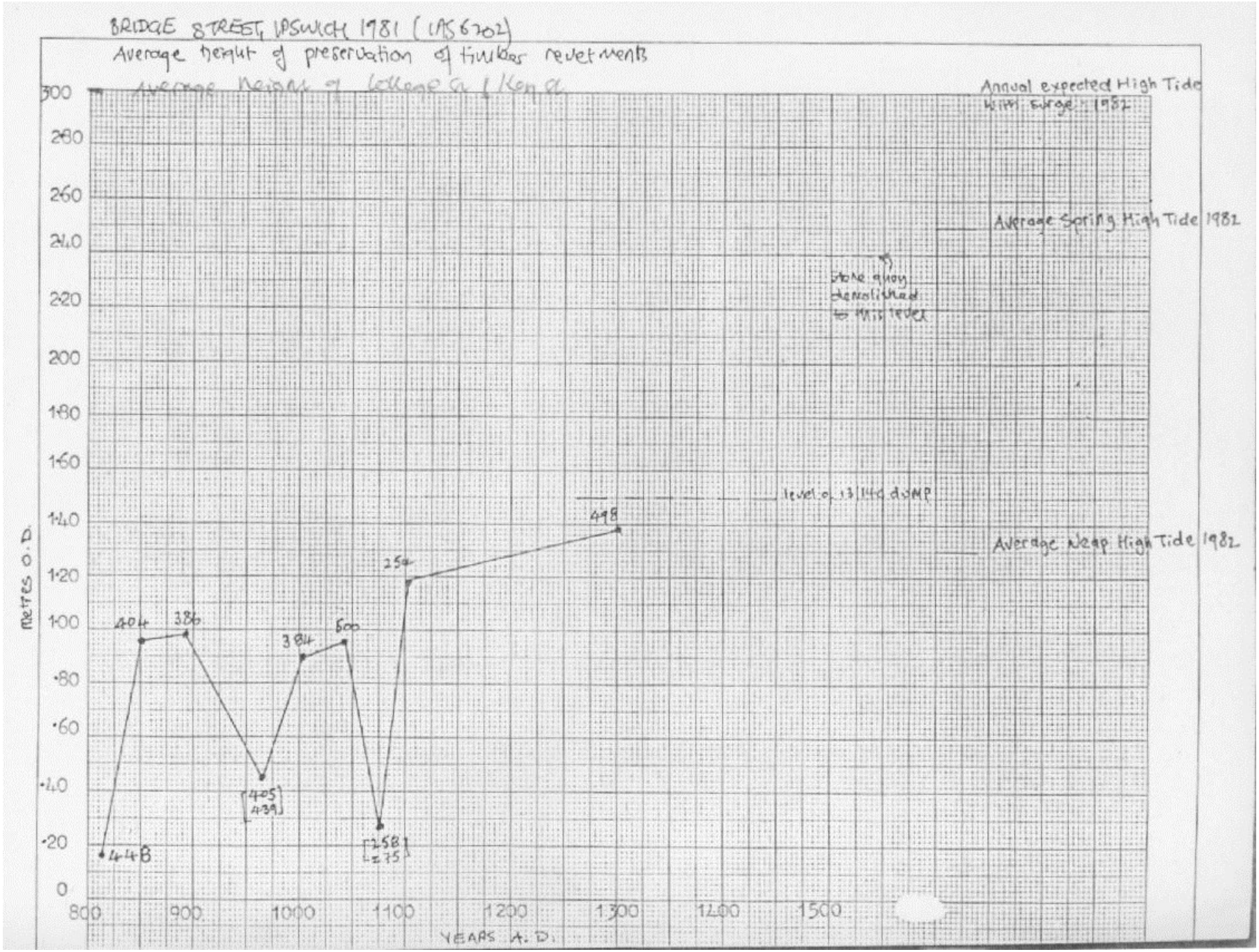
Bridge Street, Ipswich (1AS 6202) Notes on the relation of the waterfronts to river levels.

The section exposed at Bridge Street reveals a progressive extension of the river frontage out into the Orwell, resulting in a narrowing of the channel from the north bank of some 40m between about 800 and 1500 AD. There is no obvious evidence for phases of erosion resulting in a retreat of the river frontage. Average levels have been determined for the surviving tops of timber waterfronts, certain dumped layers and the later medieval stone quay and these are plotted in Fig against their approximate time of construction.

It is necessary to consider precisely what these levels mean. In the first place, they are minimum levels for the waterfront structures: the surviving structures have lost an unknown amount from their tops either by decay or demolition, and some structures (e.g. 439) appear to have partly collapsed. Consequently anomalously low levels (eg 405/439 and 258/275) need not necessarily be of significance, and certainly do not provide evidence for any phases of lowered river levels. Furthermore the structures may well have been built with different purposes in mind, requiring them to be at different heights in relation to river levels. For example, if (and this is speculative) the Middle Saxon timber revetments were built in connection with seasonal trading and were not in continuous use, submergence at Spring High Tides may have been considered tolerable, whereas in circumstances where buildings were directly adjacent to the quayside protection against all but the most exceptional tidal surges would have been required. Factors such as the draught and height of vessels may also have influenced the height of the waterfront structures, as may entirely non-utilitarian considerations. It is therefore unlikely that all of these levels are directly equivalent. From these considerations it must be concluded that the levels obtained need indicate only minimum levels for mean high tides. However, viewing the results in broad terms a long-term rise in river levels is clearly distinguishable and the figures obtained show a very similar trend to results from the Thames at London (Wilcox 1975, 290) which show surviving Roman waterfront top levels at around OD, and medieval levels between 1200 and 1500 AD rising from about lm OD to about 2.5m OD. There are no directly comparable figures from waterfront structures elsewhere in Suffolk. However, Everard (1975) in discussing the Deben Estuary adjacent to the Sutton Hoo barrow group concludes that seventh century mean sea levels were probably at only slightly below the present level.

The latest waterfront structures at the site consisted of a dump of material dated to the 13th-14th century and a later medieval stone quay, probably of 15th century

date. It is tempting to suggest that the replacement of the earlier timber revetments by these more resistant structures is related, at least in part, to flood protection necessitated by the stormy climatic phase of the middle ages. Destruction of houses at Ipswich during the floods and storms of 1287/8 is recorded by John of Oxnead (Woodward 1881, 150) and there is documentary evidence for a stormy period in the fourteenth and early fifteenth centuries (Evans 1975, 175). Continuity of these structures along the waterfront must, however, be demonstrated before they could be accepted as part of a flood protection scheme.


BRIDGE STREET, IPSWICH 1981 (IAS 6702)
Average height of preservation of timber revetments
Annual expected High Tide with Surge 1982
Average Spring High Tide 1982
Average Neap High Tide 1982
level of 13/14c dump
498
404
386
384
500
258
448
405
439
275
metres O.D.
YEARS A.D.
800
900
1000
1100
1200
1300
1400
1500

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Everard, C.E. (1975) 'The Physical Geography of the Deben Estuary at the time of the burial', in Bruce-Mitford, R.L.S. The Sutton Hoo Ship Burial Vol. 1., 78-96. British Museum, London.

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Note on soil at Bridge Street, Ipswich 1981

R.I. Tvlacphail

A "dark earth" deposit visible in the East Section at the North end of the site dates from 7th Century up to the 15th Century. It occurs in a Saxon waterfront site, and is thus comparable to a "dark earth" deposit from Whitefriars, Norwich. However, the deposit studied at Bridge Street seems to be less organic and more dried out, presumably as the result of not being waterlogged at the present.

Layering was not visible in the deposit but apparently it is stratified by increasingly older material (Keith Wade, pers. comm.) and so this suggests that this is not a dug deposit - or "garden soil dark earth" as present for example at Tanners Hall, Gloucester, or the G. P. 0. , London; but rather the resultant of sequential accumulation. The deposit contains coarse sands, pebbles, flints, some silt and clay, shell and charcoal and other anthropogenic debris. The absence of obvious earthworm activity may suggest the deposit has been wetter in the past. However, there is no evidence, in the form of fine laminae, that flooding has contributed towards the deposit. Still it must be considered that general accumulation and usuage of the site could easily obscure such evidence.