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NORWICH SOUTHERN BY-PASS : PLANT REMAINS FROM BEAKER, BRONZE AGE, IRON AGE, ROMANO-BRITISH AND LATE SAXON CONTEXTS; RIVER VALLEY SEDIMENTS

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Summary

This report presents results from two Bronze Age barrow cemeteries (sites 6099,9585,9794) with Iron Age occupation, Saxon burials and Late Saxon deposits; from Beaker and Iron Age domestic features and a Roman iron-smelting furnace; and from a section through palaeo-channel sediments in the Yare Valley (site 9589). Pre-barrow natural features produced pine charcoal and hazel, hawthorn-type and Prunus. Cremations and other deposits produced macrofossils derived from Arrhenatheretum grassland with sparse cereal remains. Beaker pits included charred emmer, hulled and naked barley, hazelnut shell and crabapple fragments. Iron Age features produced sparce cereal remains (emmer,spelt, barley) and hazel nuts. The smelting furnace was fuelled partly with broom and ling, indicating heathland locally. Upper ring-ditch fills produced some Late Saxon carbonised plant material. In the Yare Valley coarse mineral sedimentation with weed seeds, charcoal and carbonised cereal remains is related to an (as yet undated) phase of intensive agriculture.

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Introduction

Excavations were undertaken between 1989 and 1990 by Trevor Ashwin for the Norfolk Archaeological Unit at sites on the line of the A47 Norwich Southern By-Pass. In Bixley parish three ring-ditches and associated funerary deposits with pits and other features possibly pre-dating the truncated barrows were excavated (Sites 6099, 9585). A larger area excavation at Harford Farm, Caistor St Edmund (Site 9794) revealed the ring-ditches of five barrows, later prehistoric pits and post-holes, square-ditched Romano-British enclosures, and two small Anglo-Saxon cemeteries, amongst other features. In addition, during 1990, a site at Valley Belt, Trowse (Site 9589) was excavated prior to gravel extraction for road construction. Here there was evidence for Beaker and Iron Age domestic activity, Romano-British iron-smelting and square enclosures similar to those at site 9794.

Results from these sites and from studies of river valley sediments in the vicinity are presented in this report. Final interpretation of some deposits must await arrival of the radiocarbon dates : provisional interpretations which may require revision when the dates are available are enclosed in square brackets and prefixed by an asterisk.

The Trowse, Bixley and Caistor sites were all located on low hills within a landscape block with soils mapped by the Soil Survey as the Burlingham 3 Association (Hodge et al 1984, 136). This association occurs mainly on chalky till or head, but some component soils are formed, as here, on sandy fluvioglacial drift. These include soils of the Newport Series, brown sands of variable stone content. The archaeological sites were thus on the most freely-draining soils of this association, on which nowadays productivity is limited by droughtiness and poor natural fertility (ibid, 271). It seems reasonable to suppose these areas of sandy, nutrient-poor soils on hilltop locations were, in the past, not the most favoured for agriculture and may in fact have been marginal land.

Preservation and retrieval

The feature fills were composed largely of re-worked fluvioglacial sands and gravels into which the features themselves had been cut. Most of the plant material from these contexts proved to be preserved by carbonisation. Additionally there was some preservation by mineralisation. Ferrimanganiferous concretions were noted in many contexts. Generally these were black and amorphous, coating pebbles and cementing together sand grains and small charcoal fragments. In some deposits, however, plant tissue had been mineralised by impregnation with ferrimanganiferous compounds. The replacement was generally quite coarse, though the presence of replaced vascular, fibre and ray tissue characterises mineralised wood. Some indeterminate stem/leaf and possible root tissue was also noted in a mineralised state. Unburnt bone had hardly survived in these coarse, leached deposits, though cremated bone fragments were often common.

Evident or suspected cremation deposits were entirely collected for laboratory processing. The material was initially gently disaggregated under running water on a coarse (5mm) mesh. Cremated bone and large charcoal fragments > 5mm were separated from the material retained on this mesh. Carbonised plant material was then separated from the remaining sediment by manual flotation/wash-over using a 0.5mm collecting mesh, before the

non-floating residue was wet-sieved over a 1mm mesh. Mineralised plant material, being less dense than sand and pebbles, was also effectively separated by flotation/washover. The flots obtained were dried prior to sorting under a binocular microscope at low power.

Samples were taken from other contexts where concentrations of carbonised material or mineralised concretions were noted. Depending on sample size they were processed by machine flotation or manually, but using a 0.5mm mesh throughout. Macrofossils retrieved included cereal remains, nutshells, fruitstones, weed seeds etc., vegetative plant material and charcoal. Charcoal fragments > 6mm were separated for identification. Small samples were also taken from miscellaneous stains, apparently representing mineralised organic materials, in an attempt to characterise them..

Almost all the samples collected at sites on the road line were fully analysed. The flots from Valley Belt, Trowse, (Site 9589), however, were initially scanned in order to detect samples including significant and informative assemblages. Only samples which were dated by associated pottery, with a few other samples of interest, were analysed in detail.

Results

The results from the excavated sites are presented in Tables 2 - 12 and summarised in Table 1. Due to the truncated state of the sites, and the general paucity of finds, close dating of some contexts proved difficult. The excavator has divided the contexts into six broad periods, followed in Table 1. These are:

Period 1. Earlier prehistoric, up to 1000 BC, comprising features relating to the barrows and some pre-dating them. Also 'domestic' features at Site 9589.
Period 2. Later prehistoric. 1000BC-43AD
Period 3. Romano-British
Period 4. Early-Middle Saxon, 400-800AD
Period 5. Late Saxon-Medieval 800-1500AD
Period 6. Post-medieval.

An additional period 0 is used here to indicate various natural features which included carbonised plant material in their fills. The results will be considered chronologically.

Period 0 (Tables 3 and 11)

At Caistor, Site 9794, natural features including fossil periglacial features and probable tree-root hollows were common. Two of them drew the excavators' attention from the presence of reddened clay deposits in their fills associated with charcoal (1309 in 1274; 2436 in 2339), and samples were collected for flotation. 1274 was thought to be part of an ice-wedge cast and 2339 a possible periglacial hollow but clearly the charred material must be of post-glacial date.

The plant material present was sparse but interesting. Both samples included pine charcoal (Pinus sp) and 1309 contained an abraded scrap of charred hazel nutshell (Corylus avellana). Comparable results were obtained at Spong Hill, Norfolk, where pine charcoal in one case from a natural hollow, showing reddening and associated with Mesolithic flints gave radiocarbon dates in the range 8150-8280 BP (Healy 1988, 104; HAR-2903, -

Site		9585+9794	6099	6099	9585	9585	9794	9794	9589	9589	9794	9589	9794	6099
Site periods		0	1	1	1	1	1	1	1	2	2	3	4	5
Context-types			Cremations	Other	Cremations	Other	Cremations	Other	Pits etc	Pits etc	Pits/ Postholes	Furnace	Grave	Ditch fills
1.Cereals														
Cereal indet	ca fr	1	1	1	-	2	-	1	5	4	12	1	-	1
Cereal indet	ca	-	-	2	-	-	-	1	6	4	10	2	1	1
Triticum sp	ca	-	1	-	-	-	-	-	1	3	10	3	-	1
	spkfr	-	-	-	-	-	-	-	2	1	7	-	-	-
	afr	-	-	-	-	-	-	-	-	-	1	-	-	-
Triticum dicoccum-type	ca	-	-	-	-	-	-	-	3	-	1	-	1	-
Triticum dicoccum Schubl	spkfr	-	-	-	-	-	-	1	-	2	7	-	1	-
Triticum spelta L	spkfr	-	-	-	-	-	-	-	-	1	7	2	-	-
Triticum aestivum-type	ca	-	-	-	-	-	-	-	-	-	-	-	-	1
Secale cereale L	ca	-	-	-	-	-	-	-	-	-	-	-	-	1
Hordeum sp	ca	-	-	1	-	1	-	-	4	2	2	2	-	1
	ri	-	-	-	2	-	-	-	-	-	-	1	-	-
Hordeum vulgare L.emend Lam	ca	-	-	-	-	-	-	-	1	-	2	-	-	-
H.vulgare var.nudum	ca	-	-	-	-	-	-	-	3	-	-	-	-	-
Avena sp	ca	-	-	-	-	-	-	-	-	-	2	-	-	-
	afr	-	-	-	-	-	-	-	-	-	1	-	-	-
2.Nutshells/fruitstones														
Corylus avellana L		2	1	2	-	6	-	3	9	8	6	1	-	-
Prunus spinosa L		-	-	1	-	-	-	-	-	-	-	-	-	-
Malus sp		-	-	-	-	-	-	-	1	-	-	-	-	-
3.Weeds etc.														
Chenopodium album L		-	-	-	-	-	-	-	-	-	2	-	-	-
Atriplex sp		-	-	-	-	-	-	-	-	-	1	-	-	-
Chenopodiaceae indet		-	-	-	-	-	-	1	-	-	8	-	-	-
Scleranthus annuus L		-	-	-	-	-	-	-	-	1	-	-	-	-
Caryophyllaceae indet		-	-	1	-	-	-	-	-	-	-	-	-	-
Montia fontana L.subsp.chondrosperma		-	-	-	6	-	-	-	-	-	-	-	-	-
Medicago/Lotus/Trifolium-type		-	-	1	8	-	-	-	-	-	-	-	-	-
Vicia/Lathyrus sp		-	-	-	3	-	-	1	1	1	5	2	-	-
Leguminosae indet		-	-	-	-	-	-	-	-	-	-	-	-	1
Polygonum aviculare agg		-	-	1	-	-	-	-	-	-	-	-	-	-
Polygonum lapathifolium L		-	-	-	-	-	-	-	-	-	2	-	-	-
Polygonum lapathifolium/persicaria		-	-	-	-	-	-	1	-	-	9	-	-	1
Polygonum sp		-	-	-	-	1	-	-	-	-	7	-	-	-
Fallopia convolvulus (L)		-	-	-	-	-	-	2	-	2	1	1	-	1
Rumex acetosella agg		-	-	1	2	-	-	-	-	-	1	-	-	-
Rumex sp		-	-	-	-	-	-	-	-	-	2	-	-	-
Polygonaceae indet		-	-	2	-	-	-	1	-	-	-	1	-	1
Plantago lanceolata L		-	-	-	5	1	-	1	-	1	-	-	-	1
Galium aparine L		-	-	-	-	1	-	-	-	-	-	-	-	-
Lapsana communis L		-	-	-	-	-	-	-	-	-	1	-	-	-
Carex sp		-	-	-	1	-	-	1	-	-	1	-	-	-
Bromus mollis/secalinus		-	-	-	-	-	-	1	-	-	6	-	1cf	-
Gramineae indet		-	-	2	-	-	-	-	-	-	-	2	-	-
4.Vegetative plant material														
Arrhenatherum elatius (L) Beauv. ex.J & C.Presl var bulbosum (tuber)		-	-	1	2	1	-	-	-	-	-	-	1cf	-
cf.A elatius (immature tuber)		-	3	-	10	-	2	-	-	-	-	-	-	-
'Bulbs'		-	3	-	5	-	-	-	-	-	-	-	-	-
Rhizome frags		-	4	2	9	3	-	2	-	1	2	-	-	1
Root frags		-	4	3	9	-	2	4	-	-	-	-	-	1
Stem frags		-	4	2	14	2	2	2	-	-	1	-	-	1
Tubers		-	2	-	1	-	2	-	-	-	2	-	-	1
Thorns		-	-	1	-	1	-	-	-	-	-	-	-	-
Calluna vulgaris (shoots/leaves)		1	-	-	-	-	-	-	-	-	-	-	-	-
Moss stem frags		-	-	-	3	-	-	-	-	-	-	-	-	-
5.Charcoal frags > 6mm														
Corylus sp		-	-	2	1	1	-	1	-	-	-	-	-	-
Corylus/Alnus sp		-	-	1	3	-	-	-	-	-	-	1	-	-
Crataegus group (Pomoideae)		-	-	-	1	-	-	1	-	-	-	1	-	-
Ericaceae		1	-	-	-	-	-	-	-	-	-	3	-	-
Fraxinus sp		-	-	-	-	-	-	-	-	-	-	-	-	1
Pinus sp		2	-	-	-	1	-	-	-	-	-	-	-	-
Prunus sp		-	-	-	1	-	-	-	-	-	-	-	-	-
Quercus sp		-	4	5	16	-	2	10	-	-	-	3	-	-
Sarothamnus (Cytisus) sp		-	-	-	-	-	-	-	-	-	-	1	-	1
Total no. of samples with identifiable material		4	4	11	18	13	2	19	10	11	22	3	1	2

Table 1 : Summary of carbonised plant remains from sites 6099, 9585 and 9794

The results are presented in terms of frequency (ie nos. of samples in which each taxon or plant organ is present). Taxa are represented by fruits or seeds except where indicated.
Abbreviations: afr-awn fragments; ca-caryopses; fr-fragments; ri-rachis internodes; spkfr-spikelet fragments (glume bases, spikelet forks etc); NB. Charcoal from period 2 and 4 features at 9794 and period 1 and 2 contexts at 9589 was not identified.

7025, -7063). The results from Spong Hill seem to indicate that early Flandrian charred plant material accumulated in depressions left after partial in-filling of periglacial and postglacial natural features. This could relate to purely natural fires in pine woods on dry, sandy soils and need not necessarily indicate intentional clearance by Mesolithic groups. There is no direct dating evidence for the Caistor pine charcoal nor any directly associated artefacts but it seems quite possible that the charred material is penecontemporaneous with that from Spong Hill, and may relate to early Flandrian pine/hazel woodland.

The fills of other undated natural features were sampled at Bixley, Site 9585. These were 1089 in 1084 and 160 in 158. 1089 produced remains of ling (Calluna vulgaris) with Ericaceae charcoal and 160 included an indeterminate cereal grain fragment and hazel nutshell fragment. These charred plant remains are less readily interpretable, and certainly are undated.

Period 1 (Tables 2,4,6,9 and 12)
The carbonised plant remains from period 1 features are considered here in two groups : those from cremation and inhumation deposits and those from other contexts.

The cremation samples are from contexts 197, 251, 253 and 277 at Bixley, Site 6099; from 1133, 1170, 1192, 1215, 1230, 013, 017, 019, 033, 035, 057 and 062 at Bixley, Site 9585; and from 1301, 1302, 1303, 1308 at Caistor, Site 9794.

Although some of these contexts produced no charcoal fragments > 6mm, or other identifiable plant macrofossils (see Tables), in most of them large charcoal fragments were abundant. These are mainly of oak (Quercus sp), which was evidently the main fuel used on the pyres, though there is some charcoal of hazel (Corylus sp), hazel or alder (Corylus/Alnus sp),?sloe (Prunus sp.) and the Pomoideae (hawthorn-group).

Cereal remains are very sparse and infrequent : they comprise indeterminate grain fragments, a wheat grain (Triticum sp) and barley rachis fragments. There is a single hazel nutshell fragment from site 6099. Other fruits and seeds from site 9585 comprise mainly grassland species : Montia fontana subsp. chondrosperma, small leguminous seeds of Medicago/Lotus/Trifolium-type; Vicia/Lathyrus sp., Rumex acetosella, Plantago lanceolata and Carex sp.

In most of these cremation samples vegetative plant material is abundant. Much of this material cannot, at present, be identified but categories of charred plant remains are distinguishable, as follows.

1. 'Tubers', or enlarged basal internodes, of the onion couch, Arrhenatherum elatius (L) Beauv. ex. J and C Presl. var bulbosum (Willd). Spenner. These vary considerably in size and shape, from pyriform to more elongate. There are also some basal Gramineae internodes with roots, showing slight swelling, which may also be of this grass.

2. 'Bulbs'. These are rather irregularly shaped objects, c 1.1-1.9mm long, 0.5-1.8mm broad. They have one convex surface and one concave, with an attachment point at one end. There is a pattern of epidermal cells radiating from this point on the concave face with a more uniform epidermal cell patterning on the

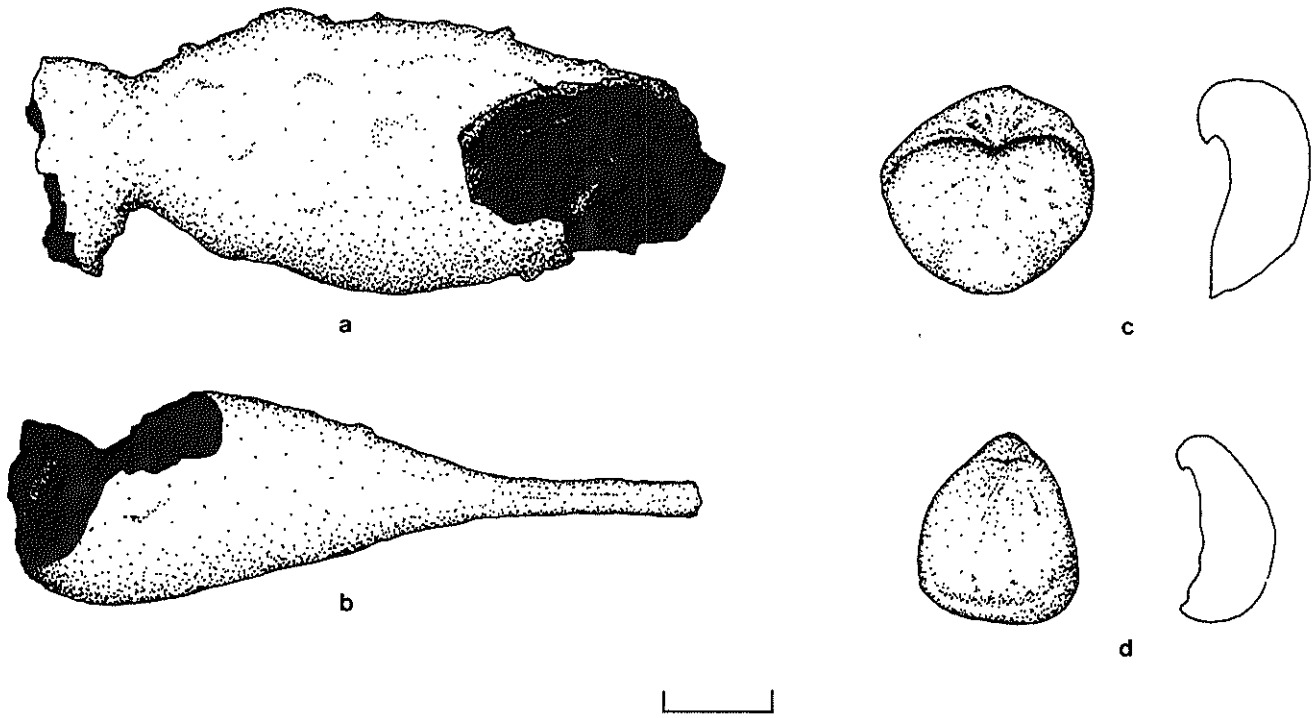


Fig 1

convex face. There is no obvious sign of an embryo or hilum and they are therefore thought to be some type of small bulb. (Fig 1).

3. Rhizome fragments. These are elongate charred plant organs typically showing short internodes with scars for root attachment. Apparent root tissue is sometimes present.

4. Stem fragments. These are of two main types. There are some woody, apparently dicotyledonous stems. Some may simply be very young twigs relating to the tree charcoals from the samples. Others externally resemble Ericaceae charcoal. Reliable identification of such very young stems has not proved possible. Stem fragments from monocotyledonous plants, including grasses and showing typical grass-type nodes and longitudinal ribbing on the internodes, are also common.

5. Tubers. Much of the charred material consists of poorly-preserved sub-spherical to elongate masses of parenchyma with little or no sign of epidermis. Tuber fragments from site 9794, in the cremations 1301 and 1302, are better preserved. They are elongate with rough surfaces and root stumps. Internally there are large cavities, produced during carbonisation. Some tubers are attached to others at narrow constrictions : other examples have slender rhizomes leading from them. (Fig 1).

6. Moss stem fragments. Short lengths of 'stem', slightly flattened and about 0.1mm thick, with abundant 'leaf' bases along their lengths closely resemble moss stems.

The range of taxa and types of plant organs present are quite typical of Bronze Age cremations. The cremation cemetery at Moverons Farm, Brightlingsea, Essex produced a very similar range of seeds, including Montia, various Leguminosae, Rumex acetosella and Plantago lanceolata with some crop weeds, occasional cereal remains, some Corylus, Sambucus and Prunus and abundant vegetative plant material (Murphy, in prep.). The significance of Arrhenatherum tubers from cremations and other contexts is reviewed by Robinson (1988). Elsewhere, Moffett (1988) describes similar assemblages from cremations at Radley Barrow Hills, Oxon. Camilla Dickson (pers. comm) reports assemblages including Arrhenatherum and 'bulbs' identical to those from the Norwich Southern By-Pass from a Bronze Age cremation in Perthshire which she notes have also come from cremations investigated by Gill Campbell at Irthlingborough and West Cotton, Northants. Most workers have been unable to identify the tubers and other vegetative material from cremation samples, though Moffett (1991) has characterised tubers of Conopodium/Bunium. Unfortunately the tubers from the Bixley and Caistor sites do not seem to be of these genera.

These remarkably consistent results from Bronze Age cremations at sites widely spread across the country are interpreted as indicating the use of uprooted grasses and associated grassland herbs as kindling for cremation pyres, though there are grounds for suspecting that at least some of the tubers represent intentional food offerings to the deceased. The sparse cereal remains and Corylus nutshell could be interpreted similarly, though cereal straw might also have been used as kindling. In ecological terms Robinson (ibid) considers that Arrhenatheretum grassland, (found today on verges, poorly-managed pasture and meadow and abandoned cultivated land which is ungrazed), is

represented. This general type of grassland community seems to have been very characteristic of land in and around barrow cemeteries during the Bronze Age.

Mineralised plant material, replaced by ferrimanganiferous compounds, was present in several flotation samples, and further samples from miscellaneous 'stains' within the fills of cremation pits, graves and other features were examined (Table 12). The 'stains' were of three main types. Firstly there were those which differed lithologically from the generally coarse sandy matrix of the feature fills. At site 6099 207(17), and at site 9794 029-30 (1-4), there were brown loamy deposits with more silt and clay, and a higher humus content, than other feature fills. These are most simply interpreted as patches of turf or topsoil in the back-filling of cremation pits and graves. Secondly there were dark-stained sand deposits which included amorphous ferrimanganiferous concretions but no replaced plant material. These may represent poorly-replaced organic materials but from the characteristics examined it is not possible to determine the type of material originally present. Most samples in Table 12 were of this type. Finally there were samples including mineralised wood or other plant tissue, for example the coffin stain 028 (Sample 3) at 9794. Most of the mineralised wood from the sites was black, hard and brittle, replaced by ferrimananiferous compounds. Features necessary for specific identification had not survived. The wood from grave fill 4029 (158) at site 9794 was orange-brown and soft, resembling wood from urban latrine pits replaced by phosphatic compounds. Possibly decay of the corpse provided a source of biogenic phosphate for mineralisation.

Besides cremations and inhumations other period 1 contexts were also sampled. At Bixley site 6099 and Caistor, site 9794 these included ring-ditch fills, pits, graves and post-holes. Oak charcoal with some hazel and Pomoideae was present, with occasional cereal remains, hazel nutshell, sloe endocarp, some seeds of grassland plants and vegetative plant material. Assemblages from these contexts seem similar to these from the cremations.

At site 9585 a series of pits was sampled. Of thirteen samples containing identifiable plant material, six included Corylus nutshell : a notably higher frequency than in other samples from these sites. Some cereal remains were also present. Pit fills with Corylus or cereals were all from pit 021 (020, 030, 036, 038, 042, 045, 062, 053). Although the material recovered is sparse from this pit, it is quite distinctively different from the material in the cremations and seems to have a more domestic character.

Another distinctive feature was pit 1090 (1106), which produced large quantities of pine charcoal (Pinus sp) with charred 'cokey' material, probably charred resin. Pine woodland was dominant in the early Flandrian, replacing birch, but in turn declining on competition from deciduous trees after about 9000BP (Huntley and Birks 1983). [*It would be most unusual to find abundant pine charcoal in a Bronze Age context as this feature appears to be. Confirmation of dating is clearly required, and a sample will be submitted for radiocarbon dating. A possible explanation is that on the well-drained nutrient-poor sandy soils formed on fluvioglacial deposits at this site pine was able to compete with deciduous species, and that areas of pine woodland persisted here

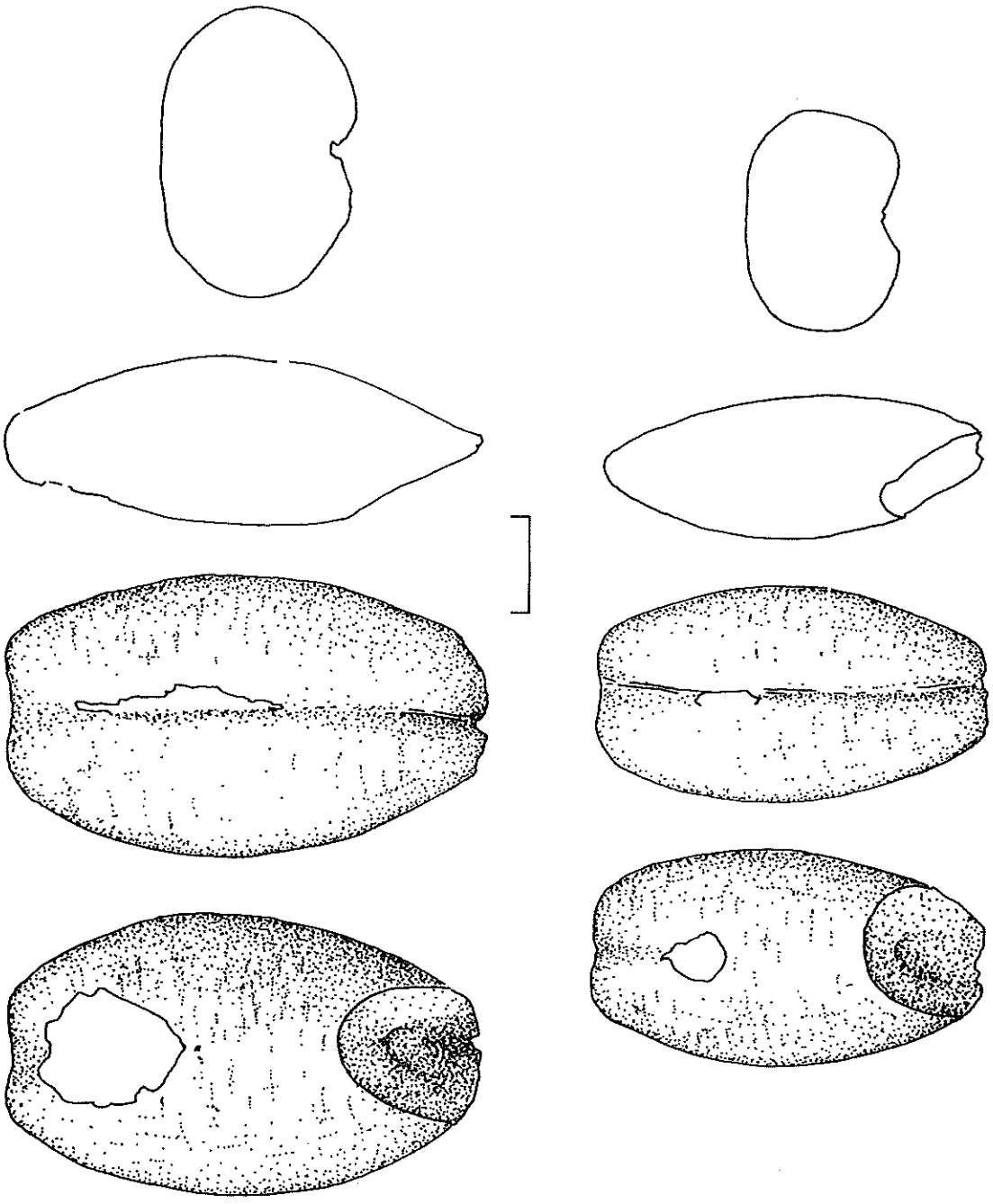


Fig 2

much later than at more favourable habitats. This interpretation is obviously provisional, pending a radiocarbon determination.]

At Valley Belt, Trowse, (Site 9589), pits and post-holes of Beaker (Period 1) date were sampled. Nine samples from contexts containing Beaker pottery and a tenth almost certainly of Beaker date were analysed (Table 6). The most frequent macrofossils in these samples from domestic features are fragments of hazel nutshell (Corylus avellana). Cereal remains occur in seven contexts; emmer-type grains (T. dicoccum) in three; barley, including both hulled and naked six-row barley , (H.vulgare, H.vulgare var nudum) in five (Fig 2). Crab apple remains (Malus sp.) were found in a single sample. Cereal chaff fragments and weed seeds are extremely uncommon. The assemblages from this site closely resemble those from Beaker pits at Longham, Norfolk (Site 13025; Fryer and Murphy in prep.), in which hazel nutshells were ubiquitous and cereal grains, including barley, less frequent. This general type of assemblage has been reported from many Neolithic sites in lowland Britain, and is thought to indicate continued substantial reliance on plant food gathering throughout the Neolithic (Moffat et al 1989) and, evidently, into the early Bronze Age.

Period 2 (Tables 7 and 10)
At site 9794 samples were collected from period 2 (Iron Age) pits and post-holes. Eight of the thirty contexts sampled produced no identifiable macrofossils but seventeen did contain cereal remains and a further two, though lacking cereals, included arable weed seeds. The assemblages consist of generally small numbers of grains, glume bases, spikelet forks and other chaff fragments of emmer (Triticum dicoccum) and spelt (Triticum spelta) with rare barley grains (Hordeum vulgare) and wild or cultivated oats. (Avena sp). Hazel nutshell fragments came from six contexts. The associated weed flora is dominated by Chenopodiaceae (mostly poorly preserved or encrusted with sediment), Polygonum lapathifolium/persicaria and Bromus sp. The assemblages are too sparse to be interpretable in terms of crop-processing activities but they do provide useful evidence supporting the excavator's interpretation of these features as domestic.

There is a spatial pattern to the distribution of cereal remains in period 2 features. In area B seven post hole fills were sampled : 3004 (3140/3145), 3115 (3163), 3116 (3164), 3117 (3165), 3118 (3166) and 3100 (3131). None of the samples from these produced charred cereals. In area C an isolated pit 1161 (1880/1881) contained no cereals, pit 1335 (1019/1344) produced few, and another isolated pit 2425 (2426/2922) in area D again few. Apart from post-hole 1742 (1744) all post-holes and pits associated with structure 5213 (Area C/D) contained cereal remains(1578,1584,1613,1640,1653,1655,1658,1673,2410,2414,2529, 5071,5126). The highest density of cereal remains was in the posthole 1613. These results indicate a focus of cereal processing activities and waste disposal around the round-house, structure 5213.

Period 2 (Early Iron Age) features at Valley Belt, Trowse (Site 9589) produced a similar range of cereals - emmer, spelt and barley - but again in very small amounts. Chaff and weeds are still more uncommon that at Site 9794. An unusual feature of the Trowse Iron Age samples is the comparative abundance of hazel nutshell fragments : they are, in fact, more frequent than cereal

remains, and in this respect the Iron Age samples closely resemble those from Beaker contexts at the same site. Interpretation of samples from such a small group of closely dated contexts is inevitably tentative, but it may be that some kind of specialised activity area, related to the exploitation of hazel scrub on marginal land, is represented.

Period 3 (Table 8)
The only Romano-British contexts sampled were those associated with the iron-smelting furnace at Site 9589. Charcoals from three contexts are of oak (Quercus sp.), broom (Sarothamnus (Cytisus) sp), the Pomoideae (hawthorn etc)., hazel or alder (Corylus/Alnus sp) and Ericaceae. A single charred flower of Calluna vulgaris indicates that the latter included ling. The remains of broom and ling are useful indicators for the proximity of heathland by this period and also show that heath vegetation was used as a source of industrial fuel. All three samples produced some cereal remains, and badly preserved grains were common in 921. It does not seem probable that the furnace would have been also used for grain drying, for the temperatures needed for this purpose clearly differ greatly from those required for smelting. The significance of these charred cereal remains is therefore difficult to assess.

Period 4 (Table 11)
The only bulk sample taken for flotation from a period 4 grave was 1021, a dark deposit in the fill of 1020 at site 9794. Charred cereal remains, including emmer, Triticum dicoccum, were present. This particular crop is not unknown from Anglo-Saxon contexts (Murphy 1990) but is far more frequently encountered in prehistoric deposits. The possibility that this grave cut through a prehistoric feature and that 1021 is a re-deposited fill has therefore to be considered.

Period 5 (Table 2)
The upper fills of the ring-ditch at site 6099 (38, 31) are dated to period 5 (Late Saxon-medieval). Two samples produced plant material, including small numbers of grains of bread wheat-type (Triticum aestivum), rye (Secale cereale) and barley (Hordeum sp) with crop weeds, vegetative plant material and charcoal of broom (Sarothamnus (Cytisus)) and ash (Fraxinus). Interpreting such a sparse collection of material unassociated with settlement evidence is obviously difficult.

Valley sediments
Introduction
The excavated sites were on well-drained glacial sandy gravels, and the fills of the archaeological features consequently provided rather poor preservation conditions for biological materials : only carbonised (and some mineralised) plant macrofossils and cremated bone survived, as noted above. In order to amplify the palaeoecological information from the project it was clear from the outset that examination of river valley sediments, exposed in contractors' excavations, would be necessary. Two areas were distinguished as potentially significant : the valley of the River Tas, directly between the Bixley sites 6099 and 9585 and the Caistor site 9794; and the Yar valley north of the Bixley sites.

The Tas Valley
Borehole transects by Norwest Holst Soil Engineering and Ground Engineering Ltd along the road-line across the Tas Valley show

that sediments above the sub-alluvial gravels comprise two main units. These are lower, predominantly, organic sediments described in the bore logs as 'silty' or 'sandy peats' and upper, predominantly mineral, sediments described as 'silty clay'. These sediments generally total less than 1m in thickness, but in borehole 168 c 75m to the south-west of the modern channel a thicker sequence through a palaeo-channel was recorded, as follows (top surface at 2.85m OD):

"2.85 to 2.65m OD	Topsoil
2.65 to 2.25m	Soft red-brown silty clay with traces of peat
2.25 to 1.55m	Plastic dark brown very silty amorphous peat
1.55 to 0.55m	Plastic black silty very sandy amorphous peat with shells and traces of gravel
0.55 to -0.95m	Medium dense dark grey fine to coarse sand and fine to coarse subrounded to subangular gravel."

Unfortunately the contractors' excavations in this area were shallow and water-filled (Jayne Bowne, pers.comm) and no sections through palaeochannels were visible.

The Yare Valley : Trowse viaduct

In the Yare valley sections were exposed briefly during construction of the Trowse Viaduct and these were recorded and sampled. Prior to the construction of the earth bund leading from White Horse Lane to the viaduct, sediments over the sub-alluvial gravels were stripped away. Two sections were recorded in detail (see Fig 3 for locations).

Section 1

0-20cm	Loose humified peaty loam; abundant fibrous and fleshy roots; merging boundary
20-35cm	Firm greyish brown organic clay/silt; large prominent reddish-brown mottles; blocky structure; abundant fibrous and fleshy roots; undulating boundary
35-45cm	Soft grey clay/silt; small black mottles; some roots; merging boundary
45-55cm	Soft brown organic clay/silt; merging boundary
55-80cm	Soft greyish-brown slightly sandy organic clay/silt; impersistent off-white marl deposit forming distinct band at 70cm and intermittently below; becoming more sandy towards base; small rounded and subrounded flints at base; sharp boundary.
80cm+	Flint gravel in coarse grey sandy matrix.

A monolith with its top at 30cm was taken for possible pollen analysis, and samples for macrofossil analysis were also collected from deposits below this level, though these were not analysed.

This section was typical of the area excavated for bund construction; deposits thinned steadily eastwards.

Section 2

0-20cm	Loose humified brown peaty loam; abundant fibrous and fleshy roots; merging boundary
20-45cm	Firm greyish-brown clay/silt; large prominent reddish brown mottles; blocky structure; some chalk fragments up to 30mm; fibrous and fleshy roots; merging boundary
45-70cm	Slightly firm greyish-brown organic sandy clay/silt;

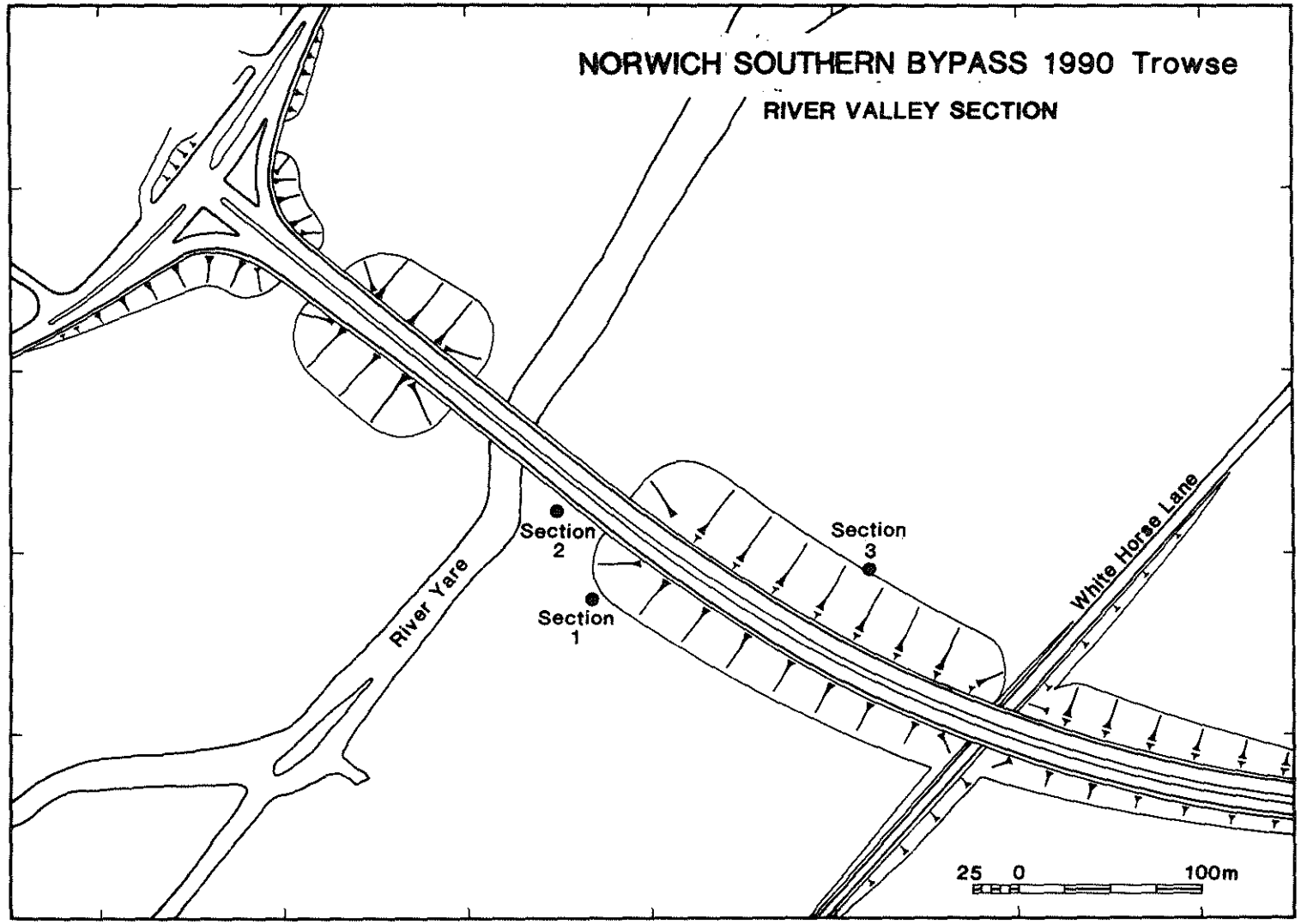

NORWICH SOUTHERN BYPASS 1990 Trowse
RIVER VALLEY SECTION
Section 2
Section 1
Section 3
River Yare
White Horse Lane
25 0 100m

Fig 3.

	small reddish-brown mottles; some wood fragments and mollusc shells, particularly towards base; fibrous and fleshy roots; merging boundary
70-85cm	Soft dark brown organic clay/silt; some fibrous and fleshy roots; merging boundary
85-153cm	Soft greyish-brown organic clay/silt; becoming progressively more sandy with increasing content of rounded and subrounded flints; 5mm band of sand at 113cm; by 143cm some large angular and subangular flints up to 65mm; small heat-shattered flints; large wood fragments at 135cm; mollusc shells locally abundant; indistinct boundary
153+cm	Soft fine-textured brown organic clay/silt; stoneless; no molluscs.

Below c. 160cm the excavation was flooded and, as pumps were not in operation, the water-level rose during recording and sampling. Because of this problem and the limited time available during a pause in the contractors' work sampling was not as detailed as would have been desirable in ideal circumstances. A monolith for pollen analysis with its top at 70cm was collected but the tube could not be inserted far into the stony sediment below about 125cm. Instead individual pollen samples were taken at the coarse interval of 5cm between 115-160cm. Macrofossil samples were collected from below 60cm.

Section 3
This was not recorded in detail, but seemed to show predominantly mineral sediments filling a channel heading northwards, and fills of a recent drainage ditch.

Trowse Viaduct Section 2
Sub-samples from the bulk macrofossil samples were taken for the determination of % dry weight and % loss on ignition (12hrs at 100 c and 12hrs at 375 c). The results are given in Table 13. Plant macrofossils were extracted from 0.5kg samples using the methods of Kenward et al (1980). Counts of macrofossils>0.5mm are given in Table 14 and the presence/apparent absence of smaller macrofossils (mostly charophyte oogonia and Juncus seeds) is noted. Carbonised plant remains are listed separately in Table 15. Only charcoal fragments>2mm were extracted for weighing.

Apical and hinge fragments of mollusca >0.5mm were extracted from the organic and mineral fractions of the 0.5kg samples. Identifications are presented in Table 16. The freshwater taxa have not been counted individually, principally because the shells are very fragile and most specimens consist of extremely small apical fragments, many not closely identifiable. It was not possible to separate out the amphibious taxa Lymnaea truncatula and Anisus leucostoma since small apical fragments were present, which could have been of these species or of other species in these genera. The valves of Sphaeriacea are mostly very immature specimens. At some levels in the sample column shells were rare. This may, in part be due to preservational factors (eg at 153cm, where gypsum crystals were present, implying shell destruction) or in part taphonomic (eg at 105cm where only comparatively dense, flat elements - Bithynia opercula, limacid shells, Sphaeriacea valves - occurred).

Other macrofossils present but not counted or identified included rhizomes, wood fragments, monocotyledonous stem fragments, mosses

(very poorly preserved), ostracods, caddis larval cases, beetles, fly puparia, amphibian bones and mammal bone fragments.

Discussion

The depth of deposits in section 2 compared to section 1, which is typical of the floodplain in this area, appears to indicate that the sediments seen in section 2 are infilling a palaeochannel, although the section was not sufficiently large to expose the base, edges or profile of this presumed channel. From field observations and analytical data (Table 13; Fig 4) there seem to be four main units: below 153cm a basal organic clay/silt; between 153-113cm a sandy organic clay/silt with flints; from 113-70cm a more organic clay/silt; and above 70cm a less organic sandy clay/silt.

The plant macrofossils (excepting crop plants) may loosely be divided into four ecological groups:

1. Aquatics/marginal rooted plants. Ranunculus subg. Batrachium, Nymphaeaceae, Rorippa microphylla, Apium nodiflorum, Oenanthe aquatica, Menyanthes trifoliata, Myriophyllum sp., Hippuris vulgaris, Alisma plantago-aquatica, Sagittaria sagittifolia, Potamogeton spp., Zannichellia palustris, Schoenoplectus lacustris.
2. Wetland/grassland plants. Caltha palustris, Ranunculus acris/repens/bulbosus, Ranunculus flammula, Lychnis flos-cuculi, Urtica dioica, Polygonum hydropiper, Bidens spp, Sparganium spp, Isolepis setacea, Eleocharis palustris/uniglumis, Carex spp.
3. 'Weeds' Papaver spp., Fumaria officinalis, Raphanus raphanistrum, Agrostemma githago, Stellaria media, Montia fontana subsp. chondrosperma, Chenopodium album, C. ficifolium, Atriplex spp, Malva sylvestris, Aphanes arvensis/microcarpa, Polygonum aviculare, P. lapathifolium, P. convolvulus, Rumex acetosella, Urtica urens, Solanum nigrum, Verbena officinalis, Valerianella sp., Anthemis cotula, Lapsana communis.
4. Woodland/scrub taxa. Rubus sp., Alnus glutinosa, Solanum dulcamara, Sambucus nigra.

Unsurprisingly, remains of plants in the first two groups form the predominant component of the macrofossil assemblages from these samples. Inspection of the data for clear trends in the relative abundance of macrofossils from these two groups has proved unsuccessful. Certain wetland taxa (Ranunculus, acris/repens/bulbosus, Lychnis flos-cuculi and Carex spp) are relatively more abundant in the topmost sediments formed, it is thought, in semi-terrestrial conditions (see below) but otherwise it is hard to see any clear pattern, perhaps because the 'seed counts' obtained are simply too small. Woodland and scrub taxa are consistently very rare, never comprising >2% of any assemblage. Clearly trees and scrub plants were rare in the valley floor whilst these deposits formed. Seeds of weed plants, however, do show fluctuations in frequency, which correlate with changes in sample lithology, and the density of carbonised plant material, as discussed below.

The mollusca include quite a high proportion of incompletely identified specimens, mainly due to the fragility and fragmentary state of the shells, but three ecological groups are distinguishable:-

1. Freshwater species. Theodoxus fluviatilis, Valvata cristata, V. piscinalis, Bithynia tentaculata, Lymnaea

truncatula, L. peregra, Bathyomphalus contortus, Planorbis planorbis, Anisus leucostoma, Gyraulus albus, Acroloxus laarstris and Sphaeriacea.
2. Wetland/marsh taxa. Carychium minimum, Succinea/Oxyloma, Vertigo antivertigo, Vallonia pulchella, Zonitoides cf nitidus.
3. Terrestrial taxa. Cochlicopa spp, Vertigo pygmaea, Pupilla muscorum, Vitrea sp., Nesovitrea hammonis, Limacidae, Euconulus fulvus, Trichia hispida group.

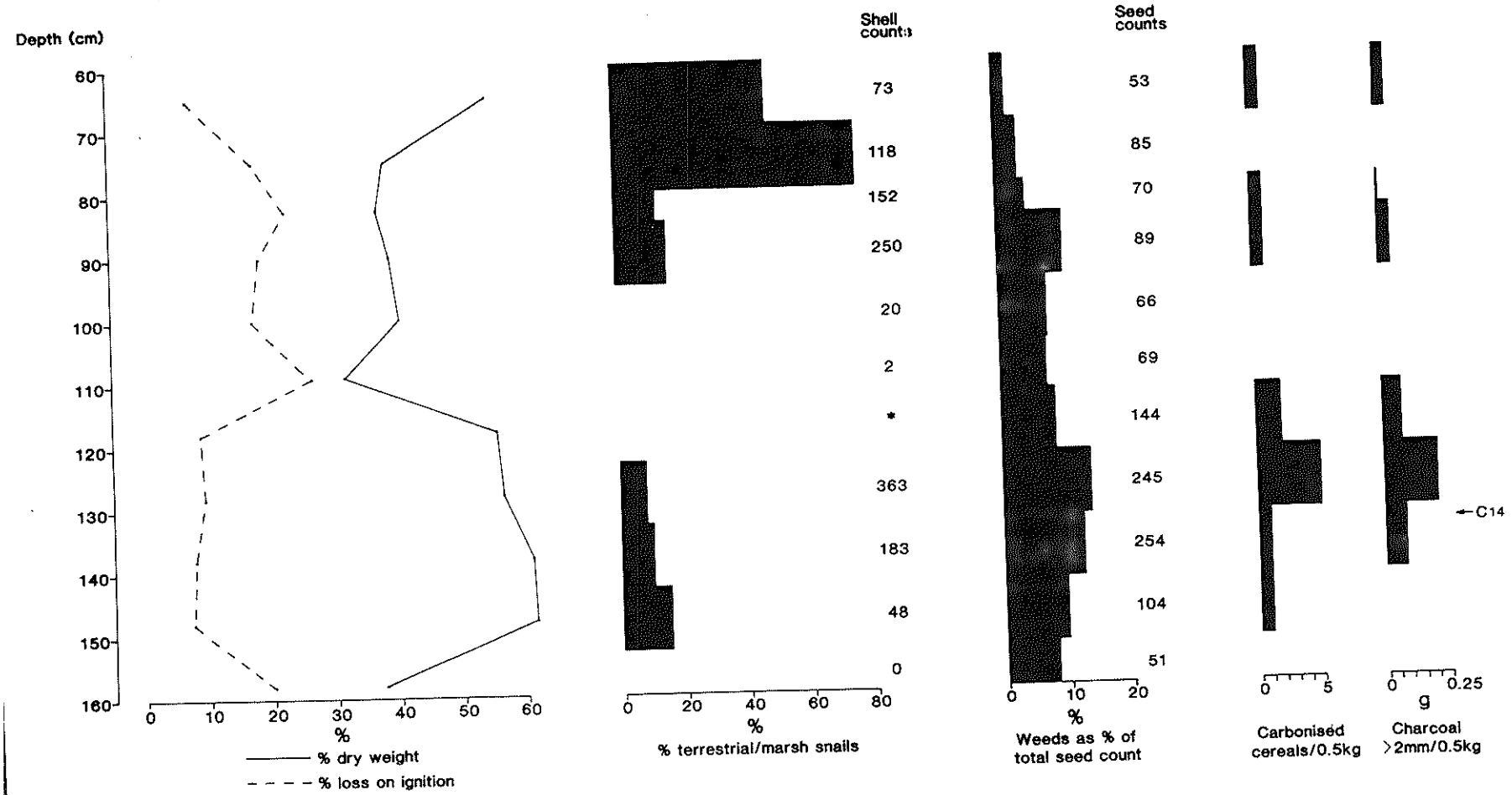
There is obviously considerable overlap in the habitat ranges of taxa in groups 2 and 3, and for present purposes these, and other incompletely identified shells, can be considered as a single group of terrestrial/marsh molluscs.

Some of the more significant results from this section are summarised in Fig 4. The basal organic sediment below 153cm (loss on ignition 20%) produced few macrofossils of plants and no whole molluscs. This is in part due to preservational factors : the presence of gypsum crystals indicated that sulphur acids of biogenic origin caused dissolution of most shells. Ecological interpretation is difficult but the fine-textured organic character of the deposit implies a tranquil sedimentary environment.

Above this, between 153 and 113cm the sediments are much less organic (% loss on ignition 7.4-9.3%) with a high sand content, some sand laminations and large rounded-angular flints up to 65mm. These features indicate deposition in an actively-flowing channel, and some of them could be explained by natural processes of channel migration in the floodplain. There are, however, also features pointing to an anthropogenic influence. Percentages of weed taxa are high at this level. Furthermore carbonised plant material (charcoal and cereals) is more abundant at this level than elsewhere in the section. In addition the sharply-fractured angular flints, some of which are heat-shattered, must relate to human activity. It is therefore suggested that the sand and flint content of the deposits at this level is related, at least in part, to agricultural activities on gravel terrace soils adjacent to the floodplain.[*A sample of wood (fragments of mature oak (Quercus sp) with 28mm diameter willow (Salix sp) roundwood) from 135cm will be submitted for radiocarbon dating.]

Sediments between 113 and 70cm are more fine-textured, becoming stoneless and with a higher organic content (% loss on ignition 17.1-26.3%). It would appear that the channel was no longer active or at least only intermittently flooded. Terrigenous plant material (weed seeds, cereals, charcoal) is still present, but at lower frequencies. Molluscs are virtually absent between 95 and 113cm, perhaps due to taphonomic factors, but above this the assemblages become increasingly dominated by terrestrial/marsh species and by 70-80cm these account for 76% of the total. Carychium spp (including C. minimum) and Vallonia spp (including V. pulchella) are the main snails. An open floodplain environment with abundant litter from fen plants seems to be indicated: the sample from 70-80cm did in fact contain a high proportion of fragmentary monocotyledonous plant stems and leaves.

Above 70cm predominantly mineral fine-textured sediments becoming more oxidised towards the surface underlie the thin peaty topsoil of the modern grazing marsh. The mineral sediments relate to over-bank flooding from the main channel and the peaty topsoil,



TROWSE VIADUCT SECTION 2

Fig 4.

presumably, to decreased frequencies of flooding since small-scale earth embankment of the Yare and drainage of the floodplain. Chalk fragments at 20-45cm imply marling.

Conclusions

The results from studies of macrofossils at these sites are summarised in Table 17. Many of the results are paralleled at contemporary sites elsewhere in the country, but there are some features which seem to have been influenced by the locations of the sites on nutrient-poor, freely-draining sandy soils of the Newport Series (Hodge et al 1984, 271).

The presence of pine charcoal and hazel nutshells in pre-barrow natural features is thought to be related to fires in early Flandrian woodland of pine and hazel. [*More surprising is the presence of pine charcoal in a pre-barrow feature probably Bronze Age date at site 9585. Until a radiocarbon date is received this dating is only tentative, but provisionally it may be suggested that on the sandy soils of the vicinity pine was able to compete with deciduous species and persist locally into the Bronze Age]. Charcoals establish that woodland and scrub of oak, hazel, hawthorn-type and Prunus sp was also present nearby. Other charred macrofossils from funerary contexts at the barrow cemeteries indicate the proximity of Arrhenatheretum grassland, a community well represented by macrofossils from barrow sites throughout the country.

The development of heath vegetation on these sandy soils is indicated by the presence of charred remains of ling and broom from the Romano-British smelting furnace at site 9589 and the late Saxon-Medieval upper ring-ditch fills at site 6099.

Beaker pits at site 9589 indicate an economy based partly on crop production (emmer, hulled and naked barley) and partly on wild plant food collection (hazel nuts, crab apples). Pits associated with the barrows at sites 6099 and 9585 produced similar but sparser material which may also be related to domestic activity. Cereals were exceedingly sparse in the cremation deposits. Iron Age domestic features at sites 9589 and 9794 included charred remains of emmer, spelt and hulled barley but in small quantities, insufficient to suggest very large-scale cereal processing. At 9794 and still more so at 9589 charred hazel nutshell fragments were more common than is usual at Iron Age sites in eastern England. A possible explanation is that on these marginal sandy soils wild plant food collection including nut gathering in hazel scrub was of greater economic importance than at sites on better soils. Some cereal remains were associated with the Romano-British smelting furnace at site 9589 and the upper fills of the ring ditch at site 6099, dated to the late Saxon-Medieval period, but the significance of these in terms of specific activities is hard to assess.

Fig 1: Charred macrofossils from cremation deposits. a,b. Tuber fragments. 9794 1301 c,d, 'bulbs' 9585 1170. Scale : 1mm.

Fig 2: Valley Belt, Trowse (9589) Charred grains of Hordeum vulgare var nudum.

Fig 3: Trowse Viaduct. Locations of sections recorded.

Fig 4: Trowse Viaduct. Summary of results, showing % dry weight and % loss on ignition of sediments, % of terrestrial and marsh molluscs, % of weed seeds,

Site periods	Bixley(Sites 6099 & 9585)	Caistor(Site 9794)	Valley Belt, Trowse(Site 9589)	Trowse Viaduct
5 (Late Saxon to medieval)	Charred remains of wheat, rye and barley with charcoals of broom and ash relating to localised fires - possibly domestic			
4 (Early to Middle Saxon)				[Sedimentation in more tranquil environment. Conditions locally becoming more terrestrial]
3 Romano-British			Iron smelting furnace fuelled with oak, broom, hawthorn group, hazel/alder, Ericaceae. Proximity of heath vegetation. ?Some cereal processing	[Sandy, stoney sediments with weed seeds, charcoal and charred cereals indicate intensive agriculture on river terraces]
2 Later prehistoric (1000bc-43AD)		Charred remains of emmer, spelt and hulled barley related to crop processing/ consumption. Hazel nut collection apparently remaining important.	Charred remains of emmer, spelt and hulled barley relate to crop processing/consumption. Hazel nut collection apparently remaining important.	
1 (Neo-BA)	Charred seeds etc., indicate local Arrhenatheretum grassland. Charcoals of oak, hazel, hawthorn-type, Prunus. [Pine charcoal suggests persistence of pine woodland locally]. Sparse cereal remains in funerary contexts. (?) Domestic deposits with charred hazel nuts and cereals	Charred seeds etc indicate local Arrhenatheretum grassland. Oak and hazel charcoals. Sparse remains of cereals in ?non-funerary contexts.	Beaker pits etc., with charred emmer, hulled and naked barley, charred remains of hazel nuts and crab-apples. Economy involving crop production and foraging.	
	Charcoals from natural features probably relating to early Flandrian pine/hazel woodland			

Table 17: Summary of results from macrofossils

numbers of cereal remains and weights of charcoal fragments per sample. Molluscs from the sample at 113-123cm (marked with an asterisk) were not counted.

Acknowledgements

Initial processing of the samples was undertaken by Val Fryer. I am also grateful to Camilla Dickson for examining the specimens described above as 'bulbs' and for her comments on them.

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Table 2 : 6099 BXY Catalogue of plant macrofossils from flotation samples.

Context 038 Sample 2 9.3 l. Ring-ditch		
Cereal frags	+	
Cereal indet	9	
Triticum aestivum-type	5	
Secale cereale	1	
Hordeum sp	1	
Leguminosae indet	1	
Fallopia convolvulus	2	
Polygonum persicaria/lapifolium	1	
Polygonaceae indet	1	
Plantago lanceolata	1	
Indet seeds etc	2	
Tubers (+ frags)	4	(ovoid with root stumps)
Rhizome frags	+++	(short internodes, longitudinal ribs)
Root frags	+	
Stem frags	+	
Sarothamnus sp (Charcoal : 7mm stems)	+	
Fraxinus sp (charcoal)	+	
Indet charcoal (knot)	+	
Burnt bone frags	+	
031 3. 5 l. Ring-ditch		
Triticum sp.	1	
312 5. 0.6 l. (12.5% sorted) Ring-ditch		
Quercus sp (charcoal)	+	
313 6. 5 l. Ring-ditch		
Arrhenatherum elatius	1 frag	
Stem frags	+	
Root/rhizome frags	+	
104 11 5.0 l. Ring-ditch		
Cereal frags	+	
Cereal indet	1	
Hordeum sp	3	
Caryophyllaceae indet	1	frag.
Rumex acetosella	2	
Polygonum aviculare	1	
Polygonaceae indet	1	
Corylus avellana (nutshell)	+	
Gramineae indet	1	
Indet seeds etc	5	
Thorn	1	
Corylus sp (charcoal : twiggy)	+	
Corylus/Alnus sp (charcoal)	+	
182 12 2.3 l. Pit		
Cereal indet	1	
Black mineralised wood frags (<17mm)		
185 13 1.2 l. Pit		
Black mineralised wood frags (<12mm)		

197 14 18.7 l. Cremation

Cereal frags	+
Triticum sp	1
Corylus avellana (nutshell)	+
Indet seed	1
?immature Arrhenatherum 'tubers'	4
? tuber 1 (flattened sub-spherical, 2.5mm diam.)	
Stem frags (monocot + woody dicot)	+++
Rhizome frags	+
Root frags	+
'Bulb'	1
Quercus sp (charcoal)	+

Black ferrimanganiferous concretions with replaced wood.

198 15 9.7 l. Pit

Medicago/Trifolium/Lotus-type	1
? Root/rhizome frags	+
Indet seed	1
Quercus sp (charcoal)	+

238 18 0.5 l. Grave

Black amorphous ferrimanganiferous concretions.

244 20 3.1 l. Grave

Polygonaceae indet	1
Gramineae indet	1
Quercus sp (charcoal)	+
Corylus sp (charcoal)	+

Black mineralised wood frags (<11mm)

251 25 9.5 l. Cremation

Stem frags	+
?Root/rhizome frags	+
Quercus sp (charcoal)	+

253 29 3.2 l. Cremation

?immature Arrhenatherum tubers	5
Stem frags (monocot and woody dicot)	++
Rhizome frags	++
Root frags	++
'Bulbs'	3
Indet	1
Quercus sp (charcoal)	+

257 30 1.5 l. (25% sorted) Post-hole

Corylus avellana (nutshell)	+
Quercus sp (charcoal)	+
Fused charred 'cokey' material	+

277 31 14.0 l. Cremation

?Immature Arrhenatherum 'tubers'	2
Tuber	1
Rhizome frags	++
Root frags	++
Stem frags (monocot & woody dicot)	+
'Bulbs'	5
Indet ? seeds	4
Quercus sp (charcoal)	+

301 34 0.7 l. Pit
Black mineralised wood frags (<11mm)

197/8 38 25.4 l. Pit, cremation

cf. *Prunus spinosa* (endocarp frag)	+
Stem frags	+
?Root frags	+
Quercus sp (charcoal)	+
Indet (fused ? charcoal)	+
Fused charred 'cokey' material	+

Samples from contexts 311(4), 314(7), 199(16) and 241(19) produced no charcoal > 6mm or other macrofossils.

Table 3 : Catalogue of plant remains from pre-barrow 'natural' features at Bixley, Site 9585

Context 1089 Sample 4 5 litres		
Calluna vulgaris (short frags with leaf bases)		+
cf. *Calluna* (capsule)	1	
Ericaceae (charcoal)	+	
Context 160 Sample 74 5 litres		
Cereal indet (fragments)	1	
Corylus avellana (nutshell)	+	

Table 4 : Catalogue of plant remains from Period 1 contexts at Bixley, Site 9585

Context 1091 Sample 5. 5 litres Pit	
Rhizome frags	+
1106 7 1.9 litres. Pit	
Pinus sp (charcoal)	+
Charred 'cokey' material (?charred resin)	+
1129 11 8.2 litres. Pit	
Bud.	1
Indet	1
1133 13 4.3 litres. Cremation	
Montia fontana subsp.chondrosperma	1
Plantago lanceolata	1
Medicago/Trifolium/Lotus-type	1
cf. Arrhenatherum elatius (immature 'tubers')	3
Root/rhizome frags	+
Stem frags (monocot + woody dicot)	+
Indet	3
1133 14 6.1 litres. Cremation	
Montia fontana subsp.chondrosperma	3
Medicago/Trifolium/Lotus-type	3
cf.Arrhenatherum elatius (immature'tubers')	1 frag
Root/rhizome frags	+
Stem frags (monocot & woody dicot)	+
Indet	3
1133 15 10 litres Cremation	
Medicago/Lotus/Trifolium-type	5
cf.Arrhenatherum elatius (immature 'tuber')	1 frag
Root/rhizome frags	+
Stem frags (monocot & woody dicot)	+
Quercus sp. (charcoal)	+
1170 18 7.5 litres (12.5% sorted). Cremation	
Medicago/Lotus/Trifolium-type	1
cf.Arrhenatherum elatius (immature'tuber')	1 frag
'Bulbs'	2
Root frags	+
Monocot stem frags	+
Moss stem frags	+
Quercus sp (charcoal)	+
Corylus/Alnus sp (charcoal)	+
1170 19 9.4 litres (6.25% sorted) Cremation	
Hordeum sp (rachis internode)	1 frag
cf.Hordeum sp (abraded basal rachis internode)	1
Montia fontana subsp.chondrosperma	2
cf.Arrhenatherum elatius (immature 'tuber')	9
Root frag	+
Monocot stem frags	+
Indet	2
Quercus sp (charcoal)	+
1170 20 11.0 litres (6.25% sorted) Cremation	
Montia fontana subsp.chondrosperma	2
Medicago/Lotus/Trifolium-type	4
Rumex acetosella	1

Plantago lanceolata	1
cf.Arrhenatherum elatius (immature 'tubers')	4
'Bulbs'	3
Root frags	+
Stem frags (monocot & woody dicot)	+
Quercus sp (charcoal)	+
Indet	4

1170 21 9.9 litres (12.5% sorted) Cremation

Medicago/Lotus/Trifolium-type	3
Vicia/Lathyrus sp	2
cf.Arrhenatherum elatius (immature 'tubers')	3
'Bulb'	1
Rhizome frags	+
Stem frags (monocot & woody dicot)	+
Quercus sp (charcoal)	+
Indet	3

1170 22 11.0 litres (6.25% sorted) Cremation

Montia fontana subsp.chondrosperma	1
Medicago/Lotus/Trifolium-type	6
Plantago lanceolata	1
cf.Arrhenatherum elatius (immature 'tubers')	2
Root frags	+
Monocot stem frags	+
Moss stem frags	+
Quercus sp (charcoal)	+
Corylus sp (charcoal)	+
Indet	4

1170 23 9.0 litres (56.25% sorted) Cremation

Montia fontana L subsp.chondrosperma	11
Medicago/Lotus/Trifolium sp	43
Rumex acetosella	4
Plantago lanceolata	4
Carex sp	1
Arrhenatherum elatius ('tuber')	1
cf.Arrhenatherum elatius (immature 'tubers')	14
'Bulbs'	19
?Tuber	1
Root frags	+
Rhizome frags	+
Stem frags (monocot & woody dicot)	+
Moss stem frags	+
Indet	17
Quercus sp (charcoal)	+
Corylus/Alnus sp (charcoal)	+

1192 31 10.5 litres (50% sorted) Cremation

Hordeum sp (rachis internode)	1
Medicago/Trifolium/Lotus sp	11
Vicia/Lathyrus sp	2
Gramineae indet	1
Arrhenatherum elatius 'tuber'	1
cf.Arrhenatherum elatius (immature 'tubers')	3
'Bulbs'	4
Root frags	+
Rhizome frags	+
Stem frags (monocot & woody dicot)	+
Indet	5
Quercus sp (charcoal)	+
Mineralised indet vegetative plant material	+

1215 32 28.4 litres (6.25% sorted) Cremation

Vicia/Lathyrus sp	1
Plantago lanceolata	1
?Rhizome frag	+
Stem frags (monocot & woody dicot)	+
Quercus sp (charcoal: some twiggy)	+

013 36 6.4 litres (12.5% sorted) Cremation

Rhizome frag	+
Woody stem frag	+
Quercus sp (charcoal)	+
Indet	3

017 39 1.8 litres (25% sorted) Cremation

Rhizome frag	+
?Monocot stem frag	+
Quercus sp (charcoal)	+
Corylus/Alnus sp (charcoal)	+

019 41 7.3 litres (12.5% sorted) Cremation

Quercus sp (charcoal)	+

020 44 5.0 litres Pit

Cereal indet	1 frag

030 45 5.0 litres Pit

Hordeum sp	1
?Rhizome frag	+

033 47 16.1 litres (12.5% sorted) Cremation

Stem frags	+
Quercus sp (charcoal)	+

035 50 2.5 litres (50% sorted) Cremation

Quercus sp (charcoal)	+
Mineralised wood	+
Mineralised ?roots	+

036 51 4.0 1 litres Pit

Corylus avellana (nutshell frag)	+
Arrhenatherum elatius ('tuber')	1

037 53 4.0 litres Pit

?Stem frag	+

038 54 5.0 litres Pit

Corylus avellana (nutshell frag)	+
Plantago lanceolata	1
Mineralised ?monocot leaf frags	+
Mineralised ?roots	+

040 58 5.0 litres Pit

Indet (charcoal)	+

042 59 5.0 litres Pit

Corylus avellana (nutshell frag)	+
?Rhizome frag	+

045 60 5.0 litres Pit

Cereal indet	1
Corylus avellana (nutshell frag)	+
Woody stem frag	+
Mineralised ?rhizome frag	+

052 62 5.0 litres Pit

Polygonum sp	1
Galium aparine	1
Corylus avellana (nutshell frag)	+
Thorn	1

053 64 5.0 litres Pit

Corylus avellana (nutshell frag)	+
Corylus sp (charcoal)	+

057 66 11.0 litres (12.5% sorted) Cremation

Quercus sp (charcoal)	+

062 69 14.5 litres (6.25% sorted) Cremation

Quercus sp (charcoal)	+
Prunus sp (charcoal)	+
Crataegus-group (charcoal)	+

Samples from contexts 1130 (12), 1181 (28), 1182 (29), 1230 (35), 019 (41), 031 (46), 036 (51), 036 (56), 111 (72), 112 (73), 256 (75), 257 (76) produced no charcoal > 6mm or other identifiable macrofossils.

Table 5 : Preliminary assessment of samples from Valley Belt, Trowse (site 9589)

These notes are based on a partial scan of flots from processed samples. They do not purport to give a complete list of taxa represented, but serve to indicate those samples including informative assemblages. Only samples positively dated from associated pottery have subsequently been examined in detail, but all flots will be retained for possible future study. Charcoal amounts are estimated on a three-point scale from 1 (small, occasional fragments) to 3 (charcoal abundant, often in large pieces).

Sample	Context		
1	72	Charcoal 2	Cereal grains, chaff, weed seeds (10.0 l)
2	8	Charcoal 1	(8.0 l)
3	210	Charcoal 2	Corylus nutshell. Cereal grain frags (10.0 l)
4	316	Charcoal 3	(11.0 l)
5	C14	sample	
6	239	Charcoal 1	Rare poorly preserved cereals. (10.0 l)
7	249	Charcoal 1	(10.0 l)
8	241	Charcoal 2	Corylus nutshell (5.5 l)
9	243	Charcoal 2	(5.5 l)
10	395	Charcoal 2	Cereal fragments (9.5 l)
11	202	Charcoal 1	(9.0 l)
12	120	Charcoal 1	(9.5 l)
13	57	Charcoal 2	Corylus nutshell. Cereals common inc. Hordeum (8.5 l)
14	89	Charcoal 2	Corylus nutshell. Cereals fairly common, inc. Hordeum (9.5 l)
15	158	Charcoal 2	Corylus nutshell common T. dicoccum-type grains common. Hordeum grains (7.5 l)
16	258	Charcoal 2	Corylus nutshell (11.0 l)
17	003	Charcoal 1	Charred vesicular 'tarry' material abundant (6.0 l)
18	212	Charcoal 2	Corylus nutshell (5.5 l)
19	236	Charcoal 2	Corylus nutshell. Cereal grains (10.0 l)
20	265	Charcoal 2	Corylus nutshell. Cereal grain (6.0 l)
21	468	Charcoal 2	(10.0 l)
22	552	Charcoal 2	Corylus nutshell. A few cereal grains, T. dicoccum spikelet fork. (9.0 l)
23	535	Charcoal 1	Charred 'cokey' material. (8.5 l)
24	566	Charcoal 2	Charred 'cokey' and 'tarry' material (9.5 l)
25	not		
26	processed		
27	587	Charcoal 2	Rare bone frags (8.0 l)
28	616	Charcoal 1	(0.75 l)
29	674	Charcoal 2	Corylus nutshell. Cereal frag. A few weed seeds (11.0 l)
30	675	Charcoal 2	(10.0 l)
31	836	Charcoal 1	Some burnt bone (0.5 l)
32	588	Charcoal 1	Burnt bone fairly common. Arrhenatherum tubers & other vegetative material (tubers etc) (6.0 l)
33	867	Charcoal 3	(10.0 l)
34	905	Charcoal 1	(1.0 l)
35	918	Charcoal 1	(0.5 l)
36	167	Charcoal 1	(0.5 l)
37	927	Charcoal 2	Includes oak and Ericaceae. A few Hordeum grains (9.0 l)
38	930(West)	Charcoal 3	Includes oak and Sarothamnus (Cytisus) and Ericaceae. Cereal frag. (10.0 l)
39	930	Charcoal 3	Mostly oak (11.0 l)
40	930(East)	Charcoal 3	Mostly oak, some ?Ericaceae (14.0 l)
41	965	Charcoal 3	Includes oak and Sarothamnus (10.5 l)
42	921	Charcoal 2	Cereal grains fairly common but poorly preserved (9.0 l)
43	993	Charcoal 2	(1.0 l)

44	1043	Charcoal 1	A few Triticum sp, Hordeum sp grains, T. dicoccum glume base, some weed seeds (0.51)
45	911	Charcoal 1	Burnt bone (3.01)
46	1013	Charcoal 1	Corylus nutshell (2.01)
47	1038	Charcoal 2	Triticum sp frag (10.01)
48	1209	Charcoal 2	Corylus nutshell. Hordeum sp grain (9.01)
49	1276	Charcoal 2	Corylus nutshell abundant (10.51)
50	1317	Charcoal 3	(10.01)
51	1194	Charcoal 1	Corylus nutshell (1.01)
52	1211	Charcoal 1	Corylus nutshell (1.01)
53	1228	Charcoal 1	Corylus nutshell (1.01)
54	1247	Charcoal 2	Corylus nutshell (1.01)
55	1324	Charcoal 1	(4.01)
56	1320	Charcoal 3	Burnt bone frags (10.01)
57	1323	Charcoal 1	Malus seed (3.01)
58	1017	Furnace lining. (Samples 58-78 taken primarily for technological studies of Roman furnace).	
59	1107	?Furnace lining	
60	1016	Furnace lining	
61	1016	Vitrified clay	
62	929	Tap slag	
63	965	Slag	
64	1610	Furnace lining	
65	927	Furnace fill	
66	927	" "	
67	927	" "	
68	927	" "	
69	930	" "	
70	930	Iron Fragments	
71	930	Slag	
72	921	Slag	
73	921	Furnace fill	
74	921	" "	
75	921	Iron frags	
76	924	Slag	
77	928	Slag	
78	929	Furnace fill	
79	1357	Charcoal 2	Corylus nutshell. A few poorly preserved cereal grains (3.01)
80	1538	Charcoal 2	Corylus nutshell abundant (11.01)
81	1399	Charcoal 2	Rare burnt bone. Corylus nutshell. Cereal grain (11.01)
82	1611	Charcoal 2	Rare poorly-preserved cereal grains (11.01)
83	1613	Charcoal 2	Corylus nutshell (2.01)
84	1667	Charcoal 2	(10.01)
85	1423	Charcoal 2	Corylus nutshell (10.01)
86	1515	Charcoal 1	Rare burnt bone (10.01)
87	1697	Charcoal 1	A few Triticum sp. Vicia/Lathyrus sp (1.01)
88	1266	Charcoal 2	Triticum grains, T. dicoccum glume base (10.01)
89	1268	Charcoal 2	A few poorly-preserved cereal grains. (9.51)
90	1263	Charcoal 2	A few Triticum sp.grains (10.01)
91	1265	Charcoal 2	A few poorly preserved cereal grains (3.01)
92	1820	Charcoal 3	Abundant but v.fragmentary (8.01)
93	1723	Charcoal 2	Cereal grain. V.rare burnt bone (10.01)

Context no	57	89	120	158	210	212	674	1194	1209
Sample no	13	14	12	15	3	18	29	51	48
Feature-type	P	P	P	P	P	P	PH	P	P
Cereal indet. ca.fr.	+	+	-	+++	+	-	-	-	+
Cereal indet. ca.	4	5	1	25	6	-	1	-	-
Triticum dicoccum-type ca	2	-	-	56	-	-	1	-	-
Triticum sp ca.	-	-	-	10	-	-	-	-	-
Triticum sp sp. spb	-	-	-	1	-	-	-	-	-
cf.Triticum sp rn fr	1	-	-	-	-	-	-	-	-
Hordeum vulgare L.emend Lam ca	-	-	-	2	-	-	-	-	-
Hordeum vulgare var nudum ca	13	9	-	4	-	-	-	-	-
Hordeum sp	-	4	-	3	3	-	-	-	1
Corylus avellana ns.fr	++	+	+	+++	+	+	+	+	+
Malus sp s.fr	-	-	-	-	-	-	+	-	-
cf.Malus sp ep	-	-	-	-	-	-	+	-	-
Vicia/Lathyrus sp s	-	-	-	-	-	-	1	-	-
Sample volume (litres)	8.5	9.5	9.5	7.5	10.0	5.5	11.0	1.0	9.0

Table 6 : Carbonised plant remains from period 1 (Beaker) pits and post-holes at Trowse, site 9589

675 (Sample 30) produced no identifiable macrofossils; 89 (Sample 14) is not positively dated by associated pottery but the material present is so similar to 57(13) that a Beaker date seems virtually certain. Abbreviations: ca-caryopsis; ep-epidermis with attached parenchyma; fr-fragments; ns-nutshell; rn-rachis node; s-seed; spb-spikelet base. Abundance of hazel nutshell is indicated on a 3 point scale : +++ = c. 7.5ml. of fragments.

Context no	3	72	552	1013	1043	1211	1228	1357	1399	1423	1538
Sample no	17	1	22	46	44	52	53	79	81	85	80
Context-type	P	P	P	P	D	PH	P	P	P	PH	P
Cereal indet. ca.fr.	-	+	+	-	++	-	-	-	+	-	-
Cereal indet. ca.	-	3	2	-	2	-	-	-	2	-	-
Triticum sp ca	-	2	2	-	3	-	-	-	-	-	-
Triticum sp gb.	-	1	-	-	-	-	-	-	-	-	-
Triticum dicoccum Schubl spf	-	-	1	-	1	-	-	-	-	-	-
T. cf. diccocum gb	-	-	-	-	1	-	-	-	-	-	-
Triticum spelta L gb	-	3	-	-	-	-	-	-	-	-	-
Hordeum sp ca	-	-	1	-	1	-	-	-	-	-	-
Scleranthus annuus L	-	1	-	-	-	-	-	-	-	-	-
Vicia/Lathyrus sp	1	-	-	-	-	-	-	-	-	-	-
Fallopia convolvulus (L)	-	-	-	-	fr	-	-	-	fr	-	-
Corylus avellana ns.fr	-	-	+	++	-	++	++	+	+	++	+++
cf.Plantago lanceolata L	-	1	-	-	-	-	-	-	-	-	-
?Rhizome fr.	-	-	-	-	-	-	-	-	+	-	-
Indet seeds etc	-	-	1	-	-	-	-	-	-	-	-
Indet fused 'tarry' material	+++	-	-	-	-	-	-	-	-	-	-
Sample volume (litres)	10.0	10.0	9.0	2.0	0.5	1.0	1.0	3.0	11.0	10.0	11.0

Table 7 : Carbonised plant remains from Period II (Early Iron Age) pits, post-holes and ditch fill at Trowse, Site 9589

Abbreviations: ca-caryopsis; fr-fragments; gb-glume base; ns-nutshell; spf-spikelet fork

Context no	921	927	930
Sample no	42	37	38
Cereal indet. ca.fr.	+++	-	-
Cereal indet ca.	33	2	-
Triticum sp. ca.	5	1	1
Triticum spelta L gb	5	1	-
Triticum spelta L spb	1	-	-
Hordeum sp.ca.	2	3	-
Hordeum sp.ri.	1	-	-
Vicia/Lathyrus sp	2	-	-
Fallopia convolvulus (l)	-	-	1
Polygonaceae indet	1	-	-
Corylus avellana L ns.fr	+	-	-
Calluna vulgaris (l) Hull.flo	-	-	1
Gramineae indet	-	-	2
Indet seeds etc.	-	-	2
Quercus sp.ch.	+	+	+
Sarothamnus (Cytisus) sp.ch.	-	-	+
Pomoideae. ch.	-	-	+
Coylus/Alnus sp.ch.	-	-	+
Ericaceae ch.	+	+	+
Indet (deformed) ch.	-	-	+
?Moss stem	-	-	+

Table 8 : Carbonised plant remains from Period III (Romano-British) contexts associated with an iron-smelting furnace at Trowse Site 9589

Abbreviations : ca-caryopsis; ch-charcoal; flo-flower; fr-fragments; gb-glume base; ns-nutshell, ri-rachis internode; spb-spikelet base.

Charcoal fragments >6mm identified. In addition 921 and 927 include small fragments from young stems of Ericaceae

Table 9 : Catalogue of plant remains from Period 1 contexts at Caistor St. Edmund, Site 9794.

Context 29 Sample 5 0.7litres. Grave.	
Corylus avellana	+
Stem fragments	+
Quercus sp. (charcoal)	+
Indet? bark (charcoal)	+
148 11 1.6litres (25% sorted). Grave.	
Black mineralised wood and stem fragments	
30 12 8.2litres. Grave.	
Plantago lanceolata	1
Indet seeds etc.	4
Stem frags	+
?Root frags	+
170 19 1litre. Grave.	
Root/Rhizome frag.	+
Indet seed	1
29 20 0.5litres. Grave.	
?Root fragment	+
Indet seed	1
1307 38 2.6litres. ?crem.	
Quercus sp (charcoal)	+
1308 39 0.5litres. ?crem.	
Quercus sp (charcoal)	+
1302 48 4.2litres. Cremation	
?Arrhenatherum elatius 'tubers' (immature)	3
Tuber fragments	33
Stem frags	+
Root frags	+
Indet seed	1
Quercus sp (charcoal)	+
Indet. charred twig	+
1301 49 1.4litres 50% sorted. Cremation	
?Arrhenatherum elatius 'tubers' (immature)	2
Tuber fragments	34
Stem frags	+
Root frags	+
Indet seeds	2
Quercus sp (charcoal)	+
1280 67 23.6litres 25% sorted. Ring-ditch	
Quercus sp (charcoal)	+
Corylus sp (charcoal)	+
Indet charcoal	+
1470 81 7.2litres 25% sorted. Grave	
Quercus sp (charcoal)	+
2042 82 3.8litres. Post-hole	
Fallopia convolvulus	1
cf.Atriplex sp	1

2779 90 1.6litres. Post-hole

Cereal indet (caryopsis frag)	+
Cereal indet (culm node)	1+ frags
Triticum dicoccum (spikelet fork)	1
Atriplex sp	4
Vicia/Lathyrus sp	1
Polygonum persicaria/lapathifolium	2
Polygonaceae indet	2
Corylus avellana (nutshell)	+
Indeterminate seeds	3
Unidentified charcoal	+

2299 91 3.8litres. Post-hole.

Fallopia convolvulus	1

1470 94 6.2litres. Grave.

cf.Carex sp	1 frag.
Indet seed	1
Quercus sp (charcoal)	+

2814 95 1.3litres 25% sorted. Pit

Quercus sp (charcoal)	+

1672 104 26.1litres. Grave.

Chenopodiaceae indet	1
Quercus sp (charcoal)	+

Black mineralised wood fragments

1671 105 19.6litres. Grave.

Quercus sp (charcoal)	+

1779 128 13.1litres. Grave

Bromus sp	1
Root/rhizome fragment	+
Crataegus-group (charcoal)	+

5000 145 5.5litres. Ring-ditch

Corylus avellana (nutshell)	+
Quercus sp (charcoal)	+

4049 156 4.0litres. Grave.
Black mineralised wood fragments.

Samples from the following Period 1 contexts were processed but produced no charcoal > 6mm or other plant remains : 170(19), 29(20), 1308(38), 1308(39), 2488(62), 1736(72), 2364(74), 2354(75), 1581(78), 1573(79), 2338(83), 2330(89), 2467(93), 2814(95), 2293(99), 1799(124), 1788(125), 1802(126), 1780(129), 1811(132), 1855(137), 4030(153), 4031(155), 4029(156), 1905(159), not processed 1303(164), 1781(165).

Context	3163	3164	3166	2411	2415	1344	1019	2417	1585	1614	1656	1641	1654	1660	1608	1674	1744	2426	2922	5072	5128	5127
Sample	41	42	44	53	58	60	61	66	80	92	97	98	100	101	110	111	118	121	122	146	148	149
Sample-type	PH	PH	PH	P	P	P	P	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	P	P	PH	P	P
Cereal frags	-	-	-	+	+	-	+	+	-	+	+	+	-	+	-	+	-	+	-	-	+	+
Cereal indet (ca)	-	-	-	6	3	1	2	-	1	1	-	-	-	-	-	2	-	4	-	-	1	3
Triticum sp (ca)	-	-	-	-	3	-	1	1	2	9	2	-	1	3	-	2	-	1	-	-	-	-
Triticum dicoccum-type(ca)	-	-	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Triticum dicoccum (gb)	-	-	-	-	2	-	2	1	-	17	3	-	-	-	-	1	-	-	-	1	-	-
Triticum dicoccum (spf)	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
Triticum spelta (gb)	-	-	-	2cf	-	-	-	-	1cf	26	4	-	1cf	-	1	4	-	-	-	-	-	-
Triticum spelta (spf)	-	-	-	-	-	-	-	-	-	3	1	-	-	-	-	1	-	-	-	-	-	-
Triticum sp (gb)	-	-	-	1	-	-	-	-	-	31	7	1	-	-	-	2	-	-	-	-	1	-
Triticum sp (spb)	-	-	-	-	-	-	-	-	-	16	2	-	-	-	-	1	-	-	-	-	1	1
Triticum sp (ri)	-	-	-	-	-	-	-	-	-	4(b)	-	-	-	-	-	-	-	-	-	-	-	-
Triticum sp (afr)	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
Hordeum sp (ca)	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-
Hordeum vulgare L.emend Lam(1.ca)	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-
Avena sp (ca)	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	1cf	-	-	-	-
Avena sp (a.fr)	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
Chenopodium album L	-	-	-	-	-	-	-	1	-	5	-	-	-	-	-	-	-	-	-	-	-	-
Atriplex sp	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
Chenopodiaceae indet (a)	-	-	-	-	38+fr	1	6+fr	-	-	9	2	-	-	-	-	6+fr	-	-	-	-	2	2
Vicia/Lathyrus sp	-	-	1co	-	2co	-	-	-	-	4s+1co	1	-	-	-	-	-	-	-	-	-	2co	-
Rumex acetosella agg.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Rumex sp	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	2	-	-	-	-	-	-
Polygonum lapathifolium L	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-
Polygonum lapathifolium/persicaria	-	-	-	1	1	-	-	-	-	3	3	1	-	-	-	3+fr	2	1	-	-	2	-
Polygonum sp	-	-	-	-	1	-	1	2fr	1	2	-	-	-	-	-	1	1	-	-	-	-	-
Fallopia convolvulus (L)	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Corylus avellana L	-	-	-	+	-	-	-	-	-	-	+	+	+	-	-	+	-	-	-	-	-	+
Lapsana communis L	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
cf.Carex sp	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Bromus mollis/secalinus	-	-	-	4	-	-	-	-	3	42	11	-	-	3	-	8	-	-	-	-	-	-
Indet seeds etc	-	-	1	3	2	-	9	-	2	6	-	1	1	-	-	4	1	1	-	-	-	1
Stem frags	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rhizome frags	+	?	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tubers	-	-	-	2fr	?	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Charred 'cokey' material	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	+	-	-	-
Sample volume (litres)	3.2	4.4	1.6	7.2	5	1	4.5	1.9	8	10.2	13.6	11.1	2.5	2	2.9	4	1.3	26.1	19.9	1.3	11.5	11.1
% flot sorted	25	100	100	100	100	50	50	100	100	25	100	50	100	100	50	100	100	50	50	100	50	25

Table 10: Plant remains from Period 2 features (post holes and pits) at Caistor St. Edmund. Site 9794

Abbreviations: afr-awn fragments; ca-caryopses; co-cotyledon; fr-fragments, gb-glume bases, 1 ca-caryopses from lateral spikelets; ri-rachis internodes; spb-spikelet bases; spf-spikelet forks.
Notes (a) Sediment-encrusted. Includes C.album + Atriplex (b) Includes T.spelta.

Other period 2 samples, which produced no plant material apart from charcoal were 3165(43), 3131(45), 3140(46), 3145(47), 1579(107), 1607(115), 1880(142), 1881(143).

Table 11 : Catalogue of plant remains from pre-barrow natural features, a period 4 grave and undated features at Caistor St. Edmund, Site 9794. Charcoals not identified from latter two groups.

Pre-barrow natural features	
Context 1309 40 2.4litres	
Corylus avellana (nutshell frag : abraded)	+
Pinus sp (charcoal)	+
Context 2436 65 1.9litres	
Pinus sp (charcoal)	+
Period 4 grave	
Context 1021 23 3.5litres	
Cereal indet	2
Triticum dicoccum-type (caryopsis)	1
Triticum dicoccum (glume base)	3
cf.Bromus sp	1 frag.
cf.Arrhenaterum elatius 'tuber'	1
Indet seed	1
Undated features	
Context 191 Sample 31 3.5litres ?Post hole	
Polygonum persicaria/lapathifolium	1
Arrhenatherum (immature 'tubers')	3
Tuber frag	+
Stem/root frags	+
Thorns	2
Indet seeds etc.	2
193 32 14.0litres (25% sorted) ?post-hole	
?Arrhenatherum elatius (immature 'tubers')	1
Tuber fragments	18
Chenopodium album	1
Root/rhizome/stem frags	+
291 35 21.9litres (25% sorted). Post-hole.	
Indet ?seeds	2
Frags of ?plant tissue with large vesicles	+
2484 64 4litres (50% sorted). Pit.	
Cereal indet	1
Indet	2
1854 135 1.5litres. Pit.	
Cereal indet	1
1280 160 13litres (50% sorted). Ring ditch	
Cereal frags	+
Cereal indet	4
Triticum sp	1
Triticum dicoccum (glume bases)	7
Triticum dicoccum (spikelet forks)	5
Triticum sp (glume bases)	3
Triticum sp (spikelet fork)	1
Rumex sp	1

1280 161 28litres (25% sorted). Ring-ditch.

Cereal frags	+
Triticum sp	1
Triticum dicoccum (spikelet fork)	1
Polygonum persicaria/lapathifolium	1

Samples from the following contexts produced no identifiable macrofossils : 139(6), 2483(63), 2085(85), 2777(86), 1633(108), 1639(109), 1855(137), 1453(162).

Table 12 : Samples from mineralised/organic 'stains' in period 1 features

Flotation samples including mineralised plant material and amorphous concretions were:
6099 BXY 182(12), 185(13), 238(18), 301(34)
9585 BXY 1192(31), 035(50), 038(54), 045(60)
9794 CBN 148(11), 1672(104), 4049(156).

6099 BXY
207 Sample 17. Period 1 cremation pit fill
Sample of dark greyish-brown loamy sand; very rare charcoal flecks and small (up to 5mm), amorphous ferrimanganiferous concretions.

195 Sample 37. Period 1 pit fill
Sample of dark brown coarse sand; abundant large (up to 15mm) ferrimanganiferous concretions; some charcoal frags up to 7mm. The concretions are amorphous, cementing together sand grains and pebbles. No mineral replaced plant tissue can be seen microscopically.

9585 BXY
1117 Sample 8. Period 1 pit fill
Sample of yellowish-brown coarse sand; a few small (up to 5mm) amorphous ferrimanganiferous concretions, cementing sand grains and pebbles. No replaced tissue. Rare charcoal flecks.

1118. Sample 9. Period 1 pit fill
Sample of brown coarse sand; abundant very large (up to 35mm) amorphous ferrimanganiferous concretions, cementing sand grains and pebbles. Rare charcoal flecks. No replaced tissue.

1135 Sample 17. Period 1 pit fill
Sample of yellowish-brown sand; rare small (up to 7mm) amorphous ferrimanganiferous concretions, cementing sand grains.
Rare charcoal flecks. No replaced tissue.

1184. Sample 30. Period 1 pit fill
Sample of yellowish-brown sand; abundant large (up to 16mm) amorphous ferrimanganiferous concretions, cementing sand grains.
Rare charcoal flecks. No replaced tissue.

9794 CBN
029. Sample 1. Stain in period 1 grave fill
Sample of brown loamy sand with very dark greyish-brown sand inclusions : Small charcoal fragments. Rare very small (1mm) ferrimanganiferous concretions, no replaced tissue.

030. Sample 2. Stain in period 1 grave fill
Sample of brown loamy sand. Small charcoal fragments. Rare small ferrimanganiferous concretions, no replaced tissue.

028 Sample 3. ?Coffin stain in period 1 grave fill
Sample of dark greyish-brown sand (cemented), rare small amorphous ferrimanganiferous concretions; rare small (2mm) black replaced wood frags; small charcoal fragments.

030 Sample 4. Stain in period 1 grave fill
Sample of brown loamy sand. As sample 2.

1883 Sample 144. Stain in period 1 grave fill
Sample of brown sand. Small charcoal flecks.

4029 Sample 158. Wood in period 1 grave.
Sample of sand with orange-brown replaced wood fragments up to 35mm. 'Phosphatised' appearance.

cm	% dry wt.	% loss on ignition
60-70	54.6	7.8
70-80	38.7	17.4
80-85	37.1	22.6
85-95	39.0	18.5
95-105	40.3	17.1
105-113	31.8	26.3
113-123	55.5	8.7
123-133	56.5	9.3
133-143	61.0	7.8
143-153	61.2	7.4
153+	37.8	20.0

Table 13 : % dry wt. and % loss on ignition of sediments. Trowse Viaduct, Section 2.

Depth (top of sample:cm)	60	70	80	85	95	105	113	123	133	143	153
Characeae (oogonia)	-	-	+	-	-	-	-	+	+	-	-
Caltha palustris L	1	-	2	-	6	2	4	3	1	2	1
Ranunculus acris/repens/bulbosus	4	27	3	2	7	5	10	13	18	6	2
Ranunculus flammula L	-	-	-	2	-	-	1	1	1	-	-
Ranunculus subg.Batrachium	-	1	1	4	2	1	1	11	3	1	fr
Nymphaeaceae indet	-	-	fr	fr	-	-	-	-	-	-	-
Papaver cf.rhoeas L	-	-	-	-	-	-	-	1	-	-	-
Papaver sp	-	-	-	-	-	-	-	1	-	-	-
Fumaria officinalis L	1	-	-	-	-	-	-	-	-	-	-
Raphanus raphanistrum L (siliqua)	-	-	-	-	-	-	-	fr	-	-	-
Rorippa microphylla (Boenn) Hyl.	-	-	4	-	1	16	19	27	22	5	-
Cruciferae indet	-	-	-	-	-	-	-	1	-	-	-
Silene sp.	-	-	-	-	-	-	-	1	-	-	-
Lychnis flos-cuculi L	-	16	2	26	1	2	3	3	3	3	3
Agrostemma githago L	-	-	-	-	-	-	1	1	fr	-	-
Stellaria media-type	-	-	-	-	-	3	2	2	1	1	-
Stellaria cf.alsine Grimm	-	6	1	6	1	-	2	4	9	1	-
Caryophyllaceae indet	-	1	-	-	-	-	-	2	-	-	-
Montia fontana L.subsp.Chondrosperma	-	-	-	-	1	-	1	5	9	4	1
Chenopodium album L	-	1	1	4	4	1	1	9	6	-	-
Chenopodium ficifolium Sm.	-	-	-	-	-	-	-	-	1	-	-
Atriplex sp	-	2	1	3	-	-	1	1	2	1	-
Chenopodiaceae indet	-	-	-	-	3	-	-	-	2	-	-
Malva sylvestris L	-	-	-	-	-	-	-	-	1	-	-
Linum sp (capsule fragment)	-	-	-	-	-	-	fr	-	-	-	-
Ilex aquifolium L (leaf fragment)	-	-	-	-	-	-	-	-	fr	-	-
Rubus sp	-	fr	-	-	-	-	-	-	1	-	-
Potentilla sp	5	-	1	-	-	-	-	-	1	-	-
Aphanes arvensis/microcarpa	-	-	-	-	-	-	-	1	-	-	-
Epilobium sp	-	-	-	-	-	-	-	1	4	-	-
Myriophyllum sp	-	-	-	-	1	-	-	-	-	-	-
Hippuris vulgaris L	-	-	-	-	2	1	-	4	-	-	-
Apium nodiflorum (L) Lang.	-	-	6	4	4	7	4	9	13	3	-
Oenanthe aquatica (L) Poiret	-	2	3	2	6	1	16	11	14	6	3
Oenanthe sp	-	-	-	-	-	-	-	-	-	2	-
Umbelliferae indet	-	-	-	1	-	-	-	-	-	-	-
Polygonum aviculare agg.	-	-	1	-	-	1	2	1	1	2	-
Polygonum lapathifolium L	-	-	-	-	-	-	-	1	1	-	-
Polygonum hydropiper L	-	-	-	-	-	-	-	-	-	3	2
Polygonum cf.hydropiper	-	-	-	-	-	-	4	5	3	-	2
Polygonum convolvulus L	-	-	-	-	-	-	-	1	-	-	-
Polygonum sp	-	-	-	2	-	fr	-	1	-	-	-
Rumex acetosella agg	-	-	-	2	-	-	3	6	4	2	2
Rumex sp	1	-	3	2	5	-	7	7	17	1	1
Urtica dioica L	2	-	-	-	1	3	2	11	8	15	9
Urtica urens L	-	-	-	-	-	-	-	-	-	-	1
Alnus glutinosa (L) Gaertn.	-	-	-	-	-	-	-	-	1	-	-
Menyanthes trifoliata L	20	4	13	9	6	3	3	7	9	3	-
cf.Myosotis sp	-	-	4	-	-	2	1	-	3	1	6
Solanum dulcamara L	-	-	-	1	-	-	-	1	-	-	-
Solanum nigrum L	-	-	-	-	-	-	-	-	1	-	-
Scrophularia sp	-	-	-	-	-	-	-	-	2	-	-
Verbena officinalis L	-	-	-	-	-	-	-	1	-	-	-
Mentha arvensis/aquatica	3	5	2	1	2	5	5	7	10	3	2
Sambucus nigra L	-	-	-	1	1	-	3	2	3	-	-
Valerianella sp	-	-	-	-	-	-	-	1	-	-	-
Bidens cernua L	-	-	-	-	-	-	-	6	-	-	-
Bidens sp	-	-	-	-	-	1	-	-	3	2	1
Anthemis cotula L	-	-	-	-	-	-	1	1	3	-	-
Cirsium/Carduus sp	-	-	-	-	-	-	-	1	-	-	-
Lapsana communis L	-	-	-	-	-	-	-	-	1	-	-
Compositae indet	-	3	-	-	-	-	-	5	1	3	-
Alisma plantago-aquatica L	-	-	1	-	1	5	8	7	9	-	8
Sagittaria sagittifolia L	-	-	-	-	-	-	-	-	1	1	-
Alismataceae indet	-	-	2	-	-	1	1	-	3	2	-
Potamogeton spp	-	1	1	4	1	-	3	5	5	-	-
Zannichellia palustris L	-	-	-	-	-	-	-	-	1	-	-
Juncus sp(p)	-	-	-	-	-	-	+	+	-	+	-
Lemna sp	-	-	-	-	-	-	-	-	-	1	-
Sparganium sp	-	-	1	-	-	-	-	-	-	1	-
Eleocharis palustris/uniglumis	1	1	-	2	-	-	2	-	2	1	-
Schoenoplectus lacustris (L) Palla	1	-	5	1	-	1	16	26	15	6	1
Isolepis setacea (L) RBr	-	-	-	-	-	-	1	2	11	14	1
Carex spp	8	9	4	4	3	1	3	5	6	4	-
Gramineae indet	-	1	5	1	2	3	6	5	6	1	-
Indet seeds etc.	6	4	2	4	5	3	7	17	11	3	4

Table 14 : Plant macrofossils (uncarbonised) : Trowse Viaduct, Section 2
Taxa are represented by fruits or seeds except where indicated.
fr-fragments only; +-present but not counted.

Depth(top of sample:cm)	60	70	80	85	95	105	113	123	133	143	153
Cereal indet.(ca)	-	-	-	1	-	-	-	1	1	-	-
Triticum sp.(ca)	1	-	1	-	-	-	2	2	-	-	-
Triticum spelta (gb)	-	-	-	-	-	-	-	2	-	-	-
Hordeum sp	-	-	-	-	-	-	-	-	-	1	-
Grass/cereal (cfr)	-	-	-	-	-	-	-	+	-	-	-
Bromus sp	-	-	-	-	-	-	-	-	1	-	-
Charcoal > 2mm (g)	0.04	-	0.01	0.05	-	-	0.07	0.21	0.08	-	-
Heat-shattered flint	-	-	-	-	-	-	-	-	+	-	-

Table 15 : Carbonised plant material etc : Trowse Viaduct, Section 2

Depth (top of sample) :cm)	60	70	80	85	95	105	123	133	143
Theodoxus fluviatilis (Linne)	-	-	-	+	-	-	-	-	-
Valvata cristata (Müller)	+	-	+	+	-	-	-	+	+
Valvata piscinalis (Müller)	-	-	+	+	-	-	+	+	-
Valvata spp	+	+	+	+	+	-	+	+	+
Bithynia tentaculata Linné)	+	-	+	+	-	-	+	+	-
Bithynia spp.	+	+	+	+	+	+	+	+	+
Lymnaea truncatula (Müller)	+	+	-	+	-	-	+	+	-
Lymnaea peregra (Müller)	+	-	-	+	-	-	-	-	-
Lymnaea spp	+	+	-	+	+	-	+	+	+
Planorbis planorbis (Linné)	-	-	+	+	-	-	+	-	-
Anisus leucostoma (Millet)	+	-	+	-	-	-	+	+	-
Bathyomphalus contortus (Linné)	-	-	-	+	-	-	+	+	-
Gyraulus albus (Müller)	-	-	-	-	-	-	+	+	-
Acroloxus lacustris (Linné)	-	-	-	+	-	-	-	-	-
Total freshwater gastropods	35	24	117	171	15	-	280	140	35
Sphaeriacea (valves)	5	7	22	49	1	2	84	43	10
(valve pairs)	-	-	4	15	-	-	11	3	1
Total freshwater (MNI)	38	28	132	211	16	1	333	165	41
Carychium minimum Müller	2	16	-	-	-	-	-	-	-
Carychium spp.	1	13	3	8	1	-	7	4	-
Succinea/Oxyloma	4	-	1	3	-	-	3	-	-
Cochlicopa spp.	2	6	-	7	-	-	1	3	-
Vertigo antivertigo (Draparnaud)	2	2	-	-	-	-	-	-	-
Vertigo pygmaea (Draparnaud)	-	-	-	-	-	-	-	1	-
Vertigo spp.	1	3	3	6	-	-	-	2	-
Pupilla muscorum (Linné)	-	-	-	-	-	-	1	-	-
Vallonia pulchella (Müller)	3	5	-	-	-	-	2	-	-
Vallonia spp	8	39	3	5	1	-	10	5	3
Vitrea sp	-	-	-	1	-	-	-	-	-
Nesovitrea hammonis (Ström)	2	-	-	-	-	-	1	-	-
Zonitoides cf.nitidus (Müller)	-	-	-	2	-	-	-	-	-
Zonitidae indet	1	3	6	4	-	-	1	2	-
Limacidae indet	4	3	3	2	2	1	1	1	-
Euconulus fulvus (Müller)	-	-	-	-	-	-	1	-	-
Trichia hispida-group	4	-	-	1	-	-	2	-	1
Indeterminate	1	-	1	-	-	-	-	-	3
Total marsh/terrestrial	35	90	20	39	4	1	30	18	7

Table 16 : Molluscs : Trowse Viaduct, Section 2

Other shelly macrofossils present but not counted included Arionid granules and ostracods. The sample at 60-70cm included amphibian bones, and at 123-133cm and 133-143cm there were mammal bone fragments up to 25mm. Shells were not extracted from the sample at 113-123cm, and were absent at 153cm.