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Elms Farm, Heybridge, Essex: plant macrofossils from wet and waterlogged contexts.

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Summary

38 samples from waterlogged fills of wells and a palaeochannel, dating from the first to fourth centuries AD were examined. Low densities of cereal remains were present in most contexts, but were common only in the palaeochannel, where crop processing waste was abundant. Other crops and utilised plants included dill, coriander, walnut, flax/linseed, possibly sainfoin, opium poppy and deadly nightshade; hazel, sloe, bramble and elder may also have been consumed. Macrofossils of dryland herbs, principally weeds and grassland species, were abundant. Trees and shrubs were sparsely represented. Despite the low-lying, poorly-drained situation of the site, close to an estuary, remains of wetland and aquatic plants and halophytes were rare. Assemblage composition was, overall, very consistent at all periods, and in different parts of the site. The results are compared with other sites in Essex.

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Introduction

Excavations at this 29 acre site were undertaken in 1993-5 by the Essex County Council Field Archaeology Unit under the direction of Mark Atkinson (Atkinson and Preston 1998). The 1993 excavation was funded by Bovis Homes Ltd, and subsequent work by English Heritage. The area examined was on low-lying terrace gravels, with some brickearth, clay and silt, formerly under rough pasture, about 0.5km to the north of the River Chelmer, at the head of the Blackwater Estuary. The river at this point is now tidal and the channel, where unembanked, is flanked by intertidal mudflats and salt marsh.

Evidence for activity before the mid-1st century BC was slight, and had been partly removed by later features, but included pits and a Middle Bronze Age ring-ditch with cremations. Rather few features could be defined as definitely pre-Roman, but these included a possible trackway, circular structure and square building with associated pits, interpreted as a possible shrine. From *c.* 50 BC, there was more intensive activity with up to ten circular buildings and associated cut features, metalled surfaces and trackways. Activity at this period, and later, was partly focused on a more developed 'temple complex', but included settlement areas. Subsequent Roman activity involved development and elaboration of the temple complex, alongside domestic and industrial areas. The road system, established in the 1st century, persisted through much of the Roman period. The temple complex appears to have been abandoned at some point in the late 4th or early 5th centuries, though pit-digging continued. There were some Early Saxon features, but there was very little evidence for any significant activity after the 5th century (Atkinson and Preston 1998).

The majority of cut features at this site were comparatively shallow, with well-drained fills of re-worked gravel and brickearth. An extensive series of bulk samples was collected for retrieval, assessment and analysis of charred plant remains and other macrofossils (Angela Monckton, in prep.). This report is concerned exclusively with plant macrofossils from the wet or waterlogged basal fills of deep pits, wells and a palaeochannel, ranging in date from *c.* 60 - 400+ AD.

Methodology

38 samples from the waterlogged fills were assessed. A small sub-sample (100 - 200g) was removed from each sample and disaggregated by manual agitation in hot water, before separating the organic fraction by wash-over, using a 0.5mm collecting mesh. The organic fraction was then scanned under a binocular microscope at magnifications of up to x50 (Murphy, unpublished). In approximate chronological order the samples assessed were:

Well 13883 (Contexts 18200, 18216, 18236, 18237, 18240). Area I, Phase IIIB, Mid 1st - Early 2nd century.
Well 9421 (Contexts 9894, 9895). Area D, Phase IIIB, 2nd century.
Well 8188 (Contexts 8167, 8214, 8195, 8196). Area E, Phase III, Mid 2nd - Early 3rd century.
Pit 9029 (Contexts 8009, 9028, 9064). Area D, Phase IIIC, Mid 2nd century.
Well 6280 (Context 16074). Area H, Phase IIIB, Mid - Late 2nd century.
Palaeochannel (Contexts 12142, 12101, 12135). Area R, Phase IV, 3rd century.
Well 14984 (Contexts 14939, 20034). Area L, Phase IV-V, Early - Mid 4th century.

Of these samples, seventeen produced macrofossil assemblages considered to be sufficiently large and well-preserved for analysis (see Tables 2 - 6). Samples selected for analysis were processed using the methods of Kenward *et al* (1980).

Identifications were confirmed by comparison with modern reference material. Macrofossils of most taxa were counted, apart from *Juncus* seeds, whose abundance was assessed on a three-point scale. In addition, no counts were made of macrofossils from 12101, 20 -30 and 30 - 40cm (Table 5), for they appeared essentially identical to those from 12101, 10 - 20 and 40 - 50cm.

A Species Richness Index was calculated for each sample, as follows:

$$\frac{\mathbf{a}}{\mathbf{b}} \mathbf{\times 100}$$

Where, **a** = Number of taxa in sample; **b** = Number of taxa in whole assemblage (Wiltshire and Murphy, in press). At this site, **b** was taken as the total number of taxa from the site as a whole (Table 1): 128 taxa in total.

Species richness and taphonomy

It is well known that macrofossil assemblages from Roman and later contexts at urban and semi-urban sites are taphonomically complex, commonly consisting of inputs from more than one source. Assemblages composed of material from one source only are most uncommon. Interpretation of macrofossil assemblages from such sites is largely dependent upon understanding their taphonomy, and a simple Species Richness Index (SRI) provides an objective and quantified contribution towards this understanding (Figure 1). Assemblages which included a very wide range of taxa, and hence a high SRI are likely to have come from deposits which accumulated in situations where plant macrofossils from several sources were incorporated into them. By contrast, a low SRI can indicate a single source. However, it can also indicate poor preservation: for example, at the present site, a sample from the palaeochannel fill 12101 included only a restricted range of uncharred plant macrofossils (Table 5), principally because it was an upper, partly de-watered upper fill, in which only durable macrofossils could be expected to be preserved: the SRI, 10.2%, was the lowest calculated for wet samples from this site.

In all other samples examined here, preservational factors are not thought to be relevant. In the well fill 18200 SRI was low (14.8%) but preservation good. The assemblage from this particular sample is thought to consist mainly of hay, with only a minor input from other sources (see below for further discussion). Samples from the Early - Mid 4th century well 14984 (14939, 20034) also had low SRIs (19.5% and 16.4%) despite good preservation conditions. These two samples produced no residues from cultivated plants, aquatic taxa or coastal plants and very few macrofossils of scrub species: the assemblages from them were overwhelmingly dominated by weeds, mostly *Urtica dioica* (nettles): 90.4% and 91.9% respectively. This implies abandonment of the immediate area at this time, with dense development of weed vegetation; indeed no obvious sign of human activity at all.

Gross assemblage composition

For purposes of interpretation, the taxa identified have been grouped, partly in terms of the means by which they were preserved, partly on ecological grounds (Table 1: Figure 2).

Charred cereals

A very extensive series of bulk samples was collected for analysis of charred cereals and associated weeds (A. Monckton, in prep), but these samples from waterlogged contexts also included charred material. In general, quantities were small. Many samples included a few charred caryopses and chaff fragments, but these are considered to be no more than the type of 'settlement noise' characteristic of Roman sites. However, fills of a palaeochannel in Area R, dating to the third century included very high densities of charred cereal remains (Table 5). This charred material consisted predominantly of glume bases and other chaff fragments of spelt wheat (*Triticum spelta*), with traces of emmer (*Triticum dicoccum*). Cereal grains were also present, together with fragments of plumules and radicles ('sprouts'). Occasional scraps of barley rachis internodes (*Hordeum* sp) and wild or cultivated oat awn (*Avena* sp) were also present.

Plainly crop processing waste accumulated, or was dumped, into this channel. The charred material is in secondary context, so the precise activity represented is uncertain. However, at other low-lying Roman sites in Eastern England, where comparable assemblages have come from more secure contexts such as corn-dryers, they have been interpreted as relating to malting. (*e.g.* Stebbing Green, Essex (Murphy 1999); Scole/Stuston By-Pass, Suffolk (Murphy and Fryer, in prep). At these sites, cereal chaff was used as a fuel for parching malt: the resultant charred assemblages comprise a mixture of fuel residues and sprouted grains. Typically, these sites were in valley floor locations, adjacent to streams and rivers, where there was an ample water supply for steeping grain to initiate germination, and where discharge of waste water presented no problems.

Charred weed seeds etc

The range of weed taxa represented by fruits or seeds is given in Table 1. Even in the 3rd century palaeochannel fills few taxa were identified. It is unclear how typical these might be of the arable weed flora in the area.

Uncharred cereals

Several samples included a few uncharred glume bases of emmer, spelt and indeterminate wheat. These need not represent anything more than scraps of chaff blown about the site from areas where cereal processing was undertaken, or where cereal by-products were being used for flooring, litter, thatching or other purposes.

Other crops and utilised plants

Taxa identified comprised *Anethum graveolens* (dill), *Coriandrum sativum* (coriander), *Juglans regia* (walnut), *Linum* cf *usitatissimum* (flax/linseed), cf *Onobrychis viciifolia* (sainfoin?), *Papaver somniferum* (opium poppy) and *Atropa bella-donna* (deadly nightshade) (Table 1). In addition, some of the some of the macrofossils of 'wild' trees and shrubs could represent food wastes, notably *Corylus avellana* (hazel), *Prunus spinosa* (sloe), *Rubus* section

Glandulosus (bramble) and *Sambucus nigra* (elder). Macrofossils of cultivated plants other than cereals were, however, rare at Elms Farm, and no deposits rich in plant food residues were encountered.

Almost all of these taxa have previously been reported from Roman sites in Essex, notably from Colchester and the villa at Great Holts Farm, Boreham (Murphy 1984, 1992, 1997). The presence of *Atropa bella-donna* in Well 13883 (Mid 1st - Early 2nd century) calls for some comment. Deadly nightshade grows wild on well-drained chalk soils, and is most unlikely to have formed part of the local flora at Elms Farm. Seeds of this species have, however, been reported from a child's coffin, found preserved by waterlogging, on the line of the Scole/Dickleburgh By-Pass, Norfolk (Fryer and Murphy, in prep.). They were associated with leaves of box (*Buxus sempervirens*), and it seems highly likely that these were placed deposits, perhaps a wreath of box placed on the breast, with a strewing of deadly nightshade berries over the body. The possible symbolic attributes of these plants is obvious: box symbolising life, and deadly nightshade, death. *Atropa* therefore seems to have had some 'religious' associations, besides its pharmacological properties as a source of atropine.

The identification of *Onobrychis viciifolia* (sainfoin) was tentative, being based on a small fragment of tuberculate pod. It is a native plant (Godwin 1975, 180), growing principally on calcareous soils, but is also a fodder crop.

Trees and shrubs

In addition to the scrub species mentioned above, samples included a few macrofossils of *Betula* sp (birch), *Salix* sp (willow/sallow) and *Quercus* sp (oak). Seeds of *Sambucus nigra* (elder) were notably common in Well 9421 (2nd century), but the quantities observed could easily have come from a single bush. The macrofossils therefore provide little data on any possible phases of scrub development.

Dryland herbs (weeds and grassland species)

This 'ecological category' includes by far the largest number of taxa (Table 1; Figure 2). Plainly, some taxa in this category are today exclusively grassland plants (e.g. *Linum catharticum, Prunella vulgaris*) and others occur exclusively in disturbed habitats (e.g. *Papaver rhoeas, Thlaspi arvense*). However, there is considerable overlap in the habitats of so-called 'weed' and 'grassland' plants, and this may have been still more marked in arable fields in the past, where tillage was relatively inefficient, permitting grassland species to persist (Hillman 1981). Equally, weed species commonly occur in areas of grassland disturbed and nutrient-enriched by grazing animals.

Greig (1988) has pointed out the very consistent composition of macrofossil assemblages from wells in the west and central Midlands, which he suggests indicates infilling by natural processes in areas of weedy abandoned land, whilst the surroundings were overgrown by scrub. Most of the assemblages from Elms Farm could be interpreted in this light. Alternatively, intentional back-filling with soil and other deposits from the immediate vicinity could be represented, for such deposits would have included abundant seeds and other remains of weed and scrub plants. Weed taxa occurring at notably high frequencies in at least some samples comprised *Conium maculatum* (hemlock), Chenopodium *album* (fat-hen), Rumex spp (docks) and, ubiquitously, *Urtica dioica* (nettle). Segetal plants (arable weeds) such as *Agrostemma githago* (corn cockle) and *Anthemis cotula* (stinking mayweed) were not particularly common: it appears that local ruderal weed vegetation is principally represented, rather than residues from crop cleaning.

One sample, from context 18200 in the Mid 1st - Early 2nd century well 13883, was rather different in character (Table 2). It had a notably low Species Richness Index (14.8%), implying an origin mainly from one source. The dominant taxon was of small Poaceae (grass) caryopses (72.5% of total macrofossil count), which were associated with *Leontodon* sp (hawkbit), larger Poaceae, *Ranunculus acris/repens/bulbosus* (buttercups), *Eleocharis* sp (spike-rush), *Filipendula ulmaria* (meadowsweet), *Juncus* sp (rushes), *Rhinanthus* sp (yellow rattle) and *Thalictrum flavum* (meadow rue). 'Weed' species were only sparsely represented. Most of the plants represented in this sample fall into Greig's (1983) group of taxa characteristic of hay meadows which are also likely to be represented in sub-fossil assemblages. It therefore seems probable that this sample either represented the immediate proximity of hay meadow or (more probably) incorporation of residues from hay in this well fill.

Wetland and damp grassland plants

This group of plants was sparsely represented, compared to dryland herbs. Only *Carex* spp (sedges), *Eleocharis* sp (spike-rush) and *Juncus* spp (rushes) were reasonably frequent, and then never abundant. Despite relatively high groundwater levels locally, the gravel surface appears to have been well-drained so that wetland and wet grassland vegetation did not develop in the vicinity. Even in the palaeochannel (Table 5) wetland taxa were not common, implying that it was no longer active during infilling.

Freshwater aquatics

Obligate aquatic plants were conspicuously rare in samples from the wells at this site, and by no means common in the palaeochannel fills (Table 5). Only three taxa were recorded: Alismataceae indet. (water plantain family), *Lemna* sp (duckweed) and *Ranunculus* subgenus *Batrachium* (water crowfoot). Prior to back-filling, the wells may have been covered, and presumably any aquatic vegetation which did develop was removed. It appears either that there was little or no standing water in these features whilst they became infilled, or else that colonisation was not possible.

Coastal and brackish-water plants

Despite the proximity of the estuary, coastal and brackish-water species were only sparsely represented. Only *Triglochin maritima* (sea arrow-grass) was at all frequent, notably in Well 13883 (Mid 1st - Early 2nd century), though rush seeds identified reasonably confidently (using criteria defined by Koerber-Grohne 1964) as *Juncus gerardii* (mud rush) occurred in Wells 13883, 9421, and 8188. Other taxa included *Beta vulgaris* (beet) and *Daucus carota* (wild carrot), both of which are found on embankments in the vicinity today, *Oenanthe* cf *lachenalii* (parsley water dropwort?) and *Scirpus maritimus* (sea club rush).

It is plain that at no stage were conditions suitable for development of halophytic vegetation at the site: the very existence of the wells shows that groundwater was fresh throughout the Roman period. These macrofossils of coastal plants are therefore likely to have reached the site with plant material imported to the site for fodder, litter, thatching or other purposes.

Vegetative plant material

Besides the fruits and seeds discussed above, most samples contained some other plant macrofossils, often not well preserved: charcoal, wood and twig fragments, buds and budscales, rosaceous thorns of *Prunus/Crataegus* and *Rubus*-type, mosses and, in well 13883, pinnule and rachis fragments of *Pteridium aquilinum* (bracken). The rosaceous thorns were often associated with other macrofossils of *Rubus* and, occasionally, *Prunus*: they serve to demonstrate that thorny shrubs were growing locally. The bracken remains are likely to represent material imported to the site for use as litter and flooring materials.

Spatial and temporal variation in assemblage composition

Reference to Figure 2 illustrates the essential similarity of the assemblages from the wells, which date from the 1^{st} to 4^{th} centuries. In all cases, dryland herbs predominated, and most other groups were comparatively rare. In Well 9421, *Sambucus* seeds were common but, as noted above, this need not be significant. No local ecological changes are apparent. Charred cereal remains occurred in abundance only in the palaeochannel, at the northern edge of the main focus of settlement. It is reasonable to suppose that activities involving cereal processing were confined to such peripheral areas of the site.

Comparison with other sites in Essex

Excavations at Slough House and Chigborough Farms, Heybridge, on the gravel terraces of the Blackwater, and in a very similar ecological situation to the site at Elms Farm revealed a series of shallow wells/water-holes dating from the Bronze Age to the 7^{th} century AD (Wiltshire and Murphy 1998). The essential difference, however, is that the Slough House and Chigborough Farm wells were not in areas of intensive settlement, but rather within field systems. They are thought to have been intended primarily for watering stock. Well 3887 at Chigborough Farm dated from the 1^{st} century AD. As at Elms Farm, the macrofossil assemblages from this feature were dominated by dryland herbs: the most abundant taxa were *Chenopodium album*, Poaceae, *Polygonum aviculare*, *Ranunculus* spp, *Rumex acetosella*, *Rumex* sp, *Spergula arvensis, Stellaria media*-type and *Urtica dioica*. Thus, as at Elms Farm, grassland and weed vegetation predominated locally. However, in Well 3887, *U. dioica* was nowhere near so overwhelmingly abundant as at Elms Farm: annual weed taxa were more common. As at Elms Farm, trees, shrubs and plants of wet soils were sparsely represented. Freshwater aquatic species, particularly *Lemna* sp. and *Ranunculus* subg. *Batrachium*, were, however, extremely common. Overall, it appears that soils were less nutrient-enriched around Well 3887, as might be expected in a location away from intensive settlement. Furthermore, on abandonment, Well 3887 seems to have been left to infill gradually, providing an opportunity for aquatic vegetation to become established. By contrast, the wells at Elms Farm, located as they were within a settlement area, are more likely to have been rapidly back-filled when they went out of use.

Remains of crop plants were rare in Well 3887 (only a few wheat glume bases and a flax/linseed capsule fragment were identified). However, as noted above, they were by no means abundant in the wells at Elms Farm: there was little evidence from the site for disposal of domestic food wastes. This is in very marked contrast to the assemblages from a late Roman well at the villa at Great Holts Farm, Boreham (Murphy 1997), which included macrofossils from a wide range of fruit and nut crops. The Boreham assemblages appeared to represent waste flooring material (hay and straw) incorporating food waste. The complete absence of such dense deposits of domestic waste at Elms Farm is surprising, given the number of samples examined, and the location of the features sampled.

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