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Ancient Monuments Laboratory
Report 7/97

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Summary

Excavations at this site revealed the plan of the fields, 3rd and 4th century farmhouses, bathhouse, granaries/barns, well and ponds of a Roman farm. The farm originated in the late 1st century, but most environmental data obtained relate to its latest, 4th century, phase. Prehistoric features and a post-constructed early medieval building were also excavated. Post-holes and associated deposits of a late Roman aisled barn included abundant charred remains of spelt, barley and pulses, representing granary deposits charred when the building was destroyed by fire. Information on cultivation methods, crop purity and use of space in the building was obtained. Charred Roman plant remains from elsewhere on the site were of crop processing waste. Charred cereals and pulses were also obtained from the medieval building. Samples of waterlogged fills from a late Roman well included macrofossils of a range of food plants: chestnut, hazelnut, walnut, stone-pine nuts and cone bracts, hawthorn, olive, cherry, sloe, bullace, apple and grape. Uncharred cereal remains, principally chaff of spelt wheat, were common. The samples also produced macrofossils of grassland and wetland herbs and mosses, thought to represent residues from hay, cut in more than one type of grassland. This mixture of food waste, crop processing waste and hay is considered to represent debris from activities within the adjacent farmhouse.

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Introduction

The excavation at Great Holts Farm was focused on a Roman farm, though prehistoric features, including ring-ditches, pits and postholes of a Late Bronze Age/Early Iron Age structure, were also excavated. There was an apparent hiatus in the Middle and Late Iron Age. The Roman farm was laid out on unoccupied ground in the later 1st century AD. Its first phase was indicated by ditched field systems. A farmhouse was constructed in the 3rd century, and replaced in the late 3rd or early 4th century by a new farmhouse with bath suite, and the field system was re-modelled (Figs. 1-2). A well and ponds were present. A possible granary/barn seems to have been replaced at this time by a large aisled granary/barn, 294. Later activity at the site was marked by a post-constructed building, 440, of early medieval date (Germany 1995).

Charred plant macrofossils

Methods

213 bulk samples (usually 1-2 buckets, *c.* 15-30 litres of soil) were collected from the dry gravel-based fills of features of all periods. Contexts bulk sampled (Figs. 1-2) included ditches, pits, the upper fills of wells, a pond, cremations, postholes and structural slots. The samples were processed by C. Forrest, using a bulk sieving/flotation tank with 0.5mm meshes throughout. During assessment, the dried flots were scanned under a binocular microscope at low power, noting the range of taxa represented by charred plant macrofossils and their abundance (Murphy, unpublished report). It was apparent that the majority of samples included exceedingly low densities of charred material. Charred cereal grains (mainly *Triticum* (wheat) with some *Hordeum* (barley), occasional glume bases of *Triticum spelta* and *Bromus* caryopses occurred quite consistently, but some samples also produced pulse seeds, *Rosa* (rose) and *Crataegus* (hawthorn) fruitstones and/or small weed seeds. However, most assemblages were too poorly preserved, or contained too few items (less than 50, usually far less) to be interpretable.

However, 24 samples included much higher densities of well-preserved material, and these were selected for analysis: they comprised postholes and other deposits from the Late Roman building 294 (18 samples), 4 samples from other Late Roman features and 2 from postholes of the medieval building 440. Identifications were made by comparison with modern reference material, and are listed in Tables 1-3. Small quantities of charred cereal remains from the lower fills of the Late Roman well 567 are listed separately in Table 4.

Crop plants

The samples from Roman Building 294 (shown as 'Granary' in the eastern corner of the rectangular farmyard enclosure in Fig. 1) were composed largely of prime grain and/or pulse seeds, with little or no cereal chaff. Identification of cereals has to be based primarily on grain morphology. The wheat grains were elongate to drop-shaped forms, with more-or-less parallel sides, maximum widths well above the embryo, usually with abruptly truncated apices, and commonly with longitudinal ridges and grooves on their dorsal surfaces where they had been adpressed to inflorescence bracts. These are of

emmer or spelt-type (*Triticum dicoccum* or *T. spelta*), probably mainly the latter. The few identifiable glume bases and spikelet forks were all of *T.spelta*: broad, keeled and strongly veined glumes, with an angle of more than 90° between the glume faces on either side of the keel, and a rounded curve around the poorly-defined secondary keel. Rachis internodes, where well-preserved, showed prominent venation.

Spelt chaff vastly predominated in Late Roman features elsewhere on the site (Table 2), though traces of possible emmer chaff with much narrower glumes showing less prominent keels, a more angular cross-section and no veins were noted in one sample. The available evidence suggests that spelt was the main wheat crop at the site.

Wheat grains from postholes of the medieval building 440 were, by contrast, all very short rounded forms, characteristically free-threshing hexaploid wheat (*Triticum aestivum* s.l.). No rachis fragments were present.

Barley was represented only by grains, with no rachis fragments. The grains were all hulled and some samples (marked with an asterisk in Table 1) included asymmetrical grains from lateral spikelets, establishing the presence of *Hordeum vulgare*. Similarly, there were no floret bases of oats, and a weed or cultivated species of *Avena* might be represented. Rye (*Secale cereale*) occurred only in postholes of the medieval building 440: the grains showed their typical variability, from very elongate to shorter, sometimes asymmetrical, but always with a more or less triangular cross-section and abruptly truncated apex.

Some postholes of building 294 contained seeds and cotyledons of pulses (Fabaceae), notably 5512. The seeds were sub-spherical to sub-angular in overall form, with cotyledon lengths of 3.3-5.1mm. Most showed little sign of the testa, and there were no well-preserved hila. However, many seeds showed a small oval depression (frequently silt-filled) below the radicle, marking the former position of the hilum, and one seed showed traces of a similar small oval hilum. From these features the presence of field pea (*Pisum sativum* var *arvense*) may be inferred. However, most specimens could equally be of cultivated vetch (*Vicia sativa*): they are too poorly preserved to tell. All are listed as Fabaceae indet. in Table 1.

Posthole 6256 from building 440 produced a single battered seed of field bean (*Vicia faba* var *minor*) with a cotyledon length of 9.1mm.

Discussion

1) The Roman Period

Building 294 was marked by eight large postholes, reconstructed as the remains of an aisled timber building, estimated to have been about 17.4 x 10.8m (see Table 1). Their fills were of dark yellowish-brown sandy clay and gravel (5493, 5501, 5513, 5542, 5544 and 5546). These fills were thought to represent soil backfilled around the standing posts, relating to the construction phase of the building. In the centre of each posthole was a pit infilled with dark greyish-brown sandy clay loam including abundant tile and charred plant material (5492, 5494, 5512, 5530-2, 5534, 5539, 5541). These pits are thought

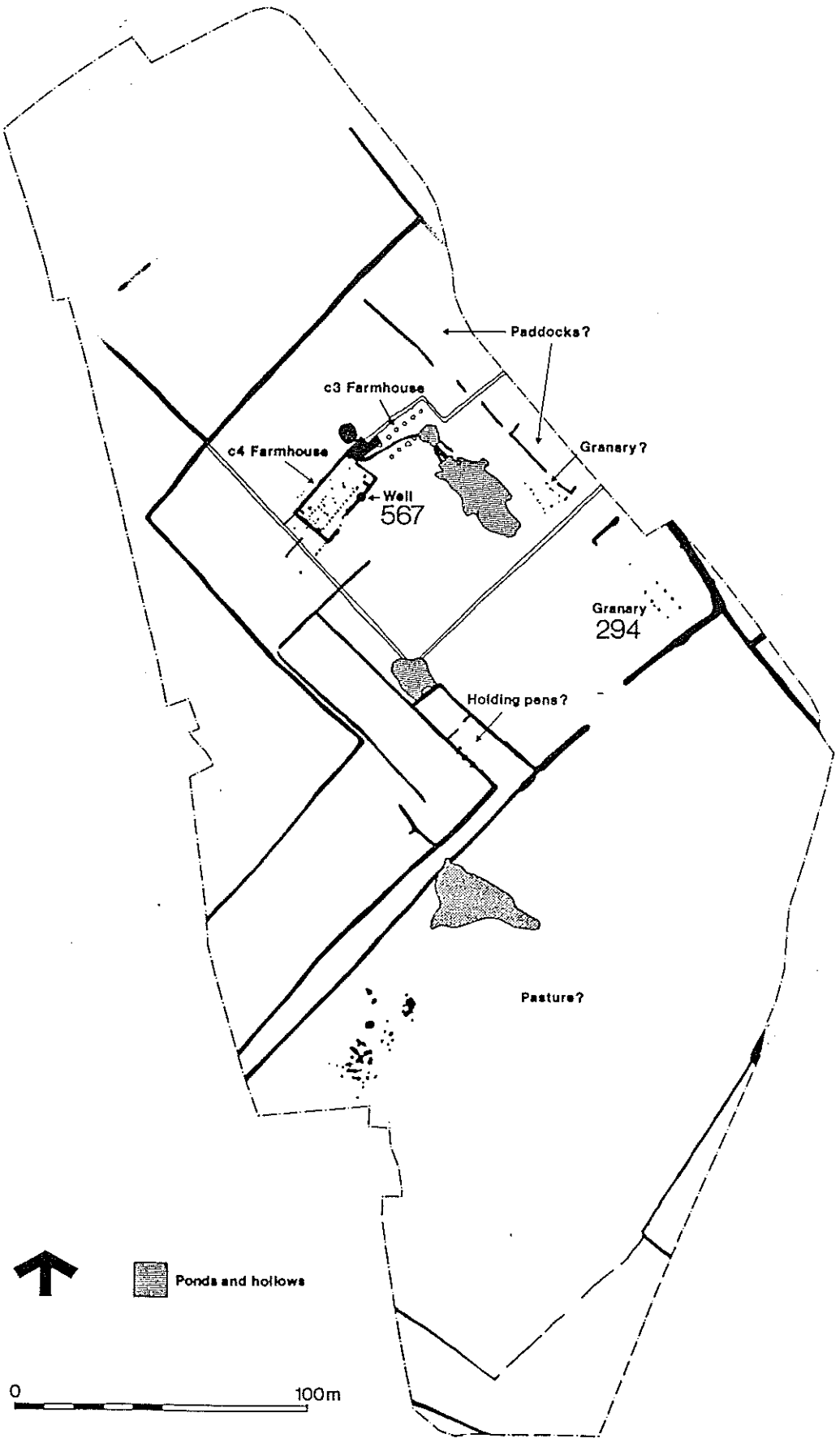

Figure 1. Late Roman features at Great Holts Farm (from Germany 1995).

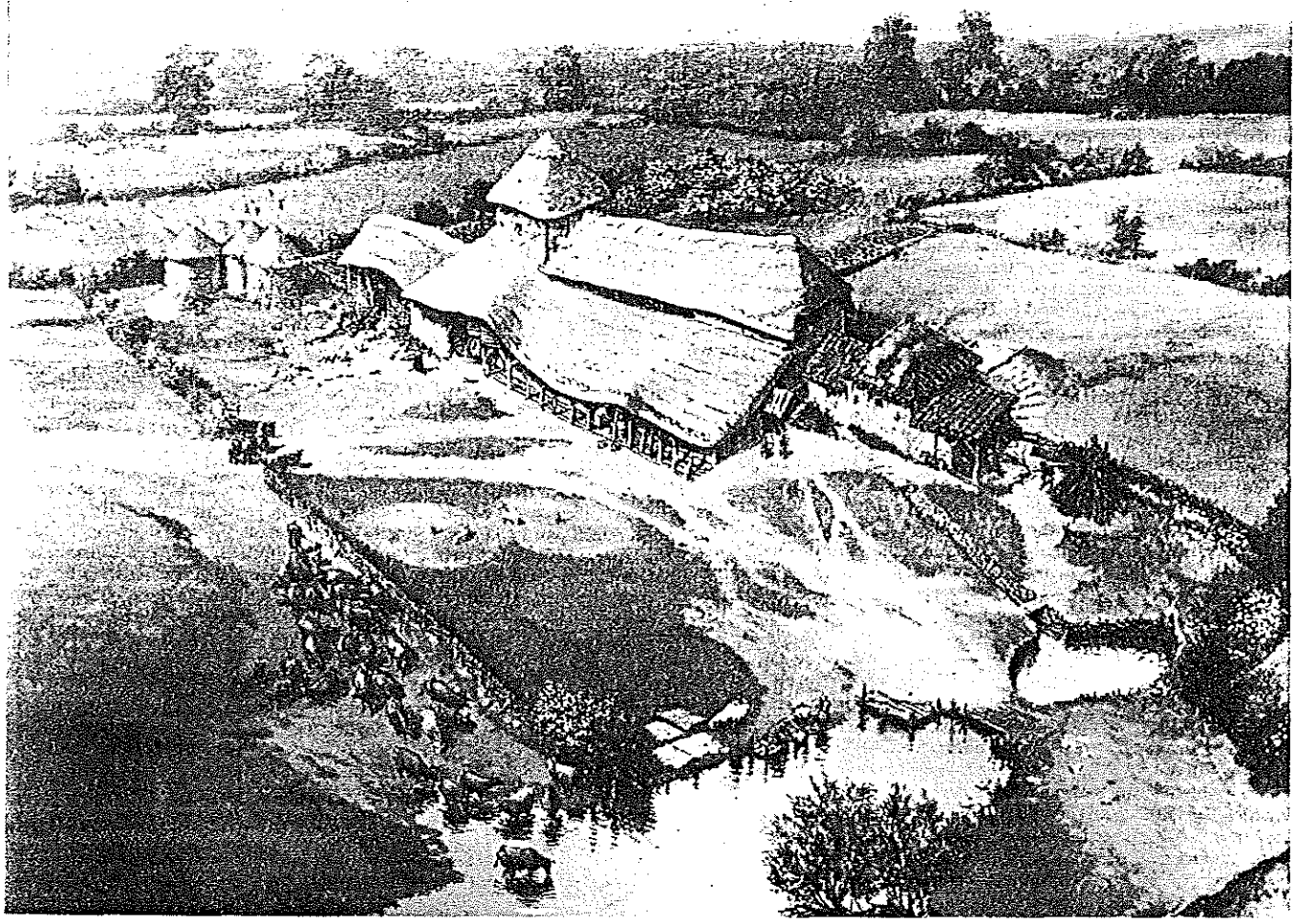

Figure 2. Reconstruction painting of the late Roman farm, by Peter Froste, showing the centre of the settlement as it may have appeared in the early 4th century. The farmhouse is reconstructed as a building similar to vernacular medieval farmhouses in the area, and is decidedly 'un-Roman' in appearance, apart from the bath-house complex on the right.

Note the rise in the roofline of the south-eastern 'portico', indicating the position of well 567. Unlike most wells excavated on archaeological sites, this one was directly adjacent to, and quite probably within, a building. This has clear implications for the taphonomy of macrofossil assemblages from the well fills.

Fills of the pond in the foreground were completely de-watered when excavated: there was no preservation of uncharred macrofossils, and pollen was badly degraded and differentially preserved.

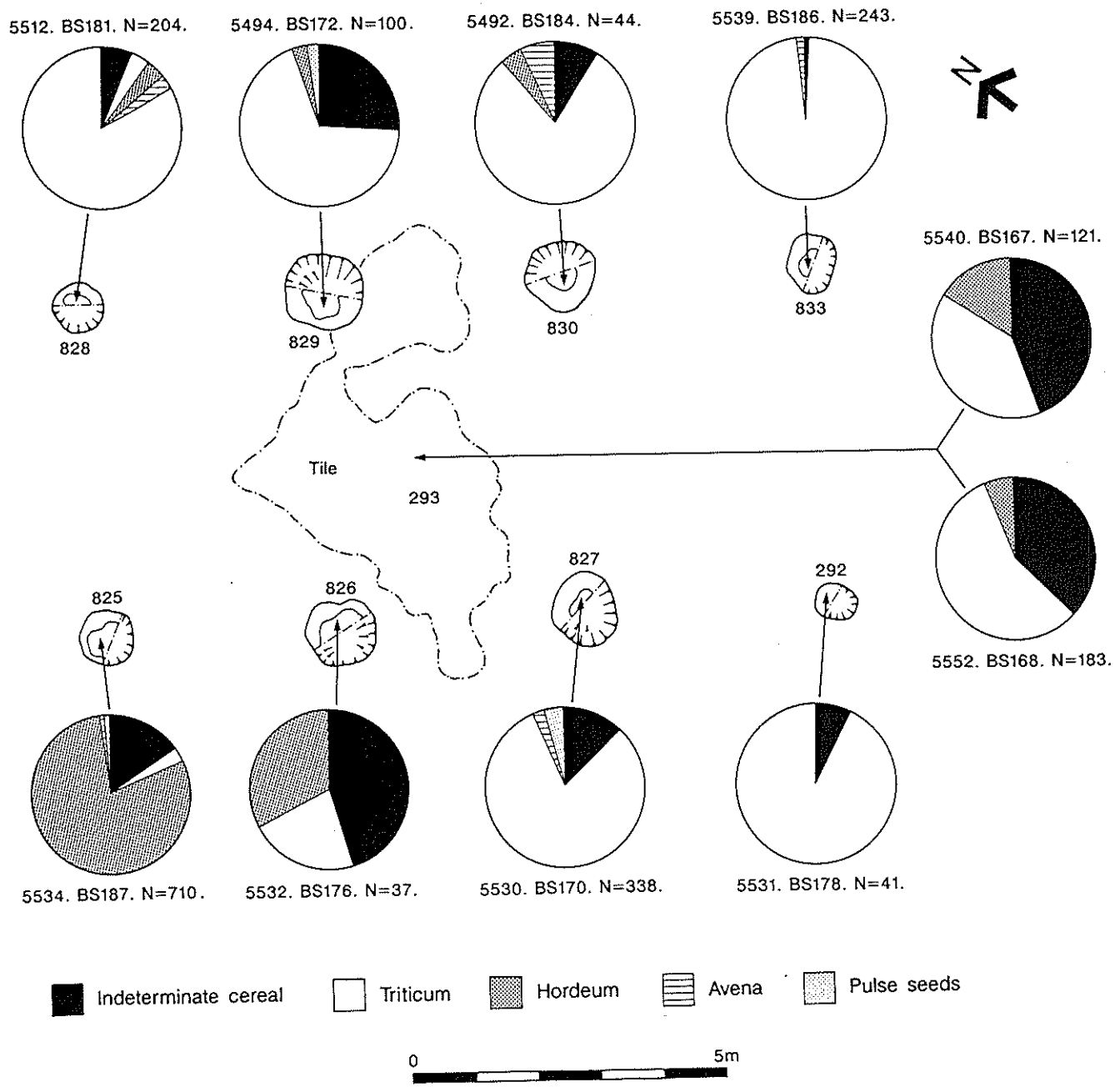
5512. BS181. N=204.
5494. BS172. N=100.
5492. BS184. N=44.
5539. BS186. N=243.
N
828
829
830
833
5540. BS167. N=121.
Tile
293
825
826
827
292
5552. BS168. N=183.
5534. BS187. N=710.
5532. BS176. N=37.
5530. BS170. N=338.
5531. BS178. N=41.
Indeterminate cereal
Triticum
Hordeum
Avena
Pulse seeds
0
5m

Fig 3

to have been dug after the building was destroyed by fire to remove or salvage the charred remains of the arcade posts ('post-extraction pits'): their fills would have been derived from charred debris in the immediate vicinity. Also relating to the destruction of the building were spreads of tile and charred material near the centre of the building (5540, 5552).

It is obvious from Table 1 that most samples of construction phase deposits included very much lower densities of charred cereals and pulses than those relating to destruction. There are some exceptions to this. 5546, for example, included a relatively high density of barley grains, which may have been intrusive from the fill of post-extraction pit 5534, cut into it, which also contained abundant barley. Overall, the destruction phase deposits are thought to include remains of crops which had been stored within the building and were charred when it burnt down; whilst those from the post-hole fills are of less certain origin, probably partly material already present in the soil when 294 was built, but also incorporating material introduced via root channels and by the activities of burrowing animals from overlying deposits.

Roman period charred granary deposits in Britain are uncommon, and this material from Great Holts Farm would appear to represent the only known granary deposit from a Roman farm, as opposed to a town or military site. The vast majority of charred cereal remains from Roman rural sites comprise processing waste (commonly abundant spelt chaff, as in other contexts at Great Holts Farm: Table 2), spoilt grain and, occasionally, charred grain and malt from so-called 'corn-driers' (Van der Veen 1989). Granary deposits have the potential to yield information on sowing techniques ('monocultures' or maslins), the form of storage (as grain or spikelets), the efficiency of crop cleaning methods, the degree of pest attack and, potentially, the structure and use, in spatial terms, of the storage facilities available. Some indication of the relative importance of crops may also be obtained.

The composition of samples from the post-extraction pits and the central tile spread are summarised in Figure 3, in which only crop seeds and grains are considered. Obviously some degree of mixing is likely to have occurred when the building burnt down and collapsed. Nevertheless, there is a clear spatial patterning to the relative abundance of crop grain seeds and grains. Samples from the southern part of the building, from contexts 5492, 5530, 5531 and 5539 consisted largely of wheat grains. Samples from the central tile spread (5540, 5552) included many very badly preserved indeterminate grains, but were probably largely of wheat, with some barley. In contexts 5532 and 5534 (the former a small sample), in the north-western part of the building, barley predominated. Pulse seeds, probably largely peas, predominated only 5512, the northernmost post-hole. From this, it would appear that wheat (thought to have been largely spelt), six-row barley and pulses were grown and stored as separate crops rather than mixed crops ('maslins') though inevitably, given the limitations of grain-processing technology at this time, there would have been some admixture of other crops.

The spatial distribution of crop remains in the Great Holts granary suggests a zoning of storage within the building. Wheats predominated at least in the southern half of the building, and perhaps in the central and north-eastern areas. Barley was largely confined to the extreme north-west and pulses to the northern corner. This could reflect

a distinction between the storage of human food and animal fodder. Roman agricultural writers record that six-row barley was grown mainly as fodder, and was rarely used as human food (White 1970, 214-5), whilst pulses have been widely used as fodder.

The preservation state of charred grains from the samples also showed some spatial variation. There are few experimental data relating the state of charred grains to conditions of charring (Boardman and Jones 1990), but in general terms it appears that high temperatures and relatively good oxygenation result in gross deformation, 'puffing' and loss of surface detail, whereas slow charring in very oxygen-deficient conditions produces charred grains preserving overall shape and surface detail well. The proportion of grains sufficiently well-preserved to be identifiable therefore could provide a measure of conditions whilst they became charred. In Building 294, it is notable that poorly preserved, unidentifiable grains were more common in the central tile spread and adjacent post-extraction pits to the north. Well-preserved grains predominated in post-extraction pits at the southern and northern ends of the building. From this, it would appear that there was a better air-flow in the middle of the building. Clearly, this could relate to the position of doors which, as in medieval barns, may have been centrally situated.

The extreme rarity of cereal chaff in these samples shows that cereals had been threshed and winnowed before being stored as grain rather than spikelets. This is not thought to be a consequence of differential preservation during charring, for the few charred rachis and glume fragments present are well preserved. This departure from the Iron Age practice of spikelet storage no doubt reflected the need to reduce bulk for large-scale storage and transportation and, of course, the shift from pit storage to above-ground granary storage. Most weed seeds had also been largely removed during crop cleaning. There was no visible evidence for insect attack or fungal spoilage.

Regrettably, there is no way of telling to what extent the charred crop grains and seeds from this building were representative of production on the farm. The material surviving represents only a small charred residue from a year's harvest, and it is perfectly possible that some of the harvest had already been sent to market and was not being stored at the site.

Roman granary deposits from urban and military sites at Caerleon (Helbaek 1964), Colchester (Murphy 1984, 1992), London (Straker 1984), York (Williams 1979), Rocester (Moffett 1989) and South Shields (Van der Veen 1994) were predominantly of wheat grain, often including a mixture of wheat species, sometimes with barley and/or rye. Urban and military sites would presumably have been receiving grain from a large number of farms, the produce of which may have been amalgamated for storage, thus explaining the more mixed wheat species composition of granary deposits than at Great Holts. A common feature of urban granary deposits is that wheat grain in particular shows signs of sprouting before charring; at Culver Street, Colchester, for example, a pile of sprouted wheat grains (associated with charred coarse textile, probably the remnants of a sack) was found in the corner of a room. It is probable that these sprouted grains were malt (Murphy 1992, 282). At Great Holts, no sprouted grains were noted.

The cleaned grain samples from Building 294 included few weed seeds, but by combining the list of taxa with those identified in other Roman contexts (Table 2) some limited information on soil conditions in arable fields may be obtained. These latter samples are more typical of Roman rural sites, consisting largely of crop processing waste: cereal chaff and weed seeds. The predominance of large-fruited grasses (notably *Bromus mollis/secalinus*) is probably partly an artefact of crop processing methods, particularly sieve mesh sizes used in crop cleaning. *Anthemis cotula*, a weed characteristic of clay soils (Kay 1971) is relatively abundant, implying some cultivation of heavy soils. Macrofossils of grassland taxa in general are not uncommon: they include small grass caryopses, *Medicago/Lotus/Trifolium* sp (medicks/clovers), *Plantago lanceolata* (ribwort plantain), *Prunella vulgaris* (self-heal) and *Danthonia decumbens* (heath grass). These could relate either to a hay crop or to grassland taxa growing in incompletely tilled arable fields as weeds. *D. decumbens* is nowadays a rare plant in Essex: Jermyn (1974) gives a scatter of records from 'dry heathy and sandy places'. Charred caryopses of this species were, however, very common in some Roman deposits at Culver Street, Colchester where it was associated with a range of grassland taxa confidently interpretable as charred residues from hay (Murphy 1992).

2) The medieval period

Unfortunately, only two postholes of the medieval building 440 were sampled (Table 3). Crops represented included bread-type wheat, indeterminate barley, rye, oats, field bean and pea/vetch. There were no cereal rachis or floret fragments and weed 'seeds', apart from *Bromus*, were rare. Interpretation of these two isolated assemblages is necessarily tentative, though it is possible that the charred material from these postholes represents debris from yet another granary fire.

Plant macrofossils from waterlogged fills of the late Roman well 567

Methods

This well was cut through the foundation trench for the south-eastern wall of building 416, thought to be the main domestic residence in the late fourth century, and appears to have been an integral part of the building, probably covered by a portico (see Fig. 2). The upper aerobic fills were initially removed and bulk-sampled for the retrieval of charred plant material (Murphy, unpublished report). Subsequently, the entire surface of the site was lowered by the gravel extractors, potentially permitting excavation of the lower waterlogged fills with resorting to shoring. However, at this lower level, the surrounding gravel and well fills were found to be highly unstable, making conventional excavation hazardous. The fills were therefore removed in blocks using a JCB, and samples were removed from these blocks for macrofossil analysis. Two sample series were taken: a series for general biological analysis, which were processed using the methods of Kenward *et al* (1980) and bulk samples for machine flotation/bulk sieving, with 0.5mm collecting meshes. Flots and residues from the latter were air-dried, and their coarse fractions (>5mm) were sorted in order to extract additional remains of fruitstones, seeds and nutshells. Assessment of these samples indicated that contexts 6462, 6463 and 6465 included abundant well-preserved macrofossils.

Macrofossils extracted in the laboratory from samples of these contexts are listed in Table 4, and large macrofossils from the bulk samples in Table 5. Identifications were, in most cases, made by comparison with modern reference specimens, though grass and cereal caryopses and from the samples were characterised mainly using criteria defined in the key of Korber-Grohne (1964). This key unfortunately does not include all species which might be present in these samples, and full identification of Poaceae has thus not been attempted. Caryopses of *Danthonia decumbens* are readily identifiable from their very distinctive short hilum, which was often white in colour.

Crops and other edible plants

Pinus pinea (Mediterranean stone-pine)

The highly distinctive woody cone bracts of this pine were present in all samples (Plate 1), and 6463 produced a cone apex with under-developed bracts attached to axillary tissue. The pine-nuts were mainly fragmentary, indicating that they had been broken for consumption, though an intact nut, 19 x 10mm came from 6463.

Castanea sativa (sweet chestnut)

Fragments of pericarp, fibrous on their interior surfaces and glossy externally, some showing basal attachment scars and stylar projections at the apex, came from 6463. Nut lengths are estimated at c. 21mm (Plate 2)

Juglans regia (walnut)

Nutshell fragments, showing distinctively furrowed and reticulate external surfaces were present in all samples. Most were very fragmentary, though 6463 produced a half nut 37 x 27mm (Plate 3)

Corylus avellana (hazelnut)

Again, hazelnuts were represented mainly by fragments. A few small intact nuts (no doubt considered too small to be worth cracking) came from 6463: 13-16mm long x 11-12mm broad.

Olea europaea (olive)

Stones of olive, with their characteristic incised venation were retrieved only from 6463 (plate 4). There was considerable variability in length (14.9 - 7.0mm), and it appeared that two size groups were represented (14.9 - 10.5mm and 8.6 - 7.0mm), though sample size (17 measurable specimens) was small.

Vitis vinifera (grape)

6463 produced a single seed, 4.5 x 3.3mm.

Prunus spp (sloe, bullace, cherry)

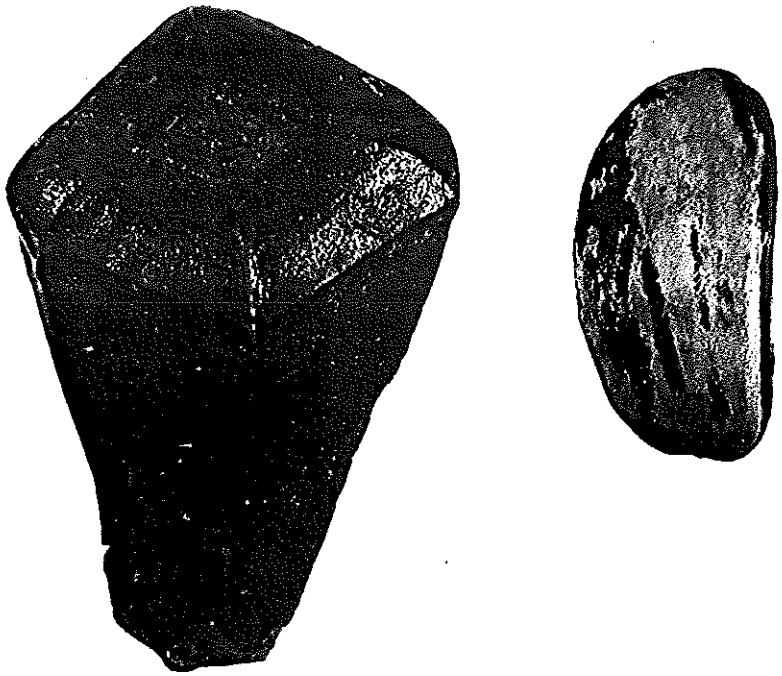

Plate 1. *Pinus pinea* (stone-pine): nut and cone bract. 6463. Scale 20mm.

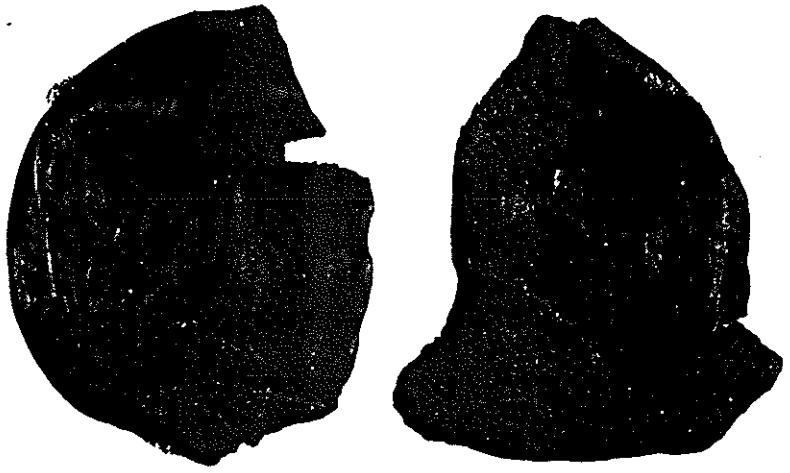

Plate 2. *Castanea sativa* (chestnut): nuts. 6463. Scale 20mm

Plate 3. *Juglans regia* (walnut): nut. 6463.
Scale 20mm

Plate 4. *Olea europaea* (olive): fruitstones. 6463.
Scale 20mm

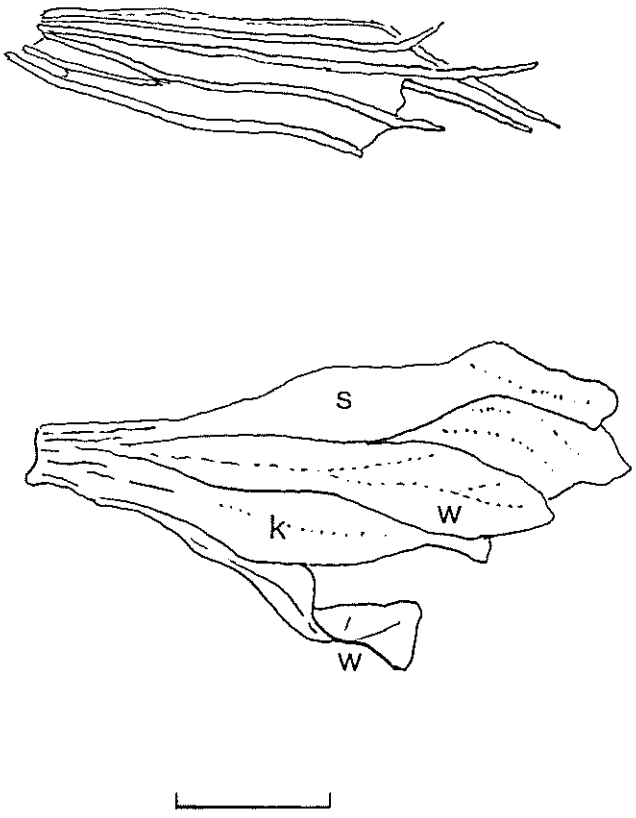

Figure 4. Inflorescence fragments of *Trifolium* sp. (clover) from well 567 (sample 972). Top: calyx. Bottom: corolla. The 'standard', 'keel' and 'wing' petals are indicate by initials. Scale 1mm.

Some of the small, rounded, rough-surfaced fruitstones of *Prunus spinosa* (sloe) were obscured by mineral-replaced mesocarp tissue, and a few had preserved epicarp. This may imply that they had been used for flavouring foods or drinks, rather than being consumed entire.

Larger, more elongate fruitstones of *Prunus domestica* subsp *insititia* were present in smaller numbers in 6363. Dimensions of six specimens were as follows: length 10.0 -15.0 mm (mean 13.0mm); width 7.0 - 13.0mm (mean 9.0mm); thickness 5 - 8mm (mean 6.2mm). No notably large, flattened forms characteristic of cultivated plums were noted.

Five smooth-surfaced, generally elongate fruitstones of cherries were also present in 6463: length 7.1 - 9.5 mm (mean 8.3mm); breadth 5.5 - 6.5mm (mean 6.0mm). Problems in identifying cherry fruitstones specifically are discussed by Willcox (1977, 287). Due to hybridisation and intra-specific variation, identification is problematic, though the native wild cherry, *Prunus avium*, is probably the most likely species.

Malus sp (apple)

No seeds were noted, but 6463 produced fragments of fibrous endocarp.

Cereals

Non-charred cereal chaff was common in 6463 and 6465, consisting of wheat glume bases and spikelet forks. Many specimens were crushed and deformed, and some were fragmentary, but the robustness and width of the glume bases (up to 1.9mm) and the persistence of ascending broad internodes on the forks indicated that spelt, *Triticum spelta*, was the predominant species. Several forks still including remnants of caryopses were noted.

The large size of some caryopses (up to approximately 7.6 x 4.0mm) left no doubt that they were of cereals, but identification was problematic. In view of the predominance of wheat chaff, wheat grains were expected to occur, but no specimens showing well-preserved pericarps with rows of transverse cells were noted. Degradation had resulted in exposure of the more irregular testa cells in some cases.

Charred cereal remains, mainly wheat grains, but including a spelt (*T. spelta*) spikelet fork, were present in 6465.

Wild flora

Herbaceous taxa present are listed in Table 4. Taxa represented by fruits or seeds are divided into two broad ecological groups: dryland herbs and wetland/damp grassland herbs. Additionally, a few taxa (e.g. bracken, *Pteridium aquilinum*) were represented only by vegetative remains.

The first group, of dryland herbs, includes both weeds and grassland species. Some of these taxa (e.g. *Agrostemma githago* (corncockle), *Anthemis cotula* (stinking mayweed)) are characteristic weeds of autumn sown cereal crops and others are characteristic grassland plants (e.g. *Linum catharticum* (purging flax), *Trifolium* sp.(clovers)). However Roman tillage may have not been so efficient as that in arable fields today, so that some grassland taxa could then have persisted as weeds of cultivation (Hillman 1981, 145-6). In particular, *Danthonia decumbens* (heath grass), which occurs consistently here, is noted by Hillman as an important arable weed in the Iron Age/Romano-British phases of Cefn Graeanog. Indeed, charred caryopses of *D. decumbens* and other grassland species were associated with charred cereal remains in other contexts at Great Holts (Table 2). In Essex today, it is a rare plant found only in 'dry heathy and sandy places' (Jermyn 1974, 206). Complete separation of dryland herbs into 'weed' and 'grassland' species is not clear-cut.

Having said this, there is no doubt that the Great Holts weed flora is not typical of Roman wells. In general, assemblages from Roman wells are dominated by species in the Chenopodietea (e.g. *Stellaria media (chickweed), Arenaria* spp.(sandwort), *Chenopodium album (fat hen), Atriplex* sp.(orache), *Urtica urens* (annual nettle) and *Solanum nigrum* (black nightshade)), with biennial and perennial weeds of the orders Onopordietalia and Artemisitalia, such as *Conium maculatum (hemlock), Malva sylvestris (mallow), Hyoscyamus niger* (henbane) and *Urtica dioica* (stinging nettle) (e.g. Greig 1988, Murphy 1996). This is thought to indicate abandonment and disuse of areas around wells, and development of weedy overgrown conditions.

At Great Holts these species are rare or absent: there is no evidence for a significant input from local weed vegetation by natural dispersal. Most of the weed 'seeds' present, mainly of cornfield weeds, are thought to have been dumped into the feature together with cereal processing waste. As in the charred samples from the site, (see above), the most abundant species is *Anthemis cotula* (stinking mayweed), pointing to cultivation of heavy clay soils.

Herb species found today predominantly in grasslands were common in the Great Holts samples, together with grass caryopses and grass/cereal culm fragments. In sample 972, calyces of *Trifolium* sp. (clover) predominated, some associated with remains of the corolla (Figure 4). Many of the taxa present are widely distributed but the samples include species indicative of several distinct grassland types. Calcicoles, characteristic of dry calcareous soils include *Daucus carota* (wild carrot) and *Linum catharticum*. However, species of dry, sandy and acidic conditions are also represented: *Danthonia decumbens, Rumex acetosella* (sheep's sorrel) and *Pteridium aquilinum*. In addition, the group of wetland/damp grassland species includes plants such as *Caltha palustris* (marsh marigold), *Filipendula ulmaria* (meadowsweet), *Lychnis flos-cuculi* (ragged robin) and *Rhinanthus minor* (yellow rattle), common in river valley meadows and drainage ditches. A similar ecologically mixed assemblage of grassland taxa came from Roman deposits at Culver Street, Colchester (Murphy 1992, 282-3). Residues from hay are thought to be represented, and at both sites hay cut in several types of grassland appears to have been amalgamated.

Mosses *by Robin Stevenson*

Mosses from 6463 (Sample 972) were identified. There were only seven stems, Comprising six species. Nomenclature follows Smith (1978) except where modified by Corley *et al* (1981).

Plagiomnium affine (Funck) Kop. Well preserved fragment. This is a plant of dampish habitats, including grasslands and woodlands. It is probably somewhat shade-demanding.
Brachythecium rutabulum (Hedw.) Br. Eur. Two well-preserved fragments. A common species, growing in a wide variety of habitats, including grasslands and woods. It prefers relatively eutrophic habitats.
Scleropodium (Pseudoscleropodium) purum (Hedw.) Limpr. A fairly well-preserved fragment. Like the previous species this plant is tolerant of a wide range of habitats, ranging from strongly calcareous to mildly acidic. It prefers well lit and fairly dry conditions, and is common in grasslands.
Rhytidiadelphus squarrosus (Hedw.). Large, branching but poorly preserved fragment. This is another species enjoying a very wide range of ecological tolerance. Again, it is very common in grassland.
Calliergonella (Calliergon) cuspidata (Hedw.) Loeske. Yet another species of wide tolerance, common in grasslands. It is particularly common in dampish conditions.
Cratoneuron filicinum (Hedw.) Spruce. Small, poorly preserved fragment. This plant grows best in damp calcareous conditions; however, it can also be found in rather drier places. This specimen is fairly well-developed, so probably came from a dampish calcareous place. Open, often grassy habitats are fairly typical.

This assemblage could occur virtually anywhere in the UK. All the species are common and widely distributed.

Conclusions

As can be seen from Figures 1 and 2, well 567 almost certainly was located within the portico of the farmhouse. The unusual features of the macrofossil assemblages from it (particularly the lack of evidence for a significant input from local weed vegetation by natural dispersal) are explicable in terms of the atypical taphonomy of the deposits. They are thought to be composed almost entirely of material intentionally dumped into the well: human food refuse, crop processing waste and hay. Assessment of insects from the deposits indicated the presence of assemblages formed in indoor habitats, the most numerous species being *Aglenus brunneus*, formerly common in compacted organic debris on earth floors of buildings (Robinson, undated). No doubt full insect analysis will amplify information, but the origin of the material in the well is already quite clear.
It seems that when the well went out of use, flooring materials from within the farmhouse were dumped straight into it, along with other domestic debris. In short, these samples provide an unusually direct picture of living conditions *within* a late Roman farmhouse.

Despite the presence of hay, there is no reason to suppose that animals were housed in the building. Most of the plant macrofossils present were intact, and the samples did not

include finely comminuted (masticated) plant material, such as occurs in animal dung. Moreover, although non-pollen palynomorphs, including microscopic charcoal, iron pyrite framboids, urediniospores of fungal rusts and fungal hyphae, were noted during assessment, ova of parasitic intestinal nematodes (e.g. *Trichuris*) were not (Wiltshire 1995). The small proportion of dung beetles (e.g. *Geotropes* sp.) in the insect assemblages could have been introduced to the site, incorporated in hay or straw (Robinson, undated). It therefore appears that hay, crop processing waste, including straw, and some bracken were used as flooring materials in human living spaces.

Although flooring was apparently unpretentious, the occupants were clearly affluent enough to consume a varied diet of plant foods, including 'exotic' species. Fruits and nuts identified comprised pine-nut, chestnut, walnut, hazelnut, olive, grape, sloe, bullace, cherry and apple, whilst charred macrofossils from other contexts show that the arable produce of the farm included spelt, barley and peas.

Whether fruit and nut crops were locally grown cannot be established. The olives, on climatic grounds, must represent imports, but all other species could potentially have been local products; even the stone-pine, which produces cones with fully developed nuts in the present British climate. The potential presence of pollen of fruit and nut crops in the well fills was not thought necessarily to be a reliable indicator that these crops were grown in the vicinity, for pollen could have been trapped in bracts and on surfaces of nuts etc. deposited in the feature: hence analysis was not undertaken. Preservation in other potentially polleniferous sediments at the site, where there was no evidence for the dumping of food wastes, (notably the pond), was poor and probably differential (Wiltshire 1995). *Pinus* (pine) pollen was noted, but specific identification is not possible. However, it seems unlikely that a well-established farm of this type would not have had orchards.

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Notes on Tables 1-5.

Taxa are represented by fruits or seeds (all charred in Tables 1-3) except where indicated.

Abbreviations

brn - basal rachis node; ca -caryopses; ca seg - capsule segments; ch - charcoal; cn - culm nodes; co - cotyledon; co br - cone bracts; flo - floret; fr - fragments; gb - glume bases; lf ra - leaf 'rachis'; ns - nutshell; pi - pinnules; s - seeds; spb - spikelet base; spf - spikelet forks; tspf - terminal spikelet forks;* - asymmetrical lateral grains of barley present.

Notes

Tables 1-3

Poaceae (small) refers to *Poa*-sized caryopses, 1.0-1.3mm in length and rounded in form; Poaceae (medium) refers to grass caryopses intermediate in size between these and *Bromus*.

Charcoal was present in all samples, but was abundant only in BS178 (5531). All fragments identified in this sample were of mature oak (*Quercus* sp). The fragments appeared to include pieces of radial boards, up to about 12mm thick. However, natural splitting along the rays after charring cannot be excluded.

BS 872(5904) included some aggregates of siliceous material, including 'silica skeletons' of indeterminate awns.

Uncharred plant macrofossils from these samples included recent intrusive weed seeds, notably *Chenopodium album* and *Stellaria media*, but also some more unusual wild taxa (e.g. *Ranunculus sceleratus*) and food plants (*Ficus carica, Rubus fruticosus, R. idaeus, Sambucus nigra*). These must be relatively recent (at the very least, post-Roman) and intrusive: they would not be expected to survive for long periods in the well-aerated gravel soils of this site. Their provenance is uncertain, though they could perhaps have derived from sewage spread on the fields as manure.

Tables 4-5

(a) Includes *P. erecta;* (b) Small caryopses (under 2.5mm long), hilum obscured; (c) Small caryopses (<2.5mm), with small round-oval hilums; (c) Elongate caryopses (2.6-3.0mm) with elongate hilums.

Figure captions

Figure 1. Late Roman features at Great Holts Farm (from Germany 1995).

Figure 2. Reconstruction painting of the late Roman farm, by Peter Froste, showing the centre of the settlement as it may have appeared in the early 4th century. The farmhouse is reconstructed as a building similar to vernacular medieval farmhouses in the area, and is decidedly 'un-Roman' in appearance, apart from the bath-house complex on the right.

Note the rise in the roofline of the south-eastern 'portico', indicating the position of well 567. Unlike most wells excavated on archaeological sites, this one was directly adjacent to, and quite probably within, a building. This has clear implications for the taphonomy of macrofossil assemblages from the well fills. Fills of the pond in the foreground were completely de-watered when excavated: there was no preservation of uncharred macrofossils, and pollen was badly degraded and differentially preserved. (Reproduced with permission from Essex County Council, Archaeology Section).

Figure 3. Charred cereals and pulses from Building 294: summary of sample composition.

Figure 4. Inflorescence fragments of *Trifolium* sp. (clover) from well 567 (sample 972). Top: calyx. Bottom: corolla. The 'standard', 'keel' and 'wing' petals are indicate by initials. Scale 1mm.

Plate captions

Plate 1. *Pinus pinea* (stone-pine): nut and cone bract. 6463.
Scale 20mm.

Plate 2. *Castanea sativa* (chestnut): nuts. 6463.
Scale 20mm

Plate 3. *Juglans regia* (walnut): nut. 6463.
Scale 20mm

Plate 4. *Olea europaea* (olive): fruitstones. 6463.
Scale 20mm

Table 1

Context type	Construction phase - postholes						Tile spreads		Demolition - post extraction pits								Other	
Context no.	5493	5501	5513	5542	5544	5546	5552	5540	5492	5494	5512	5530	5531	5532	5534	5539	5541	5533
Bulk sample no.	185	173	183	180	171	188	168	167	184	172	181	170	178	176	187	186	177	179
Cereal grains																		
Cereal indet	1	2			6	4	68	54	4	26	14	44	3	17	112	3	10	1
Triticum sp(p)	1	2	1	2	54		104	48	35	69	8	274	38	8	19	236	5	1
Hordeum sp(p)				1		42*	11*	19	2	3	7*			12	573*		11	
Avena sp(p)		1			1				3		6	7			4	4		
Cereal chaff																		
Triticum spelta L (gb)		1										11				7		
Triticum spelta L (spf)															1			
Triticum sp (gb)												6						
Triticum sp (spb)							1					3						
Triticum sp (spf)							1											
Pulses																		
Fabaceae indet (co)			2		5					1	223	20			4			
Fabaceae indet (s)			1							1	57	3						
Herbs (weeds/grassland)																		
Anthemis cotula L			2 cf									2cf				4		
Asteraceae indet																1		
Atriplex patula/hastata											1							
Bromus mollis/secalinus	1				1		3		3		5	1	2		7	20		
Bromus/Avena			1														1	
Carex sp											1							
Danthonia decumbens											1					4		
Galium sp																1		
Indeterminate seeds etc											1					3		
Medicago/Lotus/Trifolium sp											3							
Plantago lanceolata L															1			
Poaceae indet (medium)										1		5				2		
Poaceae indet (small)									1		2	29				12		
Polygonaceae indet																1		
Polygonum aviculare agg																1		
Rumex sp																2		
Other																		
Poaceae indet (cn)											2							
Quercus sp (ch)													xxx					
Sample volume (l)	15	15	n.r.	15	30	15	30	15	15	15	15	15	15	30	7.5	15	15	30
Flot volume (ml)	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	100	200	1200	<100	<100	<100	<100	<100
% flot sorted	100	100	100	100	100	100	100	100	100	100	100	25	12.5	100	100	100	100	100

Table 2

Context type	Ditch	Ditch	Feature	Pond
Context no.	5390	5416	5904	5919
Bulk sample no.	38	35	872	879
Cereal grains				
Cereal indet	14	9	5	1
Cereal indet (spr)	3		1	1
Triticum sp(p)	48	22	11	21
Hordeum sp(p)			2	
Avena sp(p)		4	3	
Cereal chaff				
Avena sp (afr)	x	x		
Triticum spelta L (gb)	11	51	100	10
Triticum spelta L (ri)	4	12	3	5
Triticum cf dicoccum Schubl. (gb)		1		
Triticum cf dococcum Schubl. (spf)		1		
Triticum sp (gb)	8	8	68	4
Triticum sp (spb)	2	4	5	1
Triticum sp (ri)		1	5	2
Triticum sp (bri)		3		
Herbs (weeds/grassland)				
Anthemis cotula L	13	9		6
Bromus mollis/secalinus	59	54	2	3
Bromus/Avena	8	3	2	
Chenopodiaceae indet			1	
Danthonia decumbens			1	
Galium aparine L			1	
Lamiaceae indet			1	
Medicago/Lotus/Trifolium sp	1			
Poaceae indet (medium)	1	3	7	6
Poaceae indet (small)	2	21	1	1
Polygonaceae indet			4	
Prunella vulgaris L				1
Rumex sp	2	4	13	2
Trifolium type				1
Indeterminate seeds etc	3		2	1
Sample volume (l)	15	15	15	15
Flot volume (ml)	<100	<100	<100	<100
% flot sorted	25	50	25	100

Charred plant macrofossils from other late Roman contexts

Table 3

Context type	Posthole	Posthole
Context no.	6256	6265
Bulk sample no.	952	955
Cereal grains		
Cereal indet	37	6
Triticum sp(p)	37	1
Hordeum sp(p)	54	1
Secale cereale L	12	14
Avena sp(p)	19	7
Pulses		
Vicia faba var minor	1	
Fabaceae indet (co)	1	
Herbs (weeds/grassland)		
Anthemis cotula L	2	
Asteraceae cf Centaurea	2	
Bromus mollis/secalinus	16	2
Bromus/Avena	20	3
Centaurea cyanus L	1	
Poaceae indet (m)	1	
Vicia/Lathyrus sp (co)	2	
Indeterminate seeds etc	1	1
Sample volume (l)	15	15
Flot volume (ml)	<100	<100
% flot sorted	100	100

Charred plant macrofossils from medieval contexts.

Table 4. Plant macrofossils from the late Roman well 567.

Context number	6462	6463	6463	6465	6465
Sample number	971	972	972	973	973
Size fraction	All	>2mm	<2mm	>2mm	<2mm
Cereals (uncharred)					
Cereal indet. ca.		13		fr.	
Triticum sp. gb	8	5	11	10	62
Triticum sp. spf	1	2	5	4	
Triticum sp. tspf.		1			
Triticum spelta L. gb		4	8	94	35
Triticum spelta L. spf		23	5	8	
Cereals (charred)					
Cereal indet. (ca)					2
Triticum sp. (ca)					16
Triticum sp. (bm)					3
Triticum sp. (gb)					2
Triticum spelta L. (spf)					1
Fruits, nuts etc.					
Corylus avellana L. ns. fr.		x			
Juglans regia L. ns. fr.		x		x	
Malus sp. end. fr.		x			
Pinus pinea L. co.br.			1		
Pinus pinea L. nu			1		
Dryland herbs (weeds/grassland)					
Agrimonia eupatoria L.		8			
Agrostemma githago L.		2			
Anthemis cotula L.	37		19		6
Apiaceae indet.			2		
Asteraceae indet.			1		
Brassicaeae indet			7		
Brassica sp.	1				
Bromus sp.		3	1		
Capsella-type			1		
Carex cf caryophyllea Latourr			2		
Centaurea sp.		1	1		
Cerastium arvense L.			27		1
Cirsium/Carduus sp.			1		
Crepis cf. vesicaria/foetida			1		
Crepis sp.		1	4	1	1
Danthonia decumbens (L.) DC.	1		4/4cf.	1	1 cf.
Daucus carota L.	2		1		
Linum catharticum L. ca seg.			12		
Linum catharticum L. s.			19		
Papaver argemone L.			1		
Plantago major L.			1		
Poaceae indet. (b)	10		24		2
Poaceae indet. (c)	14		38		3
Poaceae indet. (d)	1		2		
Poaceae indet. (flo)	3				
Polygonaceae indet.			1		
Polygonum aviculare L.	4		5		1
Potentilla sp. (a)	12		27		1
Primula sp.			1		
Primulaceae indet.			1		
Prunella vulgaris L.	4	1	5		
Ranunculus acris/repens/bulbosus	2	1	7	1	
Reseda luteola L.	3				
Rumex acetosella L.			1		
Rumex sp.	5	1	11		2
Stachys sp.			1		
Stellaria graminea/palustris	1		6		1
Stellaria media-type					1
Trifolium spp. cal.	3	4	40	1	
Urtica dioica L.	3		6		
Wetland/damp grassland herbs					
Caltha palustris L.			1		
Carex cf vesicaria L.			1		
Carex sp. (bicarpellate)	2	1	8		1
Carex sp. (tricarpellate)	6				
Filipendula ulmaria (L.) Maxim.			1		
Juncus articulatus group					x
Juncus sp(p)			x		x
Lychnis flos-cuculi L.			1		
Ranunculus flammula L.	2		10		1
Rhinanthus minor L.		10	1/2 cf.	2	
Typha sp			1		
Vegetative plant material					
Bud				1	
Charcoal	x	x	x	x	x
Epidermal frags. (indet.)	x	x	x	x	x
Mosses		x	x	x	
Poaceae indet. cn + fr.		xxx	xx	xx	
Pteridium aquilinum (L.) Kuhn lf. ra.		x			
Pteridium aquilinum (L.) Kuhn pi.			2	1	
Quercus sp. lf. fr.		x			
Twigs/wood fragments	xx	x	x	x	x
Indeterminate					
Seeds/fruits etc		3	17		
Seed capsule/calyx (?Caryophyllaceae)		2			
Inflorescence (degraded, ?Centaurea)		1			
Sample weight (kg)	0.5	0.5	0.5	0.5	0.5
% sorted	100	25	12.5	50	12.5

Taxa are represented by fruits or seeds except where indicated (see notes)

Table 5

Context number	6461	6462	6463	6465
Sample number	966	967	968	969
Nuts				
Castanea sativa L.			c.5	
Corylus avellana L. nu.fr. (grams)	0.5	1.9	32.8	1.7
Corylus avellana L. nu.			2	
Juglans regia L. nu. fr. (grams)		0.5	46.5	1.5
Juglans regia L. nu/2.			2	
Pinus pinea L. co.br.	1		62	1
Pinus pinea L. co. ap.			1	
Pinus pinea L. nu. fr. (grams)		2.8	13.5	0.1
Fruits				
Crataegus monogyna L.			6	
Crataegus sp.			1	
Olea europaea L.			21	
Prunus cf avium (L.) L.			5	
Prunus domestica L. ssp. insititia (L.) Bonnier & Layens		3	7	
Prunus spinosa L.	1	30	112	4
Vitis vinifera L.			1	
Indeterminate (? Pinus shoot - deformed)			1	
Indeterminate fruitstones (deformed)		2	7	

Large macrofossils from 15 litre bulk samples