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THE MACRO-BOTANICAL EVIDENCE FROM LATE SAXON AND EARLY MEDIEVAL STAFFORD.

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Summary

Excavations in the town of Stafford produced many rich macro-botanical assemblages, primarily from the late Saxon and Medieval periods, but also including two four-post structures thought to be possible granaries, which were dated to the Iron Age. Most of the material was charred, although there were waterlogged assemblages in some wells and pits. In Phase I, the Iron Age four-posters produced remains of emmer (_Triticum dicoccum_), spelt (_T. spelta_), bread wheat (_T. aestivum_), rye (_Secale cereale_) and barley (_Hordeum sativum_). In Phase III there were five oven/ kiln structures dated to the ninth century which contained rich deposits of charred cereals and arable weeds. A pit and a sunken feature building also produced many cereals and weed seeds. Plums (_Prunus domestica_ s.l.), cherries (_Prunus_ cf. _cerasus_), apple pips (_Malus_ sp.) and dill (_Anethum graveolens_) came from the two Saxon wells along with a range of ruderals, some plants of damp ground and a few charred cereals and segetals. In the 12th century a sand quarry was partly backfilled with an immense dump (about 10 square metres) of charred grain. Two more oven/ kilns came from later phases, although they were associated with relatively smaller amounts of grain. Two medieval wells and a pit produced dill and fennel (_Foeniculum vulgare_), as well as ruderals, damp ground plants and heather.

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THE MACRO-BOTANICAL EVIDENCE FROM LATE SAXON AND EARLY MEDIEVAL STAFFORD

by Lisa Moffett

The investigation of archaeobotanical material was an integral part of the research design for the Stafford excavations. Seeds, fruits, vegetative plant parts and pollen can all be preserved in archaeological deposits where the appropriate conditions for preservation prevail. Plant remains give information about environmental conditions, local economy and arable husbandry practices, and can complement the archaeozoological data and other types of environmental data to give a more fully rounded picture of activities taking place on the site.

Plant material normally decays quickly and is preserved in archaeological contexts only under certain special conditions. Two of the most common are waterlogging and charring. Permanent waterlogging inhibits the microbial action which causes decay by excluding the air which the micro-organisms need to survive. The relatively dense or woody outer parts of seeds often survive quite well under waterlogged conditions, although the starchy insides do not. Charring causes partial carbonisation of the organic material, which is then resistent to decay because the majority of the structure has been converted to inorganic carbon. Charring is the most common way in which cereals and other arable products are preserved. More rarely, seeds, fruits and the more durable vegetative structures are preserved by mineralisation, that is, the replacement of the organic structure by mineral salts, chiefly phosphates and carbonates, in solution. Other rarer conditions of preservation include permanent freezing and dessication, but these are generally found only under climatic extremes. At Stafford, preservation of macro plant remains was mainly by charring and waterlogging, although a very few mineralised items were found. Pollen, which is highly resistent to decay, is mostly preserved in waterlogged deposits and buried (anaerobic) soils, but can also survive in aerobic soils where the pH is low.

Each of these forms of preservation occurs under different circumstances and is likely to preserve different types of plant material. For instance, few archaeological contexts are permanently waterlogged, unless the site itself is below the water table. Much depends on the relation of the site to the permanent water table and whether this has changed since the site was occupied. The backfills of wells are usually waterlogged unless the water table has changed drastically since the well was dug, and sometimes pits, ditches and latrines are waterlogged also. The material preserved in these features is often a mix of seeds from plants growing in the immediate vicinity, and dumped waste material from various sources. Wells in particular often collect mixed floras of this type, as after they have gone out of use they are handy places for disposing of rubbish (Greig, forthcoming). Charred material obviously has to have been exposed to fire, but not burned up completely. This usually happens at the bottom of a fire where reducing (anaerobic) conditions prevail and the material will carbonise rather than oxydising into oblivion. Charring, therefore, tends to preserve the plant material that is most likely to be exposed to fire, and is dense enough to sink to the bottom of a fire. Mineralisation most often occurs in latrines and cesspits as these are the contexts most likely to have the necessary combination of a high concentration of phosphates and water to dissolve the minerals so the solution can permeate the organic material.

It is clear that usually the vast majority of botanical material on a site will not encounter these special circumstances and will disappear without a trace. In addition there are certain kinds of plant material which are unlikely to preserve under any of the conditions mentioned above, or at least not any that were present at Stafford. These include the more delicate vegetative and floral parts of the plant, and starchy material with a low chance of exposure to fire, such as starchy roots. This means that many common food items, vegetables in particular, have very little chance of surviving to be discovered. Vegetables are known in the British archaeobotanical record so far mainly from their seeds, though there have been occassional finds of fragments of waterlogged cuticle or fibres (e.g. Tomlinson, 1986; Greig, Medieval Chester, in prep.). Many vegetables such as carrots, lettuce and the cabbage family, are cultivars of wild species, some of them native to Britain, whose seeds are indistinguishable from their garden relatives. Chance of deposition, type of remains and type of preservation, therefore, are limitations imposed on any archaeobotanical assemblage and allowing for them is part of the process of interpretion.

Another aspect of interpretation is the use of ethnographic parallels. Modern farming in industrial countries uses very different tools and methods from those of the pre-industrial age. It is necessary to look to those societies still surviving in the 20th century which use traditional methods and hand tools with human and/or animal power for examples which may help us to understand Medieval husbandry practices. Such parallels have to be made with care. The methods of a farmer practicing a traditional type of agriculture in, for instance, north Africa, may have little direct application to the farmers of late Saxon Britain. Climate, soils, the kinds of crops grown, social structure and culture are just some of the different factors involved. Nevertheless it is possible to draw very useful parallels within the appropriate limitations. The possible methods of processing a particular crop, for example, are not unlimited - they are defined by the demands of the crop itself, as is the sequence of steps performed (Hillman, 1981). Workers studying traditional farming practices in various regions of the world provide invaluble information about how particular crops are sown, cultivated, harvested, processed, stored and prepared for consumption, which could not be guessed at or imagined by someone working only in a lab who has never seen these methods in use.

METHODS

Sampling

Most of the contexts at St. Mary's Grove were sampled for charred plant remains, and samples for waterlogged seeds were taken from all waterlogged features. All of the wells from the Tipping St. site were sampled, generally a different sample from every identifiable layer, and dry samples for charred remains were taken from the pottery kilns and other contexts which appeared to contain occupation material. There were no waterlogged contexts at Bath St., but all of the contexts were sampled for charred remains.

Originally the intention was to take a test sample from each context, and on the basis of the result of the test, decide how to sample the rest of the context. This system quickly broke down, as it was not possible for the field technician to keep up with the large number of test samples. All contexts, therefore were sampled regardless. The size of the sample was originally set at roughly 10% of the volume of the context. This, however, also proved to be impractical, and instead, a 10% sample was taken of the context up to a limit of roughly 25 kilogrammes. An exception was made for contexts obviously rich in charred material, which were collected in their entirety.

The sizes of the samples are given in the species tables (Tables B-L). In order to make it easier to compare samples of different sizes, the number of items per kilogramme is also given in the tables for the samples of charred remains. As is all too likely on a large project where day to day supervision was not possible, there were slip-ups and some samples sizes were not recorded. These are indicated in the tables by an asterisk.

Analysis

The dry samples were processed by flotation on site, and the collected flots sorted by biotechnicians using a low power binocular microscope. The waterlogged samples were processed in the lab by wet sieving, and were also pre-sorted by a biotechnician. Identification of seeds, fruits and other plant material was made by comparison with modern reference material.

The comprehensive sampling programme described above produced far more samples than could be analysed in a reasonable amount of time. Some selection was necessary, and for the charred material it was decided to concentrate on samples which were relatively rich in charred remains, and those which had been identified as 'primary' by the archaeologist. Some of these 'primary' contexts were the first backfills of pits and ditches, and as such not 'primary' from an archaeobotanical point of view, since the charred material in them obviously had come from somewhere else. The charred material in the archaeologically 'primary' fills was, however, more likely to be accurately dated than material derived from a fill containing pottery residual from earlier phases. The samples were quickly scanned to see which were most of productive of charred remains. Samples rich in material were chosen in preference to poorer samples for analysis because resources were limited and large assemblages can usually be interpreted with a greater level of confidence. Since the majority of samples produced a few cereal grains and weed seeds, it is clear that the samples analysed are not 'typical' in the sense that no attempt has been made to present statistically 'representative' samples, but rather those samples which seemed likely to yield the maximum information. It was felt that this approach was justified because the probable sources of most of the charred material were clearly evident on the site, and there was no need to attempt to use the charred material as an indicator of concentrations of human activity. On a different type of site, and especially where most or all of the charred material was residual, a different strategy would probably have been needed.

Waterlogged samples were also selected, as samples from the same well were usually repetitive. The upper layers of the wells often had not been permanently waterlogged and therefore most of the preserved organic material came from near the bottom. The samples chosen for analysis were usually those of organic material from, or close to, the first phase of backfill.

SOILS

The 1:25,000 soil survey map of Stafford and its immediate environs has not been published as of this writing, and the following brief description of the commonest local soil associations has been extrapolated from Soil Survey Record No. 31 (Eccleshall), (Jones, 1975) with reference to the Soil Survey Bulletin for Midland and Western England (Ragg et al., 1984).

The most easily worked soils in the region are the slightly acid brown earths on the river terraces, chiefly the Wick series and the closely related but less well-drained Arrow and Quordon series. The town of Stafford itself sits on a terrace in a loop of the River Sow and the brown earths of the river terraces would have been easily available. These soils are light, easy to plough, and although the Wick series is somewhat drought-prone, they are well suited to cereal cultivation, and can be used for other crops as well, provided the water regime is well-managed, though application of fertiliser may be necessary.

Back from the river, mainly on the gentler slopes, are fine silty or loamy soils, particularly the Whimple series. These are fertile soils, usually of moderate to high base, though sometimes the upper horizon can be slightly acid, and are also well-suited to cereals and other crops.

Further up, on the somewhat steeper slopes, the soils are dominated by clayey soils such as the Worcester series. These soils can be calcareous or non-calcareous depending on the underlying geology. They are heavier, more difficult to work, and although suitable for cereals, are considered less well-suited for root crops.

On the flat lowlands next to the River Sow itself are the alluvial soils, and in particular the Midelney series. Arable agriculture is impractical here, as the soils are too wet. They can provide lush summer grazing but are liable to poaching if grazed in the wrong season.

The soils most likely to have been under cultivation in the Saxon and early Medieval periods are the soils on the river terraces and the silty/loamy soils just above the terraces. The heavy clay soils are likely to have been more marginal for arable agriculture because of the difficulty of working them, especially in the Saxon and early Medieval periods before use of the wheeled plough and large oxteams became widespread (Postan, 1972 p.51). The value of the alluvial plain for summer grazing would of course have been recognised from early on, and we know from many legal documents throughout England in the Medieval period that grazing rights were fiercely guarded.

CULTIVATED PLANTS

The cultivated plants described below are mostly staple crops, for which the sites yielded abundant evidence. As mentioned above, there were probably other plants cultivated, but the evidence has not survived. Non-cereal cultivars such as flax and dill, for which the evidence is scanty, should probably be regarded as under-represented rather than scarce.

Emmer (*Triticum dicoccum*)

Emmer is a primitive type of wheat that was widely cultivated in the prehistoric and Romano-British periods. Generally in southern Britain it seems to have been important during the prehistoric and then declined in importance relative to spelt during the Roman period, although this may not have always have been true on a local scale. Emmer and spelt are both glume wheats, that is, the grains are tightly enclosed in the glumes (the floral bracts) and are not released by threshing. They must be subjected to a special process of parching to make the glumes brittle, followed by pounding in a mortar and pestle to release the grain (described by Hillman, 1981 and 1984a). The glumes can also be removed by loose milling, although Hillman in his ethnographic work found this to be less usual, perhaps because it also breaks the grain thus making it more difficult to remove the small weed seeds and other small-sized contaminents by sieving (Hillman, 1984a).

Emmer chaff fragments and grains occur mainly in the postholes from the Iron Age four post structures but do also occur sporadically in later contexts all the way through the Medieval period. This apparently later emmer is considered to be residual. Emmer cultivation is not known from the post-Roman period in southern Britain, and there is an obvious Iron Age period source of such material on the site which could later have been disturbed and redeposited in other features.

Spelt (*Triticum spelta*)

Spelt, like emmer, probably belongs only to the Iron Age phase of the site. Its remains are present in the granary post holes in only slightly greater numbers than emmer, and it thereafter occurs in the later contexts as a residual item in a rather similar pattern to emmer. Saxon cultivation of spelt is known from other parts of England (Green, 1979, Murphy, 1985) but there is no indication that spelt cultivation continued at Stafford.

Rivet/Macaroni wheat (*Triticum turgidum/durum*)

Rivet or macaroni wheat has been rarely reported from archaeological contexts in Britain. This may be partly due to the difficulties of distinguishing it from bread wheat, although the free-threshing tetraploids are likely to have been generally less common than bread wheat in the British Isles for climatic reasons. The free-threshing tetraploids are separated from the free-threshing hexaploids chiefly by the shape of the rachis segments, which are trapezoidal in shape and have a bulge or lump at the base of the glume insertion. The free-threshing hexaploids, by comparison, have a curved, 'shield-shaped' rachis with a double row of very fine hairs (generally only the pores remain) down each side and no lump, or at most a minor thickening, at the glume insertion (Hillman, forthcoming a). Free-threshing tetraploid grains often have a dome or hump on the dorsal side and an elongated S curve along the ventral side when seen in profile, but these characters are less reliable, and it is usually impossible to identify the grains to species. (Hillman, pers. comm.)

The two major free-threshing tetraploids, *Triticum durum*, and *T. turgidum*, usually cannot be separated without the whole spikelets or even whole ears (Hillman, pers. comm.), and there were none in these samples. Of the two, *turgidum* is perhaps the more likely. *Durum* needs more hot sunshine to ripen than the average British summer provides, and *turgidum* has the advantage also of being more winter hardy than *durum*. *Turgidum* is known to have been grown in Britain in the post-Medieval period, and was well thought of by Thomas Tusser when he wrote his famous treatise on husbandry in the 16th century (Tusser, 1580).

The introduction of *turgidum* to Britain and its earlier cultivation are at present still rather obscure. A 14th century and a couple of 16th century records are reported from daub samples from houses in Kent (Arthur 1960, 1961, and undated monograph). In the west midlands region, a free-threshing tetraploid was found in a 12/13th century context in Alcester (Moffett in Cracknell and Jones, forthcoming), a late12th/13th century context at Taunton (Greig, in Leach,1984) and a 14th century context at Warwick, Bridge End (Moffett in Cracknell, forthcoming). In Oxfordshire, a free-threshing tetraploid was found in 14th century contexts at Deancourt Farm (Moffett, in Allen forthcoming). The contexts at Stafford containing the *turgidum/durum* remains are all Medieval and are 12th-14th century. At present, the evidence seems to suggest a post-Conquest date for the introduction of this cereal to Britain, but further evidence may alter this picture. On the Continent, something closely related to *turgidum* or *durum* is known from a much earlier date, as it has now been confirmed that one of the cereals from the Neolithic Swiss lake villages was a free-threshing tetraploid (Jacomet and Schlichtherle, 1984).

Bread/club wheat (*Triticum aestivum/aestivo-compactum*)

Bread/club wheat is a consistent component of the samples although it is rarely dominent. There were three rachis nodes from the Roman granaries, but if there were any grains of bread wheat from this period they could not be distinguished from those of spelt. In the later samples there appear to be a range of grain morphologies, from short, compact club wheat type grains to long spelt-like or even rye-like grains, with most of the grains rather intermediate in form. These intermediate grains tended to be the most difficult to identify to ploidy level and thus often had to be classified as free-threshing *Triticum* sp., although most of them probably were bread wheat. The rachis internodes found were mainly lax, with only a very few short internodes which were similar to club wheat.

It is difficult to say if the variability was all in the same crop or if there were different varieties being cultivated separately. There is no clear dividing line between the compact grains and the intermediate grains, and they were usually found together. Given the often considerable amount of charring distortion present, some of the classification of these two types was probably a matter of subjective opinion. However, there was a bullet-shaped bread wheat form, difficult to distinguish from rye, which was present mainly in one Medieval feature (quarry 435) where the other types were poorly represented, and this may represent a variety that was grown separately.

Rye (*Secale cereale*)

Rye appears as a very minor component in the Roman granaries and could have been either a weed or a crop. There is some evidence for Roman cultivation of rye in Britain (Helbaek, 1952, 1964) but the evidence does not suggest that it was widely grown.

Rye seems to come into its own as a crop in the Saxon period at Stafford, and it remains abundant through the Medieval period. Rye is a winter-sown cereal, and is tolerant of drought, temperature extremes, and poor, light soils (Evans in Simmonds, 1976). It is often grown on sandy soils where other crops would be less successful, and was well represented at the Anglo-Saxon village at West Stow, possibly because of its relatively greater suitability for the local sandy Breckland soils (Murphy, 1983a, 1985). Tusser says that 'gravell and sand is for rie and not wheat (Tusser, 1580). It seems probable that rye would have been a suitable and successful crop on the local soils of the gravel terraces.

Barley (*Hordeum sativum*)

The small amount of barley from the Roman granaries is hulled, and there is exactly one asymmetrical grain indicative of the six-row type. The possibility of two-row barley is not ruled out, but six-row hulled barley, along with spelt, was the most widely cultivated cereal in the late Iron Age/Romano-British periods, and its presence would be expected.

Two-row hulled barley occurs in addition to six-row barley in the late Saxon period, and the two types appear to have been cultivated thereafter, although poor preservation makes this difficult to determine with complete confidence. In theory a crop of pure six-row barley should have two twisted grains to one straight grain, while a crop of pure two-row barley should have only straight grains, but in this case it was not possible to distinguish straight from twisted grains frequently enough to establish any reliable ratios. Of the rachises which could be identified two-row rachises were much rarer than six-row rachises, but it is difficult to know if this reflects the relative importance of the two types.

There were only two grains of a possible naked type found. Naked grains do occur in a population of hulled barley if the lemma and palea fail for some reason to enclose the grain tightly. These two, somewhat doubtful, naked grains are not considered to indicate the cultivation of naked barley.

Oats (*Avena* spp.)

Two species of cultivated oats are present at Stafford from the Saxon period: the common oat (*Avena sativa*) and the bristle oat (*Avena strigosa*). Although common oat grains are, on the average, larger than bristle oat grains, the overlap in sizes is considerable, making it impossible to safely identify individual grains to species. It is also not possible to distinguish wild from cultivated oat grains. Wild oats (*Avena fatua or ludoviciana*) are aggressive crop weeds and it is therefore highly probable that some of the oat grains in the samples are in fact contaminents rather than crop. To distinguish wild from cultivated oats it is necessary to have the lemma bases (the bases of the inner floral parts) in a good state of preservation. The lemma bases of wild oat species have a characteristic 'sucker mouth' scar where the lemma base has disarticulated cleanly from the rachis. The lemma bases of cultivated oats have a rounder, more irregular break. Godwin also distinguishes the cultivated oats *A. sativa* from *A. strigosa* by the morphology of the lemma base (Godwin, 1975), but attempts to do this with the Stafford material were rarely successful. Lemma bases are fragile and the few surviving specimens were seldom well-preserved enough to separate common oat from bristle oat. Considerable time spent examining modern uncharred material showed that it was extremely difficult to separate the secondary and tertiary florets of *A. sativa* from the primary floret of *A. strigosa* even with modern reference specimens. Lemma bases, therefore, were used only to distinguish wild oats from cultivated oats except in a few cases of exceptional preservation.

Fortunately a number of samples contained preserved oat pedicels (the spikelet forks). There were two types of pedicels, some with a detachment scar directly at the top of the pedicel, and some with a short stalk instead of a scar. Examination of a range of modern reference material showed that the lemma bases of hexaploid oats characteristically detach directly from the pedicel, whereas the inner floral parts of the diploid oats are borne on a short stalk. Further, on wild hexaploid oats the 'sucker mouth' detaches from a piece of tissue which is the reverse of the 'sucker mouth' and is quite distinctive. It was therefore possible to separate wild from cultivated oats, and diploid from hexaploid oats on the basis of the pedicel morphology (Moffett and Clapham in prep.). As the range of likely oat species under consideration for Britain is far more limited than for their area of origin the Mediterranean region, it was possible to assign the cultivated hexaploid pedicels to *A. sativa* type, and the diploid pedicels to *A. strigosa* type.

Oat grains are abundant at Stafford in both the Saxon and the Medieval periods. Medieval manor records suggest that at least in some periods oats were a major crop on some estates in Staffordshire (Birrell, 1979 p.20). Oats were often grown for fodder, but the consistent association of oats with the other cereals at Stafford suggests that at least part of the oat crop was probably intended for human consumption.

Legumes

Legumes are probably under-represented in charred material as they are less often exposed to fire except for cooking. The few peas and beans found in these samples are often unusually small, as if they had perhaps come from the ends of the pods, and were possibly part of a waste fraction. In addition to beans (*Vicia faba* var. *minor*) and peas (*Pisum sativum*), which were present in both the late Saxon and Medieval periods, the Medieval material also included cultivated vetch (*Vicia sativa*).

Flax (*Linum usitatissimum*)

A single charred seed of flax (identified as *L. usitatissimum/bienne*) was found in the sunken feature building. None of the Medieval features from St. Mary's Grove contained any flax, but this is probably due to chance, as flax was found in a Medieval well at Tipping Street (ST 32 245). Flax is grown for its fibres, which are used to make linen, and for its seeds, which are pressed to produce linseed oil.

Dill (*Anethum graveolens*)

Dill was found in the Saxon well (ST 29 608) and a probable dill seed also came from one of the Saxon ovens (ST 29 130). Dill is a potherb with a long history of use. It is mentioned by Classical writers such as Theophrastus and Pliny the elder, but was probably in use much earlier. Dill is not native to Britain and is at present thought to have been introduced by the Romans, although it is possible it may have been introduced even earlier.

Fennel (*Foeniculum vulgare*)

Fennel was found in a Medieval well from Tipping Street (ST 32, 1472). It is doubtfully native in Britain but has become naturalised (Tutin, 1980). Fennel was widely cultivated as a potherb and, like many Medieval herbs, it also had a variety of medicinal uses (McLean, 1981 p.214-215).

Plums and cherries (*Prunus* spp.)

Bullaces or damsons (*Prunus domestica* ssp. *insititia*) and Morello cherries (*Prunus* cf.*cerasus*) were common in the Saxon well (608) but unfortunately most of them were broken and unmeasurable. The cherries were identified using the criteria given in Kroll (1978). The unbroken plum stones were measured and both the absolute measurements and the length/ breadth indices were then compared with studies of archaeological plum stones undertaken by workers on the Continent, as there is at present less published comparative material available for Britain. The number of unbroken bullace/damson stones in the samples was too small (only 12 measurable specimens) to draw any conclusive comparisons but the stones did appear to form a group similar to Behre's 'Formenkreise A', which was found in Viking Age and Medieval levels at Hedeby, Medieval levels at Alt-Schleswig (Behre, 1978), and at Medieval Lübeck (Kroll, 1980), although the Stafford stones are at the smaller end of the size range for this group. The Stafford stones were also within, but towards the small end of, the size range given for *P. domestica* ssp. *insititia* and small varieties of ssp. *domestica* from Whitefriars, Norwich (Murphy, 1983b).

Bullaces, damsons and plums interbreed freely, are widely variable, and therefore extremely difficult to classify. Much more work will have to be done before it will be possible to trace the spread and development of ancient varieties.

Apple (*Malus sylvestris/domestica*)

Apple pips were also found waterlogged in the well. It was not possible to tell from the pips whether the apples were wild or cultivated, but given the presence of other orchard crops, it is likely that these are a primitive type of cultivated apple.

WEEDS AND OTHER WILD PLANTS

The few weed species present in the Roman granaries are all common species of arable and disturbed ground, such as knotgrass (*Polygonum aviculare* agg.), orache (*Atriplex* sp.), sheep's sorrell (*Rumex acetosella*) and two of the weedy grasses - brome (*Bromus secalinus/mollis* group) and wild oat (*Avena fatua/ludoviciana*). None of these species has strongly marked preferences for soil types, except for sheep's sorrel, which is generally found on acid soils. As the assemblages in the Roman granary post holes are likely to be representing a semi-cleaned storage product, the small percentage of weed seeds gives little indication of the type or size of weed flora that would have been present in the fields, although

,the presence of sheep's sorrel does suggest possible exploitation of the somewhat acid soils on the river terraces.

The Saxon period, by contrast, produced a considerable range of segetals and ruderals as well as a few hedgerow species and plants of wet ground. This relatively wide range of species continues in the Medieval period, and suggests the probable exploitation of several different soil types. The species found are mostly those with fairly dense, robust seeds, and it is highly probable that other species were present as well but their seeds have not survived charring.

In Tables B-L and the list of species (see pages**) the classification of plant species follows Clapham et al. (1962), except for the classification of the sedges (*Carex* spp.), which follows Jermy et al. (1982). Information about soil and habitat preferences is based mainly on Clapham et al. (1962) and Fitter (1978).

Arable weeds

Arable weeds probably account for the largest group of wild plant species found at Stafford. Most of them were charred, and when dealing with charred material it is necessary to consider how a seed became exposed to fire. Cereal remains constitute by far the largest class of charred material at Stafford and it is highly likely that other charred material found in the same assemblage will have become charred with the cereals. This does not mean that all charred material on the site is associated with cereals, but that the probability of exposure to fire is greatest for cereal-associated material. This probability is increased at St Mary's Grove by the lack of evidence for domestice occupation which might have produced charred material from household fires.

Many annual plants which today are not arable weeds but which grow in open habitats, especially grassland, disturbed ground and damp pasture, seem probable as arable weeds when found charred in association with charred cereals. The classification of a plant as an arable weed in an archaeobotanical assemblage, therefore, is based partly on its modern ecology, partly on past written accounts of cornfield weeds and partly on previous archaeobotanical records of species which seem to be found consistently in association with cereal assemblages despite growing in different habitats today. The heath grass *Sieglingia decumbens*, for example, is often found in charred cereal assemblages, especially in the pre-Saxon periods, though it is confined to heathland today, and Hillman has suggested that it may have been a weed of ard-cultivated fields (Hillman, 1982). The husbandry methods practiced in the pre-industrial era allowed the flourishing of many cornfield species in Britain which have since retreated into other habitats or disappeared altogether. Improved seed cleaning, drainage, herbicides and modern cultivation methods have all contributed to changes in weed ecology, but unfortunately these changes are still poorly understood.

Many of these formerly abundant arable weeds were found at Stafford. Cornflower (*Centaurea cyanus*), corncockle (*Agrostemma githago*), darnel (*Lolium temulentum*), stinking mayweed (*Anthemis cotula*) and ryebrome or chess (*Bromus secalinus*) are examples of weeds which were once common in cornfields and are now all but vanished from the British flora. Nipplewort (*Lapsana communis*) is often found in archaeobotanical assemblages associated with charred cereals, but today it grows chiefly in hedgerows and waysides. Annual grassland species such as clover (*Trifolium* spp.), the tares (*Vicia hirsuta* and *V. tetrasperma*), vetch (*Vicia sativa*), crested dog's tail (*Cynosurus cristatus*) and timothy (*Phleum pratense*) are frequently found in charred cereal assemblages and were probably invaders of cornfields in the past, although now they rarely penetrate beyond the field margins, if at all. Plant of damp ground are also frequent in the charred assemblages, suggesting that parts of some fields may have been poorly drained. Some of the buttercups (*Ranunculus* spp.), blinks (*Montia fontana*), ragged robin (*Lychnis flos-cuculi*) and spikerush (*Eleocharis palustris/uniglmis*) are all damp ground plants more usually associated with meadows but which may have been growing in damp patches in the cornfields. / u

Most of these arable weeds are plants which will grow on a range of soil types, but a few have preferences. Hare's ear (*Bupleurum rotundifolium*), charlock (*Sinapis arvensis*) and wild carrot (*Daucus carota*) are more frequent on calcareous soils, though not confined to them. Wild radish (*Raphanus raphanistrum*), corn spurrey (*Spergula arvensis*), annual knawel (*Scleranthus annuus*), sheep's sorrel (*Rumex acetosella*) and corn marigold (*Chrysanthemum segetum*) are all plants which prefer acid, generally light, sandy soils. Although most segetals, like the crops they invade, prefer to be on reasonably well-drained soil, the consistent presence of damp ground species, such as those mentioned above, implies that there were areas of the fields which were frequently wet. The ecological range of the weeds generally accords well with the local soil types. The acid ground plants are most likely to have come from the river terraces, with the fields perhaps encroaching onto the lower terraces and floodplain, where the damp ground plants would naturally grow. Field ditches may also have provided a habitat for damp ground species.

Open ground perennials

Some perennial species can grow in cultivated fields, especially where ploughing disturbance is minimal. Mallow (*Malva sylvestris*), greater plantain (*Plantago major*), ragwort (*Senecio* cf.*jacobea* type), and sowthistle (*Sonchus arvensis*) are perennial or biennial ruderals which were associated with charred cereal remains, and could conceivably have been growing at field edges. Other perennial species clearly must have come from another source. Gorse (*Ulex* sp.) and restharrow (*Ononis* sp.) are shrubs and unlikely to have been derived from cultivated fields. Black horehound (*Ballota nigra*) was only found uncharred in waterlogged deposits, and it was probably growing locally on disturbed ground. Heather (*Calluna vulgaris*) may have been imported into the town for flooring or bedding.

Aquatic plants

Although some damp ground species may have grown in the fields, true aquatic species grow in waterlogged conditions where crop plants cannot survive. Lesser spearwort (*Ranunculus flammula/reptans*, most probably*R. flammula*), water dropwort (*Oenanthe fistulosa*), bur reed (*Sparganium* sp.) and marsh bedstraw (*Galium palustre*) all occur charred, as do some of the wet/damp ground sedges, and most seem unlikely inhabitants of a crop field. The charred seeds of aquatics do not cluster together in any particular assemblages, however, but rather appear one or two species at a time in contexts heavily dominated by cereals and segetals. The possibility remains, therefore, that these plants were brought in with a crop which had been grown on land abutting permanently waterlogged ground. Alternatively, some wet ground plants may have grown in ditches on field margins.

Waterlogged remains of wet ground species are found in the wells and waterlogged pit. Sedges may have been collected for flooring, bedding or roofing materials. Other plants growing with the sedges could have been gathered with them either deliberately or inadvertently. It is also possible that some plants such as water pepper (*Polygonum hydropiper*) may have grown in the wells and pits after they started to backfill.

Hedgerow/woodland plants

Elder (*Sambucus nigra*), bramble (*Rubus fruticosus* agg.), hazel (*Corylus avellana*) and hawthorn (*Crataegus* cf. *monogyna*) are all typical hedgerow or woodland edge species. It is not really possible to infer the use of hedges from the presence of these species - waste from clearance or trimmings from the edges of existing clearings may have been used as fuel. A single fruit of whitebeam/wild service (*Sorbus* sp.-not *aucuparia*) was also found in one of the Saxon ovens. Wild service (*Sorbus torminalis*) is a tree associated with ancient woodland and ancient hedges, now rare. Whitebeam (*Sorbus aria*) is found mainly in secondary woodland and woodland edges (Rackham, 1980, p358). There are also a great many polyploid species of *Sorbus* which tend to be fairly local in their distribution, and mostly appear very similar to *S. aria*. No attempt was made to identify this charred fruit with its single surviving seed to species.

THE CONTEXTS

The Iron Age Four-Post Structures (ST 29 Phase I)

The earliest features on the St Mary's Grove site are two, or possibly three, four-post structures. The post holes are large, suggesting large timbers chosen to support a heavy weight. They are tentatively identified as granaries, and this identification is supported by the evidence from the charred plant remains.

Two postholes each from two structures (S19 and S20) were sampled for charred remains. Unfortunately the sizes of the samples were either lost or unrecorded, making it impossible to determine the relative richness of charred remains in the deposits. However, the sizes of the flots extracted from the samples were recorded and this shows that a high percentage (90% or more) of the charred material in these post holes was wood charcoal. It is possible that the granaries were destroyed by fire. The layer overlying the structures was a ploughsoil, so any destruction levels would have been removed. Intentional burning might also be done in a granary as a means of destroying pests or to clean out the last residuals of an old crop which might be harbouring molds or pests before storing the next crop. Kept under control, such a fire need not damage the structure. Some of the grains in the samples had slightly germinated, suggesting perhaps that they were indeed coming to the end of their storage life.

The main cereals found in the post holes were emmer and spelt, with small amounts of bread wheat, rye and barley. Weeds were present as no more than 3% of the number of items in a sample. As can be seen on Diagram 1 the percentage of grains and chaff fragments is roughly equal in the samples from one structure with grains predominating more in the other. A preservation bias in favour of grains over the more fragile chaff fragments is possible, perhaps depending on the temperature and amount of oxygen in the fire. Glume wheat spikelets have two glumes and usually two grains, so an approximately equal ratio of glumes to grains suggests the storage of whole spikelets. The relatively large numbers of unbroken spikelet forks tends to substantiate this suggestion. Ethnographic work carried out by Hillman on emmer cultivation in a variety of different climatic areas in Turkey, suggests that storage as whole spikelets rather than cleaned grain is often practiced in damp climates because retaining the enclosing chaff helps to retard spoilage and because large scale processing out of doors is less practical in areas of high rainfall. Final processing before consumption is undertaken piecemeal as the grain is needed (Hillman, 1981). Although the emmer and spelt crops probably were stored as whole spikelets, these seemed to have been well cleaned before being put into storage, as there are few straw remains (just two culm bases) and few weed seeds.

Saxon ovens (ST 29 Phase IIIa)

There were five oven or kiln structures in the late Saxon phase, and all were associated with substantial amounts of charred cereal remains. The charred remains included large numbers of grains, chaff and weeds. At least four cereals species are present in every oven sample, and the proportions of grains to chaff is different for each species. Table A shows the ratios of chaff fragments (rachis nodes for wheat, rye and barley, pedicel bases for oats) to grains, alongside the absolute numbers of chaff compared to grains as an indication of accuracy. The expected ratios of rachises/pedicels to grain in whole unthreshed ears is given for each species at the bottom of the table. Comparison between the expected ratios and the actual ratios gives some indication of the possible crop product represented (e.g. cleaned grain or processing waste) by indicating whether grains or chaff are over-represented relative to the original components of an ear. The absolute numbers only represent the items actually counted. For the relative richness of these samples (some of which were subsampled for efficient analysis) compare the numbers of items per kilogramme of soil as given in Table C.

The triangle diagram (Diagram 2) shows the relative proportions of chaff, weeds and grains in the Saxon ovens. This diagram shows that the ovens appear to separate into two groups. Ovens 130 and 585 are dominated by grains, though 585 also has a high percentage of weed seeds. Oven 214 also appears as part of this grouping, though as it has smaller numbers of items its relative percentages are less meaningful. Ovens 584 and 581 form another group, both containing more than 50% chaff fragments, though still with large amounts of grain, and relatively low percentages of weeds.

The sequence of crop processing for free-threshing cereals (including hulled barley and oats, which are processed by similar methods) has been described in detail by Hillman (1981) and G. Jones (1984). In simplified form, the harvested crop is threshed by beating or trampling, which detaches the grains and chaff from the ear. It is then winnowed by throwing the threshed crop into the air in a light breeze, which blows to one side the lighter chaff and weed components and leaves the grains and heavy chaff and weed components such as straw nodes, some rachises, and all but the lightest weeds. A first sieving is done with a coarse sieve which has a mesh large enough to let the grains fall through, but retains the larger elements such as bits of straw and rachises, and large seed heads. A second sieving with a fine sieve retains the grains but allows the smaller components, including most of the weed seeds, to pass through. The final stage is to hand sort out any remaining contaminents, mostly grain-sized weed seeds, straw nodes, fragments of rachis and grit. The long straw left after threshing is valued for thatching, bedding flooring etc. The other by-products of the various processing stages all have a potential use as fuel, although they can also be used for animal feed and tempering pottery (see the stages marked F in Hillman 1981, fig. 6). Both Hillman and Jones point out that these processes and the sequence in which they are performed can be subject to little variation despite differences in climate, location or culture, because the methods of processing are dictated by the demands of the crop itself. There is, for example, little point in attempting to winnow the chaff from the grains before the grains and chaff have been threshed free of the ears.

The presence of rachises and weed seeds in the ovens may be representing the use of crop processing by-products for fuel, which has become mixed with grain which was perhaps being parched or dried in the ovens. However, in all of these ovens chaff may be under-represented relative to grains due to differential survival in the process of charring. Chaff remains are lighter than grains and would tend to stay more in the upper, more aerobic, part of the fire where they would be consumed. This is particularly true of tough-rachised cereals where the rachises remain joined together and tend to get caught in the top rather than filtering to the bottom of the fire with the smaller dense items (Hillman, 1978). It is difficult to make even a good guess at the degree of differential preservation without considerable experimentation. It seems reasonable to assume, however, that there is some degree of under-representation of chaff remains. A Medieval kiln at Grove Priory, Bedfordshire, produced primarily grains and weed seeds with few chaff remains among the charred remains, but a very large number of chaff fragments had survived as silica skeletons. The ratio of chaff remains preserved under these rather rare circumstances compared to the charred chaff remains was something on the order of 1000:1. Although some cereal grains would probably have been burned completely away also, these results do suggest that chaff material is more likely to be completely destroyed in a fire (Robinson and Straker, forthcoming). If this degree of preservation is in any way characteristic of charred chaff material in ovens, then the assemblages found in ovens/kilns may bear very little relation to the composition of the original assemblages.

It is also uncertain how much differential preservation has affected the weed seeds. Experiments have shown that different kinds of seeds are affected by charring differently depending on a variety of factors such as size, oiliness, starchiness, shape etc. (Wilson, 1984). The weed seeds in the samples are almost all dense and relatively heavy for their size. They presumably represent mainly the seeds that sank immediately to the anaerobic bottom portions of the fire and thus escaped destruction.

Ovens 581 and 584

Although wheat, barley and oats are present in these two ovens, the chief cereal in both is rye. Rye grains are relatively abundant but the main component of the assemblages in both ovens is rye rachises. The proportion of rachises to grains is considerably greater than would be expected for whole unthreshed ears (see Table A), and it seems quite possible that these assemblages represent primarily the use of rye chaff for fuel. The main concentration of charred material from 581 came from the flue/stoke hole area of the oven (2242) where it was considered to be *in situ*, whereas the main concentration from 584 was *in situ* on the chamber floor (2247).

Ovens 130, 585 and 214

Oven 130 is heavily dominated by grains of oats with barley as the second most common cereal, and with smaller but roughly equal number of rye and wheat grains. Rye rachises are still more common than rye grains, suggesting that rye chaff may have been used as fuel in this oven also. Large numbers of straw culm nodes are present and flower heads of stinking mayweed (*Anthemis cotula*). The tips of what appears to be the calyx of corncockle (*Agrostemma githago*) were also found, suggesting that, despite the small number of corncockle seeds, whole capsules of corncockle may have been part of the original assemblage. Straw nodes and other large items like flower heads and large seed capsules are likely to be part of the winnowing by-product or coarse sieving by-product of grain processing, although these could still be present in semi-cleaned grain depending on how thorough the cleaning process was. As with the other oven samples, most of the weed seeds present are smaller than cereal grains and could represent fine cleanings also being used as fuel.

Ovens 585 and 214 present a somewhat less clear cut picture in the composition of their plant assemblages. Oven 214 contained a relatively small amount of material. Grains were more abundant than chaff remains and wheat was the most common cereal, at 48% of identifiable grains. Oven 585 is dominated by oat grains with a high percentage of weed seeds. The moderate amount of chaff present is again mostly rye rachises, although there are also substantial amounts of barley rachises and straw nodes. The straw nodes, together with large weed seeds such as corncockle, vetch/grasspea (*Vicia/Lathyrus*) as well as a few Compositae flower heads including *A. cotula*, suggest winnowing or coarse cleanings as for oven 130. The high percentage of oat grains (ca. 87%) also suggests a similarity between oven 585 and oven 130.

The charred assemblages from these three ovens bears some resemblance to the material recovered from the post-Roman kilns at Poundbury, except that no rye was present at Poundbury. The assemblages were similar to the Stafford ovens in being mainly cereal grains, but with a high incidence of weed seeds and relatively few chaff remains. However, most of the charred material from the Poundbury kilns came from the drying chamber areas, while the stokehole areas produced elatively less material, presumeably from having been regularly raked out (Monk, 1981). By contrast the grain-dominated ovens from Stafford had relatively little material in the chamber areas, most of the charred material being derived from the flue areas and immediately outside the flues, suggesting that this material was what had been raked out of the ovens.

The division of the ovens into two groups on the basis of their plant remains seems to correlate with their structural differences (see Cane, this vol.), except for 214, and 581 which was too poorly preserved to identify its structure. Oven 214 contained relatively less charred material and its results are correspondingly less conclusive, but it seems botanically to group better with the grain dominated ovens 130 and 585, although the dominent grain in 214 is wheat instead of oats.

Some possible functions

Grain drying. The storage life of grain depends on a combination of factors including moisture, temperature, the degree to which the grain has already been invaded by storage fungi, and also the degree of infestation of insects and mites, as these increase the moisture content and carry fungal spores (Christensen and Kaufmann, 1969). Drying and low temperature inhibit the growth of the storage fungi, which are usually the major cause of grain spoilage. The lower the temperature at which the grain is stored the higher the safe moisture content, particularly if there is free circulation of air (Ministry of Agriculture, 1966). Drying of grain therefore is not always necessary, especially if the air temperature is low. Fenton, in his ethnographic study of the Northern Isles, describes a method of storing threshed grain outdoors on a circular straw foundation. The grain was surrounded by large straw ropes and covered by thatch (Fenton, 1978). Grain was said to store for up to a year this way, no doubt helped by the low average temperature of the local climate. Fenton also mentions the use of corn driers to ripen grain when the growing season was too short for the corn to ripen in the field.

Reynolds, in reference to Romano-British 'corn driers', points out the impracticality of attempting to dry several tons of grain (an annual harvest's worth from a few hectares) in one of these structures, and concluded that malting was a more likely function (Reynolds, 1981; Reynolds and Langley, 1980). The capacity of the Stafford ovens appears to be very roughly similar to a Romano-British 'corn drier' and would perhaps be equally impractical for drying a whole harvest's worth of grain.

Grain parching. The ethnographic evidence both from the Northern Isles and from Ireland suggests that the main function of so-called corn-driers was to parch grain prior to milling (Fenton, 1978; Evans, 1957). Damp grain is inefficient to mill as it tends to crush and smear between the millstones rather than grind to a flour. Most of the modern ethnographic evidence for traditional methods of corn drying and corn parching does come from areas of consistently poor harvest weather (Scott, 1951). However, even fully ripe grain stored relatively dry mills much more efficiently after being hardened by parching. Experiments using a restored Romano-British rotary quern, found that a pound of parched grain ground to a flour in a few minutes, and needed to be put through the quern twice, but a pound of unparched grain took three quarters of an hour and needed to be put throught the quern eight or nine times (Curwen, in Curwen and Hatt, 1953 p.125-6). Parching is also done to free oats and barley from their enclosing husks (Fenton, 1978).

Malting. The Saxon ovens from Stafford have produced no evidence for malting. Only a few grains among thousands show clear signs of germination - no more than one would expect from a grain harvest grown by traditional methods in an oceanic climate. However, in drying malt it is important to keep the malt well protected from smoke and fire to avoid over-roasting or tainting the flavour of the ale. The malted grain, therefore, might have a relatively lower chance of becoming charred. Malt-drying cannot be ruled out as a function of these ovens, but the charred grain associated with the ovens was not malted and therefore must have derived from another source.

Saxon pit (ST 29 Phase IIIa)

The Saxon pit (136) appears to contain similar material to the ovens except that there is a greater proportion of wheat chaff to wheat grains. It is probable that this material was derived from one or several of the ovens.

Saxon sunken feature building (ST 29 Phase IIIa/IIIb)

The sunken feature building was destroyed be fire in the 10th century. Two of the four contexts sampled were rich in charred remains (1990 and 1988), while the two others (1991 and 1985) also contained moderate amounts of charred material. Diagram 4 shows that most of the charred remains (apart from plentiful wood charcoal) were cereal grains, with some weed seeds and few chaff remains. This is probably a clean, or nearly clean, storage product ready to be prepared for consumption. The main crops present are bread wheat, rye and oats with very little barley. Most of the weeds in the samples probably came in with the crops, but a single seed of gorse (*Ulex* sp.) and the bud stems of an unidentified shrub or tree are clearly not crop weeds and must represent material from another source such as, perhaps, building materials or bedding. A fragment of charred cloth, a flax seed and a fragment of plum stone suggest a minor element of possible household debris. The plant material is consistent with the use of this building as a dwelling or for storage, containing cereals ready to be prepared for daily consumption.

Saxon wells (ST 29 Phase IIIb and ST 32 Phase ?)

There were two wells from the Saxon period which contained waterlogged plant remains. One was from St. Mary's Grove (ST 29 608) and the other from Tipping St. (ST 32 363).

The well from Tipping Street contained mainly plants of disturbed and wet ground and is dominated by species of the Polygonaceae family, especially *Polygonum hydropiper*. Stinking

,mayweed, fat hen and chickweed are also well represented. Many of these may have been growing in the immediate vicinity of the well. Possible household debris is rather sparsely indicated by a fragment of hazel shell, a dill seed, a sloe stone, and a small amount of cereal remains including some uncharred rye and barley rachises.

The St. Mary's Grove well also produced a range of wet ground plants and ruderals, with some arable weeds which were mainly charred. There were also some charred cereal remains with which the charred weeds were presumably associated. Fruitstones were present and included bullace or damson (*Prunus domestica* ssp. *insititia*), Morello or sour cherry (*Prunus* cf. *cerasus*), and apple (*Malus* sp.), as well as a possible raspberry (*Rubus* ? *idaeus*) and a single sloe (*Prunus spinosa*). Many of the bullace/damson and cherry stones appear to have been gnawed by rodents, and two of the bullaces/damsons still had the fleshy mesocarp adhering and had obviously not been eaten. The species represented by the largest number of seeds was stinging nettle (*Urtica dioica*), which may have grown near the top of the well after it was abandoned. Stinging nettle produces prolific numbers of seeds and is often the main component in well assemblages (e.g. Wilson, 1981).

Medieval quarries (ST 29 Phase IV)

Dumps of charred grain occurred in two of the quarries from phase IV. In quarry 435 the dumping was massive, covering some 10 square metres (see Cane, this vol.). Tip lines where individual lots of material had been dumped were sometimes visible in section but unfortunately these were not distinct enough to make it possible to sample each tip separately. All of the material from this charred grain spread (2102) was collected during excavation, with the material from each grid square being kept separately. The amount of material was unmanageable, and it was decided to only analyse subsamples from four grid squares, plus one from the perimeter of the dump (2092), in order to test if there was a change in assemblage composition across the area of the dump. The percentages of the four cereals, wheat, rye, barley and oat is shown in the pie diagrams in Fig. 1. This quarry contained a type of bread wheat with bullet-shaped grains which was not present to a noticeable degree in any of the other contexts.

There was some variation horizontally in the relative percentages of the four cereals. However, as the grain is not *in situ* where it was burned, and the samples in any case probably include different vertical deposits, these variations can tell us little other than to confirm the evidence of the vertical stratigraphy that the grain was dumped in several actions and is not completely homogenous. The non-homogeneity of the dump suggests that perhaps the grain was derived from different sources or from the same source (such as a corn drier or oven) on separate occasions of use. It also possible that the grain could have been derived from a single source, such as a burned granary, where the crops had been stored separately but become amalgamated in the burning and the aftermath of cleaning up.

The grain, however, is not a fully cleaned product ready for use. In the samples from 2102, grain constitutes about 62-69% of the assemblages, chaff fragments about 21-29% and weed seeds a relatively modest 7-11%. In the sample from 2092, at the edge of the dump, grain was only 42%, chaff 45% and weeds 13%. Further confirmation comes from the presence of whole spikelets of rye, some of them still joined together as portions of whole ears. The grains in the spikelets are fully formed and the spikelets are from the middle portion of the ear, not from the terminal or basal portions which might have suggested that the grains were tail grains which sometimes remain in the spikelets after threshing. Clearly some of the the rye, at least, was from a harvested crop which had not yet been threshed and winnowed.

The assemblage from quarry 426 was mostly rye rachises wih some oat grains and chaff. Again, it appears that possibly rye chaff may have been used as a fuel in some oven or kiln which was later raked out and the rakings deposited in the quarry.

Medieval pits and ditch (ST 29 Phases IV-VII)

Most of the charred material in the pits and ditches is likely to have come from the kilns and ovens in the area. Although the features span a range of time from Phase IV to Phase VI, the charred material found in them could have come from any period either contemporary with or earlier than the filling in of the feature. It also likely that these features have some mixing of reworked material from several sources. Pit 449 from Phase IV, for example, contained several emmer glume bases reworked from the Roman phase. The amount of secondary reworking of material may be small, and might involve small numbers of items, but this is very difficult to judge. Clearly, the larger the amount of charred material there is in a deposit to start with the more likely it is that any reworking of that material will contribute relatively larger amounts of charred material to assemblages in later features.

There are, however, a few differences between the material in some of these features and the material in the primary features. A Phase V pit (471) produced most of the *Triticum turgidum/durum* found on the site. The only primary feature which contained any of this wheat was the stone built kiln (323) which is dated to Phase VI. A Phase VI pit (176) produced a higher percentage of legumes than any other feature sampled. Probably the pits and ditch were receiving the rakings of ovens and kilns in contemporary use, and the presence of these less common items represent detectable incidents of use and dumping.

The Medieval Stone-Built Kiln (Phase VI)

The stone-built kiln from phase VI at St. Mary's Grove is interpreted as a possible malting kiln on the basis of similarity with other contemporary structures considered to be malting kilns. In England, there are Medieval documentary references to malting kilns but not to corndriers (Dyer, pers. comm.), and the only archaeological example of a Medieval corndrier so far comes from Wales (Jones and Milles in Britnell,1984).

Archaeobotanical evidence for malting is based on the presence of germinated grain. To obtain malt, the grain is first immersed in water for a couple of days or more, then the water is drained off and the grain is spread on a malting floor in thin heaps. At intervals the grain is turned to prevent matting of the growing rootlets and regulate the temperature, which encourages evenness of germination. Enzymes are released during germination which free the starch granules from the matrix of the endosperm. This freeing of starch granules is called 'modification.' The modification is usually considered complete when the growing shoot (the plumule) is approximately 1/2 the length of the grain. The grain is then put in the malting kiln and 'cured' first at a low and then at a somewhat higher temperature, to suspend the enzymic activity without destroying the enzymes (Hunter, 1952). This product is malt. Any cereal grain or large grass can be used for malting, and unmalted grains as well as peas and beans can be added after malting to increase the starch content for brewing (Kaye, 1936). The presence of significant quantities of germinated grains, therefore, is often taken as indicating malting, although a damp harvest which had partly germinated in the ear and was being dried to prevent further spoilage might produce very similar remains.

Although evidence from documentary sources may suggest that kilns were used for malting rather than drying grain, there is no evidence from the plant remains that kiln 323 was a malting kiln. There were surprisingly few plant remains from the kiln sample and the assemblage is dominated by weed seeds (see Diagram 7). Only one of the cereal grains appeared to have germinated. The cereals present are the familiar mix of club/bread wheat, rye, barley and oats, with a trace of rivet/macaroni wheat. One pea and one bean were found, both substantially smaller than normal and possibly having come from the tail ends of the pods and representing a waste fraction. The proportion of chaff fragments is low, with rye rachises again accounting for most of the chaff. It seems likely that the kiln had been cleaned out and its contents disposed of elsewhere.

Medieval brewers may have used a higher proportion of unmalted grain than would be considered desirable by modern brewers. Modern experiments have shown success in brewing with up to 50% raw grain (Kaye, 1936 p.67) but the other 50% would still have to be malted or the diastic capacity of the wort would be insufficient for proper fermentation. All but one of the grains remaining in the kiln seem not to be germinated, so the grains probably do not represent accidently charred malt, though this in no way rules out the use of the kiln for malting. Rich charred deposits from a structure interpreted as a bake/brew house at a 13th/14th century grange in Oxfordshire failed to produce significant quantities of germinated grain despite fairly suggestive archaeological evidence for malting (Moffett in Allen, forthcoming d).

The Medieval Oven (ST 29 Phase VII)

Unlike the stone built kiln, the oven (ST29 188) did contain an appreciable quantity of germinated grain (at least 30%) in one of the samples, chiefly rye and oats, and a fair number of detached coleoptiles (sprouts) as well. This circular structure had no flue, and showed signs of burning in the chamber (see Cane, this vol.). This fire would have been directly under the grain, so if the oven was used for malting, considerable care would have been needed to avoid accidents. Indeed, the type of construction may be the reason why the germinated grains, if they do represent malt, became charred.

Despite the presence of significant amounts of grain, the dominent component of both samples from this oven in terms of numbers, is arable weed seeds, especially corn spurrey (*Spergula arvensis*), a weed legume (identified as *Vicia/Lathyrus* but probably *Vicia hirsuta* or *V. tetrasperma*), sheep's sorrell (*Rumex acetosella* agg.), dock (*Rumex* sp.), stinking mayweed (*Anthemis cotula*), and corn marigold (*Chrysanthemum segetum*). The seemingly high percentages of weed seeds may be partly due to the presence of several members of the Compositae, many of which produce large numbers of seeds per flower head. There are hardly any chaff fragments in the samples, which seems to suggest that the weeds were not introduced as part of a winnowing by-product being used as tinder. It is possible that the weeds are a by-product from fine-sieving the grain as one of the final stages of cleaning (Hillman, 1981; Jones, 1984). The fine sievings could have been disposed of in the kiln and become mixed with grain being processed in the kiln, or the final cleaning stages may have been considered unnecessary for grain destined for malting and the weeds were simply left in with the grain. Tusser's recommendation for cleaning grain intended for malt was to 'get out the cockle, and then let it go' (Tusser, 1580). As the same two types of products are involved it is not possible to tell whether they were separated and later became amalgamated in the kiln or whether they had never been separated in the first place.

Bath Street pit, (ST 34 12th/13th century)

The Bath street pit contained several spreads and lenses of charred material. The larger spreads near the bottom were sampled and found to be very rich in charred grain. Rye and oats were the dominent cereals, but bread wheat and barley were present as well. A few beans, a sloe and some fragments of hazel nutshell were also found. The preservation of the cereals was fairly poor but there seemed to be no sign of sprouting or detached coleoptiles which would indicate a malting accident.

There were a moderate number of wheat rachises, but other chaff material was sparse except for rye rachises. Weed seeds were abundant and the range of species present was large. The assemblages are in fact rather similar to the late Saxon oven assemblages. The ratio of rye grains to rye rachises was about 2:1, which is the expected ratio of grains to rachises for whole ears of rye. No whole spikelets were found in the samples, however, so it is not possible to say if this represents whole ears of rye or an amalgamation of cleaned grain with the by-products of grain processing. A few whole seed heads of corncockle and stinking mayweed were found in the samples, as well as some other unidentified flower heads. Whole seed heads could be representing whole weed plants incorporated in stored sheaves or they could be part of the by-product of winnowing or coarse sieving.

Tipping St. wells and pit (ST 32.12th/13th century)

Two waterlogged Medieval wells were examined and a waterlogged pit, all from Tipping St. One of the wells (233) produced an assemblage primarly of plants of waste ground. There are also a few plants of wet ground, some of which, such as *Ranunculus* subgenus *Batrachium*, and perhaps *R. lingua* and *Scirpus maritimus/tabernaemontanii*, could possibly have grown in the well after it had started to fill in. The flora indicated disturbed ground in the vicinity of the well, but probably not heavy trampling, and this too could be indicating the disuse of the well. There were no food plant remains apart from a single seed of fennel, which could have been growing as part of the waste ground assemblage rather than under cultivation.

The other well (245) contained more in the way of deposited rubbish. Charred cereal remains were present and charred seeds of arable weeds probably associated with them. A flax seed, a sloe stone, a dill seed and some heather flowers (*Calluna vulgaris*) provide an indication of household rubbish. Substantial numbers of sedge, woodrush (*Scirpus sylvaticus*) and a couple of *Juncus* seeds suggest these plants may have been collected (perhaps from the King's Pool) for flooring, bedding or thatch and dumped in the well with other rubbish. There is an element of grassland indicated by the buttercups (*Ranunculus* spp.), purging flax (*Linum catharticum*), cinquefoil (*Potentilla* cf. *erecta*), as well as the usual common ruderals.

The pit (276) contained mostly ruderal species but also a few charred cereal remains and some uncharred heather stems and flowers, and bogbean (*Menyanthes trifoliata*). Cannock Chase, a few miles to the southeast, or the southern end of the Pennine ridge, would have been a plentiful sourse of heather (Edees, 1972), although it is possible that other sources may have existed nearer to the town. Heather has been put to a number of uses, among them bedding, fodder, flooring and thatch. Heather and tall waterside vegetation were brought into York in considerable quantities, probably for similar purposes (Kenward et al. in Hall, 1978). Heather and bogbean were also found together in a Roman well at Skeldergate, York, as part of an assemblage suggesting the collection of peat (Hall, Kenward and Williams, 1980).

CONCLUSION

The botanical evidence from the Iron Age period is confined to the crop remains from the two four-post structures interpreted as probable granaries. The assemblage suggests the storage of spelt and emmer, probably still in the spikelet, with minor residuals of other crops. The crop species represented are similar to that found in Warwickshire at Tiddington, a large settlement on the second terrace of the Avon (Moffett in Palmer, forthcoming c), and at Wasperton, a smaller settlement also on a terrace of the Avon (Bowker, 1982). There is little else that can be said about the Iron Age material until more is known about Iron Age settlement and agriculture in the Stafford area.

In southern Britain between the Roman and the late Saxon periods there appears to be a change in the crops under cultivation. Emmer apparently was no longer grown and spelt, the main cereal of Roman Britain, became a minor local crop. Six-row barley continued in cultivation, but two-row barley also appeared, and bread wheat, rye and oats began to be cultivated on a larger scale. Bread wheat, and possibly rye and oats, were cultivated before the Saxon period, so this change should perhaps be viewed as one of emphasis, rather than an introduction of new crops. The period of transition between these two phases is poorly understood. The Dark Age in Britain shows a gap in the archaeobotanical record which is partly reflecting a gap in the archaeological record (Greig, 1983). Unfortunately this gap is also present in the record at Stafford. By the late Saxon period the changes in arable husbandry appear fully developed, but what interacting cultural, economic and other factors brought about the changes are as yet little studied.

The charred material from the Saxon phase at St. Mary's Grove is heavily dominated by the grain assemblages from the five kilns/ovens. The one residual context analysed from this phase contained an assemblage very similar to the kilns/ovens, and is probably derived from them. The functions of the kilns cannot be securely determined by the plant remains alone. Two of the ovens produced mainly chaff remains, three mainly grain. Grain drying for storage, grain roasting before milling, even malting, are possible functions. The material from the chaff-dominated ovens seems very likely to be representing the use of chaff as fuel or tinder. It is possible that the three grain-dominated ovens contained grain which was accidently burned while being dried or parched. However, it is possible that chaff remains are under-represented relative to grains and perhaps also to weed seeds. If this is true than the degree of under-representation is crucial to interpreting the original assemblages in the ovens, which in turn has a bearing on identifying the function(s). Unfortunately, there seems to be no means at present of deciding whether there is significant chaff under-representation, and if there is, to what degree. If Robinson and Straker's findings from Grove Priory are considered, then perhaps only a very few of the chaff fragments survived. This could possibly mean that the original composition of all the oven assemblages was chaff fuel, which would include the weed seeds and the inevitable few unthreshed grains. These denser items would remain to accumulate in the oven over a number of firings. The implication is that the ovens could possibly have been used entirely for other functions, such as bread making or drying of other foodstuffs, which are unrelated to the presence of cereal grains. The presence of legumes, dill and cherry in one of the ovens tends to suggest that the function may not have been confined to the processing of grain, and indeed a multi-purpose function seems likely. Preliminary experiments carried out by J. and C. Cane have shown that bread making and corn drying are possible in these oven/kilns, and that perhaps one type might be more suited for baking and the other for drying corn (Cane and Cane, unpub. experiment). Much more experimental work is needed, however, before any conclusions can be drawn. Experimental work will also be needed to resolve the problem of possible under-representation of cereal chaff in charred deposits.

Another late Saxon context was the sunken feature building. Although this is not being interpreted as a dwelling (see Cane, this vol.), the charred material is consistent with a domestic or storage use, being nearly clean prime grain with few chaff or weed contaminents.

The Saxon wells provided evidence of fruit such as plum, cherry and apple, and some seeds of waterside plants that may have been collected for thatch, flooring or bedding. They also yielded a few segetal plants likely to have been brought in with crops as well as an assemblage of ruderals likely to have been common in waste areas and path or road edges in the burgh.

There are few clear differences between the Medieval and Saxon assemblages other than the appearance of two crops found only the the Medieval period - vetch (*Vicia sativa*) and rivet/macaroni wheat (*Triticum turgidum/durum*). It is only recently that rivet/macaroni wheat has begun to be identified from British sites, and the date of introduction and extent of cultivation of this species are not yet known.

The 13th century stone-built kiln unfortunately produced very little in the way of charred plant remains. The high percentage of germinated rye and oat grains in the circular oven could be interpreted as evidence of malting although other explanations are possible. It is very possible that both of these structures were multi-purpose. The 17th century writer Gervase Markham speaks of kilns being used for drying sheaves of corn (but only if they had to be brought in from the fields wet), for drying grain which had had to be washed to remove smut, for drying malt, for drying oats to remove the hulls, and also for drying oats before grinding to meal (Markham, 1668, 1675).

The consistent appearance of rye chaff in the Saxon ovens/kilns, and from one of the Medieval quarry samples raises raises the questions of what the chaff was being used for and why rye chaff in particular seems to have been used.

The use of chaff material for tinder has been suggested on a number of other archaeological sites (e.g. Monk and Fasham, 1980; Hillman, 1980, 1983; van der Veen, 1983; Moffett, in prep.) and is documented in ethnographic studies from Turkey (Hillman, 1984a). Markham recommended straw fuel in malt-drying kilns for 'sweetness, gentle heat and perfect drying', or stubble from the fields if straw was not available. Other fuels could be used but imparted a taste to the ale (Markham, 1675). Although Markham was writing well after the period under consideration for Stafford, the preference for straw fuel was then at least 100 years old, as Tusser also expresses a preference for straw, saying that malt could be dried with straw or wood, but wood was more expensive and not as good (Tusser, 1580).

If rye chaff was readily available for fuel then either the chaff was being bought as a product in its own right or the rye crop was arriving in the burgh or town unprocessed and the activities of threshing, winnowing, etc. were being carried out near at hand. The presence of whole joined spikelets of rye in a 12th century quarry context, and possibly the evidence from the Bath Street pit, support the latter suggestion. Rye, therefore, may have been a locally grown crop, although this does not show that the other cereals came from further afield, as rye straw or chaff may have been preferred for some particular reason.

Whatever the straw or chaff was used for in the kilns, the possibility that the crop was arriving unprocessed suggests that the site had not wholly lost its rural character perhaps even by the 12th century. Threshing and winnowing are dusty and space-demanding activities generally carried out in the open air or in large barns. They are usually performed at the site of production to reduce the bulk and weight of the crop and the resulting costs of transport. Where crops grown in the immediate catchment area of a town or village are brought into the settlement for processing, this is usually done in an area on the edge of the settlement for the reasons just given above. It seems unlikely that primary crop processing would have been carried out in an area of more urban character where the inconvenience would be considerable and would make such activities impractical.

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COMPLETE SPECIES LIST

w=waterlogged c=charred
m=mineralised #=probably residual
+=present -=not found

	Iron Age	Saxon	Medieval	Common name
Cultivated Plants				
Triticum dicoccum	+c	+c#	+c#	emmer
Triticum turgidum/durum	-	-	+c	rivet/macaroni wheat
Triticum spelta	+c	+c#	+c#	spelt
Triticum aestivum s.l.	+c	+c	+c	bread wheat
Secale cereale	+c	+cw	+c	rye
Hordeum sativum, hulled six-row	+c	+c	+c	six-row barley
Hordeum sativum, hulled two-row	-	+c	+c	two-row barley
Avena strigosa	-	+c	+c	bristle oat
Avena sativa	-	+c	+c	common oat
Linum usitatissimum	-	+c	+cw	flax
Vicia faba var. minor	-	+c	+c	field bean
Vicia sativa (large-seeded)	-	-	+c	vetch
Pisum sativum	-	+c	+c	pea
Prunus domestica ssp. insititia	-	+w	-	bullace/damson
Prunus cf. cerasus	-	+cw	-	Morello cherry
Malus sp.	-	+w	-	apple
Foeniculum vulgare	-	-	+w	fennel
Anethum graveolens	-	+cw	+w	dill
Wild Plants				
Ranunculus acris/repens/bulbosus	-	+cw	+cw	buttercup
Ranunculus sardous	-	-	+cw	hairy buttercup
Ranunculus lingua	-	-	+w	great spearwort
Ranunculus flammula/reptans	-	+c	+cw	spearwort
Ranunculus subgenus Batrachium	-	-	+w	crowfoot
Papaver cf. dubium	-	-	+c	long-headed poppy
Papaver cf. argemone	-	-	+cw	prickly-headed poppy
Brassica nigra	-	+c	+c	black mustard
Sinapis arvensis	-	+c	-	charlock
Raphanus raphanistrum	-	+cw	+cw	wild radish
Thlaspi arvense	-	+w	-	field pennycress
Capsella bursa-pastoris	-	-	+w	shepherd's purse
Rorippa sp.	-	+w	-	yellowcress
Viola spp.	-	-	+w	violet
Hypericum hirsutum	-	+c	+c	hairy St. John's wort
Silene dioica	-	-	+c	red campion
Silene alba	-	+c	+c	white campion
Silene vulgaris	-	+c	-	bladder campion
Silene cf. nutans	-	-	+c	Nottingham catchfly
Lychnis flos-cuculi	-	+cw	+w	ragged robin
Agrostemma githago	-	+cw	+cw	corn cockle
Stellaria media type	-	+cw	+cw	chickweed
Stellaria palustris/graminea	-	+c	+cw	stitchwort
Spergula arvensis	-	+c	+cw	corn spurrey
Scleranthus annuus	-	+cw	+cw	annual knawel

Montia fontana ssp. fontana	-	+c	+c	blinks
Montia fontana ssp. chondrosperma	-	-	+cw	blinks
Chenopodium album type	-	+cw	+cw	fat hen
Chenopodium murale	-	-	+c	nettle-leaved goosefoot
Chenopodium urbicum	-	-	+w	upright goosefoot
Atriplex sp.	+c	+cw	+cw	orache
Malva sylvestris	-	+w	+c	common mallow
Linum catharticum	-	-	+w	purging flax
Ulex sp.	-	+c	+c	gorse
Ononis sp.	-	-	+c	restharrow
Trifolium sp.	-	+c	+c	clover
Vicia hirsuta	-	+c	+c	hairy tare
Vicia tetrasperma	-	+c	+c	smooth tare
Vicia sativa (small-seeded)	-	+c	+c	common vetch
Vicia/Lathyrus	+c	+c	+c	
Lathyrus pratensis	-	-	+c	meadow vetchling
Rubus cf. idaeus	-	+cw	-	raspberry
Rubus fruticosus agg.	-	+w	+cw	bramble
Potentilla anserina	-	+w	-	silverweed
Potentilla cf. erecta	-	+cw	+cw	common tormentil
Aphanes arvensis	-	-	+w	parsley piert
Prunus spinosa	-	w	+cw	sloe
Crataegus cf. monogyna	-	+c	-	hawthorn
Sorbus sp. (not aucuparia)	-	+c	-	whitebeam/wild service
Anthriscus caucalis	-	+w	-	bur chervil
Conium maculatum	-	+cw	+cw	hemlock
Bupleurum rotundifolium	-	-	+c	hare's ear
Oenanthe fistulosa	-	+c	-	water dropwort
Aethusa cynapium	-	+w	+w	fool's parsley
Daucus carota	-	+c	+c	wild carrot
Euphorbia helioscopa	-	-	+c	sun spurge
Polygonum aviculare agg.	+c	+cw	+cw	knotgrass
Polygonum persicaria	-	+cw	+cw	persicaria
Polygonum lapathifolium/nodosum	+c	+c	+c	pale persicaria
Polygonum hydropiper	-	+c	+w	water pepper
Polygonum convolvulus	-	+cw	+cw	black bindweed
Rumex acetosella agg.	+c	+cw	+cw	sheep's sorrel
Rumex obtusifolius	-	+w	-	broad-leaved dock
Rumex sp.	-	+cw	+cw	dock
Urtica urens	-	+w	+w	small nettle
Urtica dioica	-	+w	+w	stinging nettle
Betula sp.	-	+w	-	birch
Corylus avellana	-	+cw	+cw	hazel
Calluna vulgaris	-	-	+cw	heather
Anagallis cf. arvensis	-	-	+w	scarlet pimpernel
Menyanthes trifoliata	-	-	+w	bogbean
Lithospermum arvense	-	+c	+c	corn gromwell
Hyoscyamus niger	-	+w	+cw	henbane
Solanum nigrum	-	+w	+cw	black nightshade
Veronica polita/ agrestis	-	-	+c	
Euphrasia/Odontites	-	-	+cw	
Prunella vulgaris	-	-	+w	self-heal
Stachys arvensis	-	+cw	+c	field woundwort
Ballota nigra	-	+w	+w	black horehound
Galeopsis angustifolia	-	+c	+cw	narrow-leaved hempnettle

Galeopsis tetrahit agg./speciosa	-	+cw	+cw	common hempnettle
Plantago major	-	-	+c	great plantain
Plantago lanceolata type	+*c	+c	+c	ribwort plantain
Galium palustre	-	-	+c	marsh bedstraw
Galium aparine	-	+c	+c	cleavers
Sambucus nigra	-	+cw	+cw	elder
Valerianella dentata	-	+c	+c	corn salad
Senecio cf. jacobaea type	-	+cw	-	ragwort
Senecio aquaticus	-	-	+w	marsh ragwort
Senecio vulgaris	-	+w	+w	groundsel
Anthemis cotula	-	+cw	+cw	stinking mayweed
Tripleurospermum maritimum	-	+c	+c	scentless mayweed
Chrysanthemum segetum	-	+c	+cw	corn marigold
Chrysanthemum leucanthemum	-	+c	-	ox-eye daisy
Arctium lappa	-	+w	-	great burdock
Carduus/Cirsium	-	+cw	-	
Centaurea cyanus	-	+c	+cw	cornflower
Centaurea nigra type	-	+c	-	lesser knapweed
Lapsana communis	+c	+cw	+cw	nipplewort
Sonchus arvensis	-	+c	-	field milk-thistle
Sonchus oleraceus	-	+c	+w	sow-thistle
Sonchus asper	-	+w	+w	spiny sow-thistle
Taraxacum sp.	-	+w	-	dandelion
Juncus cf. effusus/conglomeratus	-	+c	+w	soft/conglomerate rush
Lemna sp.	-	-	+m	duckweed
Sparganium sp.	-	-	+c	bur-reed
Eleocharis palustris/uniglumis	-	+cw	+cw	spikerush
Scirpus maritimus/tabernaemontanii	-	+w	+w	club rush
Scirpus sylvatica	-	-	+w	wood rush
Isolepis setacea	-	+w	+cw	bristle scirpus
Carex cf. flava group	-	+c	+w	yellow sedges
Carex cf. rostrata/vesicaria	-	+w	+w	bottle/bladder sedge
Carex cf panicea	-	+w	+cw	carnation sedge
Carex cf. nigra type	-	-	+cw	common sedge group
Carex cf. appropinquata/diandra	-	+c	+w	tussock sedges
Carex cf. disticha	-	-	+w	brown sedge
Carex cf. echinata	-	+w	+w	star sedge
Carex spp.	+c	+cw	+cw	
Glyceria sp.	-	-	+cw	reed grass
Lolium temulentum	-	+c	+c	darnel
Poa annua	-	+c	+c	annual meadow grass
Poa spp.	-	+w	-	
Cynosurus cristatus	-	+c	+c	crested dog's tail
Bromus secalinus/mollis group	+c	+c	+c	rye brome/soft brome
Agropyron repens	-	+c	+c	couch-grass
Avena fatua/ludoviciana	+c	-	+c	wild oat
Arrhenatherum elatius	-	-	+c	oat-grass
Agrostis sp.	-	+c	+c	bent
Phleum pratense	-	+c	+cw	timothy

Table A

Total numbers and approximate ratios of rachis nodes to grains for each of the four major cereals identified to genus.

The column on the left under each heading shows the ratio, the column on the right shows the absolute numbers.

Saxon ovens
Rachises:Grains

Context	Wheat	Rye	Barley	Oats
1682	1:1 438:528	3:1 1558:472	1:11 153:1675	- 0:6533
2243	1:2 28:70	1:1 10:8	1:5 6:28	- 0:41
2195	1:19 1:19	2:1 24:12	- 0:2	- 0:7
2242	- 0:5	9:1 249:26	1:1 1:1	- 0:2
2247	2:1 30:16	4:1 244:67	1:9 1:9	1:12 2:25
2228	1:4 8:29	5:1 230:45	1:1 128:154	1:29 50:1469
2223	1:2 10:16	4:1 72:20	1:3 43:131	1:225 5:1126
2222	1:2 5:10	7:1 67:10	1:6 5:29	1:42 11:464

Saxon pit
Rachises:Grains

Context	Wheat	Rye	Barley	Oats
2140	2:1 85:42	2:1 21:11	1:1 12:13	- 0:52
2136	13:1 13:1	6:1 468:73	1:1 301:249	1:135 4:541
2134	1:1 79:72	5:1 50:11	1:1 22:25	1:125 5:629

Saxon sfb
Rachises:Grains

Context	Wheat	Rye	Barley	Oats
1991	1:9 1:9	1:3 5:14	- 0:1	- 0:58
1990	1:3 1:3	1:8 3:25	- 0:2	- 0:117
1988	- 0:346	1:834 1:834	- 0:0	- 0:73
1985	1:1 4:5	- 0:24	1:3 5:14	- 0:129

Medieval oven and kiln
Rachises:Grains

Context	Wheat	Rye	Barley	Oats
2323	- 0:44	1:15 16:238	1:3 2:7	- 0:555
2322	- 0:9	- 0:57	- 0:2	- 0:142
1891	1:1 27:28	2:1 39:17	1:3 3:9	- 0:78

Medieval pits (2 richest contexts only)
Rachises:Grains

Context	Wheat	Rye	Barley	Oats
2178	2:1 48:22	1:1 135:178	1:3 3:9	1:10 25:252
1929	1:1 746:523	1:1 12:9	1:1 2:2	1:90 1:90

Expected approximate ratio of rachis nodes to grains in unthreshed ears

Wheat	Rye	Barley	Oats
1:3	1:2	1:3(6-row) 1:1(2-row)	1:2 or 1:3

ST MARY'S GROVE
IRON AGE POST HOLES
Table B

Feature no.:	S19	S19	S20	S20
Context no.:	2253	2254	2249	2260
Phase:	I	I	I	I
Size of soil sample:	*	*	*	*
Volume of flot:	110ml	105ml	385ml	19ml
% of flot sorted:	50	50	12.5	100
	*unrecorded		C=compact type	
			A=asymmetric	
CEREALS				
Triticum dicoccum rachises	1cf.	2	-	-
T. dicoccum spikelet forks	12	12	8	1
T. dicoccum glume bases	21	6	10	4
T. dicoccum grains	5	1+3cf.	3cf.	-
T. dicoccum/spelta rachises	3	3	2	1
T. dicoccum/spelta spikelet forks	72	61	33	11
T. dicoccum/spelta glume bases	64	68	46	17
T. dicoccum/spelta grains	7	10	4	-
T. spelta rachises	2+1cf.	1	-	1cf.
T. spelta spikelet forks	18+3cf.	18	11	5
T. spelta glume bases	21	10	14	2
T. spelta grains	2cf.	6cf.	5cf.	1cf.
T. spelta/aestivum s.l. grains	12+2C	-	-	-
T. aestivum s.l. rachises	3	-	-	-
Triticum sp. free-threshing grains	2	-	-	-
Triticum sp. grains	261	182	194	80
Triticum sp. germinated grains	-	39	-	1
Triticum/Secale grains	2	1	-	-
Secale cereale rachises	2	2	1	-
S. cereale grains	1	1	-	-
Hordeum sativum indet. rachises	-	1	-	-
Hordeum sativum hulled grains	6+1A	5	4	-
Cereal grains indet.	138	110	106	58
Cereal/Large Gramineae culm bases	1	1	-	-
WEEDS				
Atriplex sp.	1	-	-	-
Vicia/Lathyrus	1	-	-	-
Polygonum aviculare agg.	-	1	-	-
Polygonum lapathifolium/ nodosum	1	-	-	-
Rumex acetosella agg.	-	1	-	-
Plantago sp.	1cf	-	-	-
Lapsana communis	1	-	-	1
Carex sp.	-	1	-	-
Bromus secalinus/mollis group	-	5	4	-
Avena fatua/ludoviciana	-	1	-	-
Avena sp.	4	5	2	4
Large Gramineae indeterminate	8	14	4	4

ST MARY'S GROVE

THE LATE SAXON OVENS

Table C

Feature no.:	130	214	214	581	584	585	585	585
Context no.:	1682	2243	2195	2242	2247	2228	2223	2222
Phase:	III	III	III	III	III	III	III	III
Size of soil sample (kgs.):	43	8.5	14	2.5	6	67	51	*
Size of flot (mls):	655	39	22	26	300	1300	1100	800
% of flot sorted:	100	100	100	100	8	12.5	10	25
No. of items per kg:	866	44	11	260	1333	772	728	-
	*unrecorded							
CULTIVATED PLANTS								
Triticum dicoccum spikelet forks	-	-	-	-	-	-	2	-
T. dicoccum glume bases	-	-	1	-	-	1cf.		1cf.
T. dicoccum grains	-	1cf.	1cf.	-	-	-	3	2
T. dicoccum/spelta glume bases	-	-	-	-	-	3	-	-
T. spelta rachises	9	-	-	-	-	-	-	-
T. spelta glume bases	-	-	-	-	-	-	-	1
T. aestivum rachises	267	22	-	-	17	4	7	4
T. aestivum grains	37	-	-	-	3	-	-	-
T. aestivo-compactum rachises	2	-	-	-	-	-	-	-
T. aestivo-compactum grains	53	5	7	3	-	3	1	-
Triticum sp. free-threshing rachises	157	4	-	-	9	-	3	-
Triticum sp. free-threshing grains	429	53	3	-	2	10	4	-
Triticum sp. rachises (mainly basal)	12	2	1	-	4	4	-	1
Triticum sp. terminal glume bases	4	-	-	-	-	-	-	-
Triticum sp. grains	9	12	9	2	11	16	11	10
Triticum/Secale grains	6	-	8	48	14	28	11	3
Secale cereale rachises	1558	10	24	249	244	230	72	67
S. cereale grains	472	8	12	26	67	45	20	10
Secale/Hordeum rachis frags.	87	12	1	110	-	59	25	9
Hordeum sativum 6-row rachises	74	2	-	1	1	47	21	-
H. sativum indet. rachises	79	4	-	-	-	81	22	5
H. sativum hulled grains	73	1	-	1	3	31	25	-
H. sativum indet. grains	1602	27	2	-	6	123	106	29
Avena strigosa type pedicels	-	-	-	-	-	28	-	-
A. strigosa type lemma bases	-	-	-	-	-	9	-	-
A. sativa type pedicels	-	-	-	-	1	22	-	11
A. sativa type lemma bases	-	-	-	-	-	3	-	-
Avena sp. pedicels	-	-	-	-	1	-	5	-
Avena sp. lemma bases	64	-	-	-	1	-	3	-
Avena sp. large grains	22	-	-	-	1	64	6	5
Avena sp. small grains	470	9	7	2	10	188	101	57
Avena/large Gramineae	6061	32	-	-	14	1217	1019	402
Cereal indet. ca.	20000	123	53	182	128	1552	1039	328

	1682	2243	2195	2242	2247	2228	2223	2222
Cereal/Large Gramineae culm nodes	384	4	2	3	9	60	2	46
Cereal/Lg. Gramineae culm bases	2	-	1	-	-	-	-	-
Vicia faba var. minor	7cf.	-	-	-	-	-	1	-
Vicia/Pisum	3	-	-	-	-	-	-	-
Pisum sativum	1cf.	-	-	-	-	-	-	-
Prunus avium/cerasus	1	-	-	-	-	-	-	-
Anethum graveolens	1cf.	-	-	-	-	-	-	-
WILD PLANTS								
Ranunculus acris/ repens/bulbosus	5	-	-	-	-	-	-	-
Ranunculus flammula/reptans	1	-	-	-	-	1	-	-
Brassica nigra	1	-	-	-	-	-	-	-
Sinapis arvensis	2	-	-	-	-	1cf.	-	-
Raphanus raphanistrum	60	-	-	-	1	3	9	2
Hypericum hirsutum	-	-	-	-	-	-	-	1
Silene alba	1	-	-	-	-	-	-	-
Agrostemma githago	2	-	-	4	2	15	5	3
cf. A. githago calyx tips	10	-	-	-	-	-	-	-
Stellaria media type	-	-	-	-	-	17	13	1
Stellaria palustris/graminea	-	-	-	-	-	-	-	1
Spergula arvensis	98	-	1	-	-	20	6	5
Scleranthus annuus	2	-	-	-	-	-	-	-
Montia fontana	-	-	-	-	-	1cf.	-	-
Chenopodium spp.	80	1	1	-	7	207	84	88
Atriplex sp.	119	-	-	-	2	6	4	16
Chenopodiaceae indet.	148	-	-	1	-	-	-	-
Trifolium sp.	2	-	-	-	-	1	-	-
Trifolium sp. flower	1	-	-	-	-	-	-	-
Vicia hirsuta	24	4	-	1	-	27	26	26
Vicia tetrasperma	2	1	-	-	-	-	-	-
Vicia sativa	2cf.	-	-	-	-	1cf.	-	-
Vicia sp.	3	-	-	-	-	8	4	-
Vicia/Lathyrus	318	10	9	2	1	320	255	169
Potentilla sp.	1	-	-	-	-	-	-	-
Rubus cf. idaeus	1	-	-	-	-	-	-	-
Crataegus cf. monogyna	-	-	-	-	-	-	3	-
Sorbus sp. (not aucuparia)	-	-	-	-	-	-	1	-
Rosaceae indet. thorn	1	-	-	-	-	-	-	1
Conium maculatum	-	-	-	-	-	-	-	1
Daucus carota	-	-	-	-	-	-	-	1
Small Umbel indet.	-	-	-	-	-	-	-	1
Polygonum aviculare agg.	43	-	-	-	-	10	10	1
Polygonum persicaria	2	-	-	-	1cf.	-	2	1cf.
P. lapathifolium/nodosum	4	-	-	-	-	-	-	2
P. hydropiper	3	-	-	-	-	-	-	-
P. convolvulus	50	1	-	-	2	32	42	4
Polygonum sp.	124	-	-	-	-	12	2	-
Rumex actosella agg.	51	-	2	-	15	8	5	9
Rumex sp.	90	19	-	-	-	22	5	15
Corylus avellana frags.	31	-	-	-	1	1	8	-

	1682	2243	2195	2242	2247	2228	2223	2222
Stachys arvensis	1	-	-	-	-	1	-	1
Stachys sp.	-	-	-	-	-	1	-	-
Galeopsis tetrahit agg./ speciosa	36	-	-	-	1	23	3	10
Galeopsis sp.	-	-	-	-	-	-	28	-
Plantago lanceolata type	42	-	-	-	-	2	2	2
Galium aparine	2	-	-	-	-	-	1	-
Galium aparine/spurium	-	-	-	-	-	-	3	-
Galium spp.	3	-	-	-	1	1	4	-
Valerianella dentata	-	-	-	-	-	-	-	1
Sambucus nigra	14	1	-	-	5	-	1	-
Anthemis cotula	2061	1	1	3	24	1182	543	565
A. cotula flower heads	4	-	-	-	-	-	-	2
Tripleurospermum maritimum	26	1	2	-	19	288	115	28
Chrysanthemum segetum	16	1	3	-	3	1	-	-
Centaurea cyanus	-	-	1	3	2	-	-	-
Centaurea nigra type	2cf.	-	-	-	-	6	-	-
Centaurea sp.	-	-	-	1	-	3	1	-
Cirsium/Carduus	-	-	2	-	-	-	-	-
Lapsana communis	149	-	-	-	-	56	24	16
Compositae indet.	6	-	1	-	1	59	-	12
Compositae indet. flower heads	-	-	-	-	-	1	1	-
Eleocharis palustris/ uniglumis	25	-	-	-	1	-	-	-
Carex spp.	11	-	-	-	1	2	-	1
Cyperaceae indet.	11	-	-	-	-	-	-	-
Lolium temulentum	1 cf.	-	-	-	-	-	-	-
Cynosurus cristatus	1	-	-	-	-	-	-	-
Bromus secalinus/ mollis group	18	1	-	1	-	2	3	3
cf. Agropyron repens spikelet fork	1	-	-	-	-	-	-	-
Phleum pratense	4	-	-	-	-	1	2cf.	1
Large Gramineae indet.	38	-	4	3	1	5	7	12
Small Gramineae indet.	8	1	-	-	1	6	-	-
Gramineae indet. flower bases	-	1	-	-	-	-	4	-
Tree bud stems	-	-	-	-	-	3	-	-
Unidentified	61	3	3	2	2	30	13	-

ST MARY'S GROVE
LATE SAXON PIT
Table D

Feature no.:	136	136	136
Context no.:	2140	2136	2134
Phase:	III	III	III
Size of soil sample:	1kg	15kg	*
Volume of flot:	495ml	750ml	1500ml
% of flot sorted:	12.5	12.5	12.5
No. of items per kg:	3048	1609	-
	*=unrecorded		
CULTIVATED PLANTS			
T. dicoccum glume bases	1	-	-
T. dicoccum grains	2	-	1cf.
T. dicoccum/spelta spikelet forks	5	-	-
T. dicoccum/spelta glume bases	12	-	-
T. dicoccum/spelta grains	-	-	1cf.
T. spelta rachises	-	-	1
T. spelta glume bases	2	-	1
T. spelta grains	1	-	-
T. spelta/aestivum rachises	-	-	2
T. spelta/aestivum grains	-	-	-
T. aestivum rachises	34	11	32
T. aestivum grains	-	-	9
T. aestivo-compactum rachises	3	-	-
T. aestivo-compactum grains	3	-	13
Triticum free-threshing rachises	48	2	36
Triticum free-threshing grains	6	-	18
Triticum sp. rachises	-	-	9
Triticum sp. spikelet forks	5	1	1
Triticum sp. grains	33	1	32
Triticum/Secale grains	-	3	2
Secale cereale rachises	21	468	50
S. cereale grains	11	73	11
Secale/Hordeum rachis frags.	2	55	1
Hordeum sativum 6-row rachises	5	139	12
H. sativum 2-row rachises	-	2cf.	-
H. sativum indet. rachises	7	160	10
H. sativum hulled grains	3	85	12
H. sativum naked grains	-	-	1cf.
H. sativum indet. grains	10	164	12
Avena sativa type pedicels	-	-	3
Avena sp. pedicels	-	4	2
Avena sp. lemma bases	2	319	14
Avena sp. large grains	-	1	6
Avena sp. small grains	17	413	316
Avena/Large Gramineae	35	127	307
Cereal indet.	52	275	61
Cereal/Large Gramineae culm nodes	11	89	9
Cereal/Large Gramineae culm bases	-	4	-
Cereal/Gramineae panicle nodes	-	-	6

	2140	2136	2134
WILD PLANTS			
Brassica/Sinapis alba	1cf.	-	-
Raphanus raphanistrum	1	-	1
Silene alba	-	2	2
Silene vulgaris	-	-	1cf.
Lychnis flos-cuculi	-	1	-
Agrostemma githago	-	3	3
Stellaria media type	-	-	1
Spergula arvensis	-	5	5
Scleranthus annuus	-	-	1
Montia fontana	-	1	-
Chenopodium album type	3	19	11
Chenopodium sp.	-	-	1
Atriplex sp.	-	19	9
Chenopodiaceae indet.	-	-	11
Trifolium sp.	-	-	1cf.
Vicia/Lathyrus	2	8	9
Potentilla sp.	-	1	-
Small-seeded Rosaceae indet.	1cf.	-	-
Oenanthe fistulosa	-	-	2
Polygonum aviculare agg.	2	-	2
Polygonum persicaria	2	-	1cf.
Polygonum persicaria/ lapathifolium agg.	-	10	1
Polygonum convolvulus	-	1	-
Rumex acetosella agg.	2	-	2
Rumex sp.	1	5	3
Galeopsis tetrahit agg./speciosa	-	3	-
Plantago lanceolata type	-	2	2
Sambucus nigra	-	1	2
Anthemis cotula	15	472	120
Anthemis cotula flower heads	-	-	1
Tripleurospermum maritimum	1	-	-
Chrysanthemum leucanthemum	-	-	1
Lapsana communis	1	4	4
Sonchus cf. oleraceus	-	1	-
Compositae indet.	-	3	-
Compositae indet. flower heads	-	2	-
Juncus cf. effusus/conglomeratus capsules	-	19	1
Juncus sp. capsules	-	-	7
Eleocharis palustris/uniglumis	2	10	2
Carex cf. flava group	1	-	-
Carex sp.	1	-	-
cf. Cyperaceae indet.	1	-	-
Poa cf. annua	-	-	-
Bromus secalinus/mollis group	1	3	5
Agrostis sp.	-	-	4
Phleum pratense	1	3	1
Small Gramineae indet.	1	-	1
Other Gramineae indet.	-	11	8
Gramineae indet. small culm nodes	-	-	1
Unidentified flower heads	-	-	2
Unidentified	4	12	19

ST MARY'S GROVE
THE LATE SAXON SUNKEN FEATURE BUILDING
Table E

Context:	1991	1990	1988	1985
Phase:	III	III	III	III
Size of soil sample (kgs.):	8	5	32	5
Volume of flot (mls.):	56	1000	1050	88
% of flot sorted:	100	12.5	9.5	100
Number of items per kg:	16	347	556	63
CULTIVATED PLANTS				
Triticum aestivum s.l. rachises	1cf.	-	-	-
T. aestivum grains	-	1	139	-
T. aestivo-compactum rachises	-	1	-	4
T. aestivo-compactum grains	1	-	54	-
Triticum free-threshing grains	1	2	75	1
Triticum sp. grains	7	-	78	4
Triticum/Secale grains	1	2	126	2
Secale cereale rachises	5	3	1	-
S. cereale grains	14	24	834	24
Secale/Hordeum rachises	1	-	-	-
Hordeum sativum 2-row rachises	-	-	-	3
H. sativum indet. rachises	-	-	-	2
H. sativum hulled grains	-	-	-	13
H. sativum indet. grains	1	2	-	1
Avena sativa/strigosa lemma bases	-	3	6	-
Avena sp. large grains	1	2	10	2
Avena sp. small grains	11	9	37	16
Avena/large Gramineae grains	46	106	26	111
Cereal indet. grains	17	12	191	72
Cereal/large Gramineae culm nodes and bases	-	1	1	5
Linum usitatissimum/bienne	-	1	-	-
Prunus sp.	1 frag.	-	-	-
WILD PLANTS				
Ranunculus acris/repens/bulbosus	-	2	-	-
Ranunculus flammula/reptans	1	-	-	-
Raphanus raphanistrum	-	-	1	-
Agrostemma githago	-	1	36	-
Stellaria media type	-	1	-	-
Spergula arvensis	-	3	1	2
Scleranthus annuus	1	-	-	1
Chenopodium sp.	2	7	1	6
Ulex sp.	-	-	-	1
Vicia hirsuta	-	-	4	1
Vicia hirsuta/tetrasperma	-	-	2	-
Vicia sativa	-	-	1cf.	-
Vicia/Lathyrus	2	-	6	4
Malvaceae indet.	-	1	-	-
Galeopsis tetrahit agg./speciosa	-	-	4	-
Polygonum aviculare agg.	-	-	1	-
Polygonum persicaria	-	-	-	1
Polygonum hydropiper	-	-	-	1

	1991	1990	1988	1985
Rumex acetosella agg.	-	2cf.	-	3
Rumex sp.	2	5	1	6
Plantago lanceolata type	-	-	-	2
Senecio cf. jacobea type	-	-	1	-
Anthemis cotula	5	19	4	17
Tripleurospermum maritimum	1	1	-	2
Chrysanthemum segetum	-	-	-	1
Sonchus arvensis	-	-	-	1
Lapsana communis	-	-	9	-
Compositae indet.	-	-	-	2?
Eleocharis palustris/uniglumis	-	2	-	-
Carex cf. appropinquata	1	-	-	-
Lolium sp.	-	1cf.	-	-
Bromus secalinus/mollis group	-	2	3	-
Large Gramineae indet.	2	-	15	6
Small Gramineae indet.	2	2	1	-
Gramineae indet. floral base	1	-	-	-
Tree bud stems	-	8	-	-
Unidentified	1	-	-	5
Charred cloth	-	-	1 frag.	-

ST MARY'S GROVE AND TIPPING STREET
LATE SAXON WELLS
Table F

Site:	ST 29	ST 29	ST 32
Feature number:	608	608	363
Context number:	2269	2267	1945
Phase:	III	III	10th C
Sample size:	1 litre	1 litre	1 litre
% of 1mm sieve fraction sorted:	100	100	100
F=items from fine (0.3mm) fraction			
C-charred items			
Ranunculus acris/repens/bulbosus	1	-	3
Ranunculus flammula/reptans	-	-	3
Ranunculus subgenus Ranunculus	-	-	1
Raphanus raphanistrum	1	1	-
Thlaspi arvense	-	1	3
Rorippa sp.	-	-	1cf.
Viola spp.	-	-	3
Silene alba	-	-	1
Lychnis flos-cuculi	-	1	2
Agrostemma githago	1C	1+1C	4
Stellaria media type	22	-	57
Spergula arvensis	-	1C	-
Scleranthus annuus	1	-	-
Chenopodium album type	12	17	87
Atriplex sp.	3	6	8
Malva sylvestris	12	-	6
Vicia/Lathyrus	3C	4C	-
Rubus ? idaeus	1	-	5
Rubus fruticosus agg.	-	-	5
Potentilla anserina	-	-	1?
Potentilla cf. erecta	-	-	2
Prunus spinosa	1	-	1
Prunus domestica s.l.	7	16	-
Prunus cf. cerasus	15	7	-
Malus sp.	24	6	-
Rosaceae indet. fruit frag.	1	-	-
Anthriscus caucalis	1	-	-
Conium maculatum	5	4	-
Aethusa cynapium	-	1cf.	1
Anethum graveolens	-	-	1
Umbelliferae indet.	-	-	2
Polygonum aviculare agg.	2	-	29+1C
Polygonum cf. persicaria	1	-	58
Polygonum persicaria/lapathifolium	-	1C	-
Polygonum hydropiper	-	-	629
Polygonum convolvulus	2	-	22
Polygonum spp.	-	-	6
Rumex acetosella agg.	-	1C	33
Rumex obtusifolius	2	-	-
Rumex sp.	19+1C	1	7
Urtica urens	4	-	10
Urtica dioica	59+100sF	159	5

	2269	2267	1945
Betula sp.	-	-	1
Corylus avellana	1 frag.	-	1 frag.
Hyoscyamus niger	1	1	-
Solanum nigrum	-	-	1
Stachys arvensis	2	17	-
Ballota nigra	20	5	-
Galeopsis tetrahit agg./speciosa	1	1	11
Sambucus nigra	34	39	2
Senecio vulgaris	-	-	2
Anthemis cotula	15+2C	3+12C	105
Anthemis cotula flower heads	1C	-	-
Tripleurospermum maritimum	-	1C	-
Arctium lappa	21	1	-
Arctium sp. flower head frags.	1cf.	-	-
Carduus/Cirsium	2	-	-
Lapsana communis	2	1	12
Sonchus asper	-	1	8
Taraxacum sp.	2	-	-
Eleocharis palustris/uniglumis	2	-	21
Scirpus maritimus	-	-	2cf.
Isolepis setacea	1F	-	-
Carex cf. rostrata/vesicaria	-	-	16
Carex cf. panicea	-	-	1
Carex cf. echinata	-	-	1
Carex spp.	4	4	21
Glyceria sp.	-	-	7
Poa spp.	17F	-	-
Large Gramineae	-	-	4
Small Gramineae indet.	4F	-	9
Tree buds	?	3	-
Unidentified	12+1C	?+2C	-
Triticum spelta glume base	-	1C	-
T. aestivum s.l. rachises	1C	1C	-
T. aestivum grains	1C	-	-
T. aestivo-compactum grains	-	3C	-
Triticum free-threshing rachises	-	1C	1C
Triticum free-threshing grains	2C	2C	-
Triticum sp. grains	-	7C	1C
Triticum/Secale grains	1C	1C	-
Secale cereale rachises	14+2C	1+3C	13
S. cereale grains	2C	8C	9C
Hordeum indet. rachises	-	-	2
Hordeum sp. grains	-	1C	-
Avena sp. grains	8C	16C	1C
Avena/Large Gramineae	27C	51C	-
Cereal indet. grains	4C	21C	-
Cereal/Large Gramineae culm nodes	2C	4C	-

ST MARY'S GROVE
MEDIEVAL QUARRIES
Table G

Feature no.:	426	435	435	435	435	435
Context no.:	2150	2102	2102	2102	2102	2092
Grid square:	-	066/077	066/079	068/076	069/078	-
Phase:	IV	IV	IV	IV	IV	IV
Size of soil sample (kgs.):	7	12	14.5	11	12	3.5
Volume of flot (mls.):	120	750	510	2800	350	60
% of flot sorted:	25	6.5	12.5	1	25	100
No. of items per kg.:	287	1217	971	7500	387	289
CULTIVATED PLANTS						
Triticum turgidum/durum rachises	-	-	-	-	-	1+1cf.
T. aestivum rachises	-	2	14	-	12	15
T. aestivum grains	-	-	-	-	3	1
T. aestivo-compactum grains	-	8	6	-	4	-
Triticum indet. free-threshing rachises	-	3	23	-	4	28
Triticum indet. free-threshing grains	1	4	11	-	2	17
Triticum indet. rachises	1	2	-	-	1	5
Triticum indet. grains	-	6	33	1	12	11
Triticum/Secale grains	-	4	49	10	15	2
Secale cereale rachises	117	127	292	230	236	347
S. cereale grains	12	193	273	356	270	86
S. cereale whole spikelets	-	1	-	21	-	-
Secale/Hordeum rachises	8	5	17	-	13	35
Hordeum sativum 2-row rachises	-	2	3	-	2	-
H. sativum 6-row rachises	-	-	-	-	-	-
H. sativum indet. rachises	-	-	27	-	8	3
H. sativum hulled grains	-	8	90	2	27	4
H. sativum naked grains	-	-	1	-	-	-
H. sativum indet. grains	-	8	32	-	25	7
Avena strigosa type pedicels	5	9	7	2	5	-
A. strigosa type lemma bases	-	12cf.	-	-	-	-
A. sativa type pedicels	-	3	-	-	2	-
A. sativa type lemma bases	-	10cf.	-	-	-	-
Avena sp. large grains	1	7	11	3	6	-
Avena sp. small grains	15	111	134	16	36	107
Avena/Large Gramineae grains	49	211	235	48	176	110
Cereal grains indet.	3	95	223	63	179	82
Cereal/Large Gramineae culm bases	-	-	-	-	-	1
Cereal/Large Gramineae culm nodes	49	13	55	11	8	16
Cereal/Gramineae panicle nodes	6	9	10	4	5	-
Cereal/Gramineae rachis nodes	-	2	16	-	-	2
WILD PLANTS						
Ranunculus acris/repens/bulbosus	-	1	-	-	-	-
Ranunculus subgenus Ranunculus	1	-	-	-	-	-
Hypericum sp.	1cf.	-	-	-	-	-
Raphanus raphanistrum	-	-	2	-	-	1
Lychnis flos-cuculi	-	1	-	2	-	-
Agrostemma githago	-	-	2	-	1	4
Agrostemma githago whole capsules	-	-	-	1	-	-

	426	435	435	435	435	435
Stellaria media type	-	-	-	-	1	-
Spergula arvensis	32	3	9	1	4	3
Scleranthus annuus	9	-	-	-	-	-
Chenopodium album type	19	-	1	-	-	2
Chenopodiaceae indet.	-	-	-	-	1	1
Trifolium sp.	1	-	1	-	-	-
Vicia hirsuta	-	4	5	2	5	2
Vicia/Lathyrus	4	24	55	7	22	25
Rosaceae indet. pip	1?	-	-	-	-	-
Rosaceae indet. thorn	-	-	-	-	-	1
Conium maculatum	2	-	1cf.	-	-	-
Polygonum aviculare agg.	3	-	-	-	1	1
Polygonum persicaria	2	-	-	-	-	1cf.
Polygonum convolvulus	1	-	1	-	1	-
Rumex acetosella agg.	5	1	8	-	1	6
Rumex sp.	1	1	1	2	2	-
Corylus avellana	-	-	-	-	-	1 frag.
Euphrasia/Odontites	-	-	1	-	-	-
Calluna vulgaris flowers	3	-	-	-	-	-
Stachys sp.	1	-	-	-	-	-
Galeopsis tetrahit agg./speciosa	1	1	-	-	-	-
Plantago lanceolata type	1	-	-	-	-	-
Sambucus nigra	2	-	-	-	-	-
Valerianella dentata	-	-	1cf.	-	1	1+1cf.
Anthemis cotula	104	11	29	1	8	38
Tripleurospermum maritimum	2	14	23	-	13	5
T. maritimum whole flower heads	-	-	-	1	-	-
Chrysanthemum segetum	1	7	25	4	11	23
Compositae indet. (mayweed type)	11	-	3	-	-	-
Centaurea cyanus	-	4	3	8	-	2cf.
Centaurea sp.	-	-	-	-	5	-
Lapsana communis	-	-	-	-	1	-
Sparganium sp.	-	-	-	-	1?	-
Juncus sp. capsule	1	1	1	-	-	-
Eleocharis palustris/uniglumis	-	-	1	-	-	-
Carex cf. flava group	-	-	3	2	-	-
Carex spp.	8	-	2	3	7	2
Cyperaceae indet.	3	-	-	-	-	-
Glyceria sp.	-	-	-	-	-	1
Cynosurus cristatus	1cf.	-	-	-	-	-
Bromus secalinus/mollis group	2	2	2	1	-	1
Gramineae indet.	-	6	10	3	2	2
Gramineae culm nodes (small)	-	13	1	16	20	-
Unidentified	14	-	4	4	1	6

<u>ST MARY'S GROVE</u>
<u>MEDIEVAL PITS</u>
<u>Table H</u>

Feature no.:	443	443	449	449	303	303	176	176
Context no.:	2185	2184	2178	2172	1814	1813	1520	1519
Phase:	IV	IV	IV	IV	VI	VI	VII	VII
Size of soil sample (kgs):	10	5.5	14	8	15.5	17.5	*	*
Volume of flot (mls):	240	200	285	85	100	100	*	*
% of flot sorted:	25	100	25	100	100	100	100	100
No. items per kg:	31	58	337	29	9	4	-	-
	*unrecorded							
CULTIVATED PLANTS								
Triticum dicoccum rachises	-	1	-	-	-	-	-	-
T. dicoccum glume bases	-	-	-	4	-	-	-	-
T. dicoccum/spelta spikelet forks	-	2	-	-	-	-	-	-
T. dicoccum/spelta glume bases	-	3	-	2	-	-	-	-
T. dicoccum/spelta grains	1cf.	4	-	-	-	-	-	-
T. durum/turgidum type rachises	-	-	1cf.	-	-	-	-	-
T. spelta glume bases	1cf.	2	1	3	-	-	-	-
T. spelta/aestivum rachises	-	-	1	-	-	-	-	-
T. spelta/aestivum grains	1	2	-	1	-	-	-	-
T. aestivum s.l. rachises	-	8	22	4	1	1	-	-
T. aestivum grains	-	-	3	3	-	-	-	-
T. aestivo-compactum grains	-	2	7	5	-	-	2	-
Triticum free-threshing rachises	2	3	24	2	2	1	-	-
Triticum free-threshing grains	-	9	9	-	5	1	13	9
Triticum sp. rachises	-	-	1	-	1	-	-	-
Triticum sp. grains	11	30	3	22	13	7	6	11
Triticum/Secale grains	1	5	9	-	1	1	-	-
Secale cereale rachises	-	24	135	14	16	7	-	-
S. cereale grains	2	10	178	5	19	3	-	1
Secale/Hordeum rachis frags.	-	1	8	-	5	-	-	-
Hordeum sativum indet. rachises	3	-	3	-	3	-	-	-
H. sativum hulled twisted grains	-	-	-	1	1	-	-	-
H. sativum hulled unreferable grains	-	4	7	9	1	2	13	1
H. sativum indet. grains	1	5	2	8	1	1	22	17
Avena strigosa type pedicels	-	-	17	-	-	-	-	-
A. sativa type pedicels	-	-	2	-	-	-	-	-
A. sativa lemma bases	-	-	-	-	-	-	1	-
Avena sp. pedicels	-	-	6	-	-	-	-	-
Avena sp. large grains	-	3	7	1	-	-	142	8
Avena sp. small grains	4	14	87	6	11	-	12	3
Avena/Large Gramineae grains	11	52	158	36	16	17	131	180
Cereal indet. grains	25	66	94	38	28	25	20	35
Cereal/Large Gramineae culm nodes	1	4	44	-	2	-	-	-
Cereal/Large Gramineae aerial culm frags.	-	-	6	-	1	-	-	-
Cereal/Gramineae panicle nodes	-	-	8	1	-	-	-	-
Vicia faba var. minor	-	-	-	1?	-	-	-	-
Vicia sativa (large)	-	-	-	-	-	-	2+8cf.	3
V. sativa/very small V. faba	-	-	-	-	-	-	-	4
Vicia/Pisum	-	-	-	-	-	-	-	15

	2185	2184	2178	2172	1814	1813	1520	1519
WILD SPECIES								
Ranunculus acris/repens/bulbosus	-	-	1	-	-	-	-	-
Raphanus raphanistrum	1	-	2	1	-	-	-	-
Agrostemma githago	-	1	1	1	-	-	-	-
Stellaria media type	1	-	-	-	-	-	-	-
Spergula arvensis	-	2	29	1	-	1	-	-
Chenopodium sp.	-	-	2	-	-	-	-	-
Chenopodiaceae indet.	1	1	3	2	-	-	-	-
Vicia hirsuta	1	1	1	2	1	-	-	-
Vicia sativa (small)	-	-	1	-	-	-	-	-
Vicia/Lathyrus	3	12	16	12	9	1	1	1
Rubus fruticosus agg.	-	1	-	1	-	-	-	-
Polygonum aviculare agg.	-	-	1	-	-	-	-	-
Polygonum persicaria	-	-	-	1cf	-	-	-	-
Polygonum convolvulus	1	-	1	1	-	-	-	-
Rumex acetosella agg.	-	10	1	2	-	-	-	-
Rumex sp.	-	-	5	2	-	1	-	-
Lithospermum arvense	-	1cf.	-	-	-	-	-	-
Galeopsis angustifolia	-	1	-	1cf.	-	-	-	-
Galeopsis tetrahit agg./speciosa	-	-	2	-	-	-	-	-
Plantago lanceolata type	-	-	2	-	1	-	-	-
Galium sp.	-	-	-	1	-	-	-	-
Sambucus nigra	-	-	-	1	-	-	-	-
Valerianella dentata	1	-	-	-	-	-	-	-
Anthemis cotula	2	4	195	13	2	1	-	-
Tripleurospermum maritimum	-	-	14	2	1	2	-	-
Chrysanthemum segetum	-	16	7	2	1	-	-	-
Centaurea cyanus	-	-	-	-	1	-	-	-
Centaurea sp.	-	-	-	-	1	-	-	-
Lapsana communis	-	-	1	-	-	-	-	-
Mayweed type Compositae indet.	-	6	-	3	1	-	-	-
Thistle/Knapweed type Comp. indet.	-	-	2	-	-	-	-	-
Eleocharis palustris/unglumis	-	-	1	-	-	-	-	-
Carex cf nigra	-	-	3	-	-	-	-	-
Carex spp.	-	-	1	8	-	-	-	-
Cyperaceae indet.	2	1	-	-	-	-	-	-
Poa cf. annua	-	1	-	-	-	-	-	-
Bromus secalinus/mollis group	-	-	2	-	-	-	-	-
Arrhenatherum elatius	-	-	1cf.	-	-	-	-	-
Avena fatua/ludoviciana lemma bases	-	-	2	-	-	-	-	-
Agrostis spp.	-	-	5cf.	-	-	-	-	-
Gramineae indet.	-	5	2	2	-	-	-	-
Unidentified	-	5	12	10	2	-	-	-
Possible contaminents								
Rubus fruticosus agg. uncharred	-	-	-	-	2	1	-	-
Sambucus nigra uncharred	-	-	-	-	64	66	-	-

ST MARY'S GROVE
MEDIEVAL PITS AND DITCH
Table I

Feature no.:	471	478	320	320	298	298
Feature type:	pit	pit	pit	pit	ditch	ditch
Context no.:	1929	1940	1886	1848	1934	1839
Phase:	V	V	VI	VI	VI	VI
Size of soil sample (kgs):	3	3	10.5	13	11	4.5
Volume of flot (mls):	180	85	18	100	42	30
% of flot sorted:	100	100	100	100	100	100
No. of items per kg:	647	7	2	1	3	20
CULTIVATED PLANTS						
Triticum dicoccum type rachises	1	-	-	-	-	-
T. dicoccum/spelta rachises	-	-	-	1	-	-
T. dicoccum/spelta glume bases	-	-	1	-	-	-
T. turgidum/durum rachises	96	-	-	-	4	-
T. turgicum/durum grains	1cf.	-	-	-	-	-
T. spelta type rachises	3	-	-	-	-	-
T. spelta/aestivum rachises	1	-	-	-	-	-
T. aestivum s.l. rachises	272	-	-	-	2	2cf.
T. aestivo-compactum grains	101	-	-	2	-	-
Triticum free-threshing rachises	365	-	-	-	1	-
Triticum free-threshing grains	349	-	2	-	8	-
Triticum sp. rachises	7	-	-	-	-	-
Triticum sp. grains	72	-	1	1	-	-
Triticum/Secale grains	7	-	-	-	-	-
Secale cereale rachises	12	2	-	-	1	15
S. cereale grains	9	2	-	2	2	9
Secale/Hordeum rachis frags.	2	-	-	-	-	4
Hordeum sativum indet. rachises	2	-	-	-	-	1
H. sativum hulled grains	2	-	-	-	-	-
H. sativum indet. grains	-	-	-	1	1	6
Avena sativa type pedicels	6	-	-	-	-	-
A. sativa/strigosa lemma bases	3	-	-	-	-	-
Avena sp. pedicels	3	-	-	-	-	-
Avena sp. lemma bases	1	-	-	-	-	-
Avena sp. large grains	15	-	-	3	-	-
Avena sp. small grains	11	-	3	1	2	2
Avena/Large Gramineae grains	64	2	6	-	3	8
Cereal indet. grains	328	1	3	2	4	17
Cereal/Large Gramineae culm nodes	-	1	-	-	-	-
Cereal/Lg. Gram. aerial culm frags.	77	-	-	-	-	-
Vicia faba var. minor	2	-	-	-	-	-
Vicia/Pisum	-	-	1	-	-	-
WILD PLANTS						
Raphanus raphanistrum	2	-	-	-	1	-
Stellaria media type	-	-	1	-	-	-
Chenopodium sp.	-	-	1	1	-	-
Atriplex sp.	3	-	-	-	-	-

	1929	1940	1886	1848	1934	1839
Chenopodiaceae indet.	3	-	-	-	-	-
Trifolium sp.	3	-	-	-	-	-
Vicia hirsuta	8	-	-	-	1	-
Vicia tetrasperma	6	-	-	-	-	-
Vicia sativa	7cf.	-	-	-	-	-
Vicia/Lathyrus	72	-	1	2	4	6
Polygonum aviculare agg.	-	-	-	-	-	1
Polygonum persicaria	-	1	-	-	-	-
Rumex acetosella agg.	25	1	1	-	-	-
Rumex sp.	6	-	-	-	-	-
Corylus avellana frags.	-	1	-	2	-	-
Lithospermum arvense	-	-	-	1	-	-
Euphrasia/Odontites	1	-	-	-	-	-
Sambucus nigra	-	-	-	-	1	-
Anthemis cotula	32	-	-	1	2	2
Tripleurospermum maritimum	5	-	-	-	1	1
Chrysanthemum segetum	14	-	-	3	-	5
Centaurea cyanus	-	-	-	-	-	1cf.
Knapweed/Thistle type Compositae	2	-	-	-	-	-
Lapsana communis	1	-	-	-	-	-
Lemna sp. (mineralised)	2	-	-	-	-	-
Eleocharis palustris/uniglumis	12	-	-	-	-	-
Carex spp.	2	-	-	-	-	1
Cyperaceae indet.	-	-	-	1	-	-
Lolium temulentum	2cf.	-	-	-	-	-
Lolium sp. rachises	3	-	-	-	-	-
Bromus secalinus/mollis group	4	-	-	1	-	11
Agropyron repens spikelet forks	3cf.	-	-	-	-	-
Agrostis sp.	-	-	1cf.	-	-	-
Gramineae indet.	4	-	-	2	-	-
Unidentified	14	1	1	-	1	-

ST MARY'S GROVE
MEDIEVAL OVEN AND KILN
Table J

Feature no.:	188	188	323
Feature type:	oven	oven	kiln
Context no.:	2323	2322	1891
Phase:	VI	VI	VII
Size of soil sample (kgs):	81	78	10
Size of flot (mls):	500	100	210
% of flot sorted:	25	100	100
No. of items per kg.:	1146	29	59
	g=germinated		
CULTIVATED PLANTS			
Triticum dicoccum grains	1cf.	-	-
T. dicoccum/spelta glume bases	3	3	-
T. durum/turgidum rachises	-	-	2+1cf.
T. durum/turgidum grains	-	-	1
T. spelta grains	2cf.	-	-
T. aestivum rachises	-	-	13
T. aestivum grains	-	-	1
T. aestivo-compactum grains	3	-	4
Triticum free-threshing rachises	-	-	8
Triticum free-threshing grains	14	-	14
Triticum sp. rachises (basal)	-	-	3
Triticum sp. glume bases	-	-	4
Triticum sp. grains	27	8+1g	7+1g
Triticum/Secale grains	19	8	1
Secale cereale rachises	16	-	39
S. cereale grains	145+93g	56+1g	17
Secale/Hordeum rachis frags.	-	-	6
Hordeum sativum 2-row rachises	-	-	1
H. sativum indet. rachises	2	-	2
H. sativum hulled straight grains	1g	1g	-
H. sativum hulled unreferable grains	3g	-	-
H. sativum indet. grains	3	1	9
Avena sativa lemma bases	2*	-	1*
A. sativa/strigosa lemma bases	3	1	-
Avena sp. large grains	7+17g	3+2g	18
Avena sp. small grains	63+156g	10+6g	11
Avena/Large Gramineae grains	312	121	49
Cereal indet. grains	41	48	34
Cereal/Large Gramineae culm nodes	-	-	10
Cereal/Large Gramineae culm bases	2	-	5
Coleoptiles	152	-	-
Vicia faba var. minor	1(small)	-	1(small)
Vicia/Pisum	1	-	-
Pisum sativum	-	-	1(small)
WILD PLANTS			
Ranunculus acris/repens/bulbosus	1cf.	-	-
Ranunculus sardous	-	1	1
Ranunculus flammula/reptans	2	-	-
Papaver cf. dubium	1	1	-

	2323	2322	1891
Papaver cf. argemone	10	3	-
Papaver sp.	3	2	-
Brassica cf. nigra	1	-	-
Hypericum sp.	-	-	1
Agrostemma githago	36	12	-
Stellaria media type	24	45	13
Stellaria palustris/graminea	-	2	-
Stellaria sp.	-	-	1
Spergula arvensis	302	56	4
Scleranthus annuus	1cf.	1	-
Caryophyllaceae indet.	-	-	3
Chenopodium sp.	49	40	21
Atriplex sp.	19	6	1
Chenopodiaceae indet.	67	17	14
Malva sp.	1	-	-
Trifolium spp.	10	-	-
Vicia hirsuta	4	-	-
Vicia sativa	1	1	1cf.
Vicia/Lathyrus	222	341	17
Large Leguminosae indet.	-	-	3
Potentilla sp.	1	-	-
Rosaceae thorn	-	-	1
Conium maculatum	-	-	1
Bupleurum rotundifolium	-	-	1cf.
Polygonum aviculare agg.	16	8	-
Polygonum persicaria	10	-	6cf.
Polygonum convolvulus	1	-	1
Polygonum sp.	17	5	17
Rumex acetosella agg.	495	405	57
Rumex sp.	141	91	22
Corylus avellana (frags.)	-	-	1
Lithosperum arvense	-	1	-
Hyoscyamus niger	2	3	2
Solanum nigrum	-	-	1+1?
Veronica polita/agrestis	1	-	-
Euphrasia/Odontites	45	32	3
Galeopsis tetrahit agg./speciosa	13	7	-
Plantago major	12	5	-
Plantago lanceolata type	14	2	-
Galium palustre	2cf.	-	-
Galium aparine	1	-	-
Galium sp.	4	-	2
Sambucus nigra	2	3	-
Anthemis cotula	364	203	19
Tripleurospermum maritimum	97	34	6
Chrysanthemum segetum	1088	359	64
Mayweed type Compositae indet.	182	207	-
Centaurea cyanus	8	-	1
Centaurea sp.	18cf.	2	-
Thistle type Compositae indet.	-	5	-
Lapsana communis	90	29	6
Eleocharis palustris/uniglumis	17	3	4
Isolepis setacea	1	-	-
Carex spp.	10	2	7

	2323	2322	1891
Lolium temulentum	-	-	1cf.
Poa annua	-	-	1cf.
Cynosurus cristatus	7	7	-
Bromus secalinus/mollis group	13	-	-
Bromus sp.	3	2	1
Arrhenatherum elatius	2cf.	-	-
Phleum pratense	1	2	-
Large Gramineae indet.	15	5	-
Small Gramineae indet.	55	51	9
Other Gramineae indet.	2	7	3
Unidentified flower pedicels	-	-	2
Tree buds	-	-	2
Tree bud stalks	-	-	5
Unidentified	50	21	22

BATH STREET
LARGE PIT (FEATURE 227)
Table K

Context:	1066B	1069A	1069B	1071A	1071B
Phase:	12/12C	12/13C	12/13C	12/13C	12/13C
Size of soil sample (kgs):	10	5.6	16	17.5	8
% of flot sorted:	100	100	100	100	100
No. of items per kg:	15	207	398	1114	326
CULTIVATED PLANTS					
Triticum spelta type rachises	-	-	-	1	-
T. aestivum s.l. rachises	-	-	18	21	1
T. aestivum grains	-	-	-	7	-
T. aestivo-compactum grains	6	9	97	103	11
Triticum free-threshing rachises	-	-	15	3	-
Triticum free-threshing grains	-	5	69	12	-
Triticum sp. grains	-	-	8	49	8
Triticum/Secale grains	2	13	144	377	18
Secale cereale rachises	3	10	83	1123	2
S. cereale grains	6	46	359	2230	15
Secale/Hordeum rachises	-	4	-	33	5
Hordeum sativum 6-row rachises	-	-	1	-	18
H. sativum indet. rachises	-	3	4	2	15
H. sativum hulled twisted grains	-	-	-	-	6
H. sativum hulled unreferable grains	1	5	25	13	6
H. sativum indet. grains	-	145	392	44	203
Avena sativa lemma bases	-	-	1	4	2
Avena sp. large grains	-	10	25	41	21
Avena sp. small grains	17	28	99	865	422
Avena/Large Gramineae grains	11	197	1141	1979	586
Cereal indet. grains	23	500	2334	6460	888
Cereal/Large Gramineae culm nodes	1	16	29	-	-
Cereal/Gramineae rachises	-	2	-	-	1
Vicia faba var. minor	-	-	1+2cf.	1cf.	-
Vicia sativa (large)	-	-	9	-	-
Vicia/Pisum	-	1	-	-	-
WILD PLANTS					
Ranunculus acris/repens/bulbosus	-	-	-	2	-
Ranunculus flammula/reptans	-	-	-	1	-
Papaver cf. argemone	-	-	-	1	-
Brassica sp.	1	-	-	-	-
Raphanus raphanistrum	-	1	7	28	1
Silene dioica	-	-	-	3	-
Silene alba	-	-	-	1	-
Silene cf. nutans	-	-	-	1	-
Agrostemma githago	-	1	46	446	-
A. githago whole flower heads	-	-	-	4	-
Stellaria media type	-	-	-	1	-
Stellaria palustris/graminea	-	-	1	2	-
Spergula arvensis	3	1	49	85	13
Scleranthus annuus	-	-	2	7	-
Montia fontana ssp. fontana	-	-	1cf.	8cf.	-
Montia fontana ssp. chondrosperma	-	-	-	1	-

	1066B	1069A	1069B	1071A	1071B
Chenopodium murale	-	-	-	7	-
Chenopodium sp.	4	6	43	283	12
Atriplex sp.	-	3cf.	12	100	2cf.
Chenopodiaceae indet.	3	2	85	234	4
Malva sylvestris	-	-	-	1	-
Malva sp.	-	4	-	-	-
Malvaceae indet.	-	-	1	-	-
Genista/Ulex	-	-	-	1cf.	-
Ononis sp.	-	-	-	3	-
Trifolium sp.	-	-	1	2	-
Vicia hirsuta	1	4	24	63	3
Vicia tetrasperma	-	-	3	-	-
Vicia sativa (small)	-	-	-	40	-
Vicia sp.	-	-	-	55	-
Lathyrus pratensis	-	-	1cf.	-	-
Vicia/Lathyrus	3	37	172	337	68
Prunus spinosa	-	-	-	1	-
Rosaceae indet.	-	-	1?	-	-
Daucus carota	-	-	-	1	-
Euphorbia helioscopa	-	-	-	1	1
Polygonum aviculare agg.	-	1	20	65	-
Polygonum persicaria	-	-	-	1	1
Polygonum lapathifolium/nodosum	-	-	-	1	-
Polygonum convolvulus	1	1	15	31	5
Polygonum sp.	-	2	12	18	1
Rumex acetosella agg.	1	3	38	136	8
Rumex sp.	1	7	28	59	5
Rumex sp. tubercles	-	-	-	14	-
Corylus avellana frags.	-	4	-	22	1
Stachys arvensis	-	-	-	-	1
Stachys sp.	-	-	-	1cf.	-
Galeopsis tetrahit agg./speciosa	-	2	10	31	-
Labiatae indet.	-	-	1	1	-
Plantago lanceolata type	-	-	18	-	1
Plantago sp.	-	4	-	15	-
Galium aparine	-	1cf.	-	-	-
Galium sp.	-	-	4	6	2
Sambucus nigra	-	2	18	123	1
Valerianella dentata	-	-	-	1	-
Anthemis cotula	37	54	644	1979	192
Anthemis cotula flower heads	-	-	7	21	1
Tripleurospermum maritimum	8	3	112	726	18
Chrysanthemum segetum	-	-	17	17	1
Centaurea cyanus	1cf.	2	9	330	-
Centaurea sp.	-	-	15	15	1
Lapsana communis	1	11	28	48	8
Compositae indet.	-	-	3	3	2
Compositae indet. flower heads	-	-	-	100	-
Sparganium sp.	-	-	1	2	-
Eleocharis palustris/uniglumis	-	-	1	11	-
Scirpus/Schoenoplectus	1	-	-	-	-
Carex cf. panicea	-	1	-	2	-
Carex nigra type	-	-	1	-	-
Carex spp.	1	2	6	22	1

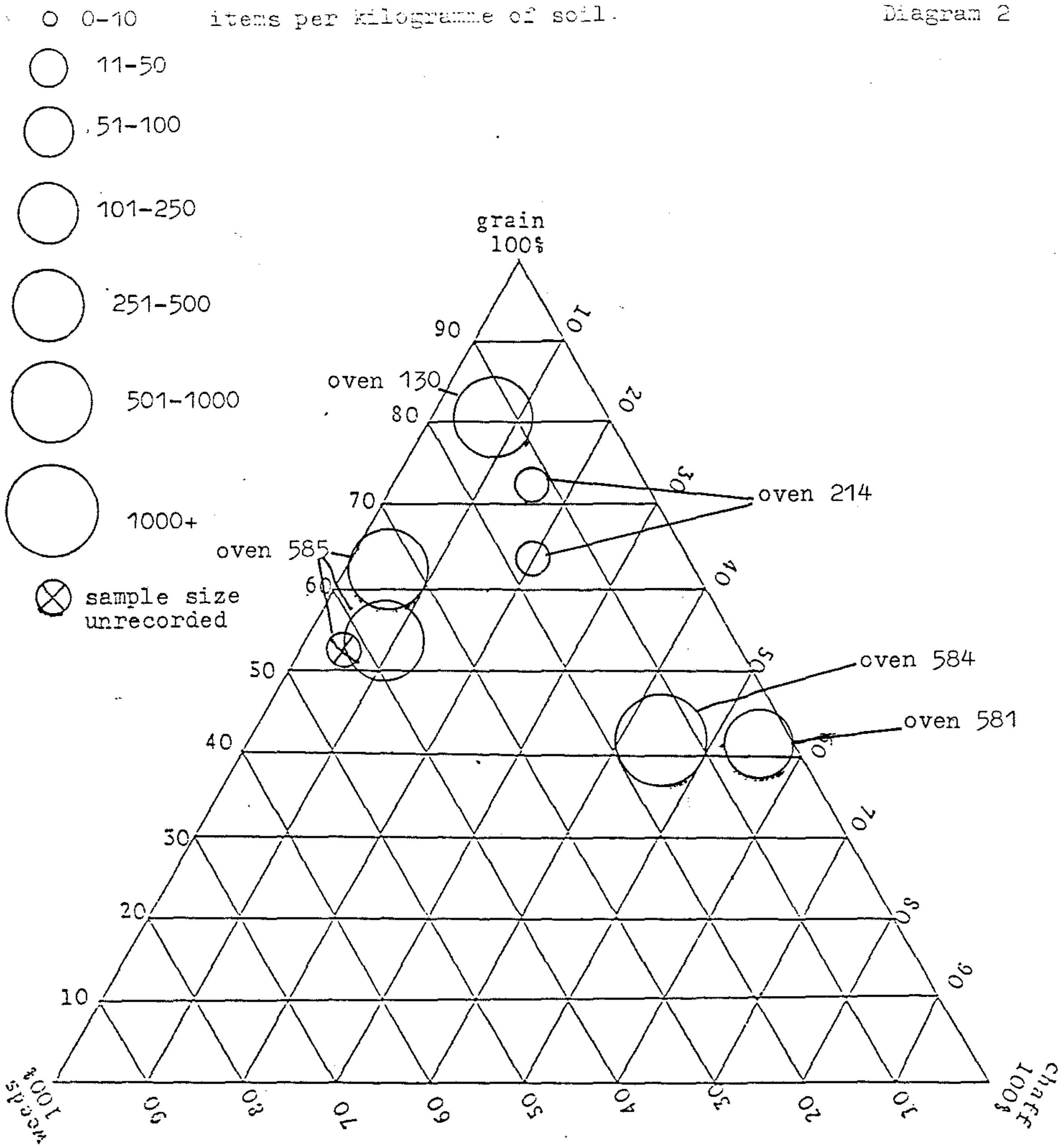
	1066B	1069A	1069B	1071A	1071B
Bromus secalinus/mollis group	-	1	7	235	-
cf. Bromus sp.	-	-	9	105	2
Phleum pratense	-	-	1cf.	-	-
Agropyron repens spikelet forks	-	-	-	10	-
A. repens glume bases	-	-	-	5	-
Large Gramineae indet.	-	1	26	66	-
Other Gramineae indet.	1	1	-	177	2
Gramineae indet. flower bases	-	-	1	3	-
Gramineae indet. rachises	-	-	-	1	-
Gramineae indet. pedicels	-	-	-	3	-
Non-Gramineae flower heads	-	-	14	-	-
Unidentified	7	2	-	-	-

TIPPING STREET
MEDIEVAL WELLS AND PIT (WATERLOGGED)
Table L

Feature no.:	233	245	276
Feature type:	well	well	pit
Context. no.:	1472	1778	1595
Phase:	12/13C	12/13C	12/13C
Sample size:	1 litre	1 litre	1 litre
% of 1mm fraction sorted:	100	100	100
F= items in fine fraction (0.3mm)			
C= charred items			
Ranunculus acris/repens/bulbosus	-	2	-
Ranunculus sardous	-	-	3
Ranunculus lingua	3	3	-
Ranunculus flammula/reptans	-	3F	-
Ranunculus subgenus Batrachium	3	3F	-
Papaver argemone	7	-	2cf.F
Papaver sp.	-	-	1F
Raphanus raphanistrum	1	1+1C	-
Capsella bursa-pastoris	3	-	-
Small Cruciferae indet.	-	4F	-
Viola spp.	-	10F	-
Lychnis flos-cuculi	1	54F	2F
Agrostemma githago	-	1C+1F	2
Stellaria media type	25	73F	22+23F
Stellaria palustris/graminea	-	2F	-
Spergula arvensis	11	1F	1F
Scleranthus annuus	-	3F	-
Montia fontana ssp. chondrosperma	-	13F	-
Chenopodium album type	17	3+118F	34+5F
Chenopodium urbicum	-	1F	-
Atriplex sp.	6	5F	19
Malva sp.	-	2F	-
Linum usitatissimum/bienne	-	1+2C+1F	-
Linum catharticum	-	2F	-
Rubus fruticosus agg.	1	3+30F	5
Potentilla cf erecta	2	14F	-
Prunus spinosa	-	1	-
Aphanes arvensis	-	14 cf.	-
Conium maculatum	12	-	4
Aethusa cynapium	2	1	2
Anethum graveolens	-	1	-
Foeniculum vulgare	1	-	-
Umbelliferae indet.	7	8F	-
Polygonum aviculare agg.	17	10+168F	3
Polygonum persicaria	3cf.	4+49F+1	3
Polygonum hydropiper	-	4F	-
Polygonum convolvulus	-	18+1F	-
Rumex acetosella agg.	39	36F	5+5F
Rumex sp.	5	1+4F	11
Urtica urens	128	36F	107+8F
Urtica dioica	18	23F	22F
Corylus avellana (nutshell frags.)	-	-	1

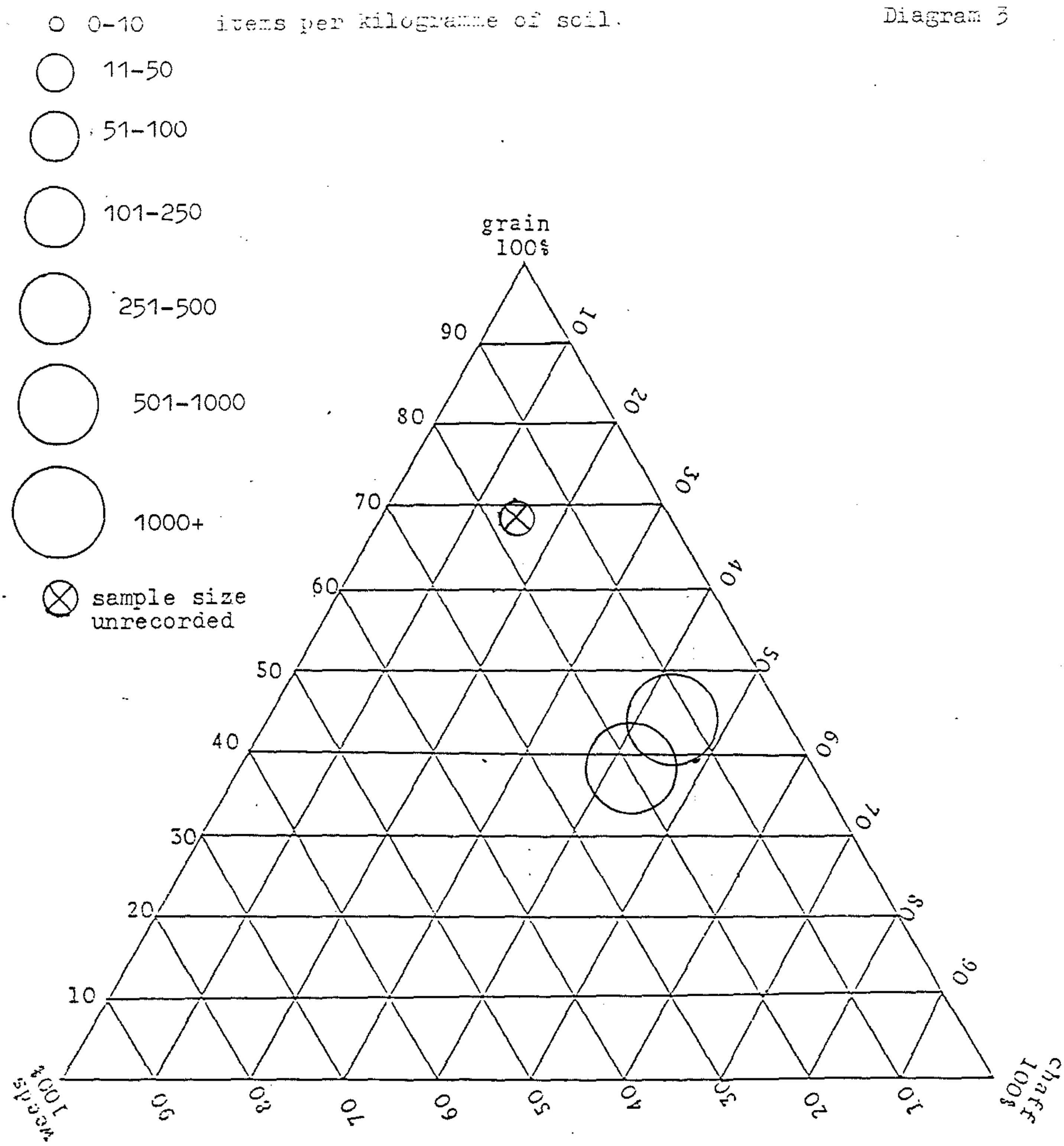
	233	245	276
Calluna vulgaris flowers	-	7F	24
Calluna stem frags with leaves	-	-	68+8F
Anagallis arvensis/foemina	-	10F	-
Menyanthes trifoliata	-	-	5
Hyoscyamus niger	10+1C	-	5+2C
Solanum nigrum	9	2+43F	7
Euphrasia/Odontites	-	1F	-
Prunella vulgaris	-	1F	-
Ballota nigra	3	-	3
Galeopsis angustifolia	-	1F	-
Galeopsis tetrahit agg./speciosa	-	3+2F	-
Sambucus nigra	27	1	151+1F
Senecio aquaticus	-	2F	-
Senecio vulgaris	-	-	1F
Anthemis cotula	2	1+3FC	4
Chrysanthemum segetum	-	-	8+2F
Centaurea cyanus	-	-	3
Lapsana communis	2	1+2F	8+1F
Sonchus oleraceus	-	-	1
Sonchus asper	-	4F	-
Juncus sp.	-	2F	-
Eleocharis palustris/uniglumis	4	11F	1
Scirpus maritimus	-	-	1cf.
Scirpus tabernaemontanii	1	-	-
Scirpus sylvaticus	-	29F	-
Isolepis setacea	-	2F	-
Carex cf. flava group	-	20F	-
Carex cf. rostrata/vesicaria	-	1	-
Carex cf. nigra	-	4F	3
Carex cf. disticha	-	-	7
Carex cf. echinata	-	55F	-
Carex cf. appropinquata/diandra	1	-	-
Carex spp.	11+1F	12+39F	11
Glyceria sp	5	2	2
Phleum pratense	1+3F	-	-
Large Gramineae indet.	-	1C	1C
Small Gramineae indet.	3+9F	7F+1C	10
Gramineae indet. flower	-	1	-
Gramineae indet. culm nodes (non-cereal)	1C	-	1
Triticum spelta/aestivum rachis	-	-	1C
T. aestivum rachises	-	-	2C
T. aestivum s.l. grains	-	22C	1C
Triticum sp. rachises	-	1+2CF	1C
Triticum free-threshing grains	-	17C	-
Triticum sp. grains	-	2C	-
Triticum/Secale grains	-	7C	-
Secale cereale rachises	-	1F	9+2C
S. cereale grains	-	60C	-
Secale/Hordeum rachises	-	2F	-
Hordeum sp. rachises	-	-	-
Hordeum sativum hulled grains	-	1F	-

	233	245	276
Hordeum sativum naked grains	-	1F	-
Avena sativa florets	-	5F	-
Avena sp. grains	-	58F	1C
Cereal indet. rachises	-	-	4C
Cereal indet. grains	-	20+2CF	2C
Cereal/Large Gramineae culm nodes	-	-	2



Triangle diagram showing the relative percentages of cereal grains, cereal chaff and weed seeds. Each circle represents one sample.

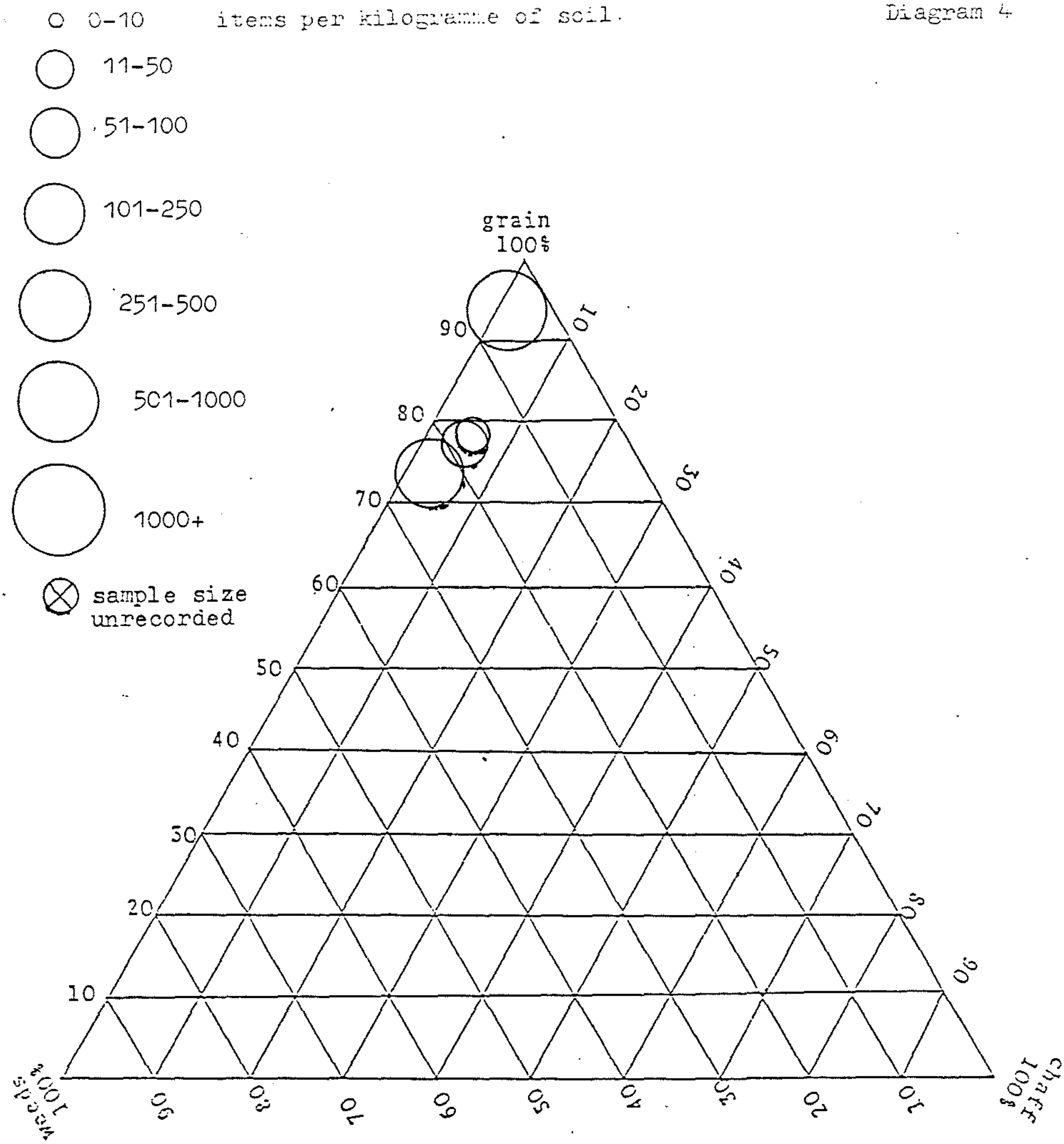
SAXON OVENS



Triangle diagram showing the relative percentages of cereal grains, cereal chaff and weed seeds. Each circle represents one sample.

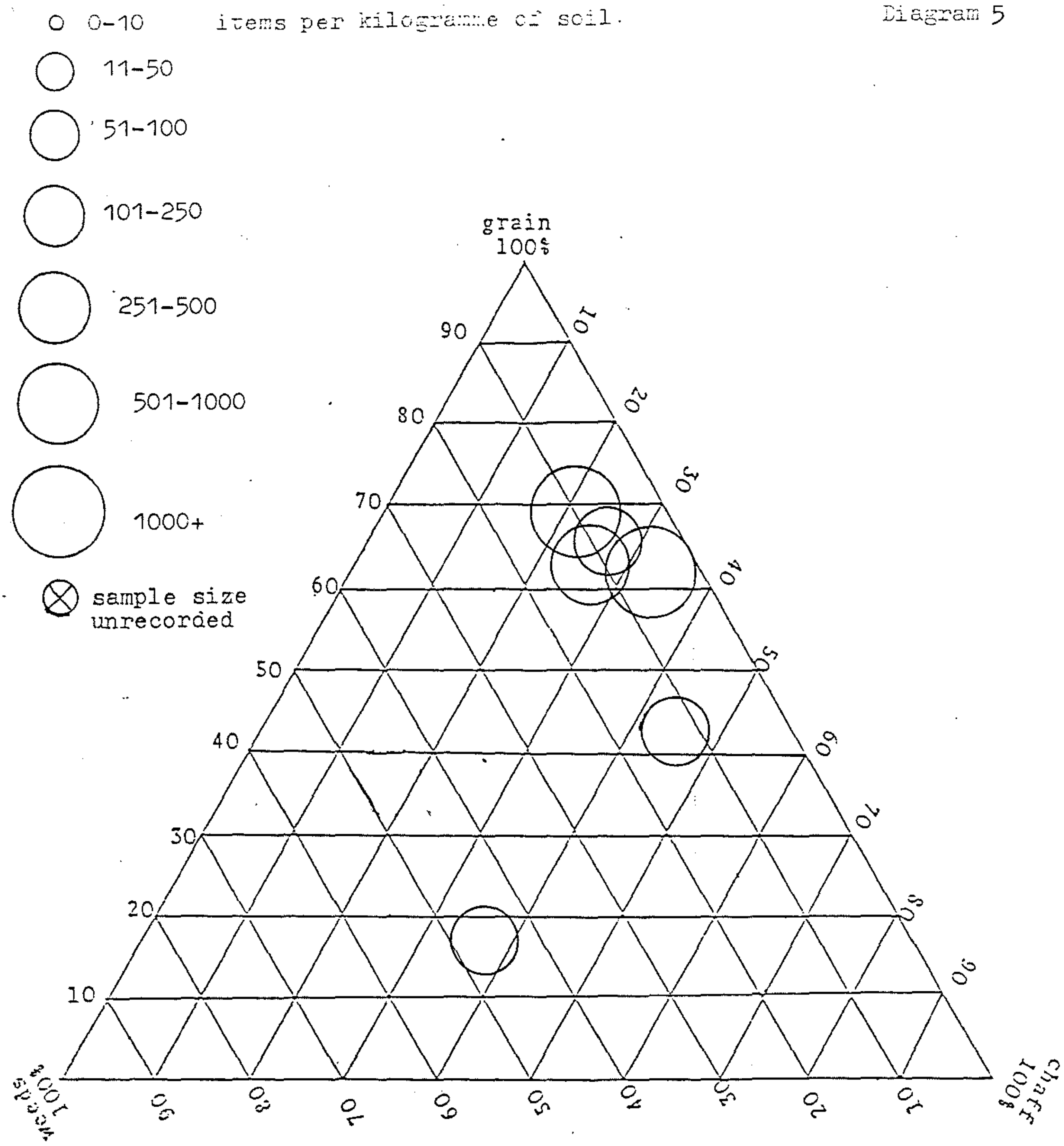
SAXON PIT (F. 136)

Diagram 4



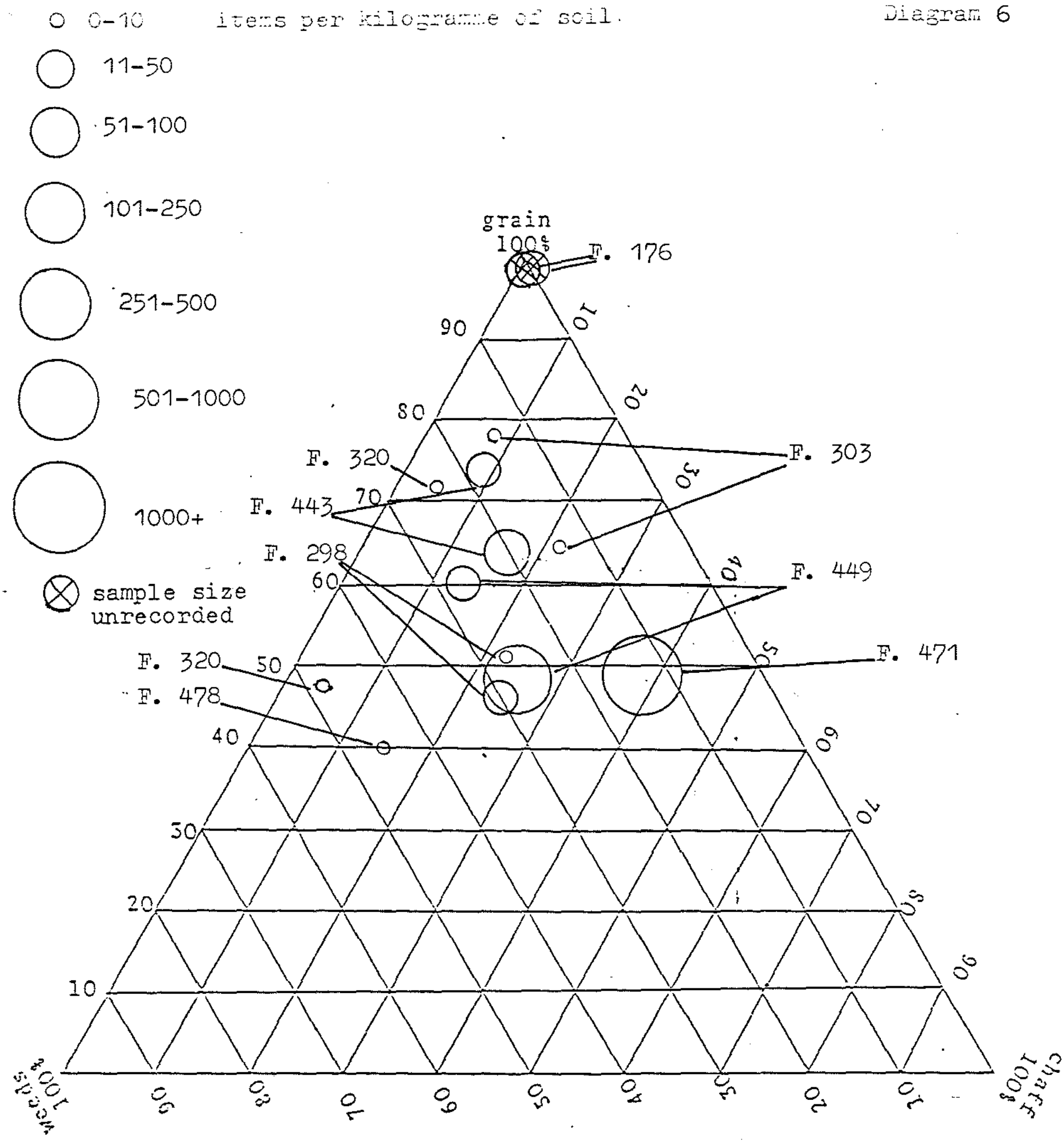
Triangle diagram showing the relative percentages of cereal grains, cereal chaff and weed seeds. Each circle represents one sample.

LATE SAXON SUNKEN FEATURE BUILDING (F. 517)



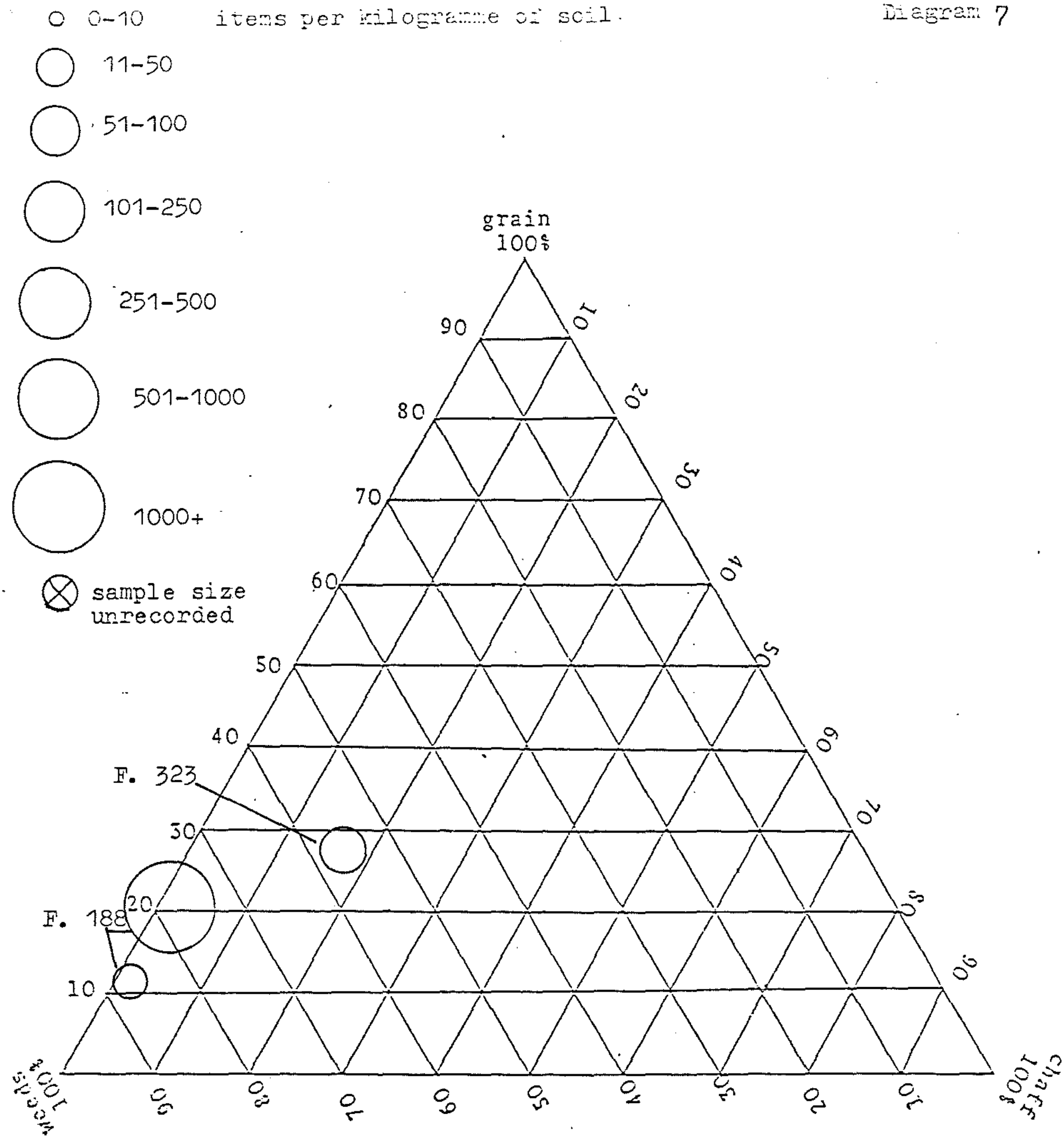
Triangle diagram showing the relative percentages of cereal grains, cereal chaff and weed seeds. Each circle represents one sample.

MEDIEVAL QUARRIES



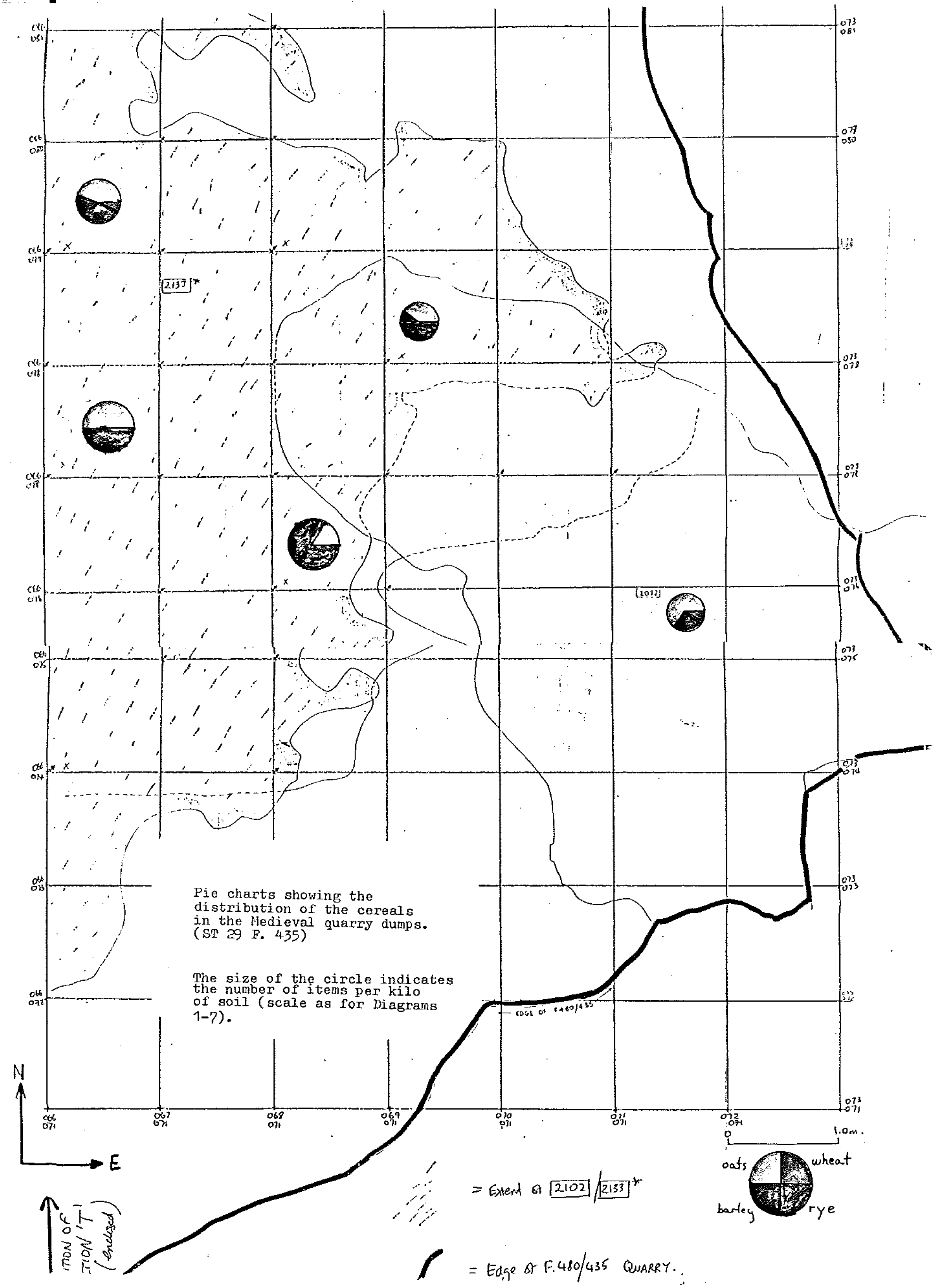
Triangle diagram showing the relative percentages of cereal grains, cereal chaff and weed seeds. Each circle represents one sample.

MEDIEVAL PITS AND DITCH



Triangle diagram showing the relative percentages of cereal grains, cereal chaff and weed seeds. Each circle represents one sample.

MEDIEVAL KILN AND OVEN



Pie charts showing the distribution of the cereals in the Medieval quarry dumps. (ST 29 F. 435)

The size of the circle indicates the number of items per kilo of soil (scale as for Diagrams 1-7).

Figure 1