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THE ARCHAEOBOTANY OF THE SALT-WORKING SITE OF UPWICH, DROITWICH, WORCESTERSHIRE

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Summary

The Upwich excavations, the archaeobotanical results from which are described here, took place on the site of the main salt well at Droitwich. There were especially valuable groups of waterlogged cereal remains which show the importance of rivet wheat and rye among the cereals grown, making useful comparison with the results from the study of charred cereal remains from a number of midland sites (Moffett 1991). There were also varied floras representing aquatic, wetland, cornfield weed, grassland, woodland and scrub vegetations. This provides information on the use of products from the surrounding countryside and on its landscape.

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The archaeobotany and some other environmental archaeology of the Saxon, medieval and postmedieval remains from the salt-working site of Upwich at Droitwich, Worcestershire (HWCM 4575) .

James Greig

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Introduction

Droitwich is unusual from an archaeobotanical point of view. Not only has there been a long history of occupation there, but the heavy clay soil and riverside site can provide good conditions for the waterlogging and preservation of organic material. The salt springs provide still further interest because of the possibility of detecting any sign of the salt extraction industry or of the associated saltmarsh vegetation. Little environmental archaeological study has been so far attempted on salt extraction sites.

Methods used

Samples were collected from various features during the excavations on a judgement basis - because they looked as if they might contain plant remains, or because the archaeological contexts would especially benefit from environmental information if it was present. Samples of around 2 kg each were collected for the study of plant and other small remains such as insects. Separate samples were collected for animal bones and wood studies. The fieldwork was supervised by Diane Williams. Full details of the samples are held in archive.

The original laboratory work was also done by Diane Williams, who sieved and sorted some of the material, and identified the snails in her samples. The samples were mostly dark material, coloured black by powdered charcoal or soot. The content of waterlogged plant remains could only be seen when the clay and charcoal had been removed by sieving and washing. Basically, sample material was broken down in water and sieved on a 0.3 mm mesh to remove fine material such as clay. The organic material was separated from sand, stones and other mineral material by being washed over with water into another container and divided into size fractions on a sieve bank (smallest mesh 0.3mm), and finally pre-sorted into groups (plants, insects, molluscs etc.), with details of the work recorded on forms. Reserve samples of about 2 litres sediment were kept in case further work was necessary. Only a few of the samples were rich in environmental material. (for further details see sieving section).

The pre-sorted material plant remains were studied by James Greig who also investigated some of the unsieved reserve sediment samples, starting with the most important contexts such as the Saxon ones. A quick assessment technique was used to find samples with useful plant remains: small amounts (about 100 cc.) of sample were washed, sieved and scanned for remains under the microscope. If useful amounts of plant remains were found, more sediment (usually 1 litre), was washed, sieved, sorted and the contents identified. Identification of some groups of material such as grass and sedge seeds and mosses is not as detailed as it could be, because of shortage of time. A few pollen analyses were made, although the amounts of fine charcoal which could not be removed by the preparation process, made it generally difficult to obtain pollen counts. The beetle faunas were not very rich apart from one sample which Peter Osborne has reported on.

4. Results

Table 1: samples with plant remains

phase	ctxt	CG	feature	approx. date
4	2651	13	layer	e/mid Saxon
5	2435	104	watercourse	mid Saxon-e/Med
6	1604	121	barrel fill	late 14th C
6	1645	121	barrel fill	late 14th C
6	2051	37	Upwich Pit	AD1265
7	888	307	repair to pump	17th C
7	1406	251	barrel-pit	mid 17/18th
7	756	229	? barrel-pit	c. AD1700

The plants are listed in taxonomic order (Clapham et al. 1987) to convey the basic data (Table 2). Much use has been made of the comments in *The Botany of Worcestershire* (Amphlett & Rea 1909), and of ecological work on plant communities (Ellenberg 1979).

The results are discussed phase by phase, and then according to the kinds of vegetation represented: wetland plants, weeds, grassland, scrub, woodland, cultivated and useful plants.

PHASE 4 early - mid Saxon

Context 2651, Context Group (CG) 104

Few of the samples from this Saxon phase contained plant remains in useful quantities, despite an intensive search. The samples seemed to consist mainly of gravel and charcoal, apart from one context. The rather small flora from this context included one plant which floats in standing water, horned pondweed (*Zannichellia palustris*), and some sedge (*Carex* sp.).

There were also a few weed seeds that mainly grow in cornfields on light soils, parsley piert (*Aphanes arvensis*) and lamb's lettuce (*Valerianella locusta*). This small flora is too little for much interpretation. Other Saxon samples consisted largely of charcoal and large pebbles, and were more or less barren of other plant remains. These layers may represent waste dumps from salt extraction, evidently providing little chance for accumulation and preservation of pollen and seeds. Industrial activity may have been concentrated here.

PHASE 5 mid Saxon - early medieval

Watercourse (2435, CG104))

Wetland plants

This contained a flora with many plants that grow up through water or on banks beside water rather than actually floating about in it; there were many seeds of spike-rush (*Eleocharis uniglumis/palustris*), and smaller numbers of seeds of water dropwort (*Oenanthe fistulosa*), fool's watercress (*Apium nodiflorum*), water parsnip (*Berula erecta*) and bulrush (*Scirpus tabernaemontani*).

Weeds of muddy habitats

There were also a number of weeds of muddy banks such as bur-marigold (*Bidens tripartita*), water-pepper (*Polygonum hydropiper*), pale persicaria (*P. lapathifolium*), and celery-leaved water crowfoot (*Ranunculus sceleratus*). These are weeds in the sense that they colonise bare wet ground such as banks and the upcast from ditches. There were mollusc opercula which might be from water snails, which may show that conditions were acidic enough to dissolve the snail shells themselves (see D. Williams' report).

Weeds of gardens and fields

A range of dry land plants were represented; some of these were summer-annual weeds, seeds of which could either have scattered from locally growing plants, or been brought in with crops and their weeds, such as the cereals discussed below. Examples were goosefoot (*Chenopodium album*), orache (*Atriplex* sp.) and corn spurrey (*Spergula arvensis*).

Weeds that usually grow with autumn-sown cereal crops were also fairly numerous, such as stinking mayweed (*Anthemis cotula*), parsley piert (*Aphanes arvensis*) and black bindweed (*Fallopia convolvulus*). Although the weeds themselves had no use, their presence can provide evidence of material such as straw that was brought in to the site from cornfields. The straw itself had largely disappeared (there were few cereal remains in this sample), leaving the weed seeds.

Finally, there were some weeds which grow on paths and other trodden places which might well have grown near the site, such as knotgrass (*Polygonum aviculare*).

Grassland plants

Grasslands of various kinds are indicated by a range

of plants; there are plants of marshy meadows such as yellow loosestrife (*Lysimachia vulgaris*) (plate 1), marsh marigold (*Caltha palustris*) (plate 1) and lousewort (*Pedicularis palustris*) and a range of sedges (*Carex* spp.). These could also have been part of the wetland floras discussed above. Less wet grassland was probably the habitat of other grassland taxa such as meadow buttercup (*Ranunculus* cf. *acris*), clovers (*Trifolium* spp.) and agrimony (*Agrimonia eupatoria*) (plate 2). This last grows in the grassier parts of waysides, and also in hay meadows. The grassland plants may have grown locally, or they might (together with the spike-rush) represent the dung of grazing animals, or remains of fodder, both things that would have probably been brought to the site from elsewhere.

To summarise, the plant remains show that some wetland plants and weeds probably grew in and around the watercourse, while plants from a wide range of other habitats seem to represent a mixture of plant materials such as hay and straw brought in to the site.

PHASE 6 late 14th century

(1604, 1645, 2051)

Wetland

Evidence of wetland plants also came from a medieval layer associated with the construction of the Upwich Pit (2051), similar to that of the watercourse 2435. The material seemed mainly to represent a natural ditch vegetation. Additionally, however, bogbean (*Menyanthes trifoliata*) seeds were present here, a plant that is found more in bogs and fens in the countryside rather than muddy town ditches, so it was probably brought in together with wetland plant material such as peat or bog moss from suitable places around Droitwich.

Weeds

Many weeds are hard to interpret since their presence in these samples could represent so many different possibilities: they could have grown on the spot (many of them were seen among the rich weed floras which sprang up on spoil tips of various Droitwich excavations, from the recent seedbank in the topsoil) or they could just as easily have been brought from elsewhere (with crops) and deposited with rubbish, for example flixweed (*Descurainia sophia*) (plate 1). Some other weeds, such as stinking mayweed (*Anthemis cotula*) and corn marigold (*Chrysanthemum segetum*) are traditional cornfield weeds, the latter particularly in spring-sown crops, and were common in this county a century or so ago (Amphlett & Rea 1909). Weed seeds from hay, straw, etc may also have given rise to rich weed floras growing on the dunghills in and around Droitwich in the past.

Grasslands

There were also some signs of several different kinds of grassland; daisy (*Bellis perennis*) is fairly tolerant of grazing or cutting, which is why it grows in lawns nowadays. The archaeobotanical finds here could provide some indication of pasture or goose-meadows. Daisy seeds are not found very often in archaeological deposits, although this may be either the result of low seed dispersal or of rarity in the past. In contrast, yellow rattle (*Rhinanthus* sp.)(plate 1) is not so tolerant of frequent cutting or grazing and is therefore characteristic of traditional hay meadow, which was mown just once. Another hay meadow plant, lesser scabious (*Scabiosa columbaria*) (plate 2) grows in a different soil, dry and chalky. There are not many places near Droitwich where this scabious might be expected to have grown - the nearest suitable habitat would appear to be on the Typical Calcareous Pelosol soils which occur in patches to the southwest of Droitwich, starting about 3 km away (Fig 1) and even so, this plant is considered "very rare" in the county flora (Amphlett & Rea 1909). Other grassland plants with less clear habitat requirements include clovers (*Trifolium* spp.) and grasses (Gramineae). Grass seeds are not often well preserved, but there were thirty in this sample, among which crested dog's tail (*Cynosurus cristatus*) was identified, which grows in meadows. Such a mixed assemblage from various grasslands might come from animal dung.

Brushwood

A barrel (CG121) 1604 contained brushwood remains with a few seeds of bramble (*Rubus fruticosus*) and of possible rowan (*Sorbus* cf. *aucuparia*), sloe (*Prunus spinosa*) fruitstone fragments and possible oak (cf. *Quercus* sp.) bud scales. This brushwood may represent fuel used for brine boiling (Hurst, pers. comm.).

Cereals and food plants

One might not expect to find many foodplant remains on an industrial site, but large amounts of

cereal chaff were found in 2051 and 1645 - Lisa Moffett found that most of the identifiable fragments were rivet wheat (*Triticum turgidum* type) with a little six-row barley (*Hordeum vulgare*), and one fragment of rye (*Secale cereale*). This adds to the evidence which she has collected showing that rivet wheat was an important crop during the medieval (and postmedieval) periods at many sites in England (Moffett 1991). The remains in context 1645 consisted almost entirely of rye (*Secale cereale*) and wheat (*Triticum* sp.) chaff, making an interesting comparison with documentary evidence for the importance of rye as a foodcorn in medieval Worcestershire (Dyer 1989: 153).

In 2051 there was a single seed of celery (*Apium graveolens*) which is both a wild plant of saline habitats (it used to grow along the Droitwich canal, Amphlett & Rea 1909) and a cultivated plant which was first used for its aromatic seeds. There was also a single seed of strawberry (*Fragaria vesca*). Vervain (*Verbena officinalis*) (plate 3) stands out here as it has been used for many medicinal purposes (Grieve 1980), yet there are no particular circumstances of the find to suggest that it was anything but natural vegetation here.

To sum up the archaeobotanical results from this phase there was a rich mixed flora of wetland plants, weeds, grassland plants and cereals indicate general rubbish. Some of the food remains might have come from human faeces.

PHASE 7 mid 17th century

Samples associated with the repair of the Upwich Pit pump framework 888 (CG307), barrel pits 1406 CG251) and 756 (CG229).

Wetland plants

Aquatic plants were much less well represented in the later medieval deposits: water crowfoot (*Ranunculus* subg. *Batrachium*) in pit fill 888, and brittlewort (*Chara* sp.) in 756. This was a small amount of evidence for aquatic plants considering the way in which the site filled up with water during excavation and may indicate that any pits on the site were not left undisturbed for long enough to become colonised by water plants, or were too saline. In contrast, deposits from larger and more permanent bodies of water such as moats, ponds and rivers often have large aquatic floras.

Possible peat

There was a mainly wetland and marsh flora in the fill of the 16/17th C barrel 756 CG229), an organic, peat-like material. The pollen spectrum contained 33% sedge (Cyperaceae) pollen and many sedge (*Carex* spp.) macrofossils were found including the great sedge (*Cladium mariscus*) (plate 2). This is hardly known from Worcestershire recently, and according to Amphlett & Rea (1909: 383) it was first recorded from Feckenham Bog in 1817. That indeed seems a likely area for this material to have come from, collected perhaps for a use such as for thatching. It is very interesting to find remains such as this, which must represent material brought in to the site for a particular purpose, from wetlands in the vicinity. Many tormentil (*Potentilla erecta*) seeds were found, representing a plant which is found on heaths and bogs and which might therefore have grown in the same habitat as the great sedge. The complete pollen count, which is given at the end of the plant list, also contained a range of tree pollen, including beech (*Fagus*) pollen, which suggests a post-Iron Age date for the peat, unless it represents later mixing of the material with other things in Droitwich at the time of deposition. This could also be the case with some of the herb pollen such as that from weeds and cereals.

This deposit seems to represent a particular material not much mixed with general rubbish, probably some kind of wetland material which was brought in to the site, rather than anything that grew in or around Droitwich. It might have been either peat, turf or reed.

Weeds

The sample associated with the Upwich pit pump repair (888) had a very distinct cornfield weed flora, of which the most typical taxa were fragments of corn cockle (*Agrostemma githago*) (plate 2), stinking mayweed (*Anthemis cotula*), cornflower (*Centaurea cyanus*), black bindweed (*Polygonum convolvulus*), shepherd's needle (*Scandix pecten-veneris*) (plate 2) and annual knawel (*Scleranthus annuus*) (plate 1). The remains of these weeds are associated with abundant traces of cereals (see below) There was some indication that this material had been grown in a number of different areas of the countryside as the habitat preferences of the weeds are different; cornflower and knawel grew mostly on light soils, shepherd's needle was formerly found throughout,

while stinking mayweed was found mainly on heavy clay (see soil map, Fig 1, and Amphlett & Rea 1909). Such weeds have practically died out since the onset of mechanised farming. They were probably brought to the site with sheaves, straw or chaff or, as the seeds of some taxa were smashed, perhaps the result of having been included in processed cereal fodder or food.

There was also a large "garden weed" flora of spring-germinating plants, some of which probably grew on the site while others may have been brought in with crops. Examples are *Cerastium* sp. (mouse-ear chickweed and *Spergula arvensis* (corn spurrey) (plate 1).

A further group of weeds, perennial ones, such as burdocks, hemlock and stinging nettles, were found mainly in context 888. This context and 2435 also contained some evidence of plants of pathways and other trodden places which one would expect around an occupied site.

Grasslands and hay meadows

Context 888 also contained a large number of grassland plants. There were yellow rattle (*Rhinanthus* sp.) (plate 2) and marguerite daisy (*Leucanthemum vulgare*) which are characteristic hay meadow plants. Such signs of various kinds of managed meadow and pasture on an archaeological site suggest that grassy material was brought there, perhaps from several sources. There are several possibilities: hay might have been brought there for animal fodder, and at times when animal power was widely used, dung would be present almost everywhere, still containing the remains of grassland plants. The third possibility is that some of the more ubiquitous grassland plants such as self-heal (*Prunella vulgaris*), purging flax (*Linum catharticum*) (plate 1), *Stellaria graminea/palustris* (plate 1) and hawkbit (*Leontodon* sp.) could have been growing on the spot.

Hedgerows and waysides

Scrub and/or hedgerows were also suggested by some of the plants identified from context 888. There were many thorns which are likely to have come from brambles (*Rubus fruticosus*) rather than roses, since bramble seeds were also present. Bur chervil (*Anthriscus caucalis*) is a wayside plant that seems to have a much greater archaeological record than one might expect since it is described as being "not common" (Amphlett & Rea 1909), although being somewhat hard to identify and also easy to miss it may be under-reported. The scrub, like the evidence of perennial weeds in this material, could have been part of the local vegetation, showing that the site was rather overgrown.

Trees

There are a few signs of trees and woodland: In context 888 there were some birch (*Betula* sp.) seeds, possible oak (cf. *Quercus* sp.) bud scales, hazel nutshell (*Corylus avellana*) and some sloe/haw (*Prunus/Crataegus* sp.) thorns. The pollen spectrum from the peaty material in the barrel 756 contained 21% tree pollen, although this may have been brought in with the peat having been laid down in an earlier, more afforested time, rather than representing trees in Droitwich itself.

Crops and possibly useful plants

These are among the most interesting remains, since they are closely connected with human activity. Contexts 888 and 1406 contained large amounts of cultivated plant remains including much cereal chaff. Context 888 contained mostly rye (*Secale cereale*), with some rivet wheat (*Triticum turgidum*) and other remains of either rivet or bread wheat (*Triticum* sp.) (all three: plate 3). The mid-18th C pit 1406 contents consisted almost entirely of cereals and cornfield weeds; it contained more wheat than rye, and a trace of barley (*Hordeum* sp.) (plate 3). Rye is interesting because, according to historical sources, it was fairly widely grown throughout the medieval period and later, and as late as 1677 in some regions ordinary household bread was made of rye, coarse and black, although wheaten bread was eaten by the more prosperous people (Palliser 1982: 89). When living standards improved rye fell out of favour, and it is only now making a comeback as health food. Besides grain, cereals provided straw which had many uses. Peter Osborne's report on the beetles in the chaff from Context 1406 showed indications of compost-like material, but not of animal dung. It is possible that the material was eaten as fodder (together with the beetles) and was deposited and buried before a typical dung beetle fauna could have arisen there, or that this straw was discarded as rubbish.

Context 888 also contained a large range of other foodplants including pea (*Pisum sativum*) (plate 2), strawberry (*Fragaria vesca*), pear (*Pyrus communis*),

apple (*Malus sylvestris*), fig (*Ficus carica*), showing that this pit fill contained food remains, if not faecal material directly. It has not been possible to check for the presence of parasite ova to confirm faeces. Catmint (*Nepeta cataria*) was also present, maybe grown as a herb. It is fairly commonly found in some urban medieval deposits such as at Rougier Street in York (Hall, in Hall & Kenward 1990), but less often in smaller settlements. Such remains seem to show that household rubbish was deposited here.

5. Conclusions

Saxon Upwich

The scarcity of plant remains means that there is little information on the botany of Saxon Droitwich.

Medieval Upwich

Medieval plant remains from urban sites often have very large weed floras, especially weeds of cornfields, but on rural sites one suspects that all rubbish was scattered on the fields. The large weed floras from these urban sites may be partly because the fields were actually weedy, and partly perhaps because straw (containing weeds) was put to a great number of uses in settlements (fodder, stabling, thatch and building material), providing more chance for remains to be preserved. The information on the rivet wheat and rye is certainly very useful, because so few places in the midlands have well-preserved remains of this kind. It is interesting that there are signs of chalk grassland so far from suitable habitats.

Post-medieval Upwich

Postmedieval remains have rarely been studied up to now, yet this was a time of great agricultural innovation, and of the introduction of many new crops and imported foodstuffs. The picture obtained from Droitwich, however, shows essentially the continuation of medieval farming. It is interesting to detect plants which must have been brought in to Droitwich from far and wide. Heathland products, however, do not seem to have been used.

Signs of salt in the flora?

The Flora of Worcestershire mentions two possible halophytes (salt tolerant plants) that used to grow along the Droitwich canal around Salwarpe, a few km south of Droitwich (Amphlett & Rea 1909). The first is celery (*Apium graveolens*), of which a single seed was found at this site in a medieval context (Phase 6), and a few more from another Droitwich excavation the site of the Old Bowling Green. It is hard to tell whether such celery seed finds represent wild plants (an hence saline conditions), or otherwise the garden plant which was cultivated for its pungent seeds which were used as flavouring. Archaeobotanical finds of celery seed are not uncommon among food remains but the use of celery stems and roots as a vegetable is a postmedieval development. The other recent halophyte was *Glaux maritima* (saltwort), and although some Primulaceae seeds were found (context 2435, phase 5), but they could not be identified precisely to this species.

Comparison with other plant remains

The plant remains from the nearby site of the old Droitwich Bowling Green (Greig & Colledge 1988) consisted of rather similar floras that contained plants of marshland and wet banksides, weeds and grassland plants, but very little of the cereal material or other foodplants which have made the Upwich results so important.

The Upwich remains were not from the more urban and domestic kind of medieval deposit with latrine and rubbish pits full of food remains (especially fruitstones), as found at Worcester (Greig 1981) and at Shrewsbury (Greig, in preparation a). Very few pieces of environmental work have been done on industrial sites such as this.

The past vegetation and landscape

There is little information from local pollen diagrams so far to provide a background of local and regional vegetational change with which to compare these Droitwich results. The outline pollen diagram from Cookley (Greig, in preparation b) shows that the lime (*Tilia*) dominated forest had largely disappeared by the Saxon period, forest which may have been replaced by scrub used for feeding the fires of the brine works. A pollen diagram from Alcester shows a little more closely what one might expect around a settlement (Woodwards & Greig 1989): there was some woodland during the Iron Age which was cleared, probably in Roman times, and there are signs of mixed farming from then through the medieval period. Medieval farming and other activities are also shown in the Cookley pollen diagram where there are signs of cereal crops and of the cornflower (*Centaurea cyanus*), apparently during the medieval period.

6. Suggestions for future research; Droitwich

The potential for further archaeobotanical research on Droitwich material depends absolutely on something that cannot be predicted: well-preserved and interesting plant remains. Plant remains have certainly been studied very usefully at a number of sites in Droitwich, such as the pollen and seeds from the Old Bowling Green site in the salt-working area (Greig & Colledge 1988). Droitwich sites from other areas have also provided plenty of charred remains, such as the Roman site at Hanbury St (Vaughan 1982) and the Bay's Meadow villa site (the latter also having a good waterlogged flora from a well (Greig 1991). It is clear that Droitwich material has the potential to provide important new information about the past vegetation and farming and use of plant materials in the area. Archaeobotany certainly needs to be considered in plans for future excavations.

The region

The regional story of vegetational change is one that is very poorly understood. Detailed pollen diagrams with well dated sequences covering the last two thousand years are a rarity anyway. It would also be very useful to investigate peat deposits in Feckenham Forest to try to obtain a dated sequence of vegetation history from there, while suitable deposits still survive.

Acknowledgements

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Summary

Droitwich is a small town in Worcestershire with brine wells which have a long archaeological record. The Upwich excavations, the archaeobotanical results from which are described here, took place on the site of the main salt well. Sufficient plant remains for useful analysis were recovered from some of the sediment samples collected during the excavations. There were especially valuable groups of waterlogged cereal remains which show the importance of rivet wheat and rye among the cereals grown, making useful comparison with the results from the study of charred cereal remains from a number of midland sites (Moffett 1991). There were also varied floras representing aquatic, wetland, cornfield weed, grassland, woodland and scrub vegetations. This provides information on the use of products from the surrounding countryside and on its landscape. The plant remains seemed to show little direct association with the salt industry, neither was there clear evidence of salt-tolerant plants which might be expected in brackish environments.

THE SIEVING AND SORTING DATA FOR UPWICH, HWCM4575.

Diane Williams and James Greig

Introduction:

Diane Williams carried out the sampling programme on site, and processed and sorted some of the samples at Worcester. James Greig processed the rest in the laboratory at Birmingham. Here are the details of this work, with descriptions of the sediments found, the processes used, and some indication of their contents. There are indications where results are to be found in the main report.

Sampling philosophy; in the field

Samples were collected from most contexts that were apparently suitable for sampling, with prospect of waterlogged remains, charred ones or both. As the analysis was to be done after the excavation, little in the way of test sampling could be done to find which were the most hopeful samples, but in retrospect the sampling programme seems to have worked all right.

Sampling philosophy; in the laboratory

The total number (and bulk) of the samples was large, and this shifted the selection and sampling phase into the laboratory work rather than having been done during fieldwork. Archaeobotanical samples depend absolutely upon the variety and state of preservation of any plant remains - without these they tell us nothing. To find the samples with good plant remains as quickly as possible, a rapid assessment technique was used; About 25cc sediment was disaggregated and roughly sieved, and immediately scanned under a microscope in a petri dish of water. The things seen were recorded (i.e. moss, charcoal, organic material, seeds etc.) and the sample discarded. In this way a large number of samples could be assessed rapidly. If a sample proved worthy of further analysis, a 1 litre sample was processed. If there were plant remains, it then raises the question as to whether the context itself is useful. In the case of Upwich the chronology was complex, with a potential date range from the Iron Age until the nineteenth century, and this meant that final phasing of the samples was only available fairly late on in the project. Certain time periods are intrinsically more interesting such as the Saxon in this case, although none are uninteresting, so the postmedieval samples from the seventeenth and eighteenth centuries represent a period rarely investigated archaeobotanically. However, well-dated samples are needed for the results to be set in context.

Sieving philosophy

The aim was to obtain a worthwhile flora for analysis. The basis for this is usually a sample in which everything is counted and identified as far as possible, and a usual sample size for this kind of analysis is around 1 litre sediment. The business of identifying waterlogged seeds is time- consuming, that of checking, labelling, bottling-up etc. especially so, but such a flora is the basis of good archaeobotanical work. Extra material can be usefully scanned to see if there are extra taxa not already found, which avoids the labour intensive work of handling the whole flora for a few extra taxa, but there was little time for this in the case of the Upwich material.

Sieving and sorting methods

The main sieving method is "washover", in which the somewhat lighter organic material is washed over the lip of a container and caught in a fine sieve of mesh 0.3mm. The sediment sample of, say, 1 litre is measured out. This is done by ading the sediment to a 2 litre beaker containing 1 litre of water, until it is filled to the 2 litre mark. The nature of the sediment is recorded, and it is put in a washing-up bowl and gently broken apart in water with finger action, and when the water becomes very muddy, some material can be washed over and the bowl filled up again with more water. The process is repeated a dozen or more times until almost all the organic material is in the sieve, and the residue is mainly inorganic material. Sometimes it is easier to break up the sediment by shaking it with water in a closed container such as a 500 cc jar with a lid. Material from Droitwich sites is usually time-consuming to process in this way because of the large clay content in the sediment which is slow to break down. No magic treatment has been discovered which is better than time, effort and water.

The washed over organic material may need to be washed again, and perhaps stood overnight in water to persuade more fine particulate matter to free itself. It then needs to be re-sieved to separate it into size fractions such as >4mm, 4-2mm, 2-1mm and 1-.3mm for convenience in sorting. The residue that did not wash over can be dried and then covered with water to float any further organic remains that did not washover in the first place, a useful check on the efficiency of sieving.

The sieved fractions can be stored for a week or so in water, but will gain fungal mycelia if left much longer, so for long-term storage must be kept in ethanol. They are best sorted in water so that frail seeds do not break up, and the finds transferred to sealed containers of ethanol, containing labels done in Rotring.

Identification is usually done in taxonomic order, that is the order of the plants in the flora and also of the eventual seed list. Some critical groups needed to have considerable time spent on them, for example the Cyperaceae and Gramineae, although in the case of the Upwich material there was not always time for this and some seed lists just have '*Carex* spp.' and 'Gramineae', and the mosses and buds have not been fully identified either. All identifications have to be checked against reference material where possible, although in some cases such as with the waterlogged rivet wheat remains, this is not always practicable.

Some critical taxa have been photographed (see plates) to show other people what the remains looked like, which can help with the spread of archaeobotanical information. Remains such as waterlogged wheat rachis material have not often been found before, and are therefore not well-known.

Sample: 47 **Context:** 607

sample volume washed: 2.7l

Sediment: Banded dark brown/black sandy silt, with brick, quartz, rootlets and iron staining.

Treatment: bulk sieved on a 500 micron mesh on site. Seeds and coal visible.

Float: contained modern roots, ancient plant remains, coal, charcoal etc.

Residue: dry sorted, contained quartz grains, brick, stone, ?glaze. About 300 ml (12.5%) sorted.

Sample: 58 **Context**: 756

Type of feature: barrel fill Date: probably ca. AD1700

Sample volume: ? **amount processed**: 752g examined

Sediment: large angular pieces of compressed peaty-like material, organic material obvious, brick bits.

Treatment: Soaked in water for 2-3 weeks, then soaked in hot water and any float washed over, and remaining lumps were broken down by hand and washed through a sieve bank. Sediment not fully broken down, so >2mm fraction soaked in water with 10g/litre washing soda (Sodium carbonate). Float washed over, remainder washed through sieve bank.

Float: various float fractions extracted in stages described above. Material generally fibrous, rather few seeds. Difficult to sort, especially the fine fraction.

Residue: brick/tile, stone and coal present.

Finds: some seeds.

Further information: question of whether material could show what the barrel (in which it was found) was used for. This material was re-sorted by JG, and some seeds were found (see main report).

Sample: 61 Context:759 Type of feature: Drain fill.

Sample volume: 0.8l amount processed: 1278g

Sediment: Silty sludge

Treatment: Soaked in hot water, nothing floated, washed through sieve bank with 4mm, 2mm, 1mm. 0.5mm and 0.3mm meshes.

Float: not washed over

Residue: almost all mineral material. There was wood, charcoal, coal, pebbles, mortar, brick, a cream ware pot of around AD 1800 , and some salt glaze.

Finds: a few seeds, moss and insect fragments

Sample: 70 **Context**: 920 **Type of feature**: Drain fill Date:

Sample volume: 1.5l **Amount processed**: 1.0 l

Sediment: Silty, gritty sludge

Treatment: Soaked in hot water with washing soda, broken down, washed through sieve bank.

Float: nothing floated

Residue: Sorted wet; brick, mortar, stone and coal noted. A lot of ''industrial'' looking residues

Finds: some wood, charcoal and seeds.

Further information:

Sample: 76 **Context**: 888 **Type of feature**:Fill of pumping mechanism pit

Date: late 17thC

Sample volume: **Amount processed**:

Sediment:Silty/sandy black sediment with bits of mortar, twigs and lumps of wood, together with other organic material. Mottled black/dark grey.

Treatment: Washed on a 0.5mm mesh

Float: material did not float or wash over.

Residue:not all sorted; bagged dry.

Finds: Abundant plant remains, beetle fragments and fly puparia (see main report).

Sample: 84 **Context**: 959 **Type of feature**: Rubbish pit? **Date**:

Sample volume: 2700g **Amount processed**: 1000g

Sediment: Gritty, gravelly black sediment.

Treatment: Soaked in water for five days, then washed through bank of sieves and sieved fractions slowly dried.

Float: not floated

Residue: Brick, mortar, wood.

Finds: Only 1 possible seed.

Further information: Corrosion of sieve noted - this seems to take place when samples still have a high salt content.

Sample: 109 **Context**: 1406

Type of feature: Pit **Date**: mid 17/early 18thC

Sample volume: **Amount processed**: 300g

Sediment: Fibrous plant material thought to be grass, embedded in a black matrix like everything else in Droitwich.

Treatment: Soaked in hot water and very gently stirred.

Float: not floated

Residue: <2mm sorted wet, other size fractions left, sorted later by JG. A little brick and coal as usual.

Finds: enormous numbers of cereal remains, some insects (reported by Peter Osborne); see main report.

Sample:116 **Context**: 1645

Type of feature: pit **Date**: late 14th C pot!

Sample volume: 2940g **Amount processed**:1000g

Sediment: a) pure greyish clay with brick fragments b) criss-cross wood layers forming a mat-like layer.

Treatment: Soaked in hot water and disaggregated by hand, and left to soak again. Difficult to wash as the sieves kept clogging with the amounts of fine fibrous organic material.

Float: not floated

Residue: brick/tile, stone, wood, charcoal. Sorted material re-sorted by JG for cereal material.

Finds: abundant cereal chaff remains - see main report.

Sample: 117 **Context**: 1515 **Type of feature**: watercourse

Date: ?Med

Sample volume: 3800g **Amount processed**: 1000g

Sediment: Silty clay with pieces of wood and stones.

Treatment: Soaked in hot water, then washed through sieve bank.

Float: Wood, charcoal, seeds, nutshells, moss and beetle remains noted.

Residue: Brick, mortar and stone present

Finds: not examined.

Sample: 118 **Context:** 1604

Type of feature: pit **Date:** late 14thC pot

Sample volume: 1880g **Amount processed:** 500g

Sediment: woody material with soil.

Treatment: Soaked in water to remove soil from wood.

Float: washed over, put through sieve bank. Contained wood, charcoal, seeds and nutshells. Sorted material re-sorted by JG.

Residue: brick, stone and coal.

Finds: buds, twigs and thorns, very few seeds.

Further information: see main report.

Sample: 119 **Context:** 1526 **Type of feature:** waterlain sediment? **Date:** ? medieval

Sample volume: 504g **Amount processed:** 50g

Sediment: silt with some clay, sand, wood and roots, very black.

Treatment: A small amount examined under a microscope to study the sediment, then washed through a sieve bank.

Float: not washed over

Residue: Brick, stone; some wood charcoal and seeds noted.

Finds: -

Sample: 121 **Context:** 1531 **Type of feature:** **Date:**

Sample volume: 1600g **Amount processed:** 500g

Sediment: Crumbly sediment with pieces of charcoal

Treatment: Subsample was soaked in hot water, and the fibrous lumps pulled apart, releasing much charcoal. The material was then washed through a sieve bank, and dried.

Float: -

Residue: Brick, mortar and stone. Charcoal.

Finds: none significant

Sample:122 **Context:**1536 **Type of feature:**? **Date:**?

Sample volume: 10 litres **Amount processed:** 500g

Sediment:

Treatment: Soaked in hot water, sieved on 0.5mm mesh.

Float: none apparent

Residue: sorted wet; charcoal, mineral material.

Finds: 1 bone fragment.

Sample: 124 **Context:** 1538 **Type of feature:** **Date:**

Sample volume: 4052g **Amount processed:** 532g

Sediment: soft sediment with much charcoal.

Treatment: Soaked in water, difficult to sieve, but washed through sieve bank.

Float: not floated

Residue: Brick, wood, charcoal

Finds: bone, beetle remains, fly puparia.

Sample: 129 **Context:** 1547 **Type of feature:** ? **Date:** ?

Sample volume: 4800g **Amount processed:** 1000g

Sediment: charcoal

Treatment: Soaked in water, washed through sieve bank.

Float: not washed over

Residue: Brick, mortar, wood, charcoal, animal bone, insects, eggshell.

Finds: none

Sample: 131 **Context:** 1562 **Type of feature:** ? **Date:** ?

Sample volume: 4200g **Amount processed:** 1014g

Sediment: Moist crumbly charcoal with lumps of white (mortar).

Treatment: Left to soak in water, very hard to sieve (clogging). 250g subsample just washed and sieved without soaking.

Float: not washed over

Residue: brick, mortar, stone, wood, charcoaal, bone etc.

Finds: none reported

Sample: 136 **Context**: 1569 **Type of feature**: pitfill **Date**: Med

Sample volume: ? 3 litres **Amount processed**: 1 litre

Sediment: ashy sediment

Treatment: washed with water and separated into size fractions then dried before sorting.

Float: not washed over

Residue: wood, charcoal, ash, no seeds

Finds: not a productive sample

Sample: 177 **Context**: 1820 **Type of feature**: watercourse

Date: ? Med

Sample volume: 3 litres **Amount processed**: 1 litre

Sediment:''black clag''

Treatment: material disaggregated and washed on 0.3mm mesh, soaked in water overnight and washed through a sieve bank of 4mm, 2mm and 0.3mm.

Float: not washed over

Residue: After the extensive fine charcoal and silt fraction had been washed through the sieve, there was mainly organic material left consisting of lumps of wood of varying sizes on all the sieves according to mesh width.

Finds: a few seeds, not really enough for a meaningful analysis.

Further information:

Sample: 259 **Context**: 1896 **Type of feature**: associated with watercourse **Date**: ? Medieval

Sample volume: 10,000g **Amount processed**: 1000g

Sediment: Crumbly black lumps of earth with white inclusions, bits of wood, and rootlets.

Treatment: Sub-sample soaked and stirred in hot water, washed through a sieve bank (4mm, 2mm, 1mm and 0.5mm), the 0.3mm sieve clogged. Material dried before sorting.

Float: not washed over

Residue: Mortar/plaster, stone. Charcoal (much), a few seeds and nutshell fragments.

Finds: Snails 2 *Valvata piscinalis*, 1 *Limnaea peregra*, 1 *Cepaea* fragment, 1 Ostracod; a fauna of both terrestrial and aquatic molluscs.

Sample: 262 **Context**: 2018 **Type of feature**: moss **Date**: Med.

Sample volume: 262g **Amount processed**: 108g

Sediment: grey clay and silt with moss

Treatment: Moss gently washed out from matrix and stored in ethanol. Remainder of matrix sieved on 0.3mm mesh sieve

Float: none

Residue: mortar/plaster, stone. Wood, charcoal, few seeds.

Finds: plenty of moss

Sample: 264 **Context**: 1812 **Type of feature**: associated watercourse **Date**: ? Medieval

Sample volume: 2850g **Amount processed**: 1000g

Sediment: Layer of sandy/clay material with layer of more clayey matrix containing much wood and other organic remains adhering to it.

Treatment: Soaked in warm water and ently broken down by hand. Washed through a sieve bank.

Float: charcoal, seeds, beetle fragments

Residue: Brick, Mortar/plaster, stone.

Finds: 1 *Limnaea peregra*, 3 *Bithynia tentaculata*, seeds and beetle remains.

Further information:

Sample: 274 **Context**: 2051 **Type of feature**: layer **Date**: Medieval

Sample volume: 3 litres **Amount processed**: 1 litre

Sediment: black clag, with a fairly large fine organic content which became obvious as processing removed the fine black particulate matter.

Treatment: Processed by JG. Washed on 0.3mm sieve to remove fine material, then washed over to concentrate organic material, through a sieve bank for different size fractions convenient for sorting.

Float: 350cc in all; 200 cc sorted carefully (counted seed results) and the extra 150 cc scanned (extras). Charcoal, wood and coal present, fibrous organic matter (possible straw remains) and fairly large numbers of seeds and beetle remains.

Residue: not much

Finds: large seed flora, cereals.

Further information: see main report.

Sample: 320 **Context**: 2115 **Type of feature**: watercourse **Date**: Med.

Sample volume: 2 litres **Amount processed**: 50cc test

Sediment: soil

Treatment: wash on .6mm mesh, examination wet.

Float: none

Residue: stones, no seeds.

Finds: some moss

Further information: sample considered barren

Sample: 332 **Context**: 2435

Type of feature: watercourse **Date**: pot no later than mid 13thC

Sample volume: 1.5 litres **Amount processed**: test 100cc, then 1 litre

Sediment: stony soil with wood remains

Treatment: A small test amount showed that seeds were present, so 1 litre was measured out and washed on .3mm mesh in stages as a first step in disaggregation, vigorously shaken in a jar with water to separate mineral material, sieved into >4mm, 4-2mm, 2-1mm and 1-.3mm fractions. The coarse fraction consisted of stick and charcoal fragments. About 250cc of the 4-2 and 2-1 fractions wet sorted, the rest (another 250cc about), dried and quick-sorted. Only some of the fine fractions sorted.

Float: material mostly organic so not floated

Residue: 600cc in all

Finds: a good seed flora, different to the other ones obtained from Upwich (see main report). Some moss, snail opercula.

Further information: many marshland plants - see main section

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Sample: 361 **Context**: 3665 **Type of feature**: earliest gravels

Date: Saxon or pre- ?

Sample volume: 2 litres **Amount processed**: 50cc test

Sediment: dark soil

Treatment: washed on .6mm mesh

Float: none

Residue: stones and a little organic matter

Finds: Wood fragments, caddis case, beetle elytron, seeds of buttercup, chickweed, elder.

Further information: not enough for further worthwhile work.

Sample: 365 **Context**: 2561 **Type of feature**: layer

Date: Saxon

Sample volume: 1.5 litres **Amount processed**: 1 litre

Sediment: sandy soil with pebbles, black with charcoal.

Treatment: Washed on .3mm mesh, organic matter and charcoal washed over.

Float: a very few waterlogged seeds, 1 snail

Residue: stones

Finds: orange-coloured fig seeds rejected as contaminants. Sedimentation tank then cleaned out of 'floaters'.

Further information: see main seed list

Sample: 372 **Context**: 2714 **Type of feature**: layer

Date: Saxon

Sample volume:1.5 litres **Amount processed**: 50cc

Sediment: earth with stones and charcoal

Treatment: washed on .6mm sieve

Float: none

Residue: everything scanned in water under a microscope

Finds: none

Further information: sample barren

Sample: 378 **Context**: 2741 **Type of feature**: layer

Date: Saxon

Sample volume: 1.6 litres **Amount processed**: 1 litre

Sediment: ashy sand and pebbled, charcoal-darkened.

Treatment: washed on a .3mm mesh, floated.

Float: separated on 4mm mesh. Charcoal

Residue: stones

Finds: very few seeds

Further information: sample barren

Sample: 382 **Context**: 2826 **Type of feature**: layer

Date: Saxon

Sample volume: 1.6 litres **Amount processed**: 50cc

Sediment: mainly charcoal

Treatment: washed on .6mm mesh, scanned wet

Float: none

Residue: charcoal

Finds: *Ranunculus acris/repens/bulbosus, Chenopodium, Rubus fruticosus.*

Further information: sample otherwise barren

Sample: 406 **Context**: 3091 **Type of feature**: pit

Date: ? pre Saxon

Sample volume: 1.6 litres **Amount processed**: 50cc.

Sediment: earth

Treatment: washed on .6mm mesh until clean, scanned wet in petri dish.

Float: none; little organic material

Residue: stones

Finds: none

Further information: sample barren

Sample: 421 **Context**:3154 **Type of feature**:layer

Date: Saxon

Sample volume: 1.5 litres **Amount processed**: 50cc

Sediment: rock-hard accretion of charcoal, sand and stones

Treatment: tried to break it down and sieve it, but too hard.

Float:none

Residue: none

Finds: none could be seen in the material.

Further information: sample barren

Sample: 508 **Context**:1678 **Type of feature**: spot find, layer

Date: ? medieval

Sample volume: 75cc **Amount processed**: all

Sediment: moss laid in criss-cross fashion, bound by dark grey/black clay-silt matrix, underlain/overlain by yellow clay/sand.

Treatment: Soaked in water, matrix breaks down easily.

Float:

Residue:sorted

Finds: moss, seeds and insects

Further information:

Sample: 514 **Context**: 3126 **Type of feature**: pit fill, trench **Date**: Medieval

Sample volume: 385cc **Amount processed**: 223cc

Sediment: Black, organic sediment, with pebbles

Treatment: Washed in 200cc water, with 62.5 cc 30 Vol hydrogen peroxide.

Float: not separated

Residue: some pottery

Finds: 1 fragment of *Agrostemma githago*, 1 *Corylus* nutshell in the residue.

Sample: 365 **Context**: 2651 **Type of feature**: layer

Date: Anglo-Saxon

Sample volume: 2 litres **Amount processed**: 1 litre

Sediment: Sand, pebbles and charcoal

Treatment: Washing with water, separating with a sieve bank.

Float: Charcoal, and a few seeds

Residue: Pebbles and sand

Finds: seeds, some charred, some waterlogged

Further information: see main report.

Sample: 378 **Context**: 2741 **Type of feature**: later

Date: Romano-British - Anglo-Saxon

Sample volume: 2 litres **Amount processed**: 1 litre

Sediment: ash, sand and pebbles

Treatment: washed in water on a fine sieve, then separated with a sieve bank.

Float: Charcoal, few seeds

Residue: stones

Finds: a few seeds

Further information: none

Sample: 516 **Context**: 1544 **Type of feature**: ? **Date**: ?

Sample volume: **Amount processed**:

Sediment:

Treatment:

Float: Snails: 20 *Bithynia tentaculata*, 2 *B. leachii*, 5 *Planorbis planorbis*, 2 *Limnaea peregra*, 1 *Succinea* sp., 1 *Heligona lapicida*.

Residue:

Finds:

Further information: none

Table 2, Plant list

by James Greig

All remains 'seeds' unless otherwise stated, abbreviations: fd = frond, cpsl fr = capsule fragments, frtst = fruitstone, spklt = spikelet, seg = segment.

Context	Sample	Type	Date
2561	365	layer	Saxon
2435	332	watercourse	? mid 13th C
1604	118	pit fill	late 14th C pot
1645	116	pit fill	late 14th C pot
2051	274	layer	medieval
888	76	pit fill	late 17th C
1406	109	pit fill	mid 17/early 18th
756	58	barrel fill	?AD1700

Upwich plant list

	sample	**365**	**332**	**118**	**116**	**274**	**76**	**109**	**58**	
plant name	**context**	**2561**	**2435**	**1604**	**1645**	**2051**	**888**	**1406**	**756**	
Chara sp.		-	-	-	-	-	-	-	1	brittlewort
Pteridium aquilinum (L.) K		-	2	-	-	-	3	-	-	bracken
Caltha palustris L.		-	1	-	-	-	-	-	-	kingcup
Ranunculus cf. *acris* L.		-	2	-	-	-	-	-	-	?meadow buttercup
Ranunculus acris/repens										
/bulbosus		4	17	-	+	7	21	-	-	buttercups
Ranunculus flammula L.		-	7	-	-	-	2	-	-	lesser spearwort
Ranunculus sceleratus L		-	3	-	-	5	15	-	1	celery-leaved crowfoot
Ranunculus subg. *Batrachium*		-	-	-	-	-	1	-	-	water crowfoot
Papaver argemone L.		-	-	-	-	1	-	-	-	prickly-headed poppy
Papaver sp.		-	-	-	-	-	2	-	-	poppy
Reseda sp.		-	-	-	-	-	2	-	-	mignonette

	sample	365	332	118	116	274	76	109	58	
plant name	**context**	**2561**	**2435**	**1604**	**1645**	**2051**	**888**	**1406**	**756**	
? *Brassica* sp.		-	2	-	-	-	1	-	-	? mustard
Raphanus raphanistrum L. cpsl		-	-	-	?	1	1	-	-	runch
Coronopus squamatus (Forskål) Ascherson		-	-	-	-	1	-	-	-	swinecress
Thlaspi arvense L.		-	2	-	-	+	-	-	-	pennycress
Cardamine pratensis L. s.l.		-	-	-	-	1	-	-	-	cuckooflower
Descurainia sophia (L.) Webb ex Prantl		-	-	-	-	3	-	-	-	flixweed
Viola sp		-	6	-	+	-	-	-	-	violet
Lychnis flos-cuculi L.		-	11	-	-	12	-	-	1	ragged robin
Agrostemma githago L.		-	-	-	-	-	=15	-	-	corn cockle
Cerastium holosteoides Fr.		-	-	-	-	-	5	5	-	mouse-ear
Cerastium sp.		-	-	-	-	1	-	-	-	mouse-ear
Stellaria media (L.) Vill. s.l.		-	11	-	+	-	-	-	-	chickweed
Stellaria palustris/graminea		-	-	-	-	-	1	-	-	stitchwort
Spergula arvensis L.		-	=7	-	-	-	1	-	-	corn spurrey
Scleranthus annuus L.		-	-	-	-	-	1	-	-	knawel
Chenopodium album type		2	16	-	-	4	9	-	1	goosefoot
Chenopodium cf. *urbicum* L.		-	-	-	-	-	1	-	-	goosefoot
Chenopodium rubrum/botryodes		-	-	-	-	-	2	-	-	goosefoot
Atriplex sp.		1	5	-	-	-	-	-	-	orache
Malva sylvestris L. cpsl.		-	-	-	-	1	-	-	-	mallow
Linum catharticum L.		-	1	-	-	-	2	-	-	purging flax
Vicia cf. *tetrasperma* (L.) Schreber		-	-	-	-	-	1	-	-	vetch
Pisum sativum L. hylum		-	-	-	-	-	1	-	-	pea
cf. *Pisum sativum* L.		-	-	-	-	-	2	-	-	pea
Trifolium sp. calyx		-	5	-	-	3	-	-	-	clover
Trifolium sp. corolla fragments		-	4	-	+	+	6	-	-	clover

sample		365	332	118	116	274	76	109	58	
plant name	context	2561	2435	1604	1645	2051	888	1406	756	
Rubus fruticosus agg.		1	=1	7	-	1	3	-	2	bramble
Potentilla erecta (L.) Räuschel		-	1	-	-	-	-	-	13	tormentil
Potentilla reptans L.		-	-	-	-	1	-	-	-	cinquefoil
Fragaria vesca L.		-	-	-	-	1	4	-	-	strawberry
Agrimonia eupatoria L.		-	1	-	-	-	-	-	-	agrimony
Aphanes arvensis s.l.		2	2	-	-	-	1	-	-	parsley piert
Rosa/Rubus thorns		-	-	-	-	-	66	-	-	rose or bramble
Prunus frtst. frg.		-	-	16	-	-	=1	-	-	sloe
Prunus/Crataegus thorns		-	-	-	-	1	2	-	-	sloe or haw
cf. *Sorbus*		-	-	12	-	-	1	-	-	rowan or service
Pyrus malus L.		-	-	-	-	-	3	-	-	pear
Malus domestica Borkh.		-	-	-	-	-	2	-	-	apple
Malus domestica Borkh. endocarp		-	-	-	-	-	6	-	-	apple
Malus/Pyrus		-	-	-	-	-	-	1	-	apple or pear
? *Pyrus* (stone cells)		-	-	-	-	-	1	2	-	? pear
Anthriscus caucalis Bieb.		-	-	-	-	-	2	-	-	bur chervil
Scandix pecten-veneris L.		-	-	-	-	-	1	=1	-	Venus' comb
Oenanthe fistulosa L.		-	1	-	-	-	-	-	-	dropwort
Aethusa cynapium L.		-	7	-	-	-	-	-	-	fool's parsley
Conium maculatum L.		1	-	-	-	12	=2	-	-	hemlock
Berula erecta (Hudson) Coville		-	2	-	-	1	-	-	-	water-parsnip
Apium graveolens L.		-	-	-	-	+	-	-	-	celery
Apium nodiflorum (L.) Lag.		-	7	-	-	-	1	-	-	fool's watercress
* ? *Peucedanum*		-	-	-	-	-	1	-	-	hog's fennel
Torilis japonica (Houtt.)DC		-	-	-	+	-	-	-	-	hedge-parsley
Daucus carota L.		-	1	-	-	-	-	-	-	wild carrot
Polygonum aviculare L.		1	8	-	-	-	3	-	-	knotgrass
Polygonum persicaria L.		-	2	-	-	-	-	-	-	red shank
Polygonum hydropiper L.		-	31	-	-	-	1	-	-	water-pepper

sample		365	332	118	116	274	76	109	58	
plant name	context	2561	2435	1604	1645	2051	888	1406	756	
Polygonum lapathifolium L.		-	3	-	-	-	-	-	-	pale persicaria
Polygonum convolvulus L.		-	12	-	-	-	=5	-	-	black bindweed
? *Rumex acetosa* L. perianth		-	1	-	-	-	-	-	-	sorrel
Rumex acetosella L.		-	2	-	-	-	2	1	+	sheep's sorrel
R. crispus L.		-	-	-	-	-	-	1	-	curled dock
Rumex cf. *conglomeratus* Murray		-	3	-	-	-	-	-	-	sharp dock
Rumex sp.		-	2	-	+	1	3	-	-	docks
Urtica urens L.		-	-	-	-	-	1	-	-	small nettle
Urtica dioica L.		1	1	-	-	-	13	1	1	stinging nettle
Ficus carica L.		-	-	-	-	-	2	-	-	fig
Betula sp.		-	-	-	-	-	3	-	1	birch
Alnus glutinosa (L.) Gaertner		-	-	-	-	-	?	-	-	alder
Corylus avellana L. (nut frag.)		-	=2	-	-	1	=1	2	-	hazel
? *Quercus* (bud scales)		-	+	++	-	-	?	2	-	? oak
Lysimachia vulgaris L.		-	2	-	-	-	-	-	-	loosestrife
Primulaceae nfi		-	3	-	-	-	-	-	-	primrose fam.
Menyanthes trifoliata L.		-	-	-	-	27	-	-	-	bogbean
Hyoscyamus niger L.		-	-	-	-	1	-	-	-	henbane
Solanum nigrum L.		-	-	-	-	+	1	2	-	black nightshade
Pedicularis palustris L.		-	1	-	-	-	-	-	-	lousewort
Rhinanthus sp.		-	-	-	-	1	1	-	-	yellow rattle
Verbena officinalis L.		-	-	-	-	1	-	-	-	vervain
Mentha sp.		-	4	-	-	-	-	-	-	mint
Lycopus europaeus L.		-	2	-	-	-	-	-	-	gypsywort
Prunella vulgaris L.		-	7	-	-	2	3	-	-	self-heal
? *Stachys*		-	-	-	-	-	1	-	-	? woundwort
Lamium purpureum L.		-	-	-	-	2	-	-	-	dead-nettle
Betonica or *Galeopsis*		-	-	-	-	-	-	1	-	?hemp-nettle
Galeopsis tetrahit/speciosa		-	9	-	-	-	2	-	-	hemp-nettle

sample		365	332	118	116	274	76	109	58	
plant name	context	2561	2435	1604	1645	2051	888	1406	756	
Nepeta cataria L.		-	-	-	-	-	1	-	-	catmint
Plantago major L.		-	1	-	-	-	1	-	-	plantain
Galium sp.		-	2	-	-	-	-	-	-	bedstraw
Sambucus nigra L.		-	-	-	-	-	3	-	-	elder
Valerianella locusta (L.) Laterrade		1	-	-	-	-	-	-	1	lamb's lettuce
Scabiosa columbaria L.		-	-	-	-	+	-	-	-	scabious
Bidens tripartita L.		-	2	-	-	-	-	-	-	bur-marigold
Senecio aquaticus L.		-	1	-	-	2	-	-	-	marsh ragwort
Bellis perennis L.		-	-	-	+	1	-	-	-	daisy
Anthemis cotula L.		-	89	-	+	7	13	1	-	mayweed
Tripleurospermum inodorum Schultz Bip.		1	-	-	-	-	-	-	-	mayweed
Chrysanthemum segetum L.		-	-	-	-	1	=4	-	-	corn marigold
Leucanthemum vulgare Lam.		-	-	-	-	-	+	-	-	moon daisy
Artemisia vulgaris L.		-	-	-	-	1	1	-	-	mugwort
Arctium sp.		1	-	-	-	-	-	-	-	burdock
Carduus sp.		-	-	-	-	1	-	-	-	thistle
Cirsium cf. *arvense* (L.) Scop.		-	-	-	-	1	-	-	-	thistle
Cirsium sp.		-	1	-	-	2	-	-	-	thistle
Centaurea cyanus L.		-	-	-	-	-	=4	-	-	cornflower
Lapsana communis L.		-	10	-	-	-	1	1	-	nipplewort
Leontodon hispidus/taraxacoides		-	-	-	-	+	-	-	-	hawkbit
Leontodon sp.		-	-	-	-	-	4	-	-	hawkbit
Sonchus oleraceus L.		-	1	-	-	1	2	1	-	sow-thistle
Sonchus asper (L.) Hill		-	13	-	-	1	4	-	-	sow-thistle
Zannichellia palustris L.		1	-	-	-	-	-	-	-	pondweed
Juncus sp(p).		1*	4	-	-	-	-	-	-	rush
Luzula sp.		1	-	-	-	-	1	-	-	wood-rush
sample		365	332	118	116	274	76	109	58	

sample		365	332	118	116	274	76	109	58	
plant name	context	2561	2435	1604	1645	2051	888	1406	756	
Eleocharis uniglumis/palustris		-	129	-	+	183	-	-	-	spike-rush
Scirpus										
tabernaemontani C.C. Gmelin		? -	30	-	-	1	-	-	-	spike-rush
Cladium mariscus L.		-	-	-	-	-	-	-	7	great sedge
Carex flava group		-	-	-	-	-	-	-	2	sedge
Carex cf. *panicea* L.		-	-	-	-	-	-	-	+	sedge
Carex cf. *elata*		-	-	-	-	-	-	-	2	sedge
Carex spp.		5	28	-	+	41	29	-	++	sedges
Triticum turgidum (spklt base)		-	-	-	-	4	22	9	-	rivet wheat
Triticum cf. *turgidum* ('')		-	-	-	-	3	-	-	-	? rivet wheat
Triticum aestivum/turgidum ('')		-	-	-	-	-	29	-	-	wheat
Triticum aestivum ('')		-	-	-	-	-	5	-	-	bread wheat
Triticum cf. *aestivum* ('')		-	-	-	-	1	-	-	-	? bread wheat
Triticum sp. ('')		-	-	-	-	23	-	-	-	wheat
? *Triticum* sp. (rachis)		-	-	-	++	-	49	123	-	? wheat chaff
Secale cereale L.(rachis segs)		-	-	-	++	-	222	48	-	rye chaff
Secale cereale L. (rachis frags)		-	-	-	-	1	5	-	-	rye chaff
cf. *Secale cereale* L.		-	-	-	-	-	-	2	-	? rye
Hordeum hexastichum (rachis)		-	-	-	-	1	-	-	-	6-row barley
Hordeum vulgare (rachis)		-	-	-	-	4	-	3	-	barley
Cerealia (culm nodes)		-	1	-	-	+	+	15	-	cereals
Cerealia (pericarp)		-	-	-	+	+	+	19	-	cereals
Glyceria sp.		-	2	-	-	2	-	-	-	flote-grass
cf. *Poa*		-	3	-	+	++	-	19	-	? meadow grass
Cynosurus cristatus L.		-	-	-	-	1	-	-	-	crested dog's tail
Gramineae		1*	1	-	-	30	41	-	-	grasses

Pollen spectrum from context 756 (sample 58) barrel fill dated around 1700

	nr	%
Ranunculus	1	+
Filipendula	1	+
Umbelliferae	1	+
Ulmus	2	1
Betula	1	+
Alnus	3	2
Corylus	5	3
Fagus	1	+
Quercus	25	15
Salix	1	+
*Plantago lan*ceolata	3	2
Compositae (T)	10	6
Cirsium type	1	+
Compositae (L)	7	4
Potamogeton type	1	+
Cyperaceae	54	33
Gramineae	46	28
Cerealia type	3	2
pollen sum	166	100
spores		
Sphagnum	1	(+)
Polypodium	2	(1)

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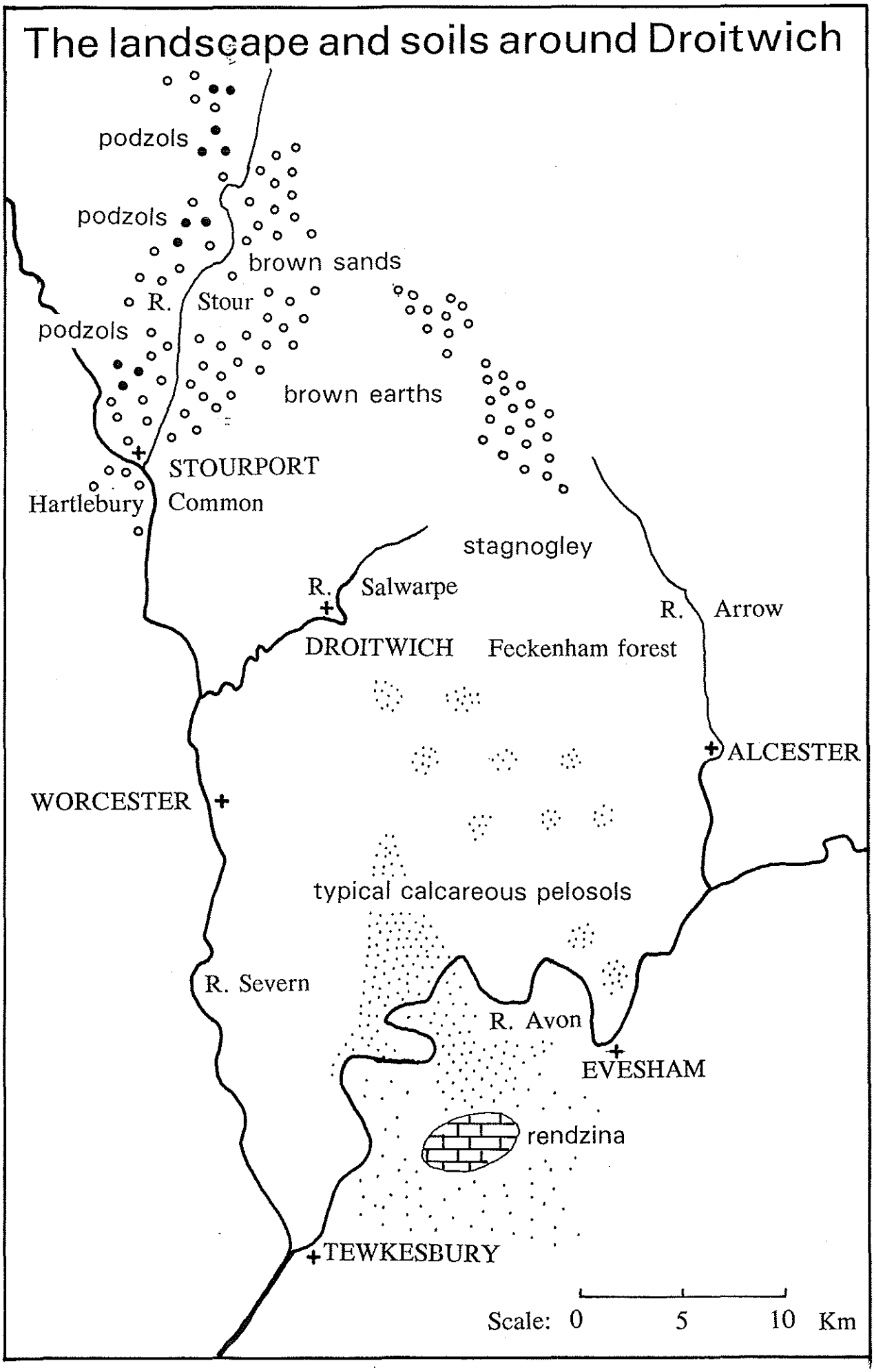
The landscape and soils around Droitwich
podzols
podzols
brown sands
R. Stour
podzols
brown earths
STOURPORT
Hartlebury Common
stagnogley
R. Salwarpe
R. Arrow
DROITWICH
Feckenham forest
ALCESTER
WORCESTER
typical calcareous pelosols
R. Severn
R. Avon
EVESHAM
rendzina
TEWKESBURY
Scale: 0 5 10 Km

plate 1

Plant remains from Upwich, in taxonomic order. Top row from left: *Caltha palustris* (kingcup) (2435) marshy grassland, *Descurainia sophia* (flixweed) (2051) weed, *Cerastium* sp. (mouse-ear chickweed) (888) grassland, *Stellaria graminea/palustris* (stitchwort) (888) marshy grassland. Middle row from left: *Spergula arvensis* (spurrey) (888) light open soil, *Scleranthus annuus* (annual knawel) (888) sandy open soil, *Linum catharticum* (purging flax) (888) grassland. Bottom row from left: *Lysimachia vulgaris* (yellow loosestrife) (2435) damp fen grassland etc., *Pedicularis palustris* (lousewort) (2435) bogs, *Verbena officinalis* (vervain) (2051) waysides, *Bellis perennis* (daisy) (2051) grasslands.

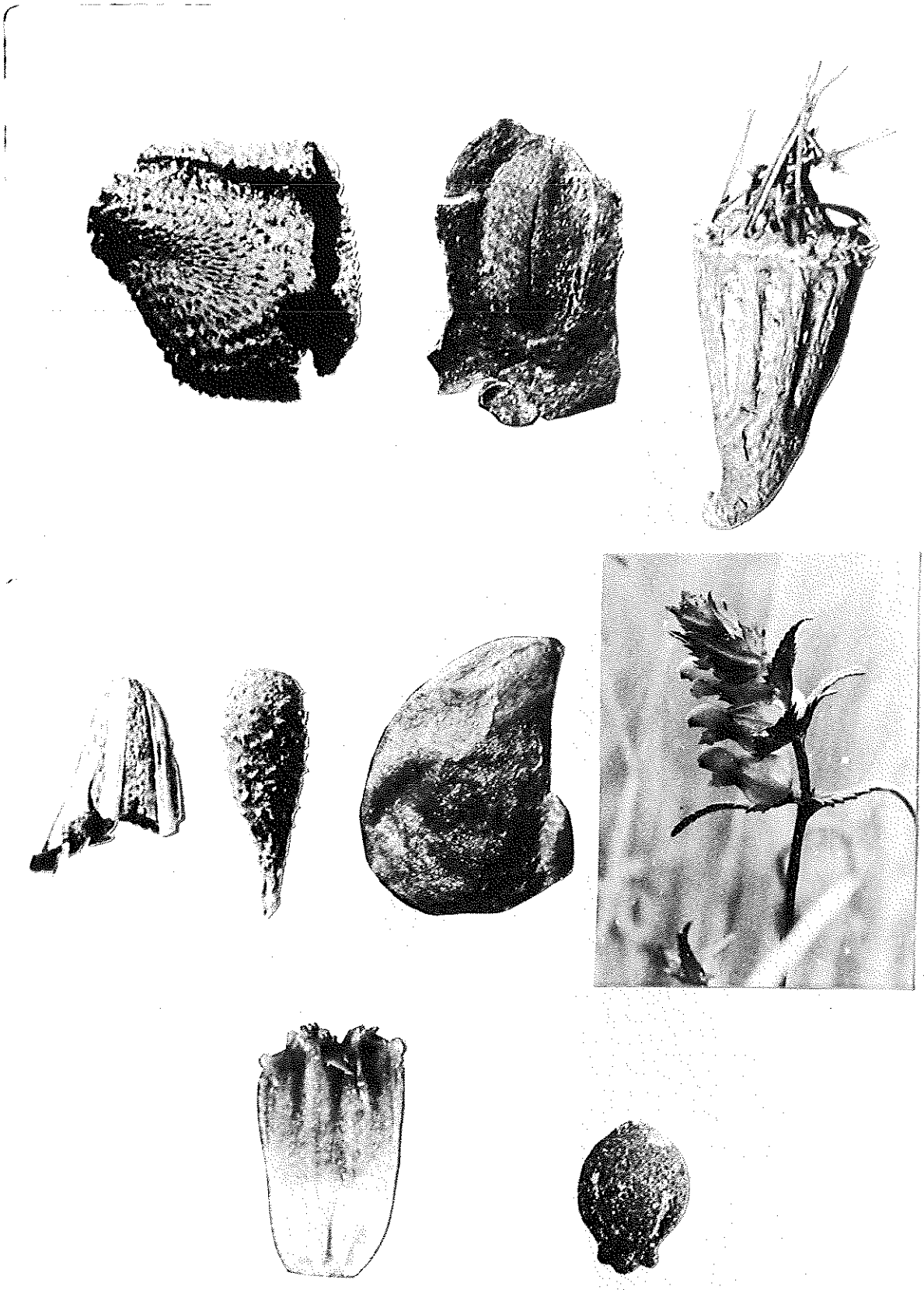

plate 2

plant remains from Upwich, in taxonomic order: Top row, from left: *Agrostemma githago* (corn cockle) (888) traditional cornfield weed, *Pisum sativum* hilum (pea) (888) crop plant, *Agrimonia eupatoria* (agrimony) (2435) waysides. Middle row, from left: *Scandix pecten-veneris* seed fragment (shepherd's needle) (888) traditional cornfield weed, *Anthriscus caucalis* (bur chervil) (888) hedgebanks, *Rhinanthus minor* seed and whole plant (yellow rattle) traditional hay meadows.Bottom row: *Scabiosa columbaria* (small scabious) (2051) chalk grassland, *Cladium mariscus* (756) (great sedge) reed-swamp.

plate 3

plant remains from Upwich, cereals from context 888 (phase 7) top left, centre: *Hordeum* sp., waterlogged rachis (barley). Middle and bottom, left, centre: *Triticum turgidum* type, waterlogged rachis (rivet wheat) Right: *Triticum* sp. rachis (wheat).