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REPORT ON THE PLANT REMAINS FROM THE BIRMINGHAM MOAT SITE

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APPENDIX 6

The Plant Remains, by J.R.A. GREIG

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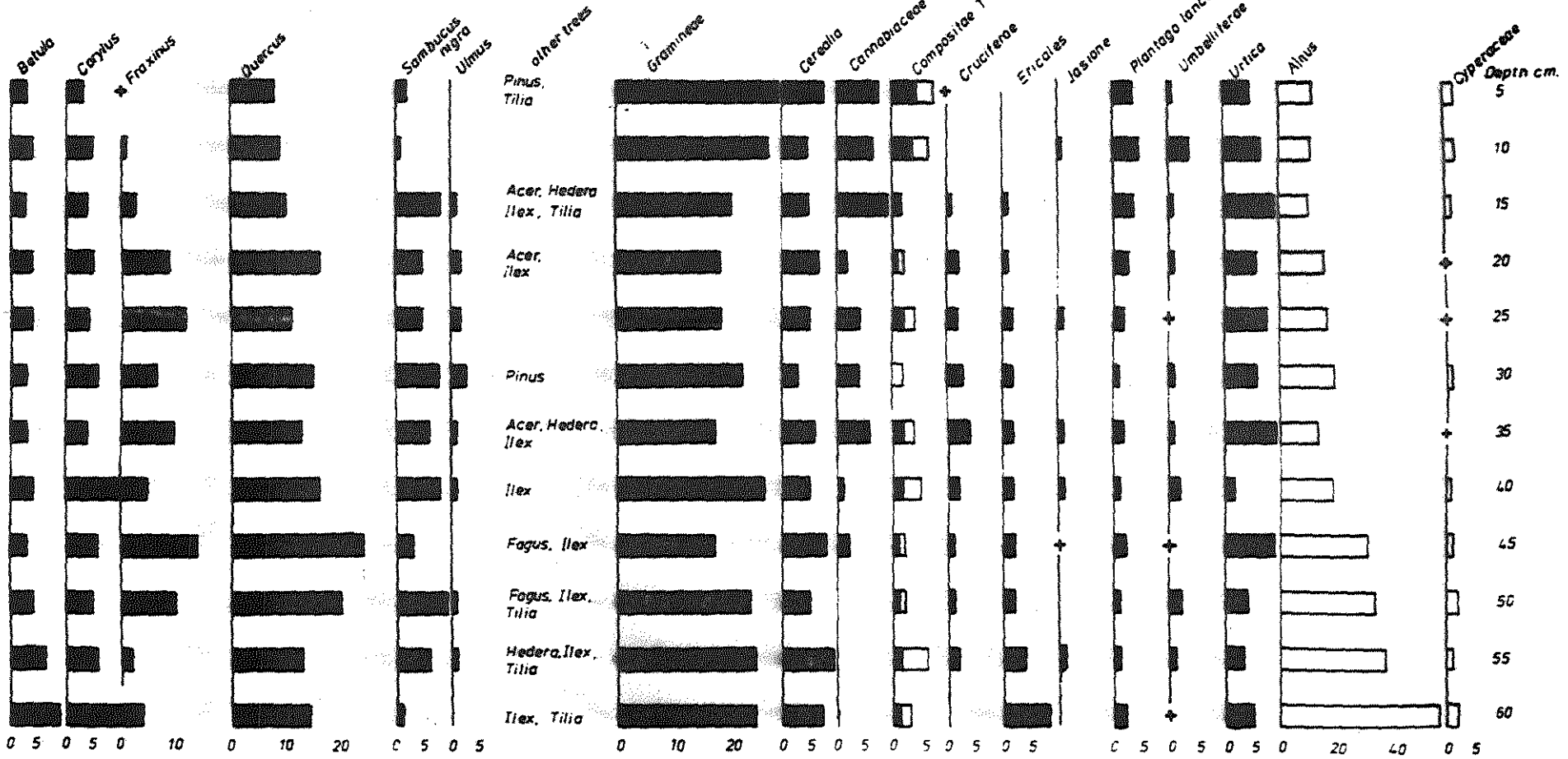
Introduction

During the redevelopment of the Smithfield Market site in Birmingham, sections of the moat of the underlying manor house of the de Birmingham family were exposed. As part of the salvage archaeology carried out on the site, a monolith of sediment from the Base 3/4 exposure of the moat was collected and described by Dr.S. Limbrey (Department of Ancient History and Archaeology, University of Birmingham) in May 1975. This monolith was divided up in the laboratory by the author into a series of block samples, each representing 10 cm. depth of sediment, and sub-samples for pollen analysis were taken at 5 cm. intervals. The block sample from 20-30 cm. was processed to extract the macroscopic remains such as seeds, and the twelve pollen samples prepared and counted to give the results shown in the pollen diagram.

Dr. Limbrey recorded that the sediment of the moat consisted of very uniform clay and schisty silt with a Munsell colour 10YR 3/2 when oxidised in the air. Occasional rounded quartzite pebbles could be seen, but there was no sign of layering or sediment change in the 60 cm. of sediment. There was a fairly sharp transition to sand at the bottom of the moat fill [layer 1 of the archaeological record], and the clay and silt layer [layers 2 and 3] was overlain by a disturbed layer with bricks and bottles and other rubbish from the nineteenth century [layers 4a, 4b and 4c]. Unfortunately there is no real dating information due to the small size of the exposure and the lack of opportunity for proper archaeological examination, but it would appear to represent a phase of deposition at some time in the post-medieval period on the basis of the pottery found associated with other moat exposures in the general area [see pp. 58 ff.]

Birmingham Moat

analysis J R A GREIG 1976



% Σ Pollen (tree pollen + herb pollen, excluding Alnus and aquatics)

BIRMINGHAM MOAT SEED LIST

Name	vernacular	number	pollen	habitat
Acer campestre var. hebecarpa DC	common maple	8	*	woods and hedges on basic soils.
Anthemis cotula L.	stinking mayweed	3	NA	common weed
Arctium sp.	burdock	=1	NA	waysides
Betula pendula Roth	silver birch	1	*	woods, heath.
Carduus sp.	thistle	5	NA	waysides etc.
Cirsium sp.	thistle	2	NA	waysides etc.
Conium maculatum L.	hemlock	7	?	damp hedgerows etc
Corylus avellana L.	hazel	=2	*	wood margins, hedges
Crataegus sp.	hawthorn	3	NA	wood margins, hedges
Ilex aquifolium L.	holly	1	*	woods, hedges
Nuphar lutea (L.) Sm.	yellow water lily	3	*	lakes, ponds and streams
Polygonum aviculare agg.	knotgrass	1	*	common weed
Potamogeton sp.	pondweed	2		lakes, ponds and streams
Prunus spinosa L.	sloe	1	?	scrub, hedges
Ranunculus acris/repens	buttercup	2	*	fields, waysides
Ranunculus sceleratus L.	celery-leaved crowfoot	2	*	around streams, ditches
Rumex sp.	dock	4	*	waste places
Rubus fruticosus agg.	bramble	23	NA	waste places, hedges
Sambucus nigra L.	elder	77	*	waste places, hedges
Solanum dulcamara L.	woody nightshade	1	NA	hedges
Sonchus asper (L.) Hill	spiny sow-thistle	2	NA	common weed
Sparganium sp.	bur-reed	8	*	around streams, ditches
Stellaria media (L.) Vill.	chickweed	1	NA	waste places
Torilis japonica (Houtt.) DC.	upright hedge-parsley	1	NA	hedgerows
Urtica dioica L.	common nettle	5	*	common weed

* = pollen present
NA = pollen not present or not identifiable to generic level.

BIRCHAM MOAT POLLEN LIST

Name	Pollen list vernacular	TREES pollen record
Acer sp.	? maple	sparse, under-represented
Betula sp.	birch	continuous, about 4%
Corylus avellana	hazel	continuous, about 6%
Fagus silvatica	beech	sparse, two grains
Fraxinus excelsior	ash	continuous, about 6%
Ilex aquifolius	holly	scattered records
Pinus sp.	pine	two grains.
Quercus sp.	oak	continuous, 15%
Salix sp.	willow	continuous, 1-2%
Sambucus nigra	elder	continuous, about 5%
Tilia sp.	lime	scattered
Ulmus sp.	elm	almost continuous, 1%
		HERBS
Artemisia sp.	wormwood	scattered
Cannabiaceae		almost continuous 5%
Caryophyllaceae	chickweeds etc.	4 records, scattered
Chenopodiaceae	goosefoot	scattered
Compositae	dandelions	continuous, 2%
(Liguliflorae)	etc.	
(Tubuliflorae)	daisies etc.	continuous, 2%
Centaurea cyanus	cornflower	almost continuous, 1%
Centaurea nigra	knapweed	almost continuous, 1%
Cruciferae	crucifers	continuous, 1%
Epilobium	willowherb	
Ericales	heathers	almost continuous 3%
Filipendula	meadowsweet	scattered
Gramineae	grasses	continuous 25%, cerealia continuous, 5%
Jasione	sheep's bit	almost continuous 1%
Leguminosae	legumes	almost continuous 1%
Plantago lanceolata	ribwort plantain	continuous, 2%
Plantago cf. media	hoary plantain	single grain
Polygonum amphibium	type amphibious bistort	scattered
Polygonum aviculare	knotgrass	scattered

BIRMINGHAM MOAT

pollen list (continued)

Ranunculaceae	buttercup	almost continuous, 1%
Rosaceae	rose family	almost continuous, 1%
Rubiaceae	bedstraw	4 scattered grains
Rumex	dock	continuous, 2%
Sanguisorba	burnet	scattered
Succisa	scabious	5 grains, scattered
Veronica	speedwell	scattered

AQUATICS

Alisma	water plantain	single grain
Alnus	alder	continuous, 20%
cf. Caltha	kingcup	scattered
Cyperaceae	sedges	almost continuous 1%
cf. Iris	flag	scattered grains
Nuphar lutea	yellow water lily	scattered grains
Nymphaea alba	white water lily	scattered grains
Potamogeton sp	potamogeton	scattered grains
Sparganium sp.	burr-reed	scattered grains

Interpreting the results

The results are expressed in a pollen diagram (fig. 30) and in the seed list ( ). It was unfortunately not possible to arrange for the study of insect remains to provide a third line of evidence, nor were the few fish remains studied. These results demonstrate the presence of various plant groups at or near the site at the time the deposit was formed. The interpretation of these results is, however, complicated by the fact that pollen and seeds are produced, dispersed and preserved in very variable amounts by different plants, and so the numbers of pollen grains and seeds recovered from a site like this will bear only an indirect relation to the abundance of the plants which produced them. Furthermore, some plants leave so little trace of their former presence that they can easily be missed, or their former importance seriously under-estimated, so a record of seeds and pollen such as this is necessarily an incomplete one. Finally, the plant remains in the moat will have come from a number of different plant communities, and it is necessary to interpret the results accordingly, to try to make a correct reconstruction of the various kinds of vegetetation that there were. Sometimes it is possible to compare archaeobotanical results such as these with ones from similar sites, but so far there are few pieces of work like this one —— this seems to be one of the first post-medieval pieces of environmental archaeology, so there are not many parallels.

Vegetation in the moat

The remains of plants which grow in water, the aquatics, such as the waterlilies (Nuphar and Nymphaea) can probably safely be assumed to have been the original vegetation of the moat itself. Another group of plants, which need damp ground rather than standing water, show what was probably growing along the edges of the moat: burr-reed (Sparganium), sedge (Cyperaceae), celery leaved crowfoot (Ranunculus sceleratus) and the qualified pollen identification of kingcup (Caltha palustris), flag (Iris sp.) and bistort

(Polygonum amphibium). The pollen counting also revealed the presence of ova of cf. Trichuris, a nematode which is a common intestinal parasite in humans and animals. These are found in far greater numbers in places like latrine pits, and their presence here in the moat sediment provides a sign that the water was contaminated by excrement. An object was seem which Dr. H.A. Waldron of the Department of Social Medicine, University of Birmingham thought to be an unfertilised Ascaris egg, and if so, this is another intestinal parasite record.

The immediate surroundings of the moat

Alder (Alnus) pollen is very abundant, reaching 50% total pollen at the base of the succession, although seeds were not found. The rather battered appearance of some of the alder pollen grains could be a sign they they had travelled some distance in running water, as if the trees were growing along the banks of whatever stream fed the moat. Alder seeds normally survive well, so their absence here is surprising considering their abundance in certain other sites. Alder pollen is so abundantly produced that it is usually considered to be represented (Andersen 1970), so its dominance in the pollen diagram should not be taken to mean that alder was the dominant vegetation too. In this case the Alnus pollen record has been excluded from the sum used to calculate the pollen frequencies, to avoid the distortion that these very large amounts would have caused to the proportions of other pollen types on the diagram. Small amounts of willow (Salix) pollen were found (not shown on the pollen diagram) representing another tree which mainly grows by water.

hedgerow

The next group of vegetation has been catagorised as hedgerow, for the sake of convenience of discussion rather than as a suggestion that all the plants listed in this group were necessarily part of hedges — they could also have been growing in scattered thickets on waste land,

or in gardens, as well as in linear form as hedges. This hedgerow vegetation is mainly represented by plants such as maple (Acer campestre), hawthorn (Crataegus sp.), hazel (Corylus avellana), holly (Ilex aquifolium), sloe (Prunus spinosa), bramble (Rubus fruticosus), elder (Sambucus nigra), woody nightshade (Solanum dulcamara), elm (Ulmus sp.)and probably a range of other plants as well. Hedgerows containing all these plants are now to be found round Birmingham in places such as the borders of Ryknield Street. In the past, hedges provided a useful amount of timber (Rackham, 1976) so this hedgerow may well have contained full size trees with oak, ash and lime, which are also found in the pollen diagram.

The patchy records of some of the plants in this group serve to illustrate some of the problems and limitations of interpretation of plant remains such as these; some plant records come mainly from pollen, such as hazel (Corylus), ash (Fraxinus), oak (Quercus), elm (Ulmus) and lime (Tilia). No macroscopic remains were found from any of these trees, save the remains of one hazel nut, yet many of them feature prominently on the pollen diagram. These trees, which obviously produce and distribute plenty of pollen (Andersen 1970) do not leave a good seed record, either because they are not dispersed like the hazel and lime, or because they are not very resistant to decay like the ash, oak and elm. On the other hand, the plant records of seeds maple (Acer), hawthorn (Crataegus), sloe (Prunus) and woody nightshade (Solanum) are mainly from seeds, for they are all very poor pollen producers and their presence could easily be missed or seriously underestimated if this was not taken into account. All of these could have been quite important parts of the local vegetation. The record of maple seeds is especially interesting as they have not often been found (cf. Godwin, 1975), and this may have been because maples do not tend to grow in wet places where their seeds are likely to become preserved. In this case it seems they were maples growing on dry land near the moat.

The elderberry (Sambucus) and the holly (Ilex) both give reasonable pollen records as well as appearing in the seed list, so they are plants unlikely to be missed. The elder is very common in material from archaeological sites, probably because it grows so well where there is abundant nitrogen and phosphorus in the soil due to the activities of man and animal, in places near settlements.

fields, etc.

The cereal (Cerealia) pollen, of which there is a constant record of around 7% in the pollen diagram, probably represents grain. The lack of seed remains is not surprising, since the caryopses (seeds) of grasses and cereals do not survive particularly well even in waterlogged archaeological deposits, and other fragments are easily missed. The most obvious explanation of the Cerealia pollen record is that grain crops were being grown in the vicinity, but it should be borne in mind that there are other possibilities, for example that the pollen came from residues of plant products such as straw (Robinson & Hubbard, 1977). More evidence for the presence of cultivated land comes from the records of the number of weeds from the moat; cornflower (Centaurea cyanus) pollen was present continuously at about 1% (although not drawn on the pollen diagram), representing one of the few weeds which can be recognised from their pollen alone. Cornflowers were found in cornfields before the days when the use of herbicides made them duller, but more productive, and they are scarcely present in Warwickshire now (Cadbury et al, 1971). Another weed, much rarer now, is the stinking mayweed (Anthemis cotula), the seeds of which were found in the moat. Other less cornfield-specific weeds of open ground include mugwort (Artemisia), knotgrass (Polygonum aviculare), sow thistle (Sonchus asper) and chickweed (Stellaria media) all of which are still common in suitable places. This list of weeds is rather small compared with those normally obtained from archaeological sites, in which theye are often the most abundant plant group represented.

Plants of waysides and meadows form another group which counts as a sign of fields etc. Grass (Gramineae) pollen is abundant (as already explained the lack of seeds is not surprising), and other plants of rough grassland include burdock (Arctium), thistles (Carduus, Cirsium), ribwort plantain (Plantago lanceolata), buttercup (Ranunculus), dock (Rumex), hedge parsley (Torilis japonica) and nettle (Urtica dioica). These were identified from pollen, seeds, or from both. This group of remains is also commonly encountered in archaeological material.

Hops or hemp

The record of Cannabiaceae-type pollen is both interesting and problematical. It could represent either the hop (Humulus lupulus) which is a native wild plant as well as a cultivated crop, or the hemp (Cannabis sativa) which is a crop plant used for fibre and oilseed, which is an introduction to Britain. This Cannabiaceae-type pollen has been found in traces in parts of pollen diagrams dated to before the Neolithic period, and these small records are therefore assumed to represent wild hops growing in places like alder fen-woods (Godwin 1975). It is necessary to examine the floristic records from the area to see whether this pollen record from Birmingham would fit with wild hops; they are "frequently but widely and very irregularly distributed throughout the county (of Warwickshire), mainly found in hedges" (Cadbury et al 1971). The amounts of Cannabiaceae-type pollen considered here are much larger than those traditionally associated with wild hops, but pollen representation is a very tricky subject and there is very little known about the pollen dispersal of this plant group, so the evidence is inconclusive.

The question whether this pollen record could represent cultivated hops has to be considered in relation to the known history of this crop. Ale was originally brewed without hops, although various herbs were added for flavouring according to local custom and taste, such as yarrow (Achillea millefolium) juniper (Juniperus communis) or sweet gale (Myrica gale) in a herbal mixture known as gruit (Corran 1975). Wild hops were used for this too, and the hops found in the remains of the boat found at Graveney in Essex and dated to about1000 A.D. give some archaeobotanical evidence that hops were being gathered then, even if the documentary evidence suggests that they were mainly collected from wild plants although cultivation was beginning in France and Germany (Wilson 1975). It would appear that hops gradually superseded the other herbs used for brewing on the Continent during the medieval period, reflected by archaeobotanical evidence from Denmark (Jensen, 1979). In Britain, hopped beer may have been known in medieval times, but this apparently did not become usual until the 16th century, when Richard Arnold's Chronicles (Customs of London) in 1503 gave a recipe for hopped beer, also mentioning that many of the brewers there then

were Flemings and Dutchmen ——— evidently the brewing of beer started off in this country, like so many other introduced industries, with the aid of foreigners before being learnt by Britons. Thereafter the brewing of hopped beer spread at the expense of ale, due to its flavour and its keeping properties, particularly in the case of the weak "small beer" which was widely consumed as a refreshing and above all safe drink at a time when many of the water supplies were very risky. The boiling up of the wort during brewing, the alcohol and particularly the hops would ensure the freedom of the beer from pathogens.

Over the years the use of hops spread from the south east of the country, where it had started, so that by the beginning of the eighteenth century ale was no longer very important (Mathias, 1957), and the growing of hops was widespread in areas suitable for this crop. They were evidently an uncertain crop, and fortunes could be made if a grower had a good crop in a year when hops were otherwise scarce, or lost if several years of good hop harvests brought the prices down too low to pay for the large amounts of labour and materials needed. Hop-yards were concentrated in the regions where the soil and local climate were best, such as the areas of Worcestershire, Surrey and Kent which are famous for hops now. In other areas, cultivation appears to have been patchy, so that Defoe's friend at Stourbridge, a great hop fair at the time (1730's) but not a hop growing area, could say "there were very few hops, if any worth naming, growing in all the counties even on this side Trent, which were above 40 miles from London"(Defoe 1948). It would be odd if this remark refers to the areas of Herefordsgire and Worcestershire which must have been important hop producing areas at that time, to supply the local markets. Apart from those places, where hops are still grown, there is little evidence in records of places where they were cultivated in the past. Birmingham, being on a plateau and with mainly sand and clay soils would not seem to be a very good place to try to grow hops, compared to the valley bottoms with rich soils and mild climate. It is therefore uncertain whether it would have been economic to have grown hops in and around Birmingham in the past.

Even if hops were grown in Birmingham near the moat, it is not certain how much pollen would be spread, because the plants are monoecious, that is to say there are male plants and female ones. The latter are important for producing the cones, as explained by J. Mills (1763) who says that the male hop "sheds a farina which is wafted all around, and is by some, not improbably, thought to be of use to impregnate other hops. Those who are of this opinion advise therefore to leave one or two hills of them standing in the hop ground. But the common practice is to mark them at their first appearance and to root them out afterwards". Nowadays, English hops for beer brewing tend to contain seeds, whereas lager brewers prefer seedless ones (Burgess 1964). Thus male hops and a certain amount of hop pollen appears to have been a feature of hop grounds in the past as well as today, and although it is not known how much pollen would be spread in this way.

A further possibility is that this pollen record from the moat could have come from residues from brewing rather than from aerial transport from living plants. The sticky parts of hops appear to collect pollen over and above that needed for fertilisation (Matthews & Lott, 1889) and the residue from the hopping process might be discarded, if it was not used as fertiliser as at the botanic gardens at Oxford. Such residues, if discarded into the moat, would be preserved there, and could perhaps be the cause of this pollen record. There are not, however, very many signs of rubbish having been deposited into the moat, so once again this possibility does not seem to be supported by other evidence.

Hemp (Cannabis sativa) is another possible source of this pollen record, and this must also be considered in relation to what is known of the history of its cultivation. Early records of this pollen type are often attributed to Cannabis (some palynologists believe that they can tell the difference between Cannabis and Humulus pollen), such as the pollen diagram from Thorpe Bulmer, Co Durham, with a horizon dated to

2064 ± 60 b.p. (114 ± 60 a.d.)(SUR 404). This is at the beginning of a curve of Cannabis type pollen, and is probably the only well-dated example of its kind (Bartley et al, 1976). This Roman date for the introduction of hemp is also supported by finds of seeds at Roman sites in London (Wilcox 1977). Hemp seems to have been cultivated in the early medieval period, judging by results from York (Kenward et al 1978) but may have lost popularity from the Tudor period, although documentary sources show that it may have remained in cultivation in some places as recently as the last century (Bradshaw et al, forthcoming). The variety of hemp that was grown for its fibre would not have been much use as a narcotic, even if those properties of the plant were known. Hemp, therefore, does not appear as an immediately obvious source of the Cannabiaceae-type pollen record from the moat, unless some evidence can be found that the crop was indeed cultivated around Birmingham in the post-medieval period.

The problem of this pollen record must remain unresolved until there are more results from documentary and palynological work to shed more light on the cultivation and use of hops and hemp, although the prospect for interesting work on post-medieval environmental archaeology is revealed here.

Woodland

It is very difficult to tell from results such as these whether the signs of trees most probably represent a few trees growing along the sides of the moat, or hedgerows with trees in them, or more distant woodland. The first two cases, single trees and hedgerows have already been discussed. More continuous woodland seems to have been present in the area as well, during the late medieval and post-medieval period according to largely documentary research work in this subject (Thorpe in Cadbury et al 1971). The botanical results presented here do not offer such clear evidence to compare with the documentary evidence: the three main trees of undisturbed forest are oak, elm, and lime, but the first two also become successful hedgerow trees when managed in this way, so their presence is no longer a sign of forest, and the lime is very scarce. Perhaps it is

fair to conclude that woodland was probably present, mainly on documentary evidence, and discuss the matter further more in connection with results obtained from other sites.

heathland

There are some possible signs of heathland in pollen records such as the birch (Betula), pine (Pinus) and ling or heath (Ericales). These offer a little evidence that heathland may have developed in such places as the districts with sandy, easily acidified soils, although the signs are so slight that this would not appear to have been one of the vegetational types to be found in the immediate surroundings of the moat. "Heath" is certainly a common enough place name in Birmingham, so these may have developed a long time ago while they were still open land.

comparison with other sites

There are not very many moats or similar sites which have been studied in this way for biological remains. There is a pollen diagram (but the seeds and insect remains have not yet been studied) from the sediments in a medieval moat cut round a Royal hunting lodge at Cowick, Humberside (Greig, unpubl.), and another pollen diagram with some seed and insect results from another medieval moat from the town of Nantwich, Cheshire (Colledge, unpubl.). Furthermore, there are some results from peaty sediments apparently of Roman date found at Alcester, Warks (Greig, unpubl., Woodwards, MSc thesis).

The pollen diagram from Cowick is very similar to this one from Birmingham in almost every detail of range of taxa represented and in their importance. Cannabiaceae-type pollen is also present, but not in such quantities as at Birmingham. The results from Nantwich and Alcester have much less tree and shrub pollen than the other two, and are generally different. The similarity of the Birmingham results to

those from a very rural site (Cowick), rather than to those from two more urban ones (Nantwich and Alcester) would suggest that the surroundings of the Birmingham moat were predominantly rural, too, at the time when the deposits were laid down there. A comparison between the most recent deposits at Cowick (virtually contemporary) and the vegetation which at present grows around the site (a patch of scrub woodland surrounded by arable land) shows that sloe (Prunus) and hawthorn (Crataegus) may be the commonest trees, yet leave scarcely any pollen record. The lesson from the Alcester results appears to be that although there are most of the signs of extensive deforestation by the Roman period in this part of Warwickshire, this may have been a local phenomenon, or else the woodland was able to regenerate to some extent.

Conclusions

The moat appears to have been fairly clean with only slight sewage contamination. The surroundings appear to have been largely rural in nature, with woody thickets or hedgerows, and there are also signs of arable land with cornfields and the possibility that hops or hemp were also grown, and probably some pasture land and heath.

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