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Ancient Monuments Laboratory
Report 18/89

INTERIM REPORT ON THE MICROSCOPIC ANALYSIS OF BURIED SEDIMENTS ASSOCIATED WITH PALAEOLITHIC AND MESOLITHIC ARTEFACTS AT UXBRIDGE, MIDDLESEX.

Patricia E. J. Wiltshire BSc.

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Summary

Analysis of a thin, black, humic silt overlyinng an artefact-bearing clay has indicated that the silt was deposited, under conditions of high water table, in late Boreal times. It has been tentatively dated to between 8500 bp (the base) and 8000 bp (the top) on the basis of the pollen evidence, and on comparison with previous palynological studies carried out on similar deposits. The pollen diagram shows that, in spite of relatively crude sampling, good resolution was obtained in the analysis. However, interpretation would benefit greatly from further work with finer sampling. Considerable changes were seen in the vegetation history of the site and these appear to be correlated with very large inputs of charcoal to the sediment. It would appear that Mesolithic peoples occupied the area throughout the period under scrutiny and that they were practising some form of environmental management with fire. The humic silt appears to be homologous with so-called 'peats' of Boreal age recorded from other sites in the Kennet, Lea and Colne Valleys which overlie artefacts of Maglemosian cultures.

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UXBRIDGE 88/VIII - E29/N03

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UXBRIDGE 88/VIII - E29/N03

Introduction

In spring 1987, excavation of the north-eastern area of the site revealed a series of deposits which included a clay horizon bearing Palaeolithic artefacts and bones of reindeer and horse. Immediately overlying the artefact-bearing horizon was a thin band of black sediment, itself overlain by clay. These deposits were sampled for pollen analysis but did not contain enough recognisable pollen grains and spores to make a palynological study feasible.

By the spring of 1988, a much larger area of the site had been excavated, and artefacts and bone remains on the clay underlying the black band had revealed Mesolithic occupation. Samples for pollen analysis were taken from an excavated pit (E29/N03). The occupation layer, the black band, and the overlying clays were sampled. Only the black band yielded enough pollen to warrant further study; the underlying and overlying clays contained sparse Filicales, Gramineae and Cyperaceae grains.

The site was revisited and monoliths from six excavated pits were obtained (E10/N03; E20/N11; E21/N03; E29/N03; E33/N15; TP2). Adequate pollen was obtained only from E29/N03 and it was decided to carry out as detailed an analysis as possible from its sediments.

Preliminary sampling of the artefact-bearing clay (343), the black band (359), and the overlying clay (370) showed that the pollen was exceedingly sparse and, generally, in a poor state of preservation. The body of layer 343 contained only sparse grains of Gramineae, Cyperaceae and undifferentiated Filicales but microscopic charcoal fragments were abundant. The black layer (359) was revealed to be a black, humic silt with exceedingly abundant microscopic charcoal throughout and moderate amounts of pollen and spores. The body of the overlying clay layer (370) contained only the very occasional Filicales and *Polypodium* spore although one grain of *Corylus* was found. It was decided, therefore, to carry out contiguous sampling throughout the humic silt, including the interfaces with the lower and upper clays.

In view of the paucity of microfossils in both clays when compared with the silt, it was decided to estimate the pH of the sediments to investigate whether there were marked differences in reaction since this might be a contributory factor in the differential pollen preservation.

After contiguous samples had been prepared for pollen analysis, it was noted that charcoal distribution was heterogeneous. It was concentrated in samples 2, 5, 6 and 9. It was also noted that these samples contained very numerous groups of spatulate and needle-like crystals. It was decided, therefore, to attempt identification of these crystals by energy dispersal X-ray analysis.

Methods

Sampling and Counting

Ten contiguous samples of 1.0 cm thickness were prepared, using 20g of sediment in each case. To obtain 20g from a thickness of 1.0 cm, it was necessary to extend the sampling laterally at each depth. The organic, silty matrix was removed using standard acetolysis and hydrofluoric acid treament for soils (Dimbleby 1985) and the resulting pellet suspended in 1.0 ml of glycerol jelly after staining with safranine. Slides were examined under phase-contrast microscopy at x400 magnification, and at x1000 magnification where necessary. It was attempted to count a minimum of 120 pollen grains, excluding undifferentiated Filicales, and, to achieve this, large total counts were necessary (see table 1). However, at depth 2.0 cm (the sample immediately below the interface with the upper clay), only 83 grains were found in spite of scanning the total area of 6 slides.

Energy Dispersion X-Ray Analysis

Samples from the humic silt were prepared for Energy Dispersion X-Ray Analysis by the standard methods described above. At the time of writing, this analysis was being carried out at the Ancient Monuments Laboratory and had not yet been completed.

Preparations to Show Distribution of Charcoal in Profile

A series of slides was prepared from the pollen jellies to show the differential distribution of charcoal within the profile. Care was taken to standardise the amount of jelly; 0.1ml of pollen suspension was added to a slide and a coverslip added very carefully to prevent jelly oozing from its margins. In this way, a visual comparison of the charcoal density was provided (see Figure 3).

pH Estimation

In view of the differential preservation in the sediments, pH estimations were carried out on contiguous samples throughout a monolith, collected subsequent to pollen analysis, from E29/N03. These were carried out with an electronic pH meter, calibrated against buffers of pH4.0 and pH7.0.

Pollen Diagram

Pollen and spores were expressed as a percentage of the total count, with undifferentiated Filicales, *Polypodium* and Cyperaceae taken out of the sum.

Results

Photographs

Figure 1 is a photograph of the south-eastern corner of the excavated site, showing the pit E29/N03 which was analysed for pollen. Figure 2 is a photograph of a cleaned face of pit E20/N11, showing the black, humic silt overlying the artefact-bearing clay.

Figure 3 is a photograph of a series of slides of pollen preparations with Slide 1 being a preparation of the interface between the humic silt and overlying clay, and Slide 10 being a preparation from the interface between the humic silt and the underlying artefact-bearing clay. The intervening slides were prepared from the contiguous samples analysed for pollen. It is important to note slides 2, 5, 6 and 9. These were the samples which contained exceptionally high levels of microscopic charcoal. These samples also contained large numbers of groups of spatulate and needle-like crystals.

Charcoal was found in every sample throughout the profile. It was also noted that there were large amounts of amorphous organic material in samples 1 and 10 (both being interfaces between clays and humic silt).

pH

The pH results are shown in Figure 4. The pH varied between 7.3 and 6.9. The clays overlying and underlying the humic silt were both alkaline in reaction, while the lower five samples of the humic silt were slightly less alkaline to neutral. Apart from the sample at depth 16 cm (the only acid sample), the upper part of the profile was decidedly alkaline.

Palynology

The palynological results are shown in Table 1 (counts), Figure 5 (pollen diagram) and Table 2 (description of pollen changes at each level).

Although contiguous 1.0 cm samples were taken throughout the core, the sampling must, nevertheless, be considered to be crude when the thinness of the humic silt layer is taken into consideration. However, in spite of this, considerable resolution was achieved, and marked changes in pollen input throughout the profile were detected.

Discussion and Interpretation

When the pollen spectrum for E29/N03 is examined, it is obvious that species richness is rather low with only twenty-two taxa being recorded. It is also interesting that pollen survived in quantity only in the black humic layer and, of all the areas investigated, only in pit E29/N03. The evidence indicates that a considerable amount of pollen must have disappeared from the sediments and that differential preservation is an important factor to be kept in mind during any attempt at interpretation of the data.

Consideration of Differential Pollen Preservation at the Site

Generally, pollen does not survive well in sediments of high pH and high redox potential. It was deemed important, therefore, to ascertain the pH of the sediments which were being analysed. Figure 4 shows that the pH of the black humic layer was largely neutral to alkaline and that both the underlying and overlying clays were decidedly alkaline. Certainly, all the pH values recorded were well within a range to allow microbial activity. Of course, soil reaction prevailing at the time of the analysis might not be the same as that persisting at the time of accretion since base-rich ground water could, presumably, greatly affect the reaction of a sediment subsequent to its deposition. But, for the purposes of this analysis, it is the more recent pH of the matrix that has most relevance since any process of corrosion which depends on high pH would have had time to operate.

It is probable, therefore, that preservation of pollen in E29/N03 has depended on anaerobiosis via water-logging so that both microbial activity and auto-oxidation of the pollen have been inhibited by high water table ever since the deposits were laid down. Indeed, it was noticed during excavation of the site that the water table in the environs of this pit was consistently higher than elsewhere (John Lewis pers. comm.). During a site visit in February 1989, after an unusually dry winter, the water table reached to just below the black humic layer in E29/N03, and the humic layer itself was fully imbibed.

This might explain the presence of pollen in the black humic layer at E29/N03, but it does not explain the absence of pollen from the underlying and overlying clays. Hopefully, soil analysis and consideration of the sedimentology will help to elucidate these matters.

Consideration of Differential Pollen Preservation throughout the Humic Silt

Very many factors influence the spectrum and diversity of pollen types found in any body of sediments, and these have been reviewed exhaustively in the literature (Moore & Webb 1978; Jacobson & Bradshaw 1981). One very important factor is that of differential decay of palynomorphs once they have been incorporated into deposits and, again, much literature has been devoted to the problem (Havinga 1964; Havinga 1967; Havinga 1971; Faegri 1971; Elsik 1971; Correia 1971). In spite of a considerable amount of observational and experimental evidence, much of it is contradictory and only generalisations can be made.

Broadly, the breakdown and disappearance of pollen appears to be related to the oxidation susceptibility and the sporopollenin content of the pollen exine, as well as the physico-chemical nature of the accreting sediments, especially redox potential and pH. In general, of those palynomorphs which have been tested, *Lycopodium, Polypodium, Pinus, Tilia* and *Taraxacum* have proved to be relatively resistant while *Fraxinus, Ulmus, Salix, Quercus, Alnus* and *Betula* appear to be sensitive to corrosion. Contradictory evidence is not surprising when considering the limited number of pollen/spore types which have been tested; even fewer environmental scenarios have been investigated since the permutations of environmental variables needing to be examined is prohibitive.

Another factor to consider is that environmental conditions prevailing any one point in time in a area of deposition might be very different from those during earlier or later times; so there might well be considerable variations in differential decay throughout any one profile of sediments.

It is important to keep all these factors in mind when interpreting the Uxbridge pollen diagram and, indeed, differential preservation certainly seems to have been operating when the paucity of palynomorphs is considered. However, pollen of *Ulmus* and *Quercus* were found in most samples and both are considered to be vulnerable to corrosion. Furthermore, both were present in moderate quantity in the upper part of the profile where the very resistant spores of *Polypodium* and Filicales appeared to be enhanced. The upper part of the diagram (top four levels) also shows a decline in the very resistant *Pinus* where the more vulnerable types increased. So, it is possible that there were real vegetational changes being recorded rather than simply the effects of differential preservation.

The Pollen Diagram - the Local Picture

The base of the diagram represents the very interface between the artefact-bearing clay and the humic silt and may give information as to the vegetation on the site, and in its environs, during the very late stages of occupation.

The immediate locality appears to have been dominated by open, weedy, sedge and grass communities, with willow, probably growing along the nearby river bank. The grass pollen may have been coming from a *Phragmites* reed swamp nearer to the river. Very near to the site, the vegetation was composed of pine-dominated woodland, with hazel as co-dominant. There were moderate amounts of oak and possibly scattered individuals of elm and birch. Ferns were also abundant and probably formed an important part of the ground flora within, and at the edge of, the woodland. *Polypodium* was possibly growing epiphytically within the stands of deciduous trees, or on shaded soil banks.

The very dense concentration of charcoal seen immediately above the interface at Level 9 (see Figure 3) seems to have resulted in a decrease in many of the taxa, but an increase in pine, Filicales and Cyperaceae. This is difficult to interpret because of the lack of refinement in sampling and, thus, the lack of temporal resolution in the data. The depth of sediment sampled may have represented a considerable time span so that consecutive events are viewed concurrently. Nevertheless, the rise in Cyperaceae indicates an increasing local wetness, and this may have been due to the clogging effect of the charcoal. Mallik et al (1984) have reported that large amounts of microscopic charcoal after local burning can have the effect of markedly increasing the moisture retention capacity of soil by virtue of the ash filling pore voids in the soil matrix. The presence of *Sphagnum* also affirms a local wetness. There may have been hummocks and pools containing *Sphagnum* nearby, or it may have been growing on raised areas around the bases of old sedge tussocks. Today, *S. contortum*, and *S. squarrosum* are found in fens and eutrophic reed/sedge swamps, provided they are not too shaded, and these may have been the species growing on the site.

It is tempting to suggest that local fires had resulted in some degree of soil erosion; the increase in pine in the diagram might thus have been due to inwashed, soil-derived pine pollen being added to its aerial component. In a percentage diagram, the status of other tree and shrub taxa would be depressed (as they are in the diagram)by the additional pine pollen if they, themselves, had been growing some distance from the site and their contribution to the pollen spectrum was derived mostly from aerial sources.

The extent of the fires cannot be ascertained, but they certainly seemed to be occurring on the site itself since much of the charcoal consisted of what appeared to be epidermal remains of monocotyledonous plants - presumably Cyperaceae. Burning in winter or early spring would certainly remove dead standing crop very effectively.

After this intense episode of burning, the pine/hazel woodland seems to have diminished and oak and birch increased. Conditions seem to have been a little drier with Cyperaceae being a little reduced and willow disappearing; and there was a marked increase in bracken, a plant which favours well drained, acid soils. There was probably an opening of the tree canopy around the site, allowing the spores of understory ferns to be more easily disseminated.

A most dramatic change in the pollen spectrum is recorded at Level 6 where Cyperaceae were drastically reduced and pine, Filicales and *Polypodium* very markedly increased. The photograph in Figure 3 shows that very large quantities of charcoal were deposited at Levels 6 and 5. It is also interesting that the charcoal fragments were very much finer than those lower down the profile. It is possible that much of the charcoal, the pine pollen, and the fern spores were derived from a massive inwash of soil onto the site, the fires probably removing a great deal of local vegetation which resulted in local soil instability.

There appears to have been a reduction in the local pine woodland after the fire episode, and deciduous woodland and scrub probably expanded into the openings. All ferns increased progressively - again, a possible indication of a more open landscape. This is further evidenced by the increase in herbs, notable appearances being those of plantain and dock - plants of open grassland and disturbed ground. It is conceivable that wild grazing animals were exploiting the area more extensively.

At Level 2, there was yet another large input of charcoal into the site and this co-incided with a further decrease in pine. This might be an indication that the pine woodland had receded from the environs of the site by this time and that any inwashed soil did not contain enough pine pollen to have the effect on the diagram seen at Levels 6 and 5.

However, large quantities of fern spores appear to have been washed into the site. Grass, Liguliflorae and plantain all increased and it is possible that areas suitable for grazing were being kept patent by pressure from animals.

Level 1 represents the interface between the humic silt and the upper clay, and the pollen spectrum suggests that, in spite of pine still being an important component of local vegetation, overall, the woodland cover had been very much reduced and both the immediate site, and its periphery, were dominated by open communities. The disappearance of Liguliflorae is rather difficult to explain but it is conceivable that the increase in grass pollen may have been derived from *Phragmites* swamp spreading from the river-side rather than from turf grasses. It is probable that local and extra-local soils were still unstable so that they were being washed onto the site, carrying large numbers of fern spores from the surrounding, higher areas. One very notable appearance in the pollen diagram is alder, a tree so characteristic of lowland fens and river-sides.

The Pollen Diagram - Broader Implications

When the pollen diagram is considered as a whole, the nature of the flora suggests that the humic silt was deposited in later Boreal times. This is equivalent to Zone VI and falls within Flandrian Chronozone 1 (Godwin 1975a & West 1970a).

In the absence of absolute dating, great care must be taken in any attempt to fit the results into a definite chronology; any date suggested must be conjectural since there is a paucity of dated pollen diagrams covering Flandrian Chronozone 1 for Southern England. One useful diagram for comparison is from Cothill Fen, Berkshire (Clapham & Clapham 1939) where a similar pattern of vegetation to that seen at Uxbridge has been ascribed to between the approximate dates of 6500 and 6000 bc (approximately 8450 and 7950 bp). Pine dominates the Uxbridge diagram to a much greater extent than at Cothill, but this may be due to an exaggeration of pine because of differential decomposition. However, differences in geology might also be important.

It is exceedingly difficult to ascribe anything other than a very approximate date to the base of the humic silt. A date of about 8450 bp is suggested on rather tenuous evidence and is based on the relative importance of oak, elm and birch when compared with diagrams such as that from Cothill. However, the top of the Uxbridge humic layer was most probably laid down well before the final part of the Boreal since, although alder was present, there was no evidence of lime. The appearance and spread of alder in Britain appears to have been diachronous (Smith & Pilcher 1973) and, although the rational limit (expansion) for the tree appears to have occurred at about 7000 BP, there are records of it happening a thousand years earlier in some parts of Britain (Chambers & Price 1985). At Uxbridge, the appearance of alder in the uppermost level merely indicates its presence and, at best, probably marks its empirical limit (the point where the pollen curve just becomes continuous). In some parts of Britain, the empirical limit occurrred very early, and dates of 95000 BP have been present for southern England (Huntley & Birks 1983) although the authors are reluctant to place too much reliability on this date. But early appearance of the tree in southern Britain (i.e. prior to 8100 BP) has been reported by Haskins (1978) and corroborated by Scaife (Scaife 1980b). A date of approximately 8000 BP for the top of the humic silt might, therefore, be a reasonable one. If these tentative dates are accepted, then the humic silt represents approximately 450 to 500 years of Mesolithic history.

There is no doubt that Mesolithic peoples had a considerable impact on the vegetation around the site at Uxbridge. The vast amount of charcoal attests to some extensive form of management of the environment which was carried out more intensively in some periods than others. There were certainly three major episodes of burning, the second one of which appeared to be associated with a complete change in the vegetation in the immediate locality. One can only surmise at the way the environment was being exploited, but the use of fire certainly seems to have been an important practice. The literature contains a large body of discussion on the possible advantages of a fire-based economy in the Mesolithic and an excellent summary has been provided by Simmons and Innes (Simmons & Innes 1987). They suggest that there is an increase in the abundance of food during the early and middle stage of post-fire regeneration; the diversity of both flora and fauna would be likely to be increased and grazing animals might be attracted by fresh browse. There are certainly modern analogues to support the idea that fire has been used to manipulate plant and animal resources (Mellars 1976a and Lewis 1982).

At Uxbridge, there appear to be very real changes in the flora after the intense fire episodes recorded in Levels 6 and 5. The pine woodland was reduced and weedy grassland, and deciduous woodland and scrub, probably increased in importance. The fire recorded in Level 2 also seems to have resulted in an enhancement of weedy grassland, providing a habitat much more suitable for man's needs than dense pine woodland.

<u>Correlations with other local Mesolithic Sites</u>

Many Mesolithic sites have been recognised on the basis of artefactual evidence in the Thames Valley and along the valleys of its tributaries such as those of the Kennet, Lea and Colne (Lacaille 1966). At a number of these sites, the artefacts have been found at the interface between basal gravels and a layer which has been described as peat. At some of the sites, notably Thatcham, Broxbourne and, more locally, Dewe's Farm, and Sandstone, the 'peat' was analysed (albeit cursorily) for pollen and was attributed to the late Boreal period (Wymer 1959; Warren et al 1934; Lacaille 1961). It would seem, therefore, that although there is a series of clays between the basal gravels and the artefact-bearing surface at Uxbridge, the 'peat' reported by these authors is homologous with the humic silt discussed in this report. It is possible, therefore, that the finds at these other local sites may be correlated with those at Uxbridge.

Mitchell (in Lacaille 1961) suggested that there was a raising of the water table at Sandstone not long after the Mesolithic occupation. The clays overlying the the humic silt (which contained pollen at Sandstone but not at Uxbridge) also contained a late (but not final) Boreal pollen assemblage. The nature of these clays lead Mitchell to conclude that the site was completely inundated before the end of the Boreal period.

Conclusion

It would seem that the humic silt layer may have spanned a period of approximately 450 to 500 years between 8500 bp to 8000bp - the late Boreal period. There was a raising of the water table after the floor of the site had been occupied and the immediate vegetation became a sedge swamp with possibly reeds and willows growing towards, and along, the river edge. Very close to the site, probably on gravel slopes, the vegetation was dominated by pine and hazel although birch, oak and elm were also growing in the environs.

The humic silt analysed in this report is probably homologous with 'peat' reported to be overlying Mesolithic artefacts of Maglemosian origin at other sites in the valley of the Thames and its tributaries.

In spite of abandonment of the immediate locality for tool-making, the area continued to be occupied as is evidenced by very large quantities of charcoal, probably derived from in-situ burning of dead standing crop, and from inwashed soils, made unstable by the burning of surface vegetation.

Three distinct periods of burning were recognised, particularly intense activity occurring in the middle of the profile where there was also a drastic change in local vegetation. There seems to have been a marked effect on local soil stability and there was probably a great deal of inwash onto the site. After this episode, the pine woodland diminished and weedy grassland increased. The area would have become more suitable for grazing animals and, therefore, for man, and grazing pressure probably kept areas patent from then on.

Although contiguous samples of 1.0 cm were taken throughout the profile, it is feared that finer sampling would be necessary to obtain the resolution required for ascertaining greater detail of vegetation change, and impact of Mesolithic activity, over critical horizons such as the mid-profile burning episode.

Recommendations for Further Work

It is recommended that contiguous samples of small volume be taken over critical horizons in the humic silt profile for pollen analysis in an attempt to elucidate finer details in vegetation change where man was obviously having a considerable impact on the environment.

It is also recommended that it would be worthwhile investigating further the south-eastern corner of the Uxbridge site for polleniferous sediments. This might allow an analysis of the spatial variation in local vegetation and thus an assessment of the degree of impact of Mesolithic peoples on the area.

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			POLLEN AND SPORE COUNT							
Depth (cm)	1	2	3	4	5	6	7	8	9	10
TREES & SHRUBS										
Pinus	20	15	58	82	148	154	178	142	211	212
Betula	-	-	1	2	2	1	-	11	2	7
Quercus	2	7	5	23	8	4	16	16	9	14
Ulmus	2	1	2	2	-	4	4	2	5	7
Alnus	3	-	-	-	-	-	-	-	-	-
Coryloid	3	4	16	17	10	4	5	8	34	54
Salix	-	-	-	-	-	-	-	-	1	2
PTERIDOPHYTA										
Filicales undiff	1108	638	2796	512	458	427	106	123	86	86
Polypodium	56	26	17	8	40	17	4	3	2	4
Pteridium	9	8	13	17	12	7	20	33	5	6
BRYOPHYTA										
Sphagnum	-	-	-	-	-	-	-	-	2	-
HERBS										
Gramineae	19	13	20	34	20	19	51	41	43	55
Cyperaceae	5	3	1	20	24	20	366	220	326	186
Bidens type	-	-	-	-	-	-	1	-	-	-
Caryophyllaceae	-	-	-	-	-	-	1	-	2	-
Centaurea nigra type	1	-	-	-	-	2	-	-	-	-
Cruciferae	-	-	-	1	-	-	-	1	2	2
Liguliflorae	-	5	2	5	4	3	-	3	2	3
Plantago lanceolata	-	1	-	2	-	-	-	-	-	-
Ranunculus type	-	-	-	1	-	-	-	-	-	-
Rosaceae	-	-	-	-	-	-	1	-	-	-
Rumex undiff	-	-	-	3	2	-	-	-	-	-
TOTAL + FILICALES	1228	721	2931	729	728	662	753	603	732	638
TOTAL - FILICALES	120	83	135	217	270	235	647	480	646	552
Levels 1 & 10 = Transitions between Black Silt (359) and Clays (370 & 343)										

TABLE 1

Level	Description of Pollen Changes throughout Profile
(Bottom)	
10	This records conditions prevailing at surface of artefact-bearing layer, and at inception of deposition of humic silt. Most abundant palynomorphs:- pine, Cyperaceae, hazel, Gramineae and Filicales. Present:- Oak, elm, birch, willow, bracken, Polypodium and some dicotyledonous herbs.
9	Very dense charcoal. Pine, Filicales and Cyperaceae increased. Two spores of Sphagnum found. Apparent drop in other taxa is probably statistical because of percentage diagram.
8	Filicales increased further. Oak, birch and bracken all increased. Pine, hazel and Cyperaceae decreased.
7	Pine, Gramineae and Cyperaceae increased (the latter to their highest value). Filicales and bracken dropped; hazel fell to its lowest level; oak appeared unchanged. Birch not found.
6	Very dense charcoal. Dramatic increase in pine and Filicales. Marked increase in Polypodium. Dramatic drop in Cyperaceae. Oak, hazel, bracken & Gramineae all showed a drop but this is probably due to statistical effects.
5	Very dense charcoal. Pine dropped and all other taxa increased. The relatively low level of Gramineae is probably statistical. Elm not found.
4	Marked drop in pine and Polypodium and very slight drop in Cyperaceae. All other taxa increased. Elm present. Notable increase in weed taxa. Plantain and docks recorded.
3	Recovery of pine and Polypodium. Marked increase in hazel and Filicales. Bracken continued to increase. Oak dropped and Cyperaceae virtually disappeared.
2	Very dense charcoal. Marked drop in pine and hazel with slight drop in Filicales. All other taxa increased, especially Liguliflorae. Birch not found.
1 (Top)	Increase in pine, elm, Polypodium, Gramineae and Cyperaceae. Oak and hazel declined slightly. Alder recorded.

TABLE 2

Latin Name on Diagram	English Names of Some Possible Plants included in the Pollen Type	Plants included in Pollen Type
Pinus	Pine	
Betula	Birch	
Quercus	Oak	
Ulmus	Elm	
Alnus	Alder	
Coryloid	Hazel & Bog Myrtle	Corylus & Myrica (only Corylus found)
Salix	Willow	
Filicales	Ferns	
Polypodium	Polypody Fern	
Pteridium	Bracken	
Sphagnum		All Sphagna
Gramineae	Grasses	
Cyperaceae	Sedges	
Bidens type	e.g. Daisies, Ragworts etc.	Bidens, Inula, Pulicaria, Eupatorium, Erigeron, Bellis
		Senecio, Gnaphalium, Solidago, Filago, Antennaria
Caryophyllaceae	e.g. Stitchworts, Mouse-ears, Chickweeds,	Whole family
	Campions	
Centaurea nigra type	Knapweeds	Centaurea nigra & C. nemoralis
Sinapis type	e.g. Charlock, Bitter Cress, Lady's Smock	23 Genera of Cruciferae
Liguliflorae	e.g. Dandelion, Hawksbeards, Hawkbits,	Whole Subfamily
	Sow Thistle, Wall Lettuce, Goat's Beard	
Plantago lanceolata	Ribwort Plantain	
Ranunculus type	e.g. Buttercups, Water Crowfoot,	Ranunculus, Clematis, Pulsatilla, Actaea
	Lesser Celandine, Traveller's Joy	
Rosaceae	e.g. Hawthorn, Sloe, Crab-apple, Rowan	Whole Family
	Tormentil, Wild Strawberry, Blackberry	
Rumex	Docks & Sorrels	All Rumex Species

TABLE 3

UXBRIDGE 88/VIII

Excavated S/E Corner of Site showing E29/N03

FIGURE 1

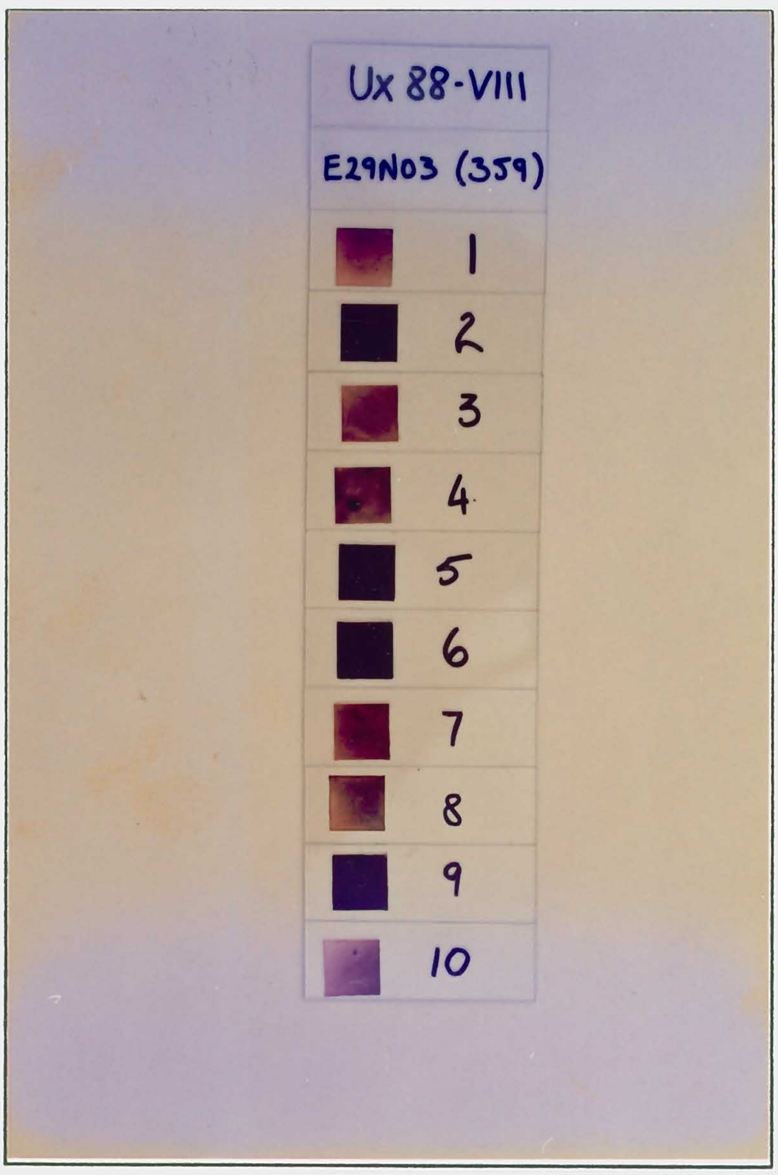
UXBRIDGE 88/VIII

Exposed Pit Face showing Humic Layer

FIGURE 2

UXBRIDGE 88/VIII

Preparation to show Differential Distribution of Charcoal in Humic Silt



Sample Number

(1 & 10 = Interfaces

FIGURE 3

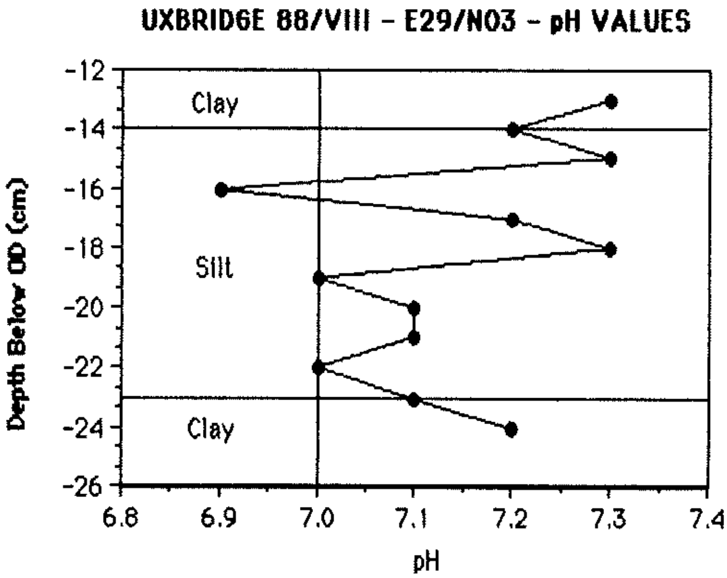

UXBRIDGE 88/VIII - E29/N03 - pH VALUES
Depth Below OD (cm)
-12
-14
-16
-18
-20
-22
-24
-26
6.8
6.9
7.0
7.1
7.2
7.3
7.4
pH
Clay
Silt
Clay

FIGURE 4

UXBRIDGE 88/VIII

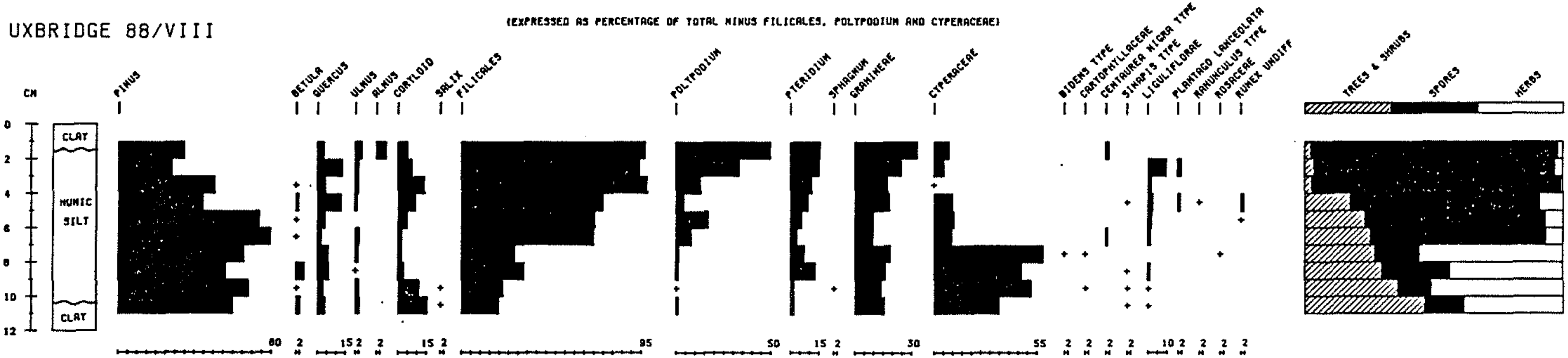


Figure 5