ANCIENT MONUMENTS LABORATORY

REPORT

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TITLE Plant macrofossils, Mildenhall, Suffolk.
(Replace AML report 2523)

MNL 130 : Plant macrofossils by Peter Murphy.

Methods

The archaeological features cut into the sand hummock contained relatively clean sandy fills with variable amounts of charred plant remains. There was some contamination by modern roots and uncharred weed seeds. Charred plant remains were extracted from 42 4kg samples of these dry deposits by water flotation in the laboratory, collecting the flot in a 250 micron mesh sieve. Charcoal and charred seeds were extracted under a binocular microscope from the dried flot.

A column sample (28), sub-divided at 5cm vertical intervals, was taken from the organic sediments of the hollow. 0.5 kg sub-samples at 10 cm. intervals were examined. The sediments were disaggregated using hot water, and hydrogen peroxide where necessary, and were then washed out over a 250 micron mesh sieve. The sieved fractions were sorted in a wet state under low power of a binocular microscope. Remains of two taxa were found to be very common, and in these cases counts of seeds etc. were made from smaller sub-samples (see Table 1). Small samples of peats from the margins of the hollow were processed by a similar method, but plant remains from organic sand samples with a large mineral component, were more conveniently extracted by flotation.

Wood and large charcoal fragments were collected for identification by hand during excavation. Plant remains identified are listed in Tables 1-4.

1. Sample 28.

The sediments filling the hollow adjacent to the sand hummock were examined in this column sample. Remains of two aquatic taxa are particularly abundant: Ranunculus subgenus Batrachium (crowfoot) and Characeae (stoneworts). Unfortunately both groups have achenes or oospores which are difficult or excessively time-consuming to determine to species. However remains of batrachian ranunculi are generally indicative of shallow fresh-water habitats, and most stoneworts are characteristic of clear, shallow water (Godwin 1975, 123; Seale 1975, 23). The remains of these two taxa show interesting,and largely complementary,variations in frequency through the deposits. Achenes of Ranunculus subgenus Batrachium are most abundant in the middle peats (20-35cm), whilst Characeae oospores are commonest in the upper peats and particularly in the shell marl. The marl, itself, is a biogenic sediment consisting largely of calcium carbonate deposited on the decay of lime-encrusted stonewort plants (Seale 1975, 23).

In a body of water unaffected by human activity an increase in stonewort oospores could be interpreted as indicating a natural change from mesotrophic to eutrophic conditions, with an increase in the calcium concentration (cf. Kelly 1964). Stoneworts have a requirement for calcium, though the demands of different species vary. (Fritsch 1961). Consequently the rise in frequency of stonewort oospores at the top of this sequence could indicate an increased influx of hard water from the adjacent uplands whereas in the lower deposits drainage may have been primarily from the sand hummocks.

perhaps related to higher rainfall in the Sub-Atlantic

It is likely, however, that occupation on the hummock had effects on water quality. Nutrient loadings may have been increased either by direct deposition of organic refuse or by leaching and surface run-off. A decline of submerged aquatic macrophytes could then result from shading by increased phytoplankton. Disturbance of the surrounding area would also have increased the amount of fine sediment suspended in the water of the hollow. Although stoneworts can tolerate the presence of decomposing matter in their substrate they do require pure water, and are rare where water is liable to become turbid or contaminated. (Fritsch 1961). The low levels of oospores in the middle of the sequence could therefore be attributed to the effects of human activity. An increase in water turbidity would perhaps have had less effect on plants with floating or emergent leaves, such as some species of crowfoot, than on the stoneworts.

To separate the effects on the aquatic flora of human activity from those of

climatic variation is therefore difficult. In all probability both factors influenced the observed variations; but it is clear from other sites in the West Row area (eg. MNL 124 and 137) that Bronze Age occupation deposits formed on relatively dry surfaces were subsequently covered by sediments formed in wetter conditions.

Other plants from these samples common either in, or at the margins of, fresh water are Ranunculus sceleratus (celery-leaved crowfoot), Hydrocotyle vulgaris (pennywort), Berula erecta (narrow-leaved water parsnip), Oenanthe cf. aquatica (water-dropwort), Polygonum hydropiper (water-pepper), Menyanthes trifoliata (bogbean), some Mentha (mint) species, Potamogeton (pondweed), Lemna (duckweed), and c.f. Alisma plantago-aquatica (water plantain). Typha (reedmace) occurs in reedswamp fringing ponds and lakes. Most of the remaining species are found in wet meadows, marshes and various waterside habitats. These include Ranunculus c.f. repens (creeping buttercup), Thalictrum flavum (meadow rue), Hypericum spp. (St. John's Wort), Polygonum c.f. persicaria (redshark), Lycopus europaeus (gipsywort), Scutellaria c.f. galericulata (skull-cap), Eupatorium cannabinum (hemp agrimony), Juncus spp. (rushes), Carex spp. (sedges) and Eleocharis sp. (spike-rush).

Remains of alder, Alnus glutinosa, (twigs, 'cones', fruits but not branches or stools) occur in the peat below 20cm. Some of the wetland herbs listed above are shade-tolerant and can occur in the undergrowth of alder carr, as well as in open habitats (Tansley, 1953). In addition there are seeds of two species which, when found in archaeological deposits, are normally considered as weeds, but can also be present in carr: Urtica dioica (stinging nettle) and Sambucus nigra (elder). S. nigra occurs particularly where carr is drying out. Overall, however, the plant remains appear to indicate fairly open, shade-free habitats with some alder in the vicinity. Under natural conditions a succession to carr would be expected, but the proximity of the settlement no doubt ensured continuous clearance of any woody growth for fuel. Direct evidence for the clearance of local carr is provided by alder and willow branches with axe-cuts from the occupation horizon at the margin of the hollow. These are discussed below.

2. Marginal deposits.

At the edges of the hollow a distinctive 'occupation horizon' (0367) of very disturbed sandy humified peat was present, overlying dark brown peat (0382) and covered by two layers of brown sandy peat (0467, 0468). These layers were sampled as column sample 49. Other disturbed humified sandy peats (0096, 0142, 0173) and low-lying archaeological features (0216, 0239, 0242, 0260) at the margins of the hollow produced few seeds; for convenience the plant remains from these layers and features are combined in Table 1.

The plant remains from 0367 and associated layers are broadly similar to those from the middle peats in column sample 28. Achenes of Ranunculus subgenus Batrachium are common, and remains of other aquatics and marsh plants also occur. Wood is abundant (see below) and a few fruits of alder are present. The relatively high frequencies of weed seeds reflect the disturbed, nutrient-rich soil conditions of this area. The seed of Hyoscyamus niger is of some interest, since there appear to be no published pre-Iron Age records of this species from Britain (Godwin 1975, 316). However the plant macrofossils of few Bronze Age settlements have yet been studied and thus H. niger may prove to have been a common synanthropic species at this period.

The samples from the remaining marginal contexts produced relatively more weed seeds, and fewer aquatics. The seed of Arenaria serpyllifolia from 0096 probably comes from a plant growing on the sand hummock; this species is common in dry habitats, often on bare ground.

Robinson (1979) has suggested that a high proportion of perennials in the weed seed assemblages of archaeological sites may be indicative of continued settlement, lasting for a period of more than a few years. Rather few weed seeds were recovered at West Row, but of these, perennials (Rubus fruticosus, Urtica dioica, Sambucus nigra) comprise 72%. The predominance of perennial weed seeds at this site may, however, reflect the survival of relicts from former carr undergrowth rather than new colonists.

3. Charcoal and wood.

Identifications of charcoal and wood are given in Tables 3 and 4, and summarised in Fig. . Charcoal was recovered from features cut into the sand-hummock by flotation and by hand selection. No attempt was made to identify fragments under 5mm. Wood was common in the peats of the hollow, but only samples from the occupation horizon in the peat have been identified.

The two main species identified were oak (Quercus sp.) and alder (Alnus sp.), with some ash (Fraxinus sp.), hazel (Corylus sp.), willow (Salix sp.) and ? sloe (Prunus sp.). Clearly the source of this wood is conjectural, but it seems reasonable to suggest that it represents trees growing in the vicinity of the site. There is no reason to suppose that the large timbers of oak and ash (0480, 0481, 0486, 0499) from the occupation horizon would have been transported far. Consequently the wood from the settlement might be interpreted as indicating the presence of varied woodland types in the immediate area: relatively dry woodland on higher ground with oak and ash standards and sloe and hazel undergrowth, whilst in the hollows carr of alder, ash and willow developed.

Further evidence for the presence of fairly dry oak-ash woodland in the locality comes from site MNL 137; here a soil horizon developed on tufa produced a woodland mollusc assemblage and was overlain by a layer of oak, ash, hazel and hazel/alder charcoal.

Although much of the wood from the site has axe-cuts, no obvious coppice poles or stools were observed and there is thus no evidence for woodland management in the vicinity.

4. Cereals.

Forty-two 4kg. soil samples from the dry sandy fills of features out into the sand hummock were processed. Of these samples only four produced remains of cereals and crop weeds, though the peaty occupation layer, 0367, produced a further single wheat grain. Uncarbonised weed seeds were recovered from many of the dry samples, but these are almost certainly modern contaminants and will not be considered here. The charred cereals and crop weeds are listed in Table .

Context No.		0151	0220	0280	0298	0367
Sample No.		13	23	41	42	49
Cereal indet.	ca	4	1	2	-	-
Triticum sp.	ca	3	-	-	-	1
Triticum cf. dicoccum	ca	3	-	-	1	-
Triticum cf. dicoccum	gb	-	-	-	1	-
Hordeum sp. cf. var. nudum	ca	1	-	-	-	-
Hordeum sp.	ca	1	-	-	1	-
Cereal indet.	cn	-	-	-	1	-
Polygonum convolvulus	nu	-	-	1	-	-
Galium aparine	fr	-	-	2	-	-

Table 4. Carbonised fruits, seeds etc.

Abbreviations:	ca	caryopsis	gb	glumebase
	cn	culm node	indet	indeterminate
	fr	fruit		

The cereal grains are almost without exception deformed and damaged, showing signs of having been carbonised rapidly. In several cases endosperm tissue has extruded during charring, producing tarry protruberances on the grain; most grains are more or less 'puffed' and some have 'cokey' surfaces. (Fig.).

Despite this distortion, the majority of the wheat grains are relatively slender

with asymmetrically triangular cross-sections, and are probably of emmer (Triticum dicoccum Schübl). The single damaged glume base has a width of approximately 1mm, but is too poorly preserved for definite identification. Due to distortion it cannot be determined whether the barley grains are of a six- or two-rowed form. The grain from 0298 is clearly angular in cross-section and is of a hulled variety. A specimen from 0151 is much more rounded, with a narrow ridge running along its ventral furrow and traces of a shallow central groove on the dorsal surface. These features are characteristic of naked barley.

From the small number of grains recovered it is impossible to assess which of these crops was the more important. On the basis of grain impressions on pottery Helbaek (1952, 205) concluded that barley was much more important than wheats in southern England during the Bronze Age. However, the frequencies of impressions of different cereals on pottery need not be related directly to crop production, and in any case some regional variation is to be expected.

The rarity of charred cereals from pre-Iron Age sites, at least in East Anglia, does require some consideration. Although few domestic sites have been examined, West Row seems to be fairly typical in producing moderate quantities of charcoal, some charred hazel-nut shells and, in under 10% of samples, a few poorly-preserved cereals. In contrast, sampling on a comparable scale at Iron Age sites in the region has produced cereals in almost every sample, frequently in an excellent state of preservation, and associated with many weed seeds. This marked difference might be attributed to the scale of crop processing: clearly if less grain was being processed, there would be less opportunity for caryopses to be charred during drying, or for chaff to be charred whilst being burnt as refuse. The methods of processing may also be relevant. Bulk drying of cereals could lead to much charring, whereas accidents occurring during small-scale drying or roasting over open hearths might be more likely to result in complete combustion or to puffing and distortion of those grains which did survive. Small weed seeds would probably not survive in such circumstances.

The question of the location of cereal farming cannot, at present, be resolved. There are two possibilities: that cereals were grown locally on the sand hummocks, or that cereal farming was restricted to the sandy Breckland margins, whilst sites such as West Row were occupied primarily for the exploitation of summer pasture. An examination of charred weed seeds associated with cereals may be expected to indicate whether crops were grown exclusively on dry soils, or whether there was some cultivation on damper low-lying ground at the Fen Edge. At this site, however, the few weed seeds present are of common arable weeds of widespread distribution (Polygonum convolvulus, Galium aparine), providing no specific information about soil conditions.

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Caption to figure.

Fig : cereals.

a-e *Triticum* sp. (wheat) caryopses illustrating range of forms and types of distortion; a,b,d. 0151 13; c. 0367 49; e. 0298 42.

f *Triticum* sp. glume base. Outer and slightly oblique inner views. 0298 42.

g *Hordeum* sp. c.f. var. *nudum* (naked barley) caryopsis. 0151 13.

h. *Hordeum* sp. (hulled barley) caryopsis. 0298 42.

Scales graduated in mm.

Context	0094				
Sample No.	28	28	28	28	28
Depth (cm); where appropriate	0-5	10-15	20-25	30-35	40-4
Sediment	Shell-marl	Peat	Woody Peat	Woody Peat	Amorph Peat
Characeae indet.	754(a)	104(a)	1(a)	-(a)	-(a)
Ranunculus subg. Batrachium sp.	1(b)	7(b)	144(b)	107(b)	3(b)
Ranunculus c.f. repens L.	-	-	-	2	-
Ranunculus sceleratus L.	-	1	1	-	-
Thalictrum flavum L.	-	-	9	12	-
Hypericum sp.	-	-	-	1	-
Arenaria serpyllifolia L.	-	-	-	-	-
Chenopodium album L.	-	-	1	-	-
Chenopodium sp.	-	-	-	-	2
Atriplex patula/hastata	-	-	-	-	-
Rubus fruticosus agg.	-	-	1	4	2
Hydrocotyle vulgaris L.	-	1	-	-	-
c.f. Berula erecta (Hudson) Coville	3	-	-	-	-
Oenanthe c.f. aquatica (L) Poir	-	1	6	3	-
Polygonum hydropiper L. (c)	-	-	-	8	-
Polygonum sp.	-	-	37	14	-
Polygonum c.f. persicaria L.	-	-	-	-	-
Urtica dioica L.	-	-	1	6	-
Alnus glutinosa (L) Gaertn fruits	-	-	2	-	3
female'cone'	-	-	-	1	-
wood	-	-	-	+	-
(?) leaf frags(d)	-	-	-	-	-
Corylus avellana L. (e)	-	-	-	-	-
c.f. Menyanthes trifoliata L.	1	-	-	-	-
Hyoscyamus niger L.	-	-	-	-	-
Mentha sp.	-	-	4	-	-
Lycopus europaeus L.	-	-	6	10	1
Lamium sp.	-	-	-	-	-
Scutellaria c.f. galericulata L.	-	-	-	1	-
Sambucus nigra L.	-	1	6	5	1
Eupatorium cannabinum L.	6	-	-	-	-
Alismataceae indet. (f)	1	26	22	18	-
Potamogeton sp.	-	-	-	-	-
Juncus spp. (g)	+	+	+	+	-
Lemna sp.	-	-	-	1	-
Typha sp.	6	4	2	1	-
Carex sp.	1	1	1	1	1

		0382	0367	0468	0467	(i)
28	28	49	49	49	49	(i)
50-55	60-65	-	-	-	-	
Sandy peat	Sandy peat					
2(a)	5(a)	-	-	-	1	+
55(b)	2(b)	15	54	13	-	-
-	-	-	-	1	-	1
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	1
-	-	-	-	-	-	9
1	-	-	-	-	-	2
-	-	-	-	1	-	6
-	-	1	4	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	2	-	1	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	1	-	-	1
-	-	3	5	1	-	4
1	-	-	-	1	1	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
+	+	-	-	-	-	-
-	-	-	-	-	-	+
-	-	-	-	-	-	-
-	-	-	1	-	-	-
-	-	-	-	-	-	-
-	-	-	1	-	-	-
-	-	-	-	-	-	1
-	-	-	-	-	-	-
-	-	-	1	-	-	15
-	-	-	-	-	-	-
-	-	-	1	5	4	2
-	-	-	1	-	-	-
-	-	+	+	+	+	+
1	-	-	-	-	-	-
-	-	-	-	-	-	-
2	-	-	1	-	-	-

Eleocharis sp.	-	10	11	6	-
Triticum sp. (h)	-	-	-	-	-
Gramineae, indet.	-	-	-	2	-
Wood fragments (unidentified)	-	+	+	+	+
Buds and bud scales (unidentified)	-	-	+	+	+
Indet.	1	2	-	4	4
Sample wt (kg)	0.5	0.5	0.5	0.5	0.5

Notes:

(a) Number of oospores/10g sample. Sample at 0-5cm included calcified thallus fragments. The majority of these oospores have lime-shells and are relatively large. They are probably mainly of Chara.

(b) Number of achenes/100g.

(c) Nutlets with perianths.

(d) These fragments have a reticulate pattern of venation closely matching that of alder leaves; the identification is, however, tentative.

(e) Charred nutshell fragments.

(f) Most specimens have partly or wholly lost their fruit-coats. The more intact examples are probably of Alisma plantago-aquatica.

(g) Seeds not counted.

(h) Charred caryopsis.

(i) This column gives the total number of seeds recovered from contexts 0096, 0142, 0173, 0216, 0239, 0242, 0260. Total sample weight 28kg.

Table 1 : Plant remains from column samples 28 and 49, and from other layers and features sealed by the shell marl.

-	-	-	-	2	8	-
-	-	-	1	-	-	-
-	-	-	-	-	-	-
+	+	-	-	-	-	-
+	-	-	-	-	-	-
2	-	-	-	-	-	-
0.5	0.5	0.4	0.4	0.4	0.4	28 (total)

Content No.	*Quercus* sp. (oak)	*Alnus* sp. (alder)	*Corylus* sp. (hazel)	*Alnus*/*Corylus* (alder or hazel)	*Fraxinus* sp. (ash)	*Prunus* sp. (sloe?)	*Salix* sp. (willow)	*Salix*/*Populus* sp (willow or popl
0102	tw	-	-	-	-	-	-	-
0145	+	+	-	-	-	-	-	-
0146	-	-	-	?	-	-	-	-
0151	+	-	+	-	+	-	-	-
0173	+	+	-	-	-	-	-	-
0190	+	-	-	-	-	-	-	-
0204	-	+	-	-	-	-	-	-
0205	+	-	-	-	-	-	-	-
0216	+	-	-	+	-	-	-	+
0225	+tw	-	-	-	-	-	-	-
0280	+	-	-	-	-	-	-	-
0298	+	-	-	-	-	+	-	-
0301	+	-	-	-	-	-	-	-
0350	+	+	-	-	-	-	-	-
0382	+	+	-	-	-	-	-	-
0393	+	-	-	-	-	-	-	-
0419	-	-	-	-	+	-	-	-
0435	+	-	-	-	-	-	-	-
0447	+	-	-	-	-	-	-	-
0465	-	-	-	-	-	-	+	-

Table 2: charcoal identifications

Abbreviations: tw - twigs

? - tentative identification

Content No.	Description of wood	*Quercus* sp. (oak)	*Alnus* sp. (alder)	*Corylus* sp. (hazel)	*Alnus*/*Corylus* sp. (alder or hazel)	*Fraxinus* sp. (ash)	*Salix* sp. (willow)	Indet.
0026	Bark + small twig	-	-	-	-	-	-	+
0083	Bark	-	-	-	-	-	-	+
0102	Bark	-	-	-	-	-	-	+
0146	Bark + small twig	-	-	-	-	-	-	+
0150	Bark	-	-	-	-	-	-	+
0364	Small branch	-	+	-	-	-	-	-
	Twigs	-	-	-	-	-	-	+
0382	Bark + small twigs	-	-	-	-	-	-	+
	Twigs	-	+	-	-	?	-	-
0393	Cut pieces*	+	-	-	-	-	-	+
0415	Bark + small twigs	-	-	-	-	-	-	+
0418	Cut 'block'*	+	-	-	-	-	-	-
	Pointed small branch*	-	+	-	-	-	-	-
	Cut 'silver'*	-	-	-	+	-	-	-
0419	Bark and small twig	-	-	-	?	-	-	+
0435	Bark and twig	-	-	-	-	+	-	+
0447	Cut small branch*	+	-	-	-	-	-	-
	Wood 'point'*	+	-	-	-	-	-	-
	Bark 'blocks'*	-	-	-	-	-	-	+
	Small branch frag.	?	-	-	-	-	-	-
0480	Timber	+	-	-	-	-	-	-
0481	Timber	+	-	-	-	-	-	-
0486	Timber*	-	-	-	-	+	-	-
0489	Small branch frags.	-	+	-	-	-	-	+
0490	Small branch	+	-	-	-	-	-	-
0491	Small branch frags.	-	+	-	-	-	-	+
0492	Pointed small branch*	-	+	-	-	-	-	-

0493	Small branch frags.	-	-	-	-	-	-	+
0494	Small branch frags.	-	-	-	-	-	-	+
0496	Small branch	-	+	-	-	-	-	-
0497	Small branch	+	-	-	-	-	-	-
0498	Branch	-	-	-	-	-	+	-
0499	Timber	+	-	-	-	-	-	-
0501	Cut small branches*	-	-	+	+	-	-	-
	Wood 'silver'*	-	-	?	-	-	-	-
	Cut twig*	-	-	-	-	-	-	+

Table 3: Wood identifications.

The following descriptive terms are used:

Small twig	$\ll$ 2 cm. diameter
Twig	2-5 cm. diameter
Small branch	5-10 cm. diameter
Branch	10-15 cm. diameter
Timber	$>$ 15 cm. diameter

'Worked' specimens are indicated by an asterisk.