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170

Ancient Monuments Laboratory
Report 54/88

THE PREHISTORIC AND EARLY MEDIEVAL WATERLOGGED PLANT REMAINS FROM MULTIPERIOD BECKFORD SITES 5006 AND 5007 (WORCESTERSHIRE), AND WHAT THEY SHOW OF THE SURROUNDINGS THEN.

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Summary

A peaty sediment was investigated for its biological remains. The sequence starts in the early bronze age, according to the radiocarbon date, and the original lime forest had mostly been cleared from this particular area by then. Forest clearance may have been somewhat earlier than elsewhere. The open landscape had grassland, including pasture shown by the presence of dung beetles. Some cereals were cultivated. The site itself was a pond or oxbow with aquatic vegetation and an alder carr.

Further up the profile the signs are of increased local human activity, with more weeds, charred cereal remains, and more inorganic material in the sediment. The local wetland vegetation is more marshy than aquatic in nature so there was probably not often standing water then, and the alder carr shows signs of clearance. This may correspond to the iron age and Romano- British period of occupation, known from the adjacent excavated site.

At the top of the profile there are signs of less farming followed by increased ploughing below a level with a late Saxon radiocarbon date. There are possible signs of hemp and bean cultivation.

Finally, the peaty sediment was covered with soil that appears to have been brought down from the slopes of Bredon Hill by medieval ploughing.

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INTRODUCTION

This piece of work is mainly concerned with the results from the peaty deposits along the Carrant Brook valley, which provided the only waterlogged evidence from the site, to compare with Sue Colledge's results from the study of charred remains from the main sites. These wet deposits were investigated in trenches (HWCM 5006 and 5007) see fig. 000. They can be related to the crop-mark sites which were the main part of the excavations at Beckford by radiocarbon dates, and, to a lesser extent, by stratigraphy.

FIELDWORK

During the course of the main excavation, fieldwalking revealed some peaty soil in an adjoining field along the course of the Carrant Brook, and auguring showed that there was a chance that suitable deposits would be preserved which could be relevant to the cropmark sites. Investigation had to wait until after the next harvest, so in September 1978, with the permission of the landowner (Mr ......) some trenches were cut with tractor digger (JCB) in the places where the deposits seemed deepest according to the results from the boreholes. The layout of these, HWCM 5006 and 5007, are shown in Fig ..., and the stratigraphy in Fig ...

The stratigraphy consisted of topsoil, underlain by a layer of clay in one trench (5007) but not the other. Underneath lay peaty sediments, more or less mixed with clay and silt, down to the basal Pleistocene gravels. Although the ground may have been waterlogged in the winter, the trenches did not fill up at the time of excavation, but the Carrant Brook probably kept the water table reasonably high. Waterlogging was therefore good, but not perfect. The deeper trench, 5007, had about 1.5m stratigraphy, the shallower one only 1m.

Sampling was done with monolith tins each covering 25cm, which were pressed into a cleaned face of the profile and then dug away with a spade. This sampled the stratigraphy for detailed recording in the laboratory, and allowed the pollen samples to be taken at a 2cm interval with a cork borer, also in the laboratory. The bulk samples were collected in a continuous series of slices, at an interval of 5 cm., with a suitable amount of material for plant macrofossils, insect remains and radiocarbon dating.

LABORATORY WORK

The results were obtained from what appeared to be the better series of samples from site 5007, where a layer of clay covered the peats and appeared to have protected them from drying out to some extent.

The pollen samples were prepared using normal methods. The clay content was sometimes a problem, and preservation was adequate rather than good. It was not possible to count pollen preparations above 62 cm as there was too little pollen. Sue Colledge did samples 70, 74, 86, 90, 100, 114, 126 and 130cm, and James Greig checked the results from these and prepared and counted the rest of the samples. It was decided that a 4cm sample interval would give adequate results in the time available.

The macrofossils were extracted from samples of 4-5 litres each, which were broken down in water and washed over on to a mesh of 0.3mm. It was then treated with paraffin (kerosene) to float off the insects and some of the plant remains. The organic material thus collected was further washed and separated on sieves of 4, 1, and 0.3mm mesh for convenience in sorting. The mainly organic fraction was sorted in alcohol under a 10x microscope, and the plant and insect remains picked out. Sue Colledge identified some of the seeds, and James Greig checked the earlier identifications and sorted and identified some extra material. Preservation of macrofossils was reasonable, although few seeds were preserved in the layers above 80 cm. The number of insect fragments was rather low, but Maureen Girling obtained some useful results from them (see Girling & Robinson's report). Paraffin flotation is no longer done for botanical samples because only a proportion of the seeds float, and it is difficult to get rid of the oily droplets afterwards - botanical samples are sieved out in water alone and any insect remains sorted out with the plant material, and if extra beetles are needed, further samples may be treated with paraffin.

The upper radiocarbon sample was of peaty sediment, which is not very suitable for this purpose, but happened to be the only dateable material found. Peat carries the risk that it may have been penetrated by later roots, and thus that its radiocarbon age might differ somewhat from the true age of that sediment layer. There is also the possibility of hard water error to be borne in mind (A.G. Brown, personal communication). The lower radiocarbon date comes from wood, which is rather more suitable for dating. The silty and stony sediment in the middle part of the profile was not suitable for dating.

RESULTS

The pollen results are drawn up in the pollen diagrams (Figs 2 and 3). These are arranged in rough ecological groupings, insofar as these are possible with pollen types. Tree and shrub pollen is fairly straightforward in this respect. Indicators of arable land and other weeds are occasionally harder to divide, such as

Compositae (T): some of this record could also be from taxa such as the marshland plant Bidens (bur-marigold) as well. In the grassland group Compositae (L) pollen was abundant, and has been included here, yet only one seed corresponding to this group of plants was found. **Ranunculus** (buttercup) type has been included with grassland although many of the buttercup seeds could have been from marshland vegetation too. Some of the wetland taxa are easier because there are clues from the macrofossils, so Cruciferae pollen has been put with wetland indicators because the **Nasturtium officinale** (watercress) seed record suggests this plant as the source of much of this pollen type. Similarly, **Apium nodiflorum** seeds show that much of the Umbelliferae pollen may have come from fool's watercress. Within the groups, the taxa are in taxonomic order from the left (Clapham et al. 1962). The macrofossil results are listed in taxonomic order (Fig 4).

The pollen shows certain aspects (such as grassland and woodland) more clearly than others, while the macrofossils show up other aspects (such as weeds and marsh plants). The beetle results show up herbivore dung and certain aspects of the wetland.

The radiocarbon date for the base of the profile is 1800 +/- 110 bc (HAR 3954), which represents early bronze age time, although Mark Robinson commented that it did seem early. The top of the profile has a date of 950 +/- 70 ad (HAR3624) at 70cm below the ground surface, where organic deposits were covered by soil which buried the marsh, and this appears to suggest a Saxon date for the start of hill-wash deposition.

DISCUSSION

Overall picture

One would expect that the pollen and seeds in a largely natural deposit such as this valley peat would mainly show what plants there ~~was~~ in the immediate locality, and any changes that took place there. Of paramount interest, however, is any sign of the settlement of the iron age and Romano-British cropmark site a few hundred meters distant, which may have happened to have become preserved in the wetland.

The pollen and seeds show no great change to the mainly open vegetation around marshland which grew there during the three thousand years in which the sediment accumulated at this site. On very close examination of the stratigraphy, pollen and seeds, however it has been possible to distinguish several main phases. The main types of vegetation will be discussed first, then the slight changes.

Crops and possible crops

There is a surprising amount of evidence for crops, considering that it comes from a natural waterlogged deposit with little sign of interference. There is a small amount of cereal pollen throughout the sequence which shows that grain was grown, but it would be most odd if cereals were not part of the mixed farming economy of any lowland site. Unusually for a waterlogged site, a small amount of charred grain was found, Hordeum, barley, and spikelet fragments of Triticum dicoccum, emmer wheat. The main finds from the occupation site were hexaploid wheat (which includes emmer) and barley (see Sue Colledge's report). It would not appear that large-scale grain processing took place near the stream, because far more cereal pollen would be expected from the chaff than the rather modest amount actually found. The area was connected with the nearby settlement, as shown by a human burial in HWCM 5006 as well as by the charred cereal remains. This human activity here is not surprising, as the Carrant Brook probably acted as the main water supply for the people and stock at the settlement.

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Two other crop plants were recorded from the uppermost part of the pollen diagram, Vicia faba, bean, and Cannabiaceae, hop/hemp, which would be typical Saxon crops in agreement with the likely date of the upper part of the profile.

It should be said that crop plants do not all leave a clear record from plant remains, so these rather slight results probably do not represent the whole story of arable farming at Beckford.

WEED COMMUNITIES

ubiquitous annual weeds

These are also rather scarce, considering how abundant they can be when preserved on occupation sites. Most of the annual weeds belong to the Chenopodietea (fat hen class) which are the most ubiquitous weeds of fields, gardens and elsewhere. This group includes Raphanus raphanistrum (charlock), Stellaria media (chickweed), Chenopodium and Atriplex species (fat hen and oraches), Aethusa cynapium (fool's parsley), Polygonum aviculare (knotgrass), Polygonum convolvulus (black bindweed), Urtica urens (lesser nettle), Lamium sp. (dead-nettle), and Galeopsis sp. (hemp-nettle). What these may show is that dry-land vegetation with these weeds was growing fairly close to the wet marshy valley deposit, or that this material was deposited there.

possible cornfield weeds

There are also some annual weeds that may be considered characteristic of cornfields, the Secalinietea, (rye-brome class), although this overlaps considerably with the preceding group. Some of these are typical weeds on rather acid, sandy soils such as Papaver dubium (poppy), Raphanus raphanistrum (charlock), and Aphanes arvensis agg. (parsley piert). Others tend to be more common on light base-rich soils, such as Ranunculus parviflorus (small-flowered buttercup), and Valerianella locusta (cornsalad). This is rather a small flora for discussing the weed communities, but surprisingly large considering that it comes from a natural valley marsh deposit such as this. The weed flora from the main site was also small (see Sue Colledge's report). Of these weeds, Ranunculus parviflorus (small-flowered buttercup) was considered local and rather rare at the beginning of the century and Hyoscyamus niger (henbane) rare (Amphlett & Rea 1909).

perennial and biennial weeds
These are commonly in evidence, although here there is just a little Malva (mallow), Rumex (dock), Conium maculatum (hemlock) Arctium (burdock), Carduus and Cirsium thistles , with Urtica dioica (stinging nettle) fairly abundant. Hyoscyamus niger (henbane) is present down to 120 cm. It is fairly common on iron age sites, but has only just appeared from earlier ones, such as bronze age Runnymede (Greig, in prep.).

GRASSLANDS
Grassland is shown more clearly by pollen results than from seeds because certain grassland plants give a strong pollen record, such as Gramineae (grasses)(around 50% of the land pollen here), Plantago lanceolata (ribwort plantain) (around 10%) and Trifolium repens and T. pratense (white and red clovers), although their seeds do not preserve easily and are not so often found in quantity. Some of the grassland pollen records could have come from marsh vegetation, it is true, for seeds of Glyceria (flote-grass), an aquatic grass, were found. The pollen records of Caltha (marsh marigold), Thalictrum (rue) and Filipendula (meadowsweet) could all be from marshy grassland. Plants of drier grassland recorded from pollen include Lotus type (birdsfoot trefoil), Vicia cf. lathyrus (vetchling), Sanguisorba minor (lesser burnet, a calcicole), Rhinanthus tp. (yellow rattle), Campanula type (bell-flowers) and Centaurea nigra tp. (knapweeds), all typical of meadow or pasture.

Seeds of a few grassland plants were found, such as Linum catharticum, also pollen at 70cm (fairy flax), Prunella vulgaris (self-heal), Glechoma hederacea (ground ivy) and a charred Plantago lanceolata (ribwort plantain). The few beetles were indicative of grazed land with dung, adjoining water.

These signs of grassland show that it was probably present locally in one form or other, and was an important part of the landscape. It is hard to imagine farming in the lowlands to have been other than a mixed arable/pastoral system, and the pastoral element would require meadow and pasture. Grasslands may even have covered most of the landscape.

WOODLAND, SCRUB

It is thought that the most of the non-marshy landscape around Beckford was covered in was originally forested with tree cover that had developed during the Mesolithic period. This 'wildwood' (Rackham 1980) would have been mainly of Tilia (lime) in the midlands (Greig 1982) as well as Quercus (oak) and Ulmus (elm). Little forest clearance seems to have taken place before the later neolithic, although there were probably small clearings and fields giving rise to pre-elm decline cereal records (Edwards & Hirons 1984). After around 5000 years bp (the elm decline horizon) forest was rapidly cleared from the fertile and easily cultivated land on the alluvium in the river valleys, for example along the Avon and its tributaries. The formation of the marsh along the Carrant Brook may have been affected by this forest clearance (see discussion later), and certainly by the start of preserved deposits at around 1800 bc there is no sign of closed forest, but rather of a generally open landscape. Quercus (oak) and Ulmus (elm) are the main forest trees represented, with only a trace of Tilia (lime). The tree pollen amounts to only about 15% land pollen in the lower deposits. Furthermore, there are no beetles indicative of trees.

Woodland on wet ground along the floodplain is indicated by considerable Alnus (alder) pollen, probably from an alder carr growing in the marshy deposits. In other pollen diagrams from this area (Brown 1982, 1983) there seems to have been alder carr in almost every valley bog. At Beckford there is sign of Hedera (ivy) locally as well.

Scrub is archaeologically interesting because of the possibility that signs of it could represent hedges which may have grown along the boundaries found archaeologically as ditches. Hedges would surely have been necessary to confine stock, and some of the woody plants recorded may have been growing in hedges. The list of pollen types includes Acer (maple), a characteristic midland hedge tree today. In addition, there are several records of herbs which are found in woodland or hedgerows, such as Moehringia trinerva (three-nerved sandwort) and Torilis japonica (upright hedge-parsley). The signs of scrub are slight, but then it is unlikely to have grown right by the marsh and is therefore probably poorly represented anyway.

HEATHLAND

Heathland shows up very well in pollen diagrams, because heaths and heathers distribute abundant and characteristic pollen (Ericales type). This appears in the pollen diagram near the horizon dated to around 1800 bc. and disappears soon after. There are some patches of heathland around Bredon Hill now, but none very close to Beckford. In the past, heathland seems to have resulted from forest clearance on light soils, and subsequent leaching of the exposed soil and degradation (podzolisation) until only heathland plants could grow there. This happened in the prehistoric period in many places, although here evidently to only a limited extent. No macrofossils of heathland plants were found.

WETLAND

This tends to be the main botanical evidence recovered from wet sites, because the local aquatic and marshland vegetetation has the best chance of pollen and seeds being preserved right where the plants were growing. It is, however, archaeologically the least significant, because it would have been relatively unaffected by human activities, and also not very important in terms of its products.

Aquatic vegetation

This grows in water, or floats on it. There are several taxa in this class. Ranunculus subgenus **Batrachium** (water crowfoot), Nasturtium officinale (watercress), Myriophyllum (millfoil; a pollen record), Potamogetonaceae (pondweeds), and Zannichellia palustris (horned pondweed) are among the most truly 'aquatic' members of the flora. Their presence in the succession shows that the deposit was flooded, rather than just marshy, at times during which it was laid down. The water crowfoot and horned pondweed records are mainly in the lower part, 122 cm and deeper. This lowest part of the deposits then has signs of standing water.

Marshland plants

The records of marshland plants are not so strong at the bottom of the profile as they are a little further up; there are peaks of Caltha (kingcup) and Polygonum bistorta type (bistort) pollen (although no corresponding seeds) from 126-100 cm . The top of the profile has very great signs of marshland, represented by vast numbers of seeds from taxa such as: Ranunculus sceleratus (celery-leaved water crowfoot), Hypericum cf. tetrapterum (St Johnswort), Lychnis flos-cuculi (ragged robin), Apium nodiflorum (fool's watercress), Mentha arvensis/aquatica (probably water mint), several Carex (sedge) species, and Glyceria cf. fluitans (flote-grass), particularly in the samples at 90cm and above.

REGIONAL ENVIRONMENT AND VEGETATION CHANGE

The pollen diagrams from this area (Brown 1982, 1983, Brown & Barber 1985) show great signs of the lime forest on the higher ground providing that one corrects the pollen records for productivity and dispersal. The diagrams mainly show the alder carr down in the valleys. There are conventional elm declines, which probably represent late neolithic land use at around 3000 bp, but very little reduction in tree pollen until later in the diagrams. The date for the base of the Beckford sequence, 1800 bc (early bronze age), and indications of a largely deforested landscape, are earlier than the main deforestation dated in Brown's pollen diagrams (around 600-800 bc, middle bronze age). This could be because Beckford is an area which is very good for farming, which may therefore have been cleared of forest before the rather wetter land along the Severn valley where Brown's cores were collected. Other evidence of the possible date of forest clearances comes from the organic beds in the River Avon near Bidford-upon-Avon which have a somewhat indirect relationship with erosion of cleared land and which have provided dates in a range from 1000 - 300bc (Shotton 1978, Greig 1987, Osborne, in preparation). Another site is the bronze age mound at Bournville, Birmingham (Barfield & Hodder 1981) dated to around 1000bc, underneath which was an organic bed with signs of original lime forest (Greig, unpublished). In conclusion one could say that it is unwise to argue that the area round Beckford was cleared of forest much earlier than other areas on the basis of just one radiocarbon date, but the apparently open landscape as early as 1800bc is earlier than the evidence of this from other dated sites.

Although the lowest part of the Beckford pollen diagram (142-122cm) has relatively small amounts of tree pollen , it does have slightly more signs of a woodland flora than the rest of the diagram. Even then, tree pollen is only around 15%, so the landscape would have been fairly open rather than forested. The alder pollen values, not included in the figure above, are also greater in this part of the diagram, (and alder seeds in the lowest sample) and together with greater records of aquatic plants, show that the deposit was at least partly waterfilled, and the beetle evidence confirms this. The sample at 120cm was similar, with more sign of dung beetles. Also at this level, there were pollen records of marshland plants such as **Caltha** (marsh marigold), and **Filipendula** (meadowsweet).

The marsh could have been an oxbow pond beside the stream course, or a wet deposit forming in the valley where the stream was slow flowing. Such marsh deposits have been found of varying ages and apparently sometimes of purely natural occurrence, although the erosion of soil following forest clearance seems to have had some effect, judging by the increased number of such deposits dating from the bronze age (Shotton 1978). There are, however, some more or less natural rivver valley peat beds as well, for example the one investigated in the Stour valley at Cookley which has a sequence going from the late glacial until recent times (Greig, in preparation).

possible Iron age and Roman phase

The pollen from 118-100 cm (and the macrofossils from 120 and 100 cm) form the more-or-less distinct next phase. There is a sediment change to organic clay/silt with visible charcoal and a range of stones, including weathered limestone. Tree pollen (except Betula (birch) is less and there are more signs of an occupied landscape, for instance cornfield weeds such as Valerianella locusta (cornsalad), and other weeds such as Hyoscyamus niger (henbane), the latter mainly known from deposits of iron age or later, although present at Runnymede in the Bronze Age. The range of weeds increases, with **Atriplex** (orache), **Urtica** urens (lesser nettle), Prunella vulgaris (self-heal), Lamium sp., Plantago media and P. lanceolata, (plantains) and the thistles Cirsium and Carduus.

This part of the profile has signs of increased arable farming shown by the weeds, charred cereal remains (although they are present right to the bottom of the profile) and possibly also by the larger amount of mineral material in the sediment, and the presence of pastureland shown by the dung beetles. It might possibly correspond with the iron age and Romano-British occupation of the Beckford site, which one would expect to have been more intense and local, as shown by the archaeological evidence, although there is little positive evidence except that it seems to lie between the Bronze Age and the Saxon periods.

Possible Saxon phase

Above this apparent occupation phase (98-86 cm on the pollen diagram) the sediment becomes more organic and the cereal pollen record becomes discontinuous, suggesting that either cereals were being less cultivated, or that the cornfields and processing were taking place further away from the marsh. It is no more than speculation that this might represent a phase of abandonment after the Roman period. The largest beetle fauna is present here.

Comparison with other sites

These results may be compared with those from a late iron age ditch at Tattersall Thorpe, Lincolnshire (Greig in Clowne et al. 1986) which gave rather similar results; the pollen diagram differs in having only traces of pollen of wetland plants, although some macrofossils such as those of Ranunculus subg. Batrachium (water crowfoot) were abundant. The ditch at the Iron age enclosure site at Fisherwick also provided similar results (Greig in Smith 1979). The floras from Iron age Farmoor, near Oxford (Lambrick & Robinson 1978) are much larger, but show similar assemblages of weeds, marshland and grassland plants.

This Iron age occupation of the lower river terraces raises various questions such as the nature of the occupation: at Farmoor it seems clear that the site could only have been occupied during dry seasons, and not, therefore, in winter. The wetness of the ground, and the botanical evidence mainly of grassland, suggests that grazing meadow rather than cornfields was the main land-use there. The other sites mentioned certainly lay near the water table, for the biological evidence from them comes form fairly shallow ditches containing organic sediments. One might expect them to have become flooded in the winter as well, for rivers then flowed uncontrolled and probably flooded much more than now. Beckford is on more of a slope, and the main excavated site is quite dry, and indeed there were no organic remains fouond there apart from charred ones. So year-round occupation would have been possible here, and also the growing of a range of crops on the light alluvial soil which now makes the vale of Evesham famous for its horticulture. It would therefore appear that Iron age occupation and use depended upon what the landscape had to offer; In the large river valleys with extensive floodplains it may have been worthwhile to have summer settlements for occupation while the lush summer grazing was used there, as along the Thames at Farmoor and along the Trent at Fisherwick. In smaller and steeper valleys as at Beckford there may have been no need to have separate settlements, as the permanent dwellings could remain dry, yet be conveniently near the marshy grassland along the Carrant Brook.

Saxon farming seems likely for the part of the diagram from 80cm and above because Cannabiaceae and **Vicia faba** are present, and because of the radiocarbon date of ad 940 +/- 80 at 70cm. This suggests that the ploughwash which finally covered the site was brought down Bredon Hill later in the medieval period (see Limbrey, pp.--). There are many signs of marsh plants, for example **Ranunculus** subgenus **Ranunculus**, probably **R. repens** (creeping buttercup), **R. sceleratus** (celery- leaved water crowfoot), **Hypericum** cf. **tetrapterum** (St Johnswort), **Lychnis flos-cuculi** (ragged robin) and **Apium nodiflorum** (fool's watercress).

There seems to have been more population pressure at this time, and heavier land was being ploughed up than hitherto, made easier by the iron ploughs, and this was causing the erosion that covered the peaty deposits that have been studied here.

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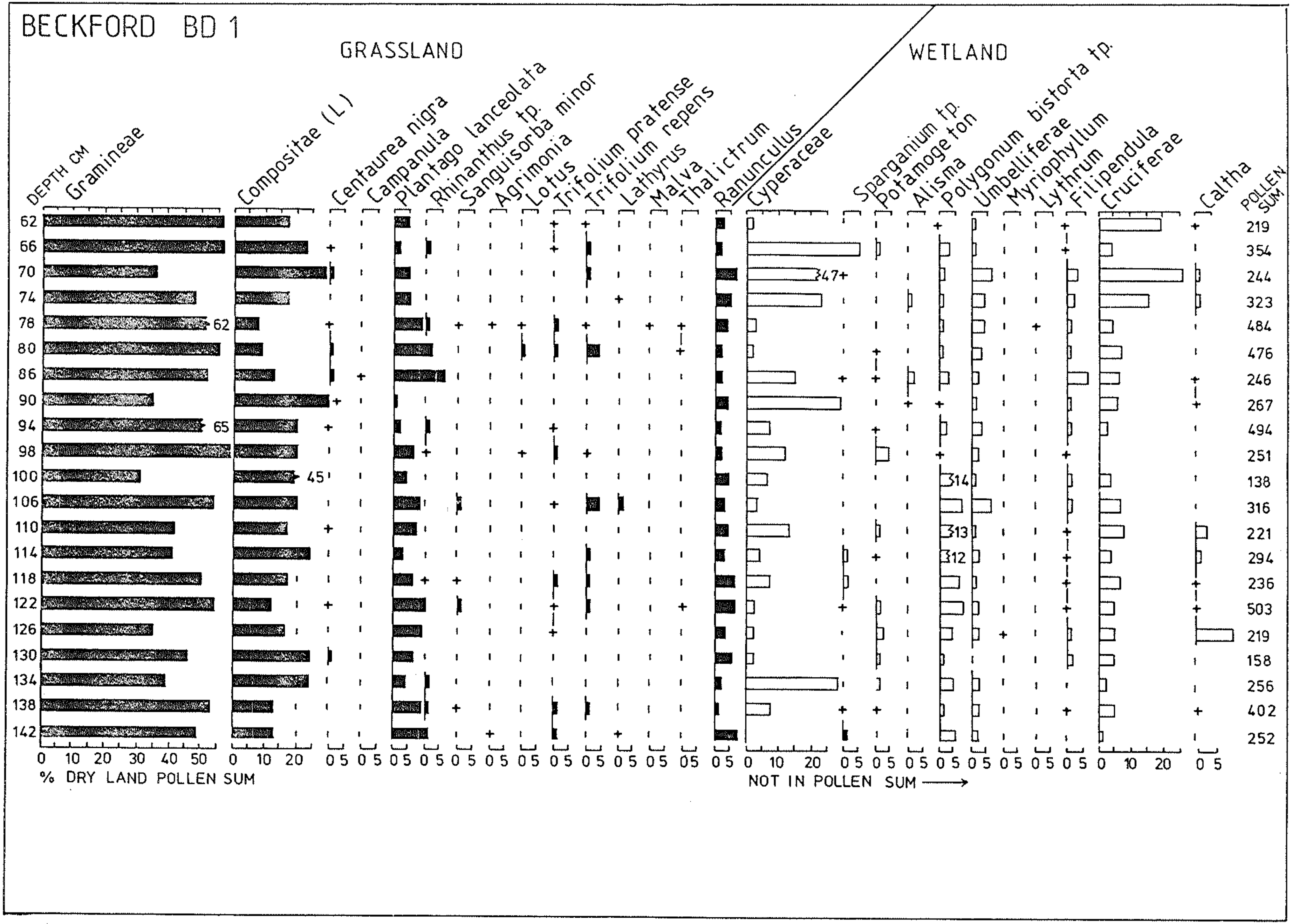
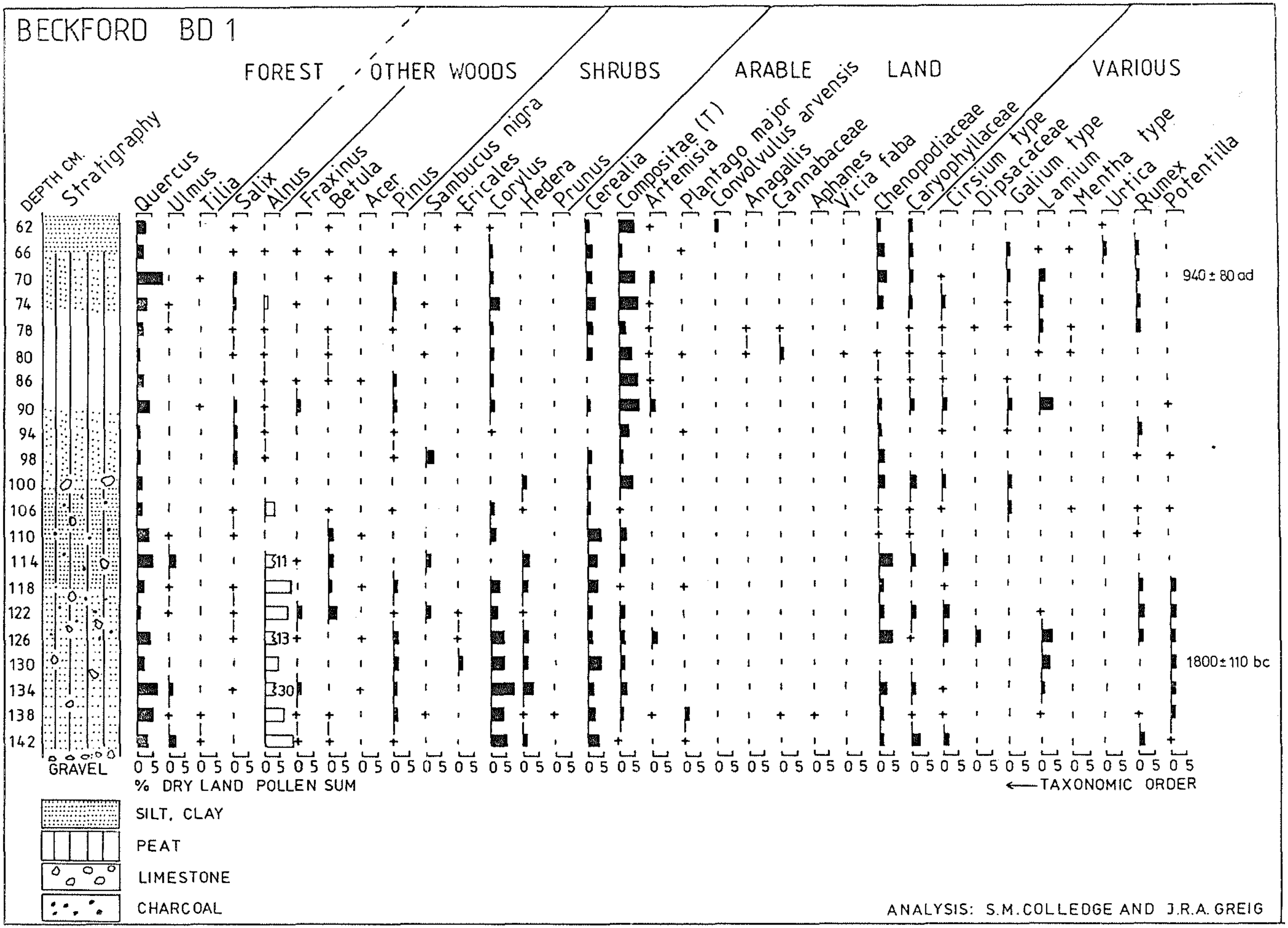
Table 1
SEED LIST
in taxonomic order, after Clapham et al. (1962)

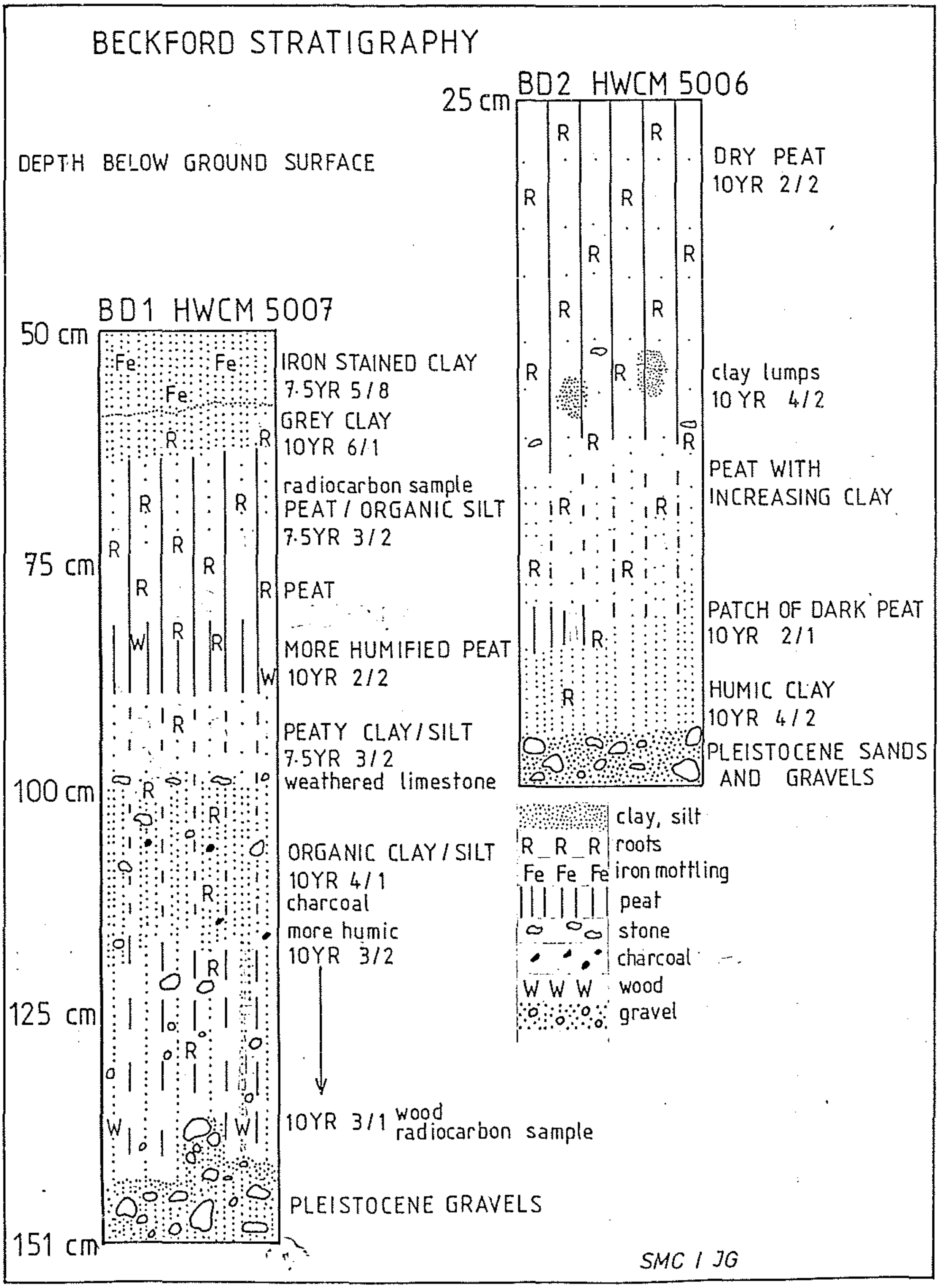
depth cm.	80	85	90	100	115	120	140
Ranunculus subg. Ranunculus	117	514	853	34	23	12	7
Ranunculus parviflorus L.	1	-	-	-	1	1	3
Ranunculus flammula L.	8	2	2	-	-	-	-
Ranunculus sceleratus L.	226	128	46	6	-	2	3
Ranunculus subg. Batrachium	-	3	1	-	28	45	28
Papaver dubium L.	-	-	-	-	1	-	-
Raphanus raphanistrum L.	-	2	-	-	-	-	-
Rorippa nasturtium-aquatica (L.) Hayek		-	-	1	-	4	201
Viola sp.	-	1	-	-	-	-	-
Hypericum cf. tetrapterum Fr.	214	76	69	1	3	6	-
Lychnis flos-cuculi L.	24	30	15	1	-	-	-
Cerastium sp.	-	1	-	-	-	-	-
Stellaria media group	3	-	-	2	1	4	2
Stellaria palustris/graminea	-	-	-	-	-	-	1
Moehringia trinervia (L.) Clairv.	-	-	-	-	-	-	1
Montia fontana ssp. chondrosperma (Fenzl (S.M. Walters)	-	1	-	-	1	-	-
Chenopodium cf. polyspermum L.	-	-	1	-	-	-	-
Chenopodium cf. album L.	5	-	3	1	-	1	1
Chenopodium sp.	-	6	-	-	1	-	-
Atriplex sp.	4	3	-	1	3	-	-
Malvaceae	-	-	-	*1	-	-	-
Linum catharticum L.	-	-	-	-	-	-	1
Vicia cf. sativa L.	-	1*	-	-	-	-	-
cf. Vicia sp	-	-	-	8*	-	-	-
Rubus fruticosus agg.	-	2	2	-	1	4	-
Rubus/Rosa thorns	-	4	-	1	-	-	-
Potentilla anserina L.	-	-	-	-	14	-	-
Potentilla reptans L.	-	8	17	16	2	10	10
Aphanes arvensis agg.	-	-	2	3	4	5	3
Prunus spinosa L.	-	4	-	-	-	-	-
Epilobium sp.	-	8	15	1	-	-	-
Torilis japonica (Houtt.) DC	1	1	-	-	-	-	2
Conium maculatum L.	2	-	-	-	-	-	-
Apium nodiflorum (L.) Lag.	295	135	92	24	2	6	8
Aethusa cynapium L.	3	-	-	-	-	-	-
Polygomun aviculare agg.	-	2	1	-	4	3	3
Polygonum persicaria L.	1	1	-	-	-	-	-
Rumex acetosella agg.	1	-	-	-	-	1	-
Rumex obtusifolius L.	-	-	1	1	-	-	-
Rumex sp.	8	4	1	5	-	-	2
Urtica urens L.	25	-	-	-	1	3	-
Urtica dioica L.	-	5	57	82	2	21	13
Alnus glutinosa (L.) Gaertn.	-	-	-	-	-	-	3
cf. Anagallis sp.	-	2	-	-	-	-	-

depth cm.	80	85	90	100	115	120	140
Hyoscyamus niger L.	-	3	1	-	1	2	-
Mentha cf. aquatica L.	-	2	4	-	-	-	-
Mentha arvensis/aquatica	27	5	9	-	-	2	-
Lycopus europaeus L.	-	2	5	-	-	-	1
Prunella vulgaris L.	-	-	1	-	-	2	-
Stachys sp.	-	-	1	-	-	1	-
Lamium amplexicaule L./ hybridum Vill./purpureum L.	-	-	-	-	2	1	-
Galeopsis sp.	1	-	-	-	-	-	-
Glechoma hederacea L.	-	2	14	10		-	-
Plantago major L.	-	-	8	4	4	2	-
Plantago lanceolata L.	-	-	-	-	-	1*	-
Sambucus nigra L.	-	2	4	3	1	4	3
Valerianella dentata (L.) Poll.	-	-	-	2	1	1	-
Valeriana cf. officinalis L.	-	1	-	-	-	-	-
Bidens sp.	-	-	3	-	-	-	-
Arctium sp.	-	-	-	-	1	-	-
Carduus sp.	1	1	6	-	8	1	-
Cirsium cf. vulgare (Savi) Ten.	-	-	-	-	-	3	-
Cirsium cf. palustre (L.) Scop.	2	-	-	-	4	15	6
Cirsium sp.	-	-	3	4	1*	-	-
cf. Crepis capillaris agg.	-	-	-	1	-	-	-
Alismataceae	1	-	2	-	-	-	-
Potamogetonaceae	-	-	-	2	-	21	-
Zannichellia palustris L.	-	-	-	-	3	1	2
Juncus sp.	2	18	110+	100+	46	80	96
Eleocharis uniglumis/ palustris	22	99	131	2	23	24	15
Schoenoplectus cf. tabernaemontani (C.C. Gmel.) Palla	-	4	-	-	-	-	-
Isolepis setacea (L.) R. Br.	-	-	10	3	2	2	5
Carex cf. flava agg.	50	16	7	-	44	53	16
Carex cf. hirta L.	33	70	45	53	58	24	14
Carex cf. elata All.	-	-	-	2	-	-	-
Carex cf. divulsa Stokes	10	12	14	-	-	-	-
Carex sp.	15	21	-	-	-	-	-
Glyceria cf. fluitans (L.) R. Br.	6	8	13	2	4	-	-
Bromus sp.	-	-	-	-	1*	-	-
Hordeum vulgare L.	-	1*	-	-	-	-	2*
Triticum cf. dicoccum	-	3*	3*	3*	1*	1*	1*
TOTAL	1111	1216	1573	380	301	186	254



BECKFORD BD 1
GRASSLAND
WETLAND
DEPTH CM
Gramineae
Compositae (L)
Centaurea nigra
Campanula
Plantago lanceolata
Rhinanthus tp.
Sanguisorba minor
Agrimonia
Lotus
Trifolium pratense
Trifolium repens
Lathyrus
Malva
Thalictrum
Ranunculus
Cyperaceae
Sparganium tp.
Potamogeton
Alisma
Polygonum bistorta tp.
Umbelliferae
Myriophyllum
Lythrum
Filipendula
Cruciferae
Caltha
POLLEN SUM
62
66
70
74
78
80
86
90
94
98
100
106
110
114
118
122
126
130
134
138
142
219
354
244
323
484
476
246
267
494
251
138
316
221
294
236
503
219
158
256
402
252
62
65
45
47
14
13
12
% DRY LAND POLLEN SUM
NOT IN POLLEN SUM


BECKFORD BD 1
FOREST
OTHER WOODS
SHRUBS
ARABLE LAND
VARIOUS
DEPTH CM.
Stratigraphy
Quercus
Ulmus
Tilia
Salix
Alnus
Fraxinus
Betula
Acer
Pinus
Sambucus nigra
Ericales
Corylus
Hedera
Prunus
Cerealia
Compositae (T)
Artemisia
Plantago major
Convolvulus arvensis
Anagallis
Cannabaceae
Aphanes
Vicia faba
Chenopodiaceae
Caryophyllaceae
Cirsium type
Dipsacaceae
Galium type
Lamium
Mentha type
Urtica
Rumex
Potentilla
62
66
70
74
78
80
86
90
94
98
100
106
110
114
118
122
126
130
134
138
142
GRAVEL
311
313
330
940 ± 80 ad
1800 ± 110 bc
0 5
% DRY LAND POLLEN SUM
← TAXONOMIC ORDER
SILT, CLAY
PEAT
LIMESTONE
CHARCOAL
ANALYSIS: S.M.COLLEDGE AND J.R.A.GREIG


BECKFORD STRATIGRAPHY
DEPTH BELOW GROUND SURFACE
BD1 HWCM 5007
50 cm
75 cm
100 cm
125 cm
151 cm
IRON STAINED CLAY
7.5YR 5/8
GREY CLAY
10YR 6/1
radiocarbon sample
PEAT / ORGANIC SILT
7.5YR 3/2
PEAT
MORE HUMIFIED PEAT
10YR 2/2
PEATY CLAY/SILT
7.5YR 3/2
weathered limestone
ORGANIC CLAY / SILT
10YR 4/1
charcoal
more humic
10YR 3/2
10YR 3/1 wood radiocarbon sample
PLEISTOCENE GRAVELS
BD2 HWCM 5006
25 cm
DRY PEAT
10YR 2/2
clay lumps
10 YR 4/2
PEAT WITH INCREASING CLAY
PATCH OF DARK PEAT
10YR 2/1
HUMIC CLAY
10YR 4/2
PLEISTOCENE SANDS AND GRAVELS
clay, silt
roots
iron mottling
peat
stone
charcoal
wood
gravel
SMC / JG