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Ancient Monuments Laboratory
Report 193/88

POLLEN ANALYSIS OF THE BRONZE AGE CAIRN AND AN ADJACENT PEAT PROFILE AT CHYSAUSTER, CORNWALL

Robert G Scaife PhD BSc FRGS

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Summary

In March 1984, a Bronze Age Cairn and an extensive system of field boundaries and lynchets were excavated by the Central Excavation Unit. Two pollen sequences have been produced. The first of these is from the soils of the old land surface underlying the Bronze Age Cairn. This has indicated that the environment contained oak and hazel woodland which was disturbed by agricultural activity just prior to the construction of the monument. The second pollen sequence is longer and comes from a localised peat filled channel occurring downslope from the archaeological site. This sequence illustrates that the local vegetation had comprised oak and hazel woodland for a substantial length of time. In this profile, three phases of anthropogenic activity have been recognised and it is thought that these relate to the archaeological sites nearby. This had a substantial effect on this fen mire vegetation community and caused oscillations between willow and alder carr woodland.

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POLLEN ANALYSIS OF THE BRONZE AGE CAIRN AND AND AN ADJACENT PEAT PROFILE AT CHYSAUSTER, CORNWALL.

Robert G Scaife.

I) INTRODUCTION

During 1984, a Bronze Age cairn and prehistoric field systems were excavated because of damage caused by farming activities. This work was carried out by the Central Excavation Unit under the direction of G Smith. This site complex lies closely adjacent to the Chysauster Iron Age village near Penzance, Cornwall. Two pollen profiles have been examined in order to provide data on the background vegetation of the site during the prehistoric period. One profile from under the Bronze Age cairn has been examined and the results presented here. This cairn has been dated to 3800-3100 bp from radiocarbon assay of charcoal from under the cairn and from associated satellite burials on its perimeter. The extensive field systems around the site have not been dated. A single sample from beneath one field boundary yielded a date of 4570 +/-120 bp (HAR-6925) but this is thought to be substantially earlier than the true age of the field system, the charcoal being residual from an earlier event. Consequently, it is possible that this extensive area of field boundaries may date from other prehistoric periods. Because of the indeterminate age of these field bank structures and the proximity of the soils buried under the banks to the modern land surface, no pollen analyses were attempted. Two small peat-filled channels were located down-slope from the Iron Age settlement. The longer of these has been pollen analysed and the results of which are presented here. These studies were carried out in conjunction with the soil studies of Dr. R.I. Macphail.

II) THE CAIRN PROFILE

The well defined old land surface was sampled from a section to the south side of the Bronze Age Cairn at a point where a large curb stone block had effectively sealed the old land surface.The buried soil profile appeared to be truncated with only a a minor amount of the humic uppermost horizon present. The soils showed a degree of soil deterioration and comprised weakly developed Ea horizon. Samples were taken at 2 cm intervals to a depth of 30 cm; that is, into the sub-soil horizon. Pollen was, however, only present in countable quantities in the uppermost 12 cm of the A, Ea and top of the Bh horizons. This is typical of the destruction of pollen in palaeosols with highest absolute pollen frequencies occurring at the top of the old land surface (Dimbleby 1985) and becoming progressively reduced downwards.

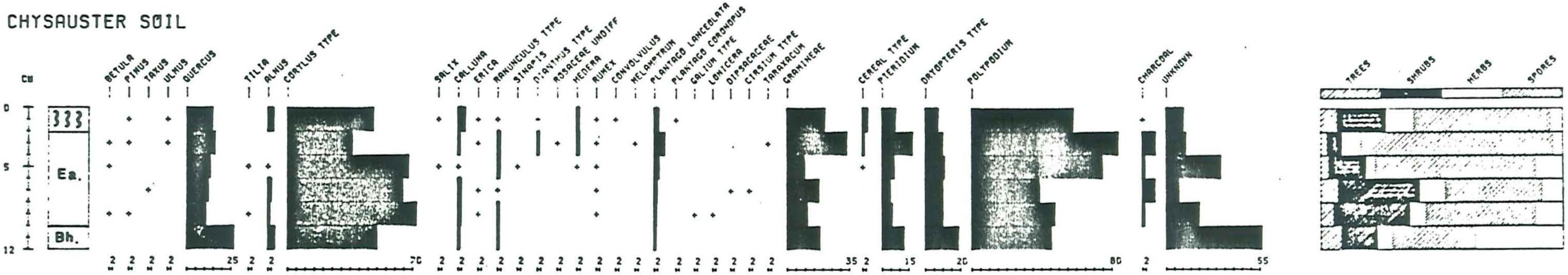
CHYSAUSTER SØIL
CM
0
5
12
Ea.
Bh.
BETULA
PINUS
TAXUS
ULMUS
QUERCUS
TILIA
ALNUS
CORYLUS TYPE
SALIX
CALLUNA
ERICA
RANUNCULUS TYPE
SINAPIS
DIANTHUS TYPE
ROSACEAE UNDIFF
HEDERA
RUMEX
CONVOLVULUS
MELAMPYRUM
PLANTAGO LANCEOLATA
PLANTAGO CORONOPUS
GALIUM TYPE
LONICERA
DIPSACACEAE
CIRSIUM TYPE
TARAXACUM
GRAMINEAE
CEREAL TYPE
PTERIDIUM
DRYOPTERIS TYPE
POLYPODIUM
CHARCOAL
UNKNOWN
TREES
SHRUBS
HERBS
SPORES
25
35
15
80
55

Figure 1

A) METHODOLOGY

Soil samples of 1-2 ml were prepared using standard techniques for the extraction of pollen and spores (Moore and Webb 1978). A sum of between 300 and 100 grains (depending on the state of preservation) was made from each of the the six contiguous levels. The results of these counts are calculated as a percentage of Total Pollen and are represented in diagram form (Fig. 1).

B) DESCRIPTION

The pollen sequence in this soil section is homogeneous throughout, with the exception of some differential preservation in pollen and spores. This is evidenced by the inceasing number of unidentifiable pollen grains occurring towards the bottom of the soil profile. The arboreal pollen (spectra) are dominated by Quercus (oak). There are only minor occurrences of other trees (which include Betula (birch), Pinus (pine), Taxus (yew), Ulmus (elm), Tilia (lime), Alnus (alder) and Corylus (hazel) type (which may also include Myrica ;sweet gale). The high values of this last taxon and the dryness of the soils suggest that we are likely to be dealing with Corylus in this sequence.

There is some differentiation in herbaceous pollen throughout the profile with an increase in the number and type of weed taxa, especially Plantago lanceolata; (ribwort plantain) and cereal type pollen towards the top of the profile. There is also a corresponding increase in microscopic charcoal particles towards the top of the profile. Very large numbers of the spores of Polypodium (polypody fern), Pteridium (bracken) and Dryopteris type (a group containing many fern types, having the same spore morphology). These are so abundant that Macphail (   ) has been able to discern these in his soil thin sections.

C) DISCUSSION

The pollen recovered from this section portrays a vegetation of markedly different character to that of today (furze scrub and heathland and open pasture). It is clear that the cairn was constructed in an environment which was initially composed of Quercus and Corylus wooodland. Corylus was perhaps an understorey to oak woodland although he woodland would have ben more open in order for flowering to take place. This type of woodland remains today in isolated areas such as valley bottoms. The soils here are naturally acid to neutral being developed on granitic bedrock. As noted by Macphail, this soil is of an acid brown earth character (Macphail this volume). It is clear from Macphail's soil micromorphological analyses that these soils were biologically active. This is undoubtedly the reason for the relatively shallow and homogenized pollen record which is present. It can be noted that percentages of heathland taxa (Erica and Calluna) are low. These taxa have subsequently expanded to form the heathlands of today.

In the upper levels of this soil profile, the increasing diversity and frequency of weed taxa and cereal pollen indicate that some agricultural activity was taking place in the local area during the period immediately prior to construction of the cairn. This phase of agricultural activity is also evidenced in the soil character (see Macphail) which shows a distinct cultivated layer some 3 cm thick under the cairn. It is, however, clear that some soil truncation has taken place with most if not all of the Ah horizon missing in the sequence analysed for pollen. Because of this truncation and of soil mixing, it is not possible to state whether this was of short duration or a relatively long duration. The fact that the herbs are present in the uppermost part of the soil profile correlates strongly with Macphail's view that a phase of anthropogenic activity just prior to the construction of the cairn resulted in soil acidification and earthworm loss. Pollen would thus progressively cease to be moved down into the lower parts of the soil profile. We are thus, seeing the initiation of the degradation of this acid brown soil which culminated in the acid soils which are present today. As noted by Macphail, it is likely that the impact of this pre-cairn cultivation may have acted as a trigger to accelerated leaching, acidification and podzolisation. Furthermore, this would also have had the effect of promoting water run-off from the valley sides (see below).

High frequencies of spores in soil profiles are often associated with the effects of differential pollen/spore destruction in active soils. Whilst this may be true at the base of this soil profile, spores occurring throughout most of the soil profile are in a fine state of preservation. It is likely, therefore, that these constitute 'real' components of the vegetation. High values of Dryopteris type and Polypodium thus represent an environment in which conditions suited the growth of ferns. This corresponds with the wooded character of the vegetation and one may envisage luxurious growth of woodland fern types as part of the ground flora (eg. Buckler ferns in the Dryopteris type category) and Polypodium growing parasitically on trees. This would resemble the character of woodland present near the site today.

IV) THE PEAT SEQUENCE

Two compacted sequences of peat were located at a distance of c. 200 m downslope from the Iron Age enclosures and c. 100 m from the modern valley bottom carr (alder, oak and willow) woodland. Both sequences are narrow peat filled channels. One was found in a section on the edge of the car park and a deeper one to the north edge of the field underlying the road-side hedge bank/ditch. The latter deeper sequence was chosen for pollen analysis. The character of this peat was of dark brown to black, highly humified detritus peat with little visible structure other than monocotyledonous rootlet penetration from overlying layers. Microscopical analysis of the peat showed this character to be more or less consistent throughout the peat with the exception of inorganic (sand/silt) particles and Sphagnum (Sphagnum moss) leaves in the lowest levels. The latter are correlated with relatively high Sphagnum spore counts (pollen zone 1). These peats no

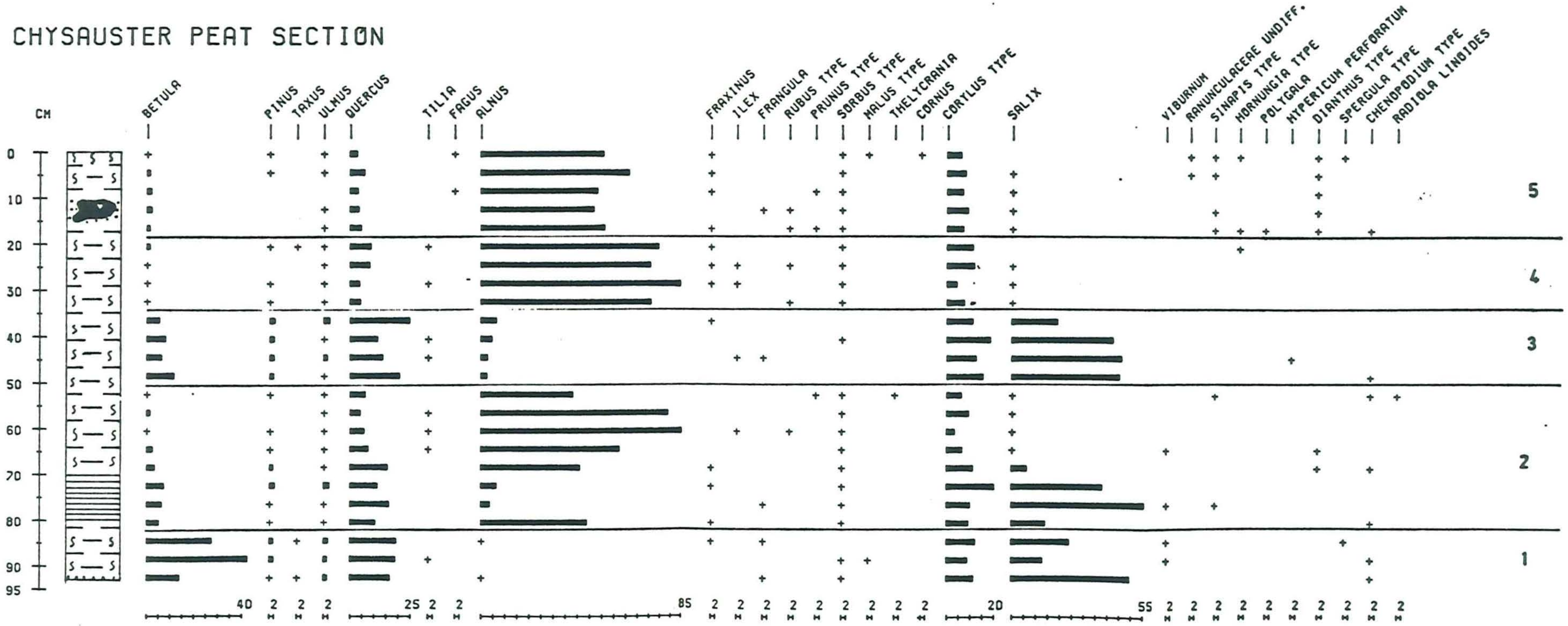
CHYSAUSTER PEAT SECTION
CM
BETULA
PINUS
TAXUS
ULMUS
QUERCUS
TILIA
FAGUS
ALNUS
FRAXINUS
ILEX
FRANGULA
RUBUS TYPE
PRUNUS TYPE
SORBUS TYPE
MALUS TYPE
THELYCRANIA
CORNUS
CORYLUS TYPE
SALIX
VIBURNUM
RANUNCULACEAE UNDIFF.
SINAPIS TYPE
HORNUNGIA TYPE
POLYGALA
HYPERICUM PERFORATUM
DIANTHUS TYPE
SPERGULA TYPE
CHENOPODIUM TYPE
RADIOLA LINOIDES
0
10
20
30
40
50
60
70
80
90
95
5
4
3
2
1
40
25
85
20
55

Figure 2

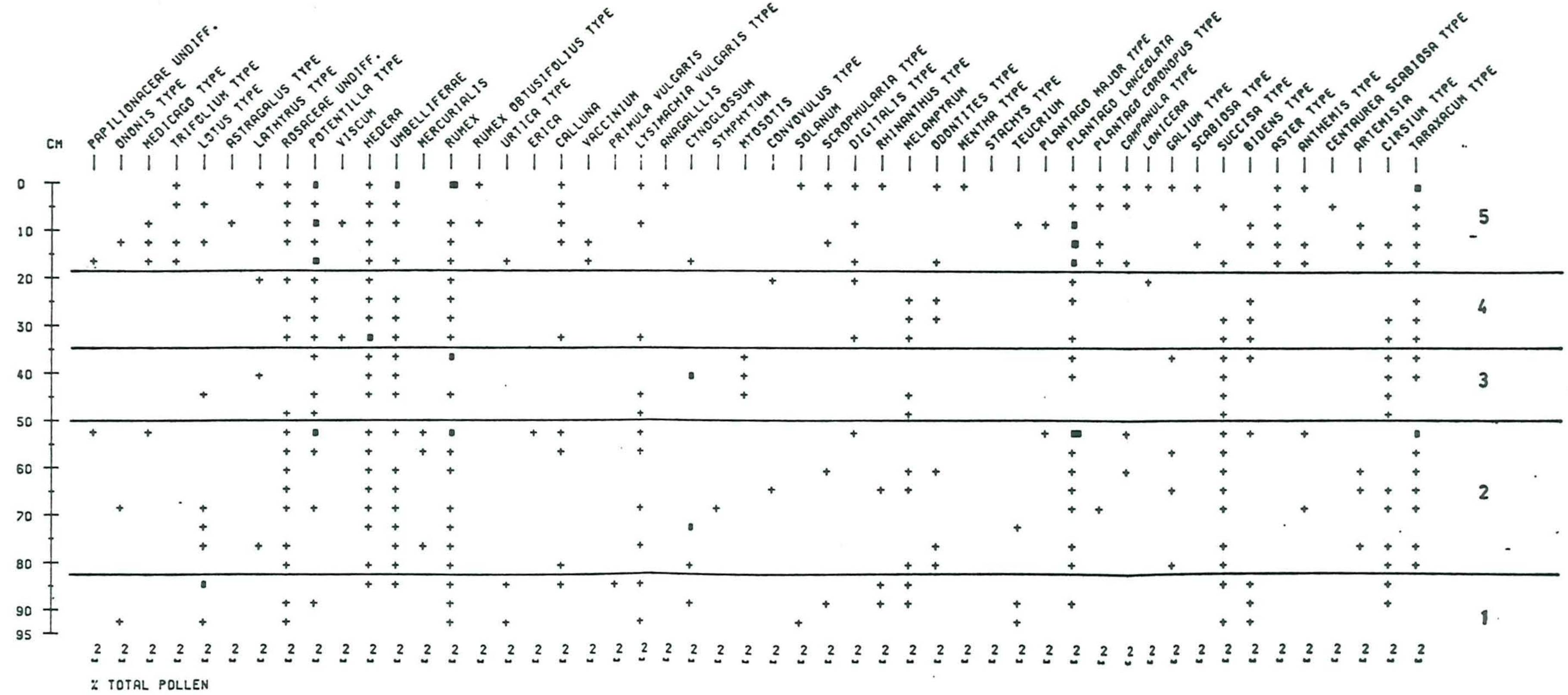

Figure 3; Peat section cont.

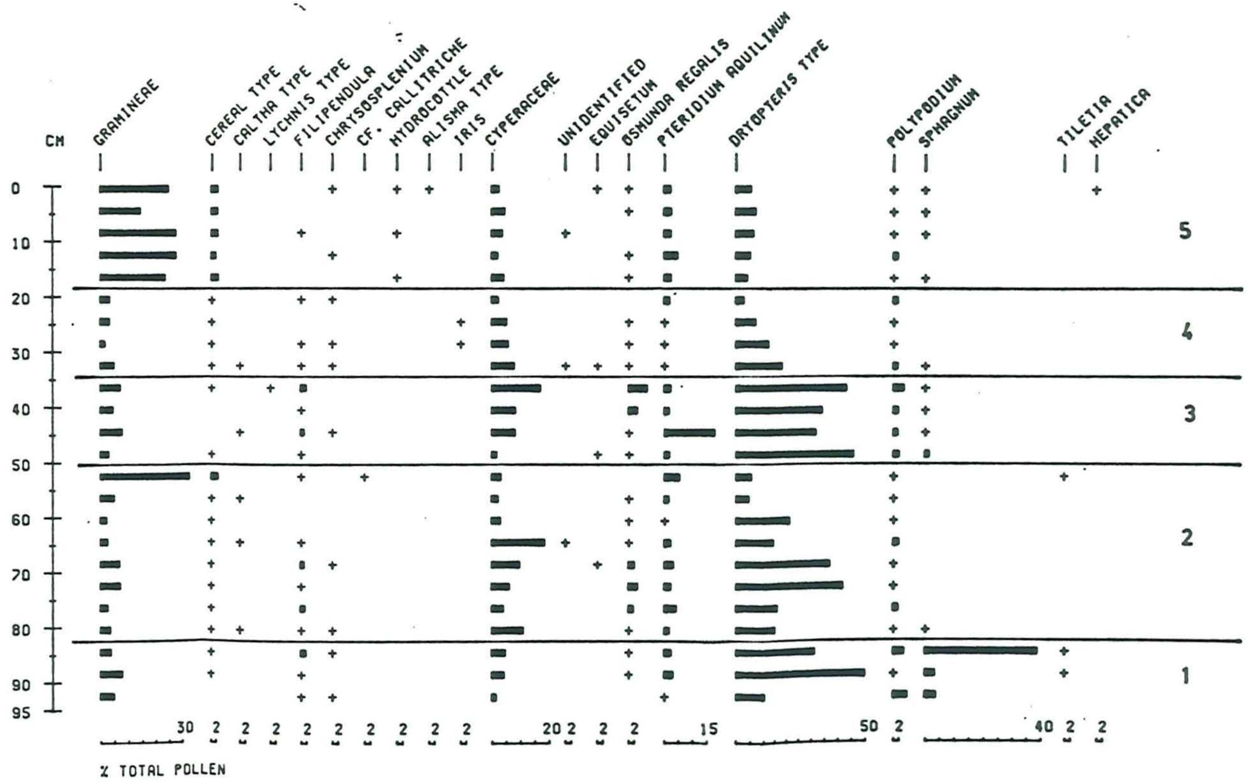

Figure 4; Peat section cont.

contained material ('eg wood and charcoal) which was suitable for radiocarbon dating. Dating of blocks of peat was not attempted because of the numerous rootlets penetrating from level above and because of the highly humified nature of this peat.

A) METHODOLOGY

Samples of c. 1 ml. of peat were prepared for analysis and counting using standard techniques (Moore and Webb 1978). Basic pollen counts of 500 grains were made although in levels where Alnus (alder) pollen was exceptionally abundant, higher counts were made. Thus, the pollen sum ranges from . As with the sub-cairn, old land surface pollen frequencies have been calculated as a percentage of total pollen and spores as a percentage of total pollen plus spores. The results of these are presented in pollen diagram form (fig. 2-4). Five pollen assemblages have been identified on the basis of biostratigraphical changes inherent in the pollen sequence. These changes and zones are briefly summarised.

Zone 1, 92-82 cm; Characterised by the dominance of Betula (birch), Quercus, Corylus and Salix (willows) in the arboreal and shrub category. Herbs are dominated by Gramineae. Spores are characterised by a peak in Sphagnum but with substantial quantities of Dryopteris type.

Zone 2, 92-50 cm; Betula and Salix decline. Alnus increases to high values. Quercus and Corylus remain constant. Sphagnum is absent in the zone. At the top of the zone, herbaceous pollen increases with weed taxa showing small peaks (Plantago lanceolata, Rumex, Potentilla type). Gramineae also shows a marked peak. Dryopteris type maintains high values. Of note is a peak of Osmunda regalis.

Zone 3, 50-34 cm; This zone is characterised by an increase in the values of Betula, Quercus, Corylus and Salix. Pinus also increases slightly. Alnus conversely decreases to low values. Cyperaceae (sedges), Dryopteris type and Polypodium increase. Sphagnum becomes evident again.

Zone 4, 34-18 cm; Alnus increases to high values. Quercus and Corylus decline (a statistical response to increasing Alnus). Salix declines from the high percentages of pollen zone 3 to sporadic occurrences.

Zone 5, 18-0 cm; Characterised by a substantial increase in Gramineae. Cereal type and Plantago lanceolata and a range of herbs occur, the latter sporadically. Alnus declines slightly but remains dominant.

B) DISCUSSION

As noted above, radiocarbon dating was not attempted on this peat sequence because of the character of the peat which comprised much detrital matter and monocot. rootlet penetrating from above and which would jeopardise the integrity of any assay. Dating and interpretation is thus by inferences drawn from the pollen diagram, the interpretaion of the spectrum underlying the Bronze Age Cairn and from the local archaeology.

Two aspects of the vegetation represented in this pollen sequence can be isolated; the autochthonous component comprising the plants of the fen mire which gave rise to the peat and the dryland component which illustrates the vegetation growing on the surrounding interfluves.

It is clear that there have been substantial changes in the character of the fen/mire community Initially, in pollen zone 1, Salix carr was dominant and lasted into the middle of pollen zone 2. Subsequently, and perhaps due to some drying out of the mire, Alnus became dominant (pollen zone 2). This phase is associated with pollen such as Chrysosplenium (golden saxifrage) which is typical of alder and willow carr woodland. In pollen zone 3 and immediately subsequent to a short phase of anthropogenic activity at the top of zone 2, there is a marked return to willow carr. This may have been a response to increased valley side 'run-off' and waterlogging. This pase of willow carr reverts to alder carr woodland which remained dominant throughout pollen zone 4 and 5 to the top of the peat column.

The soil pollen analysis discussed above has indicated that the vegetation prior to construction comprised largely oak and hazel woodland. There is also evidence from the peat sequence that this was the characteristic vegetation of the area throughout the prehistoric period. Values for pollen of both Quercus and Corylus type remain broadly consistent throughout the peat pollen sequence. Fluctuations which do occur are largely statistical responses to increases of other (local) taxa within the pollen sum (Alnus and Salix).

In many circumstances, the initiation of valley peat mire sequences can be correlated with anthropogenic pressures on the adjacent land. This causes a reduction in evapotranspiration resulting in increased water run-off from valley sides and a higher ground water table which may give rise to waterlogging of topographic depressions providing situations of anaerobism and peat growth (Moore 1978, Scaife 1980). It can be noted that here, there are substantial peaks in Betula and Sphagnum in pollen zone 1. This undoubtedly represents the waterlogging of the valley base with consequent development of willow carr and Sphagnum communities. This may have been a response to the initial clearance of valley side woodland. The Betula of zone 1 perhaps represents the subsequent colonisation of these cleared areas. By pollen zone 2, Sphagnum had died out and willow carr gave way to alder colonisation. This represents stabilisation of the adjacent valley sides. At 52 cm, there is evidence of a short phase of anthropogenic activity which is indicated by peaks in pollen of Gramineae, cereal, Plantago lanceolata and other herbs. This was a relatively short-lived, perhaps ephemeral clearance. It is possible that this phase of agriculture was again largely responsible for changes in the hydrological status of the area and hence changes in the ecological status of the mire. Although, as noted, the phase was relatively short, threshold values in the tolerances of Alnus may have been breached (eg. longer periods of standing water during the winter months).

A third and more extensive phase of anthropogenic activity is represented in pollen zone 5 where there is an increase in cereal pollen. This attests to arable activity whilst a substantial increase in grasses may be taken as evidence for increased areas of pasture. The latter is problematic because the peats are of monocotyledonous character and thus the pollen of grasses may result from autochthonous growth. Three phase of anthropogemic activity have thus been recognised. The intervening periods show periods of much less intense anthropogenic activity although it can be noted that there is a consistent, if sporadic, occurrence of cereal pollen type. The small areal extent of this peat mire, which forms a narrow channel running down-slope, means that the pollen rain is likely to represent only relatively local growth ie up to 20-30 metres from the sample site. The background agriculture indicated may represent cropping activities at a greater distance from the sampling point.

c) DATING

Dating of the three phases is problematic, but preliminary suggestions can be put forward. Zone 1 which contains Ulmus (elm) and cereal pollen may represent early Neolithic activity. The anthropogenic phase at the top of pollen zone 2 (52 cm) may be correlated with the Bronze Age cairn which has been dated at between c. 3800 bp and 3,100 bp. Pollen zone 5 shows a marked phase of anthropogenic activity which is evidenced by cereal cultivation and perhaps pastoral activities. The top of this zone does not have evidence of heathland vegetation such as exists today. It is thought, therefore, that this pollen zone (5) may be correlated with the archaeological activity associated with the Iron Age village and field enclosures. Any future work should aim to procure more sound dating materials (wood and charcoal) from adjacent peat sequences.

V) CONCLUSION

Two pollen sequences have been constructed from and adjacent to the Bronze Age cairn and Iron Age village. Pollen in the soil sequence underlying the Bronze Age cairn (3800-3100 BP) illustrates a vegetation at the time of construction was dominated by oak and hazel woodland of open character. At the time of construction of the cairn the vegeation was one of open oak and/or hazel woodland. There is little evidence for heathland, grassland or scrub (such as exists today) at the time of barrow construction. This is commensurate with the thin brown earth character of the pre-cairn old land surface. The presence of some cereal pollen and weeds at the top of the soil profile suggests that some arable activity was taking place on, or adjacent to, the site.

A peat sequence developed in a channel incised into the valley side below the Iron Age village. This development of this peat sequence is most likely to be a response to forest clearance and resultant changes in local hydrology causing waterlogging of depressions and the valley bottom. Subsequent changes in the status of the mire which oscillated between willow carr and alder carr, similarly reflect further phases of anthropogenic pressure. In the absence of radiocarbon dating, tentative correlations are made with early Neolithic, Bronze Age and Iron Age activities.

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Depth (cms)	0	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84	88	92
BETULA	9	13	14	14	10	20	11	5	13	25	38	50	55	6	21	9	17	23	36	64	41	179	208	122
PINUS	1	2	-	-	-	3	-	4	5	9	7	12	6	1	-	1	6	8	9	9	7	9	7	6
TAXUS	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2
ULMUS	2	3	-	2	1	1	2	1	4	11	5	10	1	1	2	5	2	7	10	7	7	11	6	12
QUERCUS	26	73	29	27	43	160	127	99	53	121	55	113	100	45	76	155	57	119	57	168	89	126	93	148
TILIA	-	-	-	-	-	1	-	1	-	-	1	1	-	-	1	1	1	-	-	-	-	-	1	-
FAGUS	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ALNUS	488	774	450	376	497	1404	1120	2283	925	31	21	21	11	282	1525	2370	444	315	32	35	372	4	-	6
FRAXINUS	1	2	1	-	1	1	1	1	-	2	-	-	-	-	-	-	-	1	2	-	1	1	-	-
ILEX	-	-	-	-	-	-	1	1	-	-	-	1	-	-	-	2	-	-	-	-	-	-	-	-
FRANGULA	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	2	-	1	-	2
RUBUS TYPE	-	-	-	1	2	-	1	-	1	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-
PRUNUS TYPE	-	-	2	-	3	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
SORBUS TYPE	3	2	2	4	3	11	2	4	3	-	1	-	-	6	3	5	5	3	2	1	3	-	4	3
MALUS TYPE	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
THELYCRANIA	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
CORNUS	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CORYLUS TYPE	55	95	60	69	65	202	180	104	93	53	90	103	75	45	175	83	49	84	102	103	77	79	43	101
SALIX	-	7	2	1	2	-	1	3	10	93	208	387	222	3	1	9	6	47	193	582	118	157	63	442
VIBURNUM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	1	1	-
RANUNCULACEAE UNDIFF	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SINAPIS TYPE	3	1	-	1	3	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-
HORNUNGIA TYPE	1	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
POLYGALA	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HYPERICUM PERFORATUM	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
DIANTHUS TYPE	2	1	2	3	1	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-
SPERGULA TYPE	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CHENOPODIUM TYPE	-	-	-	-	1	-	-	-	-	-	-	-	1	2	-	-	-	1	-	-	1	-	1	1
RADIOLA LINOIDES	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
PAPILIONACEAE UNDIFF	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
ONONIS TYPE	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
MEDICAGO TYPE	-	-	4	1	1	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
TRIFOLIUM TYPE	1	1	-	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LOTUS TYPE	-	1	-	4	-	-	-	-	-	-	-	1	-	-	-	-	-	7	1	1	-	7	-	1
ASTRAGALUS TYPE	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LATHYRUS TYPE	1	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-
ROSACEAE UNDIFF.	6	3	3	5	-	1	-	1	2	-	-	-	1	5	2	5	1	4	-	1	1	-	1	2
POTENTILLA TYPE	11	10	14	8	17	1	1	3	1	3	-	3	2	11	1	-	-	7	-	-	-	-	2	-
VISCUM	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HEDERA	2	5	3	3	2	3	13	18	19	4	1	1	-	1	11	21	7	1	1	-	5	4	-	-
UMBELLIFERAE	11	1	3	-	1	-	2	3	2	5	2	4	-	1	-	3	6	4	1	3	3	1	-	-
MERCURIALIS	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	1	-	-	-	-
RUMEX	24	-	9	6	7	1	4	9	1	6	-	1	-	10	7	5	-	3	1	1	1	1	2	1
RUMEX OBTUSIFOLIUS T	1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
URTICA TYPE	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
ERICA	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
CALLUNA	1	6	2	6	-	-	-	-	3	-	-	-	-	4	2	-	-	-	-	-	3	1	-	-
VACCINIUM	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PRIMULA VULGARIS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
LYSIMACHIA VULGARIS	1	-	1	-	-	-	-	-	1	-	-	2	1	1	1	-	-	3	-	5	-	2	-	1
ANAGALLLIS	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CYNOGLOSSUM	-	-	-	-	1	-	-	-	-	-	6	-	-	-	-	-	-	-	6	-	2	-	2	-
SYMPHYTUM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-

PEAT SECTION

RAW POLLEN DATA

Depth (cms)	0-2	2 -4	4-6	6-8	8-10	10-12
BETULA		1	2		1	
PINUS	2	1			1	
TAXUS				1		
ULMUS	1	1				
QUERCUS	43	31	28	37	32	26
TILIA			1		1	
ALNUS	10		2	6	3	4
CORYLUS TYPE	142	70	139	192	210	49
SALIX	1		1			
CALLUNA	12	2	2	5	5	1
ERICA	1	1		1	1	
RANUNCULUS TYPE	3	3	3	1	3	1
SINAPIS			2			
DIANTHUS TYPE	1	2				
ROSACEAE UNDIFF		1				
HEDERA	4	3	1			
RUMEX	1	1	1	1	1	
CONVOLVULUS	1					
MELAMPYRUM		1				
PLANTAGO LANCEOLATA	8	12	6	5	4	1
PLANTAGO CORONOPUS	1					
GALIUM TYPE					1	
LONICERA					1	
DIPSACACEAE				1		
CIRSIUM TYPE				1		
TARAXACUM		1				
GRAMINEAE	63	65	21	53	34	18
CEREAL TYPE	9	2	1			
PTERIDIUM	25	40	16	15	19	14
DRYOPTERIS TYPE	24	22	26	34	34	23
POLYPODIUM	399	891	577	189	261	81
CHARCOAL	3	16	3	24	4	
UNKNOWN	35	27	99	26	73	122

PEAT SECTION CONT.

MYOSOTIS	-	-	-	-	-	-	-	-	-	2	1	4	-	-	-	-	-	-	-	-	-	-	-	-
CONVOVULUS TYPE	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
SOLANUM	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
SCROPHULARIA TYPE	4	-	-	4	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	1	-
DIGITALIS TYPE	2	-	5	-	1	1	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
RHINANTHUS TYPE	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	1	-
MELAMPYRUM	-	-	-	-	-	-	1	2	1	-	-	1	1	-	-	1	6	-	-	-	1	2	3	-
ODONTITES TYPE	5	-	-	-	1	-	1	1	-	-	-	-	-	-	-	2	-	-	-	1	3	-	-	-
MENTHA TYPE	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
STACHYS TYPE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TEUCRIUM	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	1
PLANTAGO MAJOR TYPE	-	-	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
PLANTAGO LANCEOLATA	2	11	13	16	13	4	7	-	3	2	1	-	-	25	2	2	1	1	-	1	3	-	2	-
PLANTAGO CORONOPUS T	1	1	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
CAMPANULA TYPE	1	1	-	-	2	-	-	-	-	-	-	-	-	3	-	1	-	-	-	-	-	-	-	-
LONICERA	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GALIUM TYPE	5	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	1	-	-	-	1	-	-	-
SCABIOSA TYPE	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SUCCISA TYPE	-	1	-	-	2	-	-	1	2	2	1	1	1	1	1	4	2	1	-	1	1	4	-	2
BIDENS TYPE	-	-	6	4	-	-	3	2	3	2	-	-	-	1	-	-	-	-	-	-	-	3	1	1
ASTER TYPE	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ANTHEMIS TYPE	1	-	-	2	1	-	-	-	-	-	-	-	-	1	-	-	-	2	-	-	-	-	-	-
CENTAUREA SCABIOSA T	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ARTEMISIA	-	-	2	1	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1	-	-	-	-
CIRSIUM TYPE	-	-	-	1	1	-	-	1	5	2	1	1	2	-	-	-	1	5	-	1	2	4	1	-
TARAXACUM TYPE	15	6	6	8	9	-	1	2	5	1	1	-	-	8	1	3	3	2	-	1	3	-	-	-
GRAMINEAE	236	180	255	220	226	59	47	41	60	34	21	64	14	242	92	57	18	51	35	25	29	24	38	43
CEREAL TYPE	23	28	22	13	25	3	7	3	2	3	-	-	2	19	10	10	6	3	1	2	2	2	2	-
CALTHA TYPE	-	-	-	-	-	-	-	-	1	-	-	1	-	-	1	-	2	-	-	-	1	-	-	-
LYCHNIS TYPE	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FILIPENDULA	-	-	1	-	-	2	-	2	9	9	2	9	1	1	-	-	6	8	1	14	1	12	2	3
CHRYSOSPLENIUM	1	-	-	1	-	2	-	1	1	-	-	1	-	-	-	-	-	1	-	-	1	1	-	1
CF. CALLITRICHE	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
HYDROCOTYLE	2	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ALISMA TYPE	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IRIS	-	-	-	-	-	-	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CYPERACEAE	23	55	33	15	40	40	81	150	100	83	40	68	8	23	40	81	142	74	31	41	93	31	21	12
UNIDENTIFIED	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
EQUISETUM	1	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-
OSMUNDA REGALIS	1	1	-	1	1	-	2	7	7	34	15	2	1	-	1	2	8	15	16	17	5	5	2	-
PTERIDIUM AQUILINUM	21	30	22	39	22	34	11	24	11	11	8	180	8	41	26	20	16	24	11	44	14	15	15	9
DRYOPTERIS TYPE	51	90	58	40	38	47	114	340	272	366	249	383	404	40	84	727	124	445	359	195	148	295	482	101
POLYPODIUM	8	5	5	11	8	25	9	16	18	18	7	11	9	7	18	15	13	4	5	17	7	25	3	45
SPHAGNUM	2	2	2	-	5	-	-	-	1	2	1	1	6	-	-	-	-	-	-	-	5	410	16	32
TILETIA	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	2	1	-
HEPATICA	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

CAIRN POLLEN SECTION

RAW POLLEN DATA