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Hazleton long cairn, Gloucestershire :

carbonised cereals and charcoal from the old land surface

by Vanessa Straker

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Introduction

The total excavation of Hazleton north neolithic long cairn took place over four seasons from 1979-1982 under the direction of Alan Saville for Western Archaeological Trust. Excavation revealed that the cairn was an example of a laterally chambered Cotswold-Severn tomb with a non-orthostatic dry-stone forecourt wall (Saville, 1984). A simplified plan of the site is shown in Fig. 1. The burial deposits were generally well preserved; the two burial chambers were located approximately at the centre of the cairn and each comprised an elongated entrance and passage with a right angled turn into a roughly rectangular chamber. The cairn was underlain by a well preserved buried soil and flanked by two quarry ditches. The buried soil varied in thickness from a few centimetres to 0.4 metres. Beneath cells M-S to the west of the chambers was a midden like deposit containing flint, pottery, burnt and unburnt animal bone, charred plant remains, fragments of possible quernstone and a large quantity of charcoal which gave the soil in this area a black colour (Saville, 1982). This deposit implies settlement and domestic use of the site before the cairn was built. Throughout the excavation the deposits were extensively sampled for environmental analysis and an on site bulk sieving programme was devised for substantial qantities of the old land surface. In addition to the work described in this report B.Levitan has studied the animal bones, M.Bell the molluscs (Bell, 1983), R.Macphail has carried out detailed micromorphological analysis of the buried soil (Macphail, 1985), R.Scaife has analysed pollen from the same deposit (Scaife, 1985) and J. Rogers is currently studying the human remains from the burial areas.

This report will consider the evidence for pre-cairn vegetation and agriculture from a study of the

HAZLETON NORTH NEOLITHIC LONG CAIRN

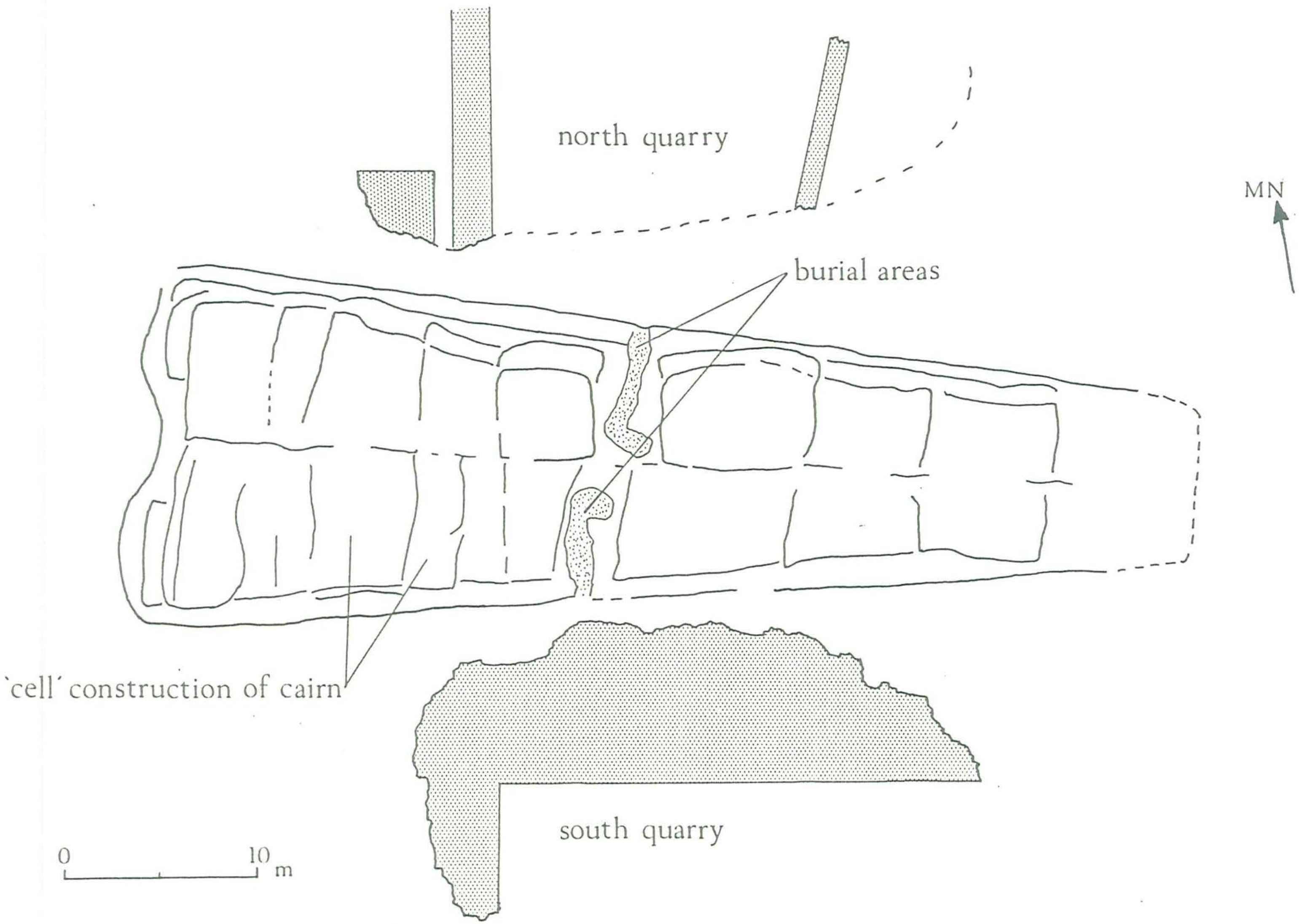

Fig. 1 Simplified plan of excavation.

charcoal and cereals, in the light of the other environmental data. The Hazleton results will be discussed in relation to what is known about Neolithic agriculture in general for Southern England, and comparisons will be drawn between the precairn vegetation sequence at Hazleton and other sites.

Charcoal

Charcoal was particularly abundant in the buried soil and was collected during excavation and also recovered as a result of the bulk sieving. As in fact the excavated samples provided the opportunity to look at spatial variation throughout the whole of the buried soil, this material formed the core of the study. A randomly selected 20% sub-sample of the charcoal samples was chosen as the total quantity was too great to study in detail. The distribution of the identified charcoal is shown in Fig. 2 and emphasises the concentration in the midden area. Over 100 samples were examined and the species recorded were distributed generally throughout the buried soil although the greatest diversity was in the midden area. As the bulk sieving retained the smallest fragments left behind by manual excavation, a 20% randon sub-sample of the charcoal from the bulk sieving was examined to see if the species composition was the same as that for the old land surface as whole. No new species were identified and the range of species was smaller than for the OLS in general presumably because of the smaller number of samples but despite their relative size.

Only small quantities of charcoal were available for study from the cairn fill and quarry ditches - material representative of the period during construction of the monument and after the ditches began to silt up. While some of the same species were identified as in the buried soil the range is more limited, probably by the small number of samples rather than the effect of environmental change or selection.

The results of the charcoal analyses are given in Table 1 and the data for the buried soil is also portrayed in the form of a pye chart. To assist the identification of the wood, reference material was consulted in Bristol and the Ancient Monuments Laboratory.

HAZLETON : distribution of identified charcoal from the old land surface

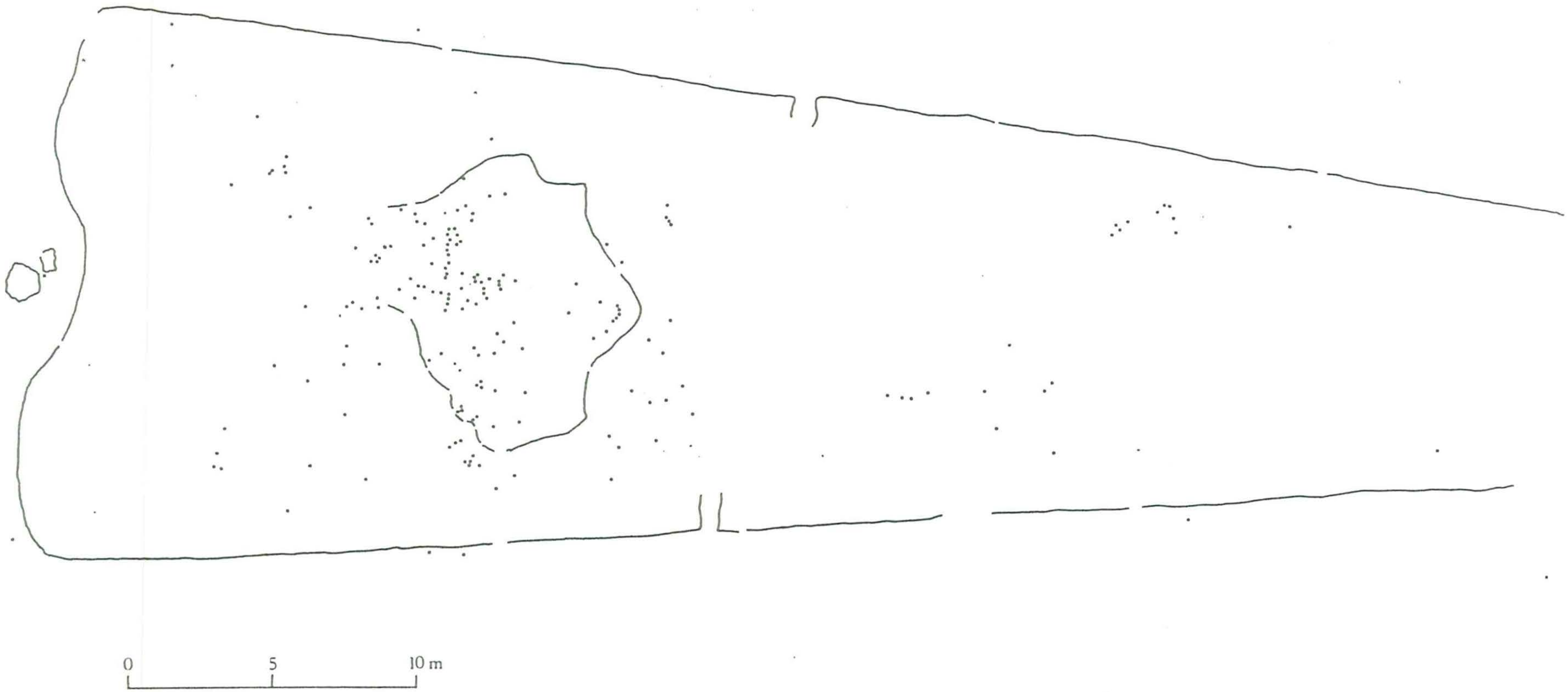

Fig. 2

The problems of the interpretation of charcoal assemblages are well known. Charcoal is robust and potentially able to survive as a residual contaminant from earlier deposits, and as a fuel or other source of raw material is open to selection in a way that pollen or some molluscs, for example, may not be. Indeed, residual artefacts were recovered from the excavation; Alan Saville noted the presence of Mesolithic flint microliths in the old ground surface, concentrated particularly in the forecourt and south horn areas (Saville, 1984). Residuality is not likely to be of any significance in the midden area, which is regarded as a specifically Neolithic accumulation (Saville, pers. comm.). It was felt that as such a wealth of other environmental data was available for Hazleton, the soil pollen being especially important in this respect, cautious if reasonable use could be made of the substantial and carefully excavated charcoal assemblage. Method of quantification is also a problem in the study of charcoal (as admirably described by G.Thompson, unpublished). Merely to record presence/absence of species will mask any dominance of particular taxa, whereas counting of fragments can sometimes over represent species that are more breakable. It was considered that while volume (as described in Thompson, unpubl.) was probably the most accurate method of quantification, it was also awkward and time consuming to employ. Weight was selected as sufficiently accurate for the present study. Different woods have different densities and therefore care has to be taken with this method of quantification, as no calibration tables are available for correcting weights of different species as these will vary depending not only on the taxon but also on the part of the tree from which the sample was obtained. Despite these problems, it was decided that as a rough guide weight would be adequate to indicate the proportions of the different species in the buried soil.

As Fig. 3 shows, hazel (Corylus avellana) accounts for almost half the charcoal examined, with the hawthorn group (Pomoidae) the next most frequent and the larger trees such as oak, elm, ash and beech present but in small amounts. Although pollen is usually poorly preserved in

A. Old land surface

	excavated samples % weight	sieved samples % weight
Corylus avellana	49.2	9.50
Pomoidae	19.6	0.62
Quercus sp.	4.6	-
Fraxinus excelsior	3.7	-
Ulmus sp.	2.5	0.49
Betula sp.	2.2	1.03
Prunus sp.	1.3	-
Corylus/Alnus	1.0	-
Ilex aquifolium	0.5	-
Fagus sylvatica	0.1	-
Indeterminate	15.4	87.3
weight	86.7 gm	22.4 gm.

B. Quarry (post dates cairn use)

	% weight
Corylus avellana	61.4
Ulmus sp.	24.9
Pomoidae	7.5
Fraxinus excelsior	6.2
weight	7.1 gm

C. Other contexts (during cairn construction/use)

	% weight
Indeterminate	86.1
Corylus avellana, Pomoidae, *Quercus* sp.	13.9
weight	2.1 gm

TABLE 1 Hazleton : charcoal identification

HAZLETON : charcoal from the old land surface

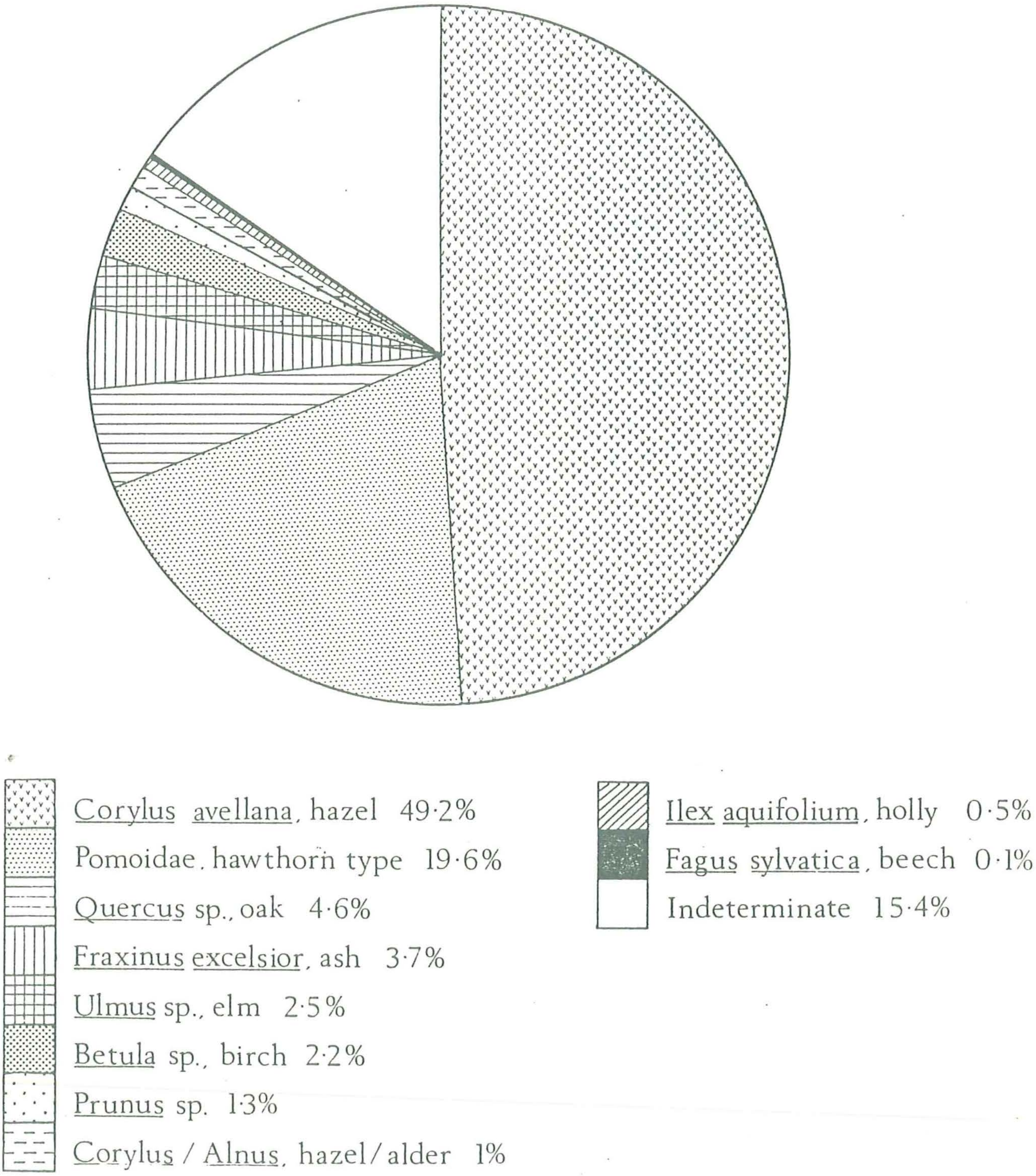

Fig. 3 Charcoal expressed as % by weight of different taxa.

calcareous soils, Rob Scaife managed to obtain a small amount of pollen from the buried soil. On the basis of this work he considers that the vegetation on the site before the cairn was constructed was hazel scrub (Scaife, 1985). This suggestion is certainly supported by the hazel dominated charcoal assemblage and relative scarcity of large trees, but the pattern of vegetation may have been more complicated as discussed later. This vegetation would have replaced the Atlantic climax woodland which is detected by Bell from molluscs preserved in a subsoil tree hollow (Bell, unpubl.) and from the disrupted soil fabric in the same feature (Macphail unpublished). At Hazleton hazel with smaller amounts of Pomoidae (hawthorn type), Prunus and birch would have been effective secondary colonisers on the prehistoric brown soil of the Cotswold limestone. Ash, too, often forms secondary woodland on chalk or limestone often replacing elm and possibly lime (Rackham, 1980, 214). Holly is an understorey species in woods and wood pastures perhaps associated with relict stands of elm, oak or ash (Rackham, 1980). All the taxa shown in Fig. 3 are common on the limestone today as well as being considered native to the area (Riddelsdell et al., 1974; Clapham, Tutin and Warburg,1962). Beech, however, is generally regarded asa being a latecomer in the postglacial sequence and its native range is restricted to southern Britain (Rackham, 1980). The Hazleton find is therefore of interest as it confirms the presence of this species close to its northern limit early in the Neolithic. Although beech prefers acid soils it flourishes on the Cotswolds; the oolitic limestone weathers slowly and the buried soil at Hazleton was decalcified, which is probably why molluscs were not preserved in the upper part of the soil.

Some charcoal (15.4% by weight) was not identified; this category includes the smallest fragments as well as distorted or poorly preserved examples. Checks were kept on the smallest fragments and it is considered that few (if any) species were left undetected.

It is interesting to note that lime (Tilia) charcoal is not present in the assemblage although lime pollen is recorded from the buried soil, Scaife considers that as lime pollen is relatively resistant to decay and therefore possibly differentially preserved, the lime may represent the former Atlantic climax woodland. This would certainly help to explain its absence from the charcoal record though observations by Sheldon (pers. comm.) imply that lime is much less robust than other forms and may be less likely to be represented for this reason. Even if lime was substantially removed, relict stands may well have survived with other forest trees.

Carbonised cereals and wild species

Bulk samples were collected from the buried soil (context 211) and wet sieved on site to a minimum mesh size of 1mm, the flot having been poured off and retained. A total of 126 samples were wet sieved (*c.* 1134 litres of sediment). Samples were taken principally from the midden area, but others areas were also sampled. Fig. 4 shows the distribution of cereals, wild species and hazelnut fragments from bulk sieving and, where hazelnuts are concerned, from manual excavation as well. Table 2 gives details of the cultivated and wild species recovered from the bulk sieving.

The cereals

Cereal pollen was noted by Rob Scaife, who considers that cropping or crop processing was taking place in the vicinity of the site. Some charred cereal grains were recovered as a result of the bulk sieving, however cereal chaff was very rare and restricted to two spikelet forks and two glume bases of glume wheat only. It is generally recognised that cereal chaff if well preserved, will allow more reliable identification to be made than can be done on the basis of grain morphology alone where wheat, in particular is concerned. The chaff from Hazleton was not well preserved and of little additional help in this respect other than to confirm the presence of emmer (*T. dicoccum*).
The cereal grains (principally wheat; barley was not

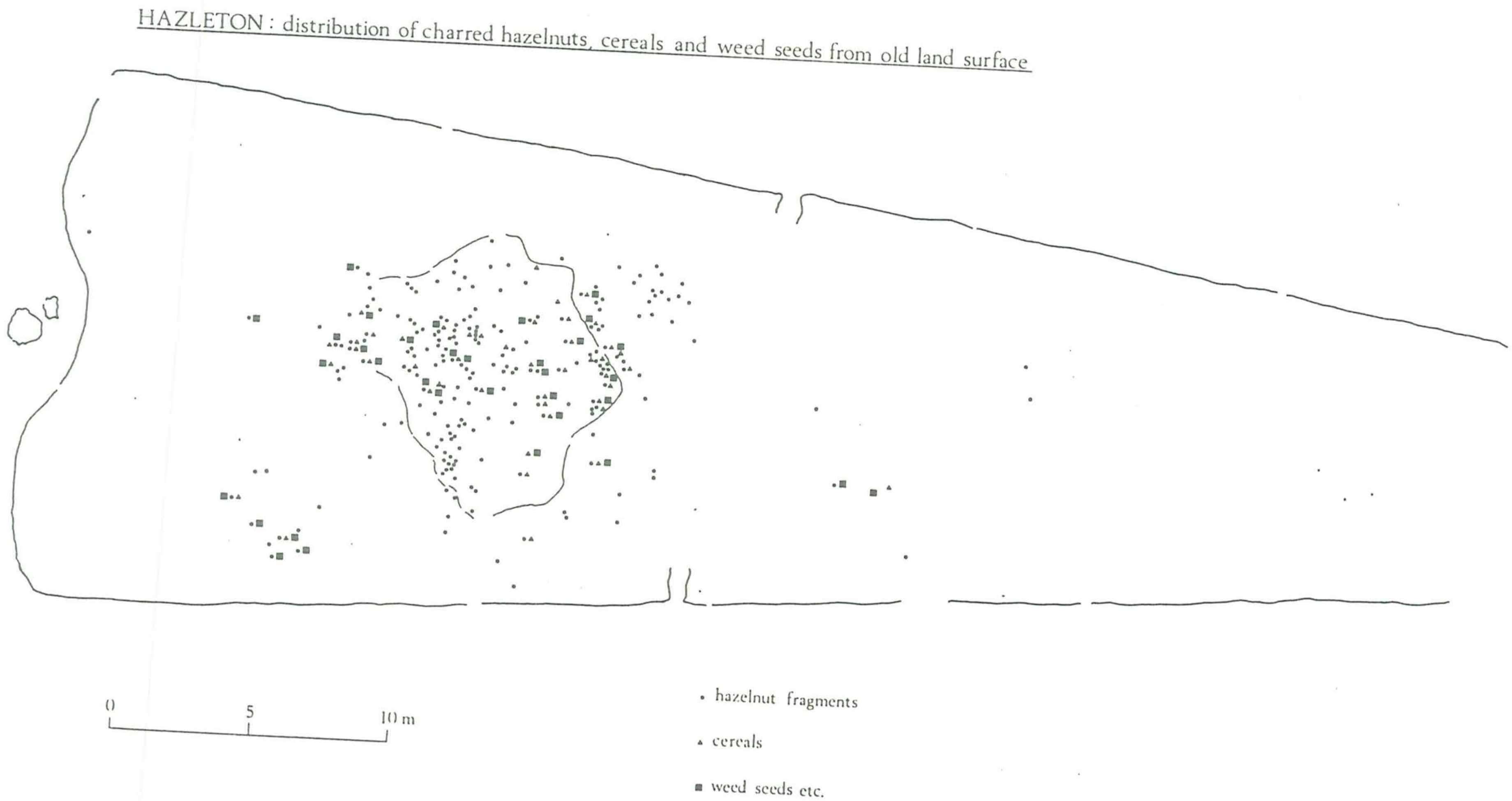
HAZLETON : distribution of charred hazelnuts, cereals and weed seeds from old land surface
0
5
10 m
hazelnut fragments
cereals
weed seeds etc.

Fig. 4

Latin name	common name	number	habitat
cereals			
Triticum sp.	wheat		
	grain	182+	
	spikelet fork	1	
T cf. monococcum	einkorn		
	glume base	1	
T. monococcum or dicoccum	einkorn or emmer		
	grain	1	
	spikelet fork	1	
T. dicoccum	emmer		
	grain	49+	
	glume base	1	
Triticum dicoccum or spelta	emmer or spelt		
	grain	1	
	glume base	1	
T. spelta or aestivum s.l.	spelt or bread wheat		
	grain	3	
Triticum aestivum s.l.	bread wheat		
	grain	33	
Triticum or Secale	wheat or rye		
	grain	6	
Triticum or Hordeum	wheat/barley		
	grain	3+	
cf. Hordeum sp.	cf. barley		
	grain	3+	
cereals gen. et sp. indet.		2++	
wild species			
Arrhenatherum elatius var. tuberosum	onion couch (tubers)	++	A, G
Atropa bella-donna	deadly night-shade	2	S
Corylus avellana	hazelnuts	+++	S
Cruciferae indet.		1	
Galium cf. aparine	cleavers	2	A
Gramineae	grasses	30	G, varied
Plantago lanceolata	ribwort plantain	1	G
Polygonum cf. aviculare agg.	knotgrass	1	G
Polygonum convolvulus	black bindweed	1	A, W
Prunus spinosa	sloe	++	S

Rumex acetosella	sheep's sorrel	+	A
Rumex sp.	dock	2	varied
cf. *Urtica urens*	small nettle	1	A, W
Vicia/lathyrus	vetch/tare	1	G
Viola sp.	violet/pansy	1	varied
		TOTAL	355
unidentified		c. 10	

KEY: A - arable land
G - grassland
S - scrub, woods
W - disturbed ground, waste places etc.
\+ - fragments

Table 2 Wild and cultivated plants from the old ground surface

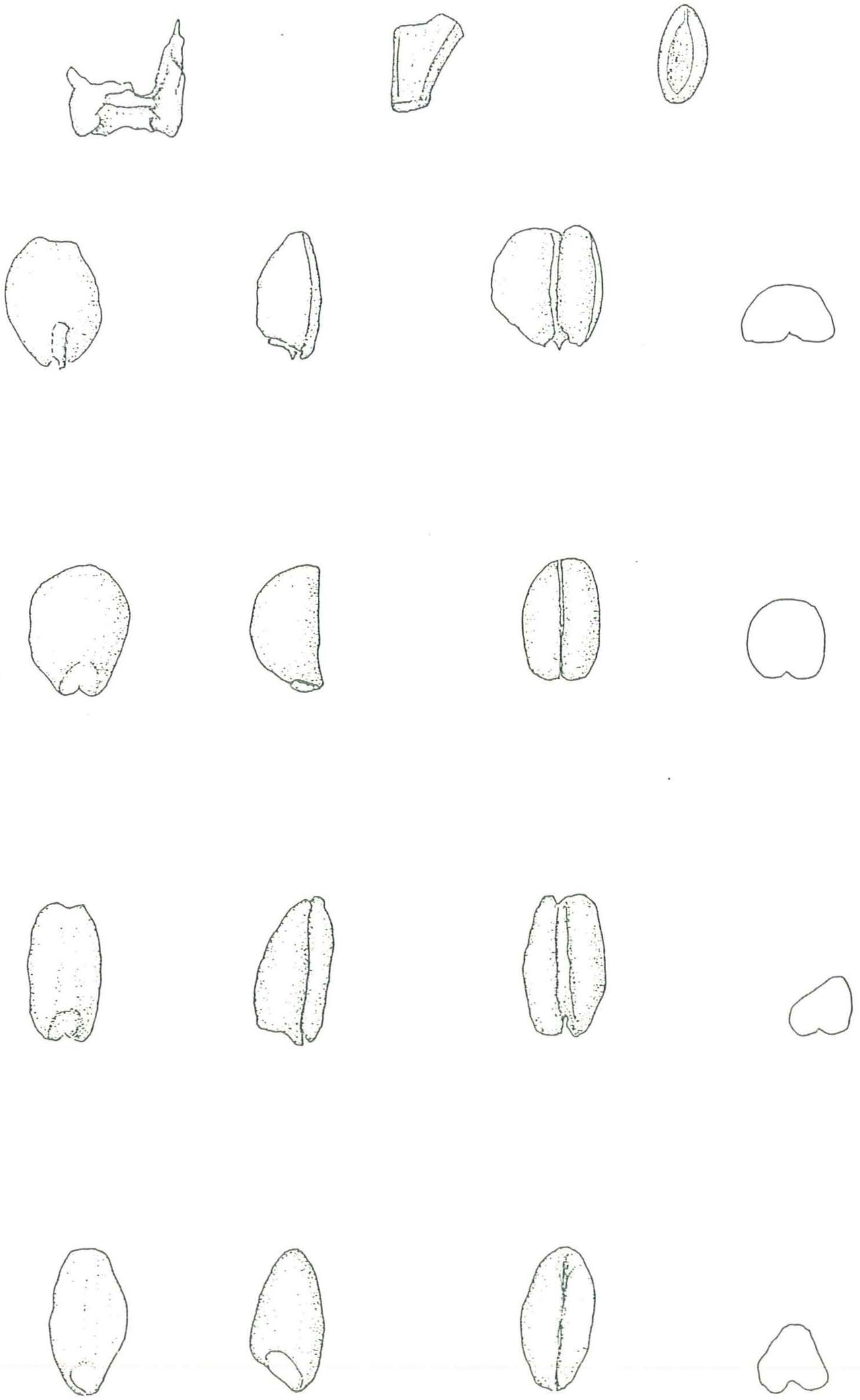

Fig. 5 Row 1 T. dicoccum/monococcum spikelet fork, width 2mm
T. dicoccum, glume base,base width 1mm
Plantago lanceolata, length 2.2mm

Rows 2 and 3 T. aestivum s.l., lengths 4.5mm

Rows 4 and 5 T. dicoccum, lengths 4.8 and 4.9mm identified with certainty), were separated into the groups given in Table 2 on the basis of grain morphology. It was noted that this can be variable to some extent within as well as between species and for this reason classification is particularly tentative for some specimens. Most of the wheat was identified to the level of genus only, but a small amount with a distinctive humped dorsal surface is suggestive of emmer (*T. dicoccum*) and another smaller group with rounded caropses and steeply angled embryos was suggestive of hexaploid wheat of the *T. aestivum* (bread wheat) group. The limited chaff remains are glume wheats and unfortunately no rachis or other chaff fragments were found to confirm the presence of a free threshing bread wheat. Examples of these groups are illustrated in Fig. 6. None of the grains were definitely suggestive of spelt wheat (*T.spelta*) though the Neolithic date of this species has been confirmed for the grain from Hembury, originally identified by Helbaek (1952). Some intermediate grains are assigned to *dicoccum/spelta* or *spelta/aestivum* level only. Because of the lack of cereal chaff and the fact that any assemblage of cereals of early Neolithic date is a valuable addition to the crop record for this period, it was decided to take scanning electron micrographs of the transverse cell layers of the grains as an aid in confirming the species of wheat present in the assemblage. This technique was developed by Korber-Grohne and Piening (1980) and Korber-Grohne (1981). Although some transverse cells were preserved on the grains, measurement of length and breadth that could be made did not readily conform to the size ranges given by Korber-Grohne and Piening (1980). Limited comparative measurements were made on modern charred reference specimens and it was noted that length/breadth ratios of the transverse cells varied appreciably within species and individual grains and this observation was confirmed by S.Colledge and G.Hillman (pers. comm.) who have carried out more detailed study on different populations and species of wheat and other cereals. The inference is, therefore, that more research work is needed before the transverse cells or other cell layers can safely be used to aid species determinations.

A few grains resembled rye (Secale cereale) as they were somewhat "bullet" shaped and have been scored on Table 2 as Triticum/Secale. They are, however, most likely to be wheat. Although the recent work of Jones and Chambers (1984) has pushed back the antiquity of rye in this country possibly to the Bronze Age, there is no evidence that rye was present in the British Neolithic. It was hoped that scanning electron microscopy would confirm that these morphological variants were wheat but this possibility had to be excluded.

The weed species associated with the cereals are limited in number, but of great interest for several reasons. Certain species such as Galium, Rumex acetosella, Urtica urens and Polygonum convulvulus can all be found growing as arable weeds. However, as the arable weed flora is not well developed and small in size and little cereal chaff is preserved, little information on crop processing techniques or agrarian practice can be derived from the assemblage. Hillman (1981 and 1984) has published a model based on observations on the cultivation and processing of glume wheats still grown in parts of Turkey and processed using traditional methods. This is intended to assist in the interpretation of archaeological assemblages of these important crop plants. Unfortunately no substantial British cereal assemblage of Neolithic date, to the writer's knowledge, to which these ideas can be applied, has been recovered. One or two points based on Hillman's work can however be made. P.convolvulus is an example of a twining species implying perhaps that if it was an arable weed that as far as harvesting techniques were concerned straw was gathered with the crop. The Galium (bedstraw) may belong to the aparine group and this is often regarded as indicative of autumn sowing, a practice which was not thought to predate the Bronze Age (Jones,1980).

Other plant remains from the old land surface may be indicative of grassland and scrub. Deadly nightshade, sloe and hazel are scrub/woodland edge species. Hazelnuts were present in large amounts all over the old land surface, but concentrated particularly in the midden area (Fig.4).

Hazelnuts and sloes, locally abundant wild food resources, would have been a valuable part of the diet and indeed Jones (in press) sees early cereal cultivation as an supplement to the gathering of wild resources rather than vice versa.

The grassland component of the deposit is of interest. Vetches, grasses, knotgrass and plantain are present, as are the carbonised tubers of *Arrhenatherum elatius* var. *tuberosum*, the onion couch. This last species has been noted in several Bronze Age deposits (eg. Godwin, 1975, 404; Jones, 1978, 101). Godwin (1975) suggested that the grass may have been a weed of cultivated land whereas Jones (1978) considered it as a possible food source. Although many writers consider that *A. elatius* is a weed of cultivated ground (eg. Godwin, 1975; Hubbard, 1980) others have noted its tendancy to spread in abandoned arable land. Tansley (1939, 293) cited an area of abandoned arable land at Rothamstead Experimental Station known as Broadbalk Wilderness where *Arrhenatherum* was noted in this respect. Before 1882 the plot carried an annual crop of wheat. The crop was not harvested in 1882 and by 1914 the area, which had remained untouched (and uncharted) supported 'oak-hazel wood with various herbaceous species. On the other half of the plot the woody species had systematically been removed after 1886 and by 1913 *A. elatius* was dominant with *Centaurea nigra*. Tansley suggests that these two species represent a plagioclimax maintained by constant removal of the woody plants. This second situation effectively led to the maintainance of a grassland; the forthcoming national vegetation classification section dealing with grasslands also throws some useful light upon plant communities in what is termed *A. elatius* coarse grassland (*Arrhenatheretum elatioris*) (Rodwell, in prep.). This is of assistance in trying to understand the grassland component of the Hazleton assemblage. The *A. elatius* coarse grassland commumity is one in which coarse leaved tussock grasses, notably *A. elatius* with (usually) smaller amounts of *Dactylis glomerata* and *Holcus lanatus* are generally dominant. Few of the numerous herb species mentioned by Rodwell as often present in the community are noted in the small Hazleton

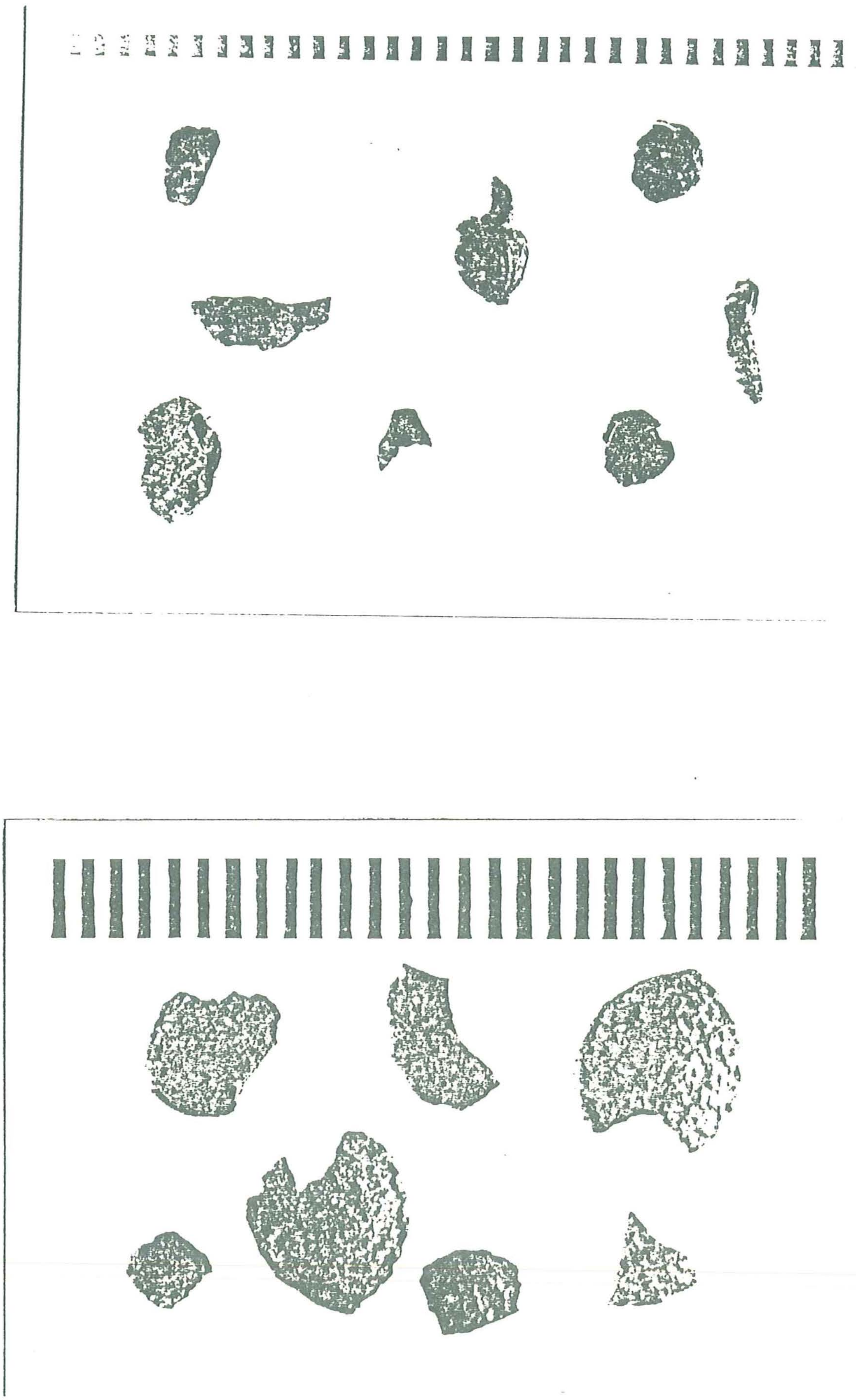

Plate 1 Top *Arrhenatherum elatius* var. *tuberosum* (Onion Couch)

Bottom *Prunus spinosa* (Sloe)

assemblage, but the grassland species, _Rumex,_, _Vicia/Lathyrus_, _Plantago lanceolata_ and _Galium aparine_ can all be found in the _Arrhenatheretum_. _Galium_ and _Plantago_ are also possible weeds. The" _Arrhenatheretum_ is above all an ungrazed grassland" common throughout Britain on "road verges, railway embankments, churchyards, neglected agricultural and industrial habitats such as badly managed pastures, meadows, building sites, quarries and rubbish dumps"(Rodwell in prep.). Rodwell also notes that ploughing and subsequent abandonement of land after unsuccessful arable cultivation has been a widespread factor in the development of some extensive stands of _A. elatius_. Although this need not imply that the arable cultivation in the Hazleton area was generally unsuccessful, Richard Macphail's work shows evidence of Neolithic soil erosion which could have eventually led to reduced yields. He noted that the soil is shallow and as structural breakdown had occurred there may have been some down slope soil loss. A vital factor in the development of the _Arrhenatheretum_ is an absence or irregularity of mowing. It will stand occasional mowing, essential in stopping the invasion of woody species, and in these circumstances the community is a stage in the scrub/woodland succession. It flourishes on generally well structured loams but will grow on a variety of circumneutral soils. It is possible that such as grassland was present at Hazleton, this can only be a tentative suggestion.

At Hazleton therefore, despite the small size of the assemblage it is possible to suggest that cereal cultivation took place at or near the site and that the arable land may have been abandoned, though not grazed, and eventually reverted to scrub which was cleared for the building of the monument. This idea would imply that the arable and grassland communities such as exist have become mixed. Macphail noted that the buried soil was poor and decalcified with no evidence of manuring, so it may have been necessary to rotate the cultivation between different plots in the same area. If this was the situation then it is probable that patches of arable, abandoned arable and scrub formed a "mosaic" in the area before the cairn was built and after the climax possibly lime dominated forest was cleared. It is tempting to postulate that grazing animals were excluded from the ceremonial precinct to allow the grassland to be maintained, but as the evidence suggests that it could also have reverted to scrub and the use of the area was domestic rather than ritual before the cairn was constructed, this cannot be substantiated. The idea of a 'managed grassland' area seems more plausible for the situation immediately after the cairn was constructed, but we have no information on the contemporary vegetation at this stage other than the fact that the molluscs from the quarry ditches suggest that the clearance phase was relatively sort lived and local (Bell, unpublished).

It must be emphasised however, that the assemblage of charred plant remains is very small and a hypothesis such as that advanced above for the nature of the grassland needs further exploration: on future excavations of this type of monument, it would be worth attempting similar recovery of plant remains to see if it is possible to identify the nature of such grassland from better preserved charred plant material.

Drawing mainly upon the specialist reports of Macphail,Bell and Scaife the following sequence can therefore be postulated:

PRE CAIRN

1. Atlantic climax forest, possibly lime dominated - evidence from molluscs and soil in subsoil tree hollow feature and possible residual pollen in buried soil.

2. Clearance and tilling - soil micromorphology shows dusty clay coatings at 7-8cm depth in the profile of the buried soil. Cereal pollen and charred cereal remains in the buried soil.

3. Abandoned arable land - possible evidence from the weed

species for Arrhenatherum dominated ungrazed grassland, this may have reverted to scrub if the woody species were not removed.

4. Scrub - probably hazel dominated implied by the pollen and charcoal.

5. Clearance - for building of cairn.

POST CAIRN

6. Woodland regeneration of an unknown composition suggested by the molluscs from the south quarry.

Situations 2,3 and 4 may have been consecutive or comtemporary with patches of arable, abandoned arable and scrub forming a mosaic in the cleared area.

Evidence for early agriculture comes from several barrow sites; from the pre barrow soil at Beckhampton Road, for example, pollen of weeds of cultiviation and cereals implies arable farming (Ashbee et al.,1979). At Horslip, pollen from the buried soil suggests open country conditions, possibly arable, becoming recolonised by hazel and some trees in the vicinity of the barrow, whereas the site of the barrow itself, according to the evidence of the molluscs, was grassland (Ashbee et al.,1979). At Ascott under Wychwood, although on oolitic limestone like Hazleton, molluscs do survive in the buried soil (Evans in Simpson, 1971). Dimbleby argues from the pollen that after forest clearance there was an open phase followed by scrub regeneration and that the molluscs did not have time to change from open ground species. Perhaps in fact this situation is comparable with that at Hazleton and though the pollen is also relativley local in orign, owing to different patches of land use, the evidence from snails and pollen can appear to conflict.

Neolithic crop husbandry

Evidence for arable agriculture has come indirectly from sources such as quernstones recovered on excavations, more directly from cereal pollen in peat and buried soils of Neolithic date and from the excavation of plough marks preserved on former land surfaces, an important and well known example of the latter being the cross plough marks preserved under South Street long barrow and described by Fowler and Evans (1967). Details of the crops grown are, however surprisingly scarce and are still largely dependant upon the important work summarised by Jessen and Helbaek (1944) and Helbaek (1952). This work was based principally on impressions of plant material preserved in pottery rather than the charred remains of the crops themselves. Hubbard (1975) suggests why pottery imressions may not give an accurate picture of the importance of different crops and Dennell (1976) made the point that fabric analysis of the pottery, largely from Windmill Hill, in which the impressions were found, points to a diverse origin of the pottery supplies to the sites, a fact not available to Helbaek. The crops are therefore not necessarily representative of the economy of the sites themselves. Dennell proposed a scheme which reflects the regional differences in cultivation of crops based on geology and soils. His model suggests that relatively ligh soils such as chalk or limestone would support wheat (principally emmer wheat) and barley, whereas on heavier soils such as those in the Bath/Frome area, conditions would have been most suitable for the cultivation of wheat. However, in view of the evidence from Hazleton for Neolithic soil erosion and the possibility of decreasing soil fertility, it is clear that the local conditions and cultural traditions would have been of overriding significance. In addition, despite the fact that Hazleton is underlain by oolitic limestone, the buried soil contains clay and is not considered as a light soil.

The only other chambered long cairn for which bulk flotation of the old land surface has been carried out is that at Gwernvale, Powys. As with Hazleton, despite the fact that large quantities of soil were processed, the cereal remains were scanty consisting consisting principally of emmer

SITE	GRAIN	IMPRESSIONS	REFERENCE
Gwernvale, Powys	+	-	Hillman, forthc.
Hurst Fen	-	+	Clark, 1960
Bishopstone, Sussex	+	-	Arthur, 1977
Hembury, Devon	+	-	Helbaek, 1952
Windmill Hill, Wilts	-	+	Helbaek, 1952
Springfield, Essex	+	-	Murphy, 1984
Spong Hill, Norfolk	+	+	Murphy, 1984
Carn Brea, Cornwall	-	+	Mercer,
Whitehawk, Sussex	-	+	J&H, 1944
Maiden Castle, Dorset	-	+	J&H, 1944
Abingdon, Oxon.	-	+	J&H, 1944
Easterton, Scotland	-	+	J&H, 1944
Eday, Orkney	_	+	J&H, 1944
Unstan, Orkney	_	+	J&H, 1944
Dunloy, N.Ireland	_	+	J&H, 1944
Whitepark, Eire	-	+	J&H, 1944
Nes Gruting, Shetland	+	-	Calder, 1955
Down Farm, Dorset	+	-	Jones, 1980
Barton Court, Oxon.	+	-	Jones, 1980
Mount Farm, Oxon.	+	-	Jones, 1980

(last 3 sites later Neolithic)

Also evidence from many of these sites for exploitation of wild resources such as hazelnuts.

Table 3. <u>Examples of sites producing evidence of Neolithic arable agriculture</u>.

with a small amount of barley and low numbers of weed. Hillman feels that these cannot be assigned to a particular crop product and may even be the result of accidental burning of the sward. At Gwernvale, no swollen grass rhizome tubers were recovered (Hillman, forthcoming).

Hillman, in his discussion of Neolithic agriculture (in Simmon and Tooley, 1981), while adding a number of sites to the record, reiterates the fact that many of the questions concerning the development of crop husbandry in this country are still largely unanswered. He concludes that in general terms emmer, naked and hulled six-row barley and smaller amounts of bread wheat, flax and possibly pulses were cultivated. Thus the Hazleton assemblage while modest in size is an important addition to the crop record for the early Neolithic and fits in well with the general picture.
Table 3 gives a list of sites for this period for which published information is available, though there are no doubt other records not cited or in press. On many of the sites evidence for wild plant resources such as hazelnuts was abundant, as it was at Hazleton.

The limited crop record which exists at present seems to imply that early in the Neolithic, crop plants were considered perhaps as an addition to the wild resources, both plant and animal which were collected/hunted and upon which communities were formerly dependant. Dennell (1983) suggests that cereal cultivation did not necessarily have to be the result of colonisation from the continent, but contact from the indigenous population could have caused new ideas and practices to become incorporated into existing traditions. Although this seems likely, the same innovations would presumably also have arrived with immigrants from the continental mainland. As far as livestock were concerned, it is palusible that a form of 'woodland based pastoralism' contributed to the economy.

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