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577.

Potterne, Wiltshire : Carbonised plant remains from the Late Bronze Age Midden (Interim report)

by Vanessa Straker

Rescue excavations in 1983 and 1984 by C. Gingell and A. Lawson for the Trust for Wessex Archaeology confirmed the size and importance of the LBA midden and underlying settlement at Blackberry Field, Potterne (Gingell and Lawson 1984).

During the excavations 1 metre square column samples were taken by W. Carruthers, and the analysis of the carbonised plant remains from two of the four 1984 columns forms the subject of this report. The four squares were positioned to cover as wide an area of the trench as possible (Carruthers 1985), though the two examined were adjacent to observe variation between adjacent squares and the effect of doubling the sample size. The samples were sieved and sorted by W. Carruthers who has reported upon the mineralised plant remains present throughout and beneath the midden deposits (Carrruthers 1985).

The aim of the study is to:

1. Identify the crop plants preserved in the midden and in the features beneath it and compare this with other LBA records.

2. Note any vertical differentiation within the midden in the presence of the different crop plants.

3. Identify any changes in the weed flora at different levels in the midden, in case this can suggest that different habitats were

exploited for cereal production during the period that the midden accumulated.

4. Compare the carbonised and mineralised plant assemblages.

5. Investigate the variation in the assemblages derived from adjacent 1 metre square columns, and examine whether the sampling strategy in 1984 recovered adequate material or whether an altered plan will be required for any future excavation.

1 and 2 . With the exception of levels 1-3 which are disturbed, several species of wheat (Triticum spp.) dominate the cereal assemblage (Table 1). The amount of grain is low and varies in the upper part of the midden, but increases in levels 7-10, whereas chaff shows a general increase towards the base of the midden in the levels where the amount of carbonised material has anyway increased. Barley (Hordeum sp.) is also present throughout the midden in smaller quantities than wheat. Oats (Avena sp.) are found only in small amounts, with a slight increase towards the base of the midden. Rye (Secale cereale) was not identified with certainty; caryopses with characteristics in common with both wheat and rye were scored as Triticum/Secale.

All the cereals with the exception of oats are present in the pre-midden contexts.

Wheat The criteria for the identification of the glume wheats are those of Hillman (forthcoming and in press). Grains with the morphological characteristics of emmer (T. dicoccum), such as a humped dorsal surface are present in small amounts throughout the midden, though mostly in

Table 1. Columns 88 and 89 : cereals

TAXA		COMPONENT	1		2		3		4		5		6		7		8		9		10		11		PRE-N
			88	89	88	89	88	89	88	89	88	89	88	89	88	89	88	89	88	89	88	89	88	89	
Avena sp.	Oats	grain	-	-	-	-	1	3	-	1	3	1	-	2	7	5	-	-	12	10	5	10	-	-	-
cf. Avena sp.	Oats	grain	-	-	-	-	-	-	-	-	1	-	2	1	-	-	-	-	-	-	-	-	-	-	-
Avena sp.	Oats	awn fragments	-	-	-	-	-	-	-	-	-	-	-	-	-	-	++	+	+	-	+	-	-	1	-
Avena sp.	Oats	floret base	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	+	-	-	-	-	-	-	-
Avena sp./Bromus sp.	Oats/Brome	grain	-	-	-	-	1	-	1	1	-	1	-	1	-	1	2	1	-	1	1	4	-	1	1
Avena sp./Hordeum sp.	Oats/Barley	grain	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Bromus S. Eubromus	Brome	grain	-	-	-	-	-	1	4	3	-	2	2	3	36	3	130	18	27	7	15	38	7	2	1
Hordeum sp., T	Barley	grain	-	-	-	-	-	7	1	2	1	2	-	2	7	-	-	-	1	-	-	-	1	-	2
Hordeum sp., S	Barley	grain	-	-	-	-	11	1	9	7	-	-	-	5	-	-	-	-	-	-	-	1	-	-	1
Hordeum sp., HS	Barley	grain	-	-	-	-	-	-	-	-	2	1	1	1	-	-	2	1	-	-	-	1	-	1	2
Hordeum sp. HT	Barley	grain	-	-	-	-	2	2	2	2	2	1	4	5	3	5	13	-	1	4	-	-	-	-	-
Hordeum sp. H	Barley	grain	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	10	-	5	3	2	-	-	-
Hordeum sp.	Barley	grain	-	-	2	1	1	12	18	13	9	4	13	17	10	12	11	3	8	5	8	13	6	2	23
cf. Hordeum sp.	Barley	grain	-	-	1	-	-	1	-	-	-	-	1	1	-	-	1	-	-	-	1	-	-	-	1
Hordeum sp.	Barley	rachis internode	-	-	-	-	-	-	-	-	-	-	3	-	-	-	2	-	-	-	-	-	-	-	1
cf. Secale cereale	cf. Rye	grain	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	1	-	-	1	-
Triticum cf. aestivum s.l.	Bread Wheat	grain	-	-	1	1	4	1	1	3	-	-	1	1	2	3	1	1	9	3	-	2	-	-	5
T. aestivum/dicoccum	Bw/Emmer	grain	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	3	8	-	-	3
T. cf. dicoccum	cf. Emmer	grain	-	-	1	-	5	2	4	2	1	1	4	3	5	2	10	-	6	-	17	17	1	-	3
T. dicoccum	Emmer	glume bases	-	-	-	-	-	-	1	1	1	-	1	8	6	-	15	2	9	6	15	51	24	4	6
T. dicoccum	Emmer	spikelet forks	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	7	4	1	-	-
T. dicoccum/spelta	Emmer/Spelt	glume bases	-	-	-	-	-	-	-	-	9	-	-	4	2	-	2	-	-	1	6	10	1	-	4
T. dicoccum/spelta	Emmer/Spelt	spikelet forks	-	-	-	-	-	1	-	-	-	-	-	8	2	11	-	-	-	1	1	-	-	-	-
T. dicoccum/spelta	Emmer/Spelt	grain	-	-	-	-	-	-	-	-	-	-	-	-	2	1	-	-	-	-	3	-	-	-	2
T. monococcum/dicoccum	Einkorn/Emmer	spikelet forks	-	-	-	-	-	-	-	-	-	-	-	-	7	1	-	-	1	-	-	1	-	-	1
T. monococcum/dicoccum	Einkorn/Emmer	glume bases	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	2	-	-	1	-	1	2
T. monococcum/dicoccum	Einkorn/Emmer	grain	-	-	-	-	-	-	1	-	-	-	1	1	-	-	7	-	-	2	-	1	-	-	-
T. cf. monococcum	cf. Einkorn	glume bases	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
T. monococcum/Secale cereale	Einkorn/Rye	grain	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T. cf. spelta	cf. Spelt	grain	-	-	-	-	1	-	5	-	-	-	-	-	5	5	14	3	-	1	-	20	3	4	8
T. spelta	Spelt	glume bases	-	1	-	-	-	-	7	8	10	9	1	19	10	9	28	1	9	17	63	60	12	5	28
T. cf. spelta	cf. spelt	glume base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
T. spelta/aestivum	Spelt/Breadw.	grain	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-
Triticum sp.	Wheat	grain	-	-	2	2	6	5	12	15	11	11	7	14	21	11	23	10	28	13	25	18	7	6	27
Triticum sp.	Wheat	glume bases	-	-	-	-	3	2	10	13	2	36	10	36	24	27	50	17	55	29	219	261	31	24	52
Triticum sp.	Wheat	spikelet forks	-	-	-	-	-	-	-	2	-	4	1	7	4	1	8	2	-	1	12	11	3	1	4
Triticum sp.	Wheat	glume fragments	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
Triticum sp.	Wheat	spikelet fork bases	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	2	3	1	-	1	-	1
Triticum sp.	Wheat	rachis internodes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	1	-	-	2	-	-	2
Triticum sp./Hordeum sp.	Wheat/Barley	grain	1	-	-	-	1	1	11	2	7	1	1	6	15	1	3	1	2	1	12	17	-	1	12
Triticum sp./Secale cereale	Wheat/Rye	grain	-	-	-	-	-	-	1	3	-	-	2	1	-	-	-	1	1	-	1	4	1	-	3
Cereal sp.		rachis fragments	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	3	-	-	1	1
Cereal sp.		grain	-	-	-	-	3	1	2	5	1	3	1	6	1	1	2	12	+	+	++	++	+	+	37
Cereal sp.		shoots	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-
cf. cereal culm nodes			-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-

level 10. Glume bases of emmer, which are more reliably identified to species level than grains of emmer were present in level 4 downwards, and particularly in level 10. Grains with a flattened dorsal surface were scored as comparable with those of spelt wheat in levels 3,4, and 7 downwards (ie. throughout the midden) and the presence of chaff in the form of spikelet forks and glume bases from level 4 downwards confirmed the identification. Some wheat grains with a rounded dorsal surface and steeply angled embryo were suggestive of bread wheat (T. aestivum s.l.; the group commonly grown at the present day), and were found in small amounts but at all levels in the midden. No definite rachis remains or other chaff was identified to confirm the presence of the bread wheat but it has been identified in small quantities on prehistoric sites from the Neolithic onwards (Hillman 1981).

Various intermediate categories are listed on Table 1 where the grains had characteristics in common with more than one species. The T. monococcum/dicoccum category indicates the presence of einkorn or single grained emmer; but unfortunately the chaff is not well enough preserved for einkorn to be identified with certainty.

Barley (Hordeum sp.) is present throughout the midden, some is hulled, but no naked grains were observed though this could be due to poor preservation. The presence of some twisted grains suggests that the barley is either six-rowed or a mixture of six-row and two-row varieties. Occasional rachis internodes were recorded, of varying lengths. However, the small numbers involved do not allow the use of the internodes to suggest whether the barley was of a lax-eared or erect spike variety, or a mixture of the two.

Oats (Avena sp.). Oats, mainly in the form of caryopses are present in small quantities throughout the midden, particularly in levels 7,9, and

10. Unfortunately the chaff remains consist principally of awn fragments and it is not possible to tell whether the oats are a cultivated form or wild, in which case they could be regarded as weeds of the cereal fields. Wild oats are still a troublesome weed of cereal fields today. Unlike the other cereals, oats are not found in the pre-midden deposits.

Bromus Brome, classified only as far as the subgenus Eubromus is present at all levels, especially 7-10, and it is also present in the pre-midden deposits. This group of grasses is commonly found in association with cereal crops and arable weeds and is generally regarded as an additional weed contaminant. It is possible that on occasion brome was cultivated deliberately as it is edible and the caryopses are quite large, similar in size to some oats. At Potterne, in the two columns so far examined, brome is at least as common as barley and slightly more frequent than oats.

On the basis of the carbonised plant remains recoverd so far, it is not really possible to make detailed suggestions about crop processing or agricultural practice; after the other columns have been analysed, it may be possible to say more on these aspects. It is clear, however on present results that at least some of the final stages of the processing of glume wheats were being carried out at the site as the presence of glume bases, spikelet forks and some arable weeds indicates. Wheat appears to have been the main cultivar and analysis of the other columns should reveal whether barley remains a more minor component or, if lateral variation in the midden proves to be great, is equally important. At present, oats and brome are best regarded as contaminants of the wheat and barley crops.

Deatils of Bronze Age arable agriculture in Britain are still

surprisingly slight. Dennell (1976), in his reassessment of Helbaek's early conclusions about the nature of Bronze Age crop husbandry (Helbaek, 1952), suggested that wheat and barley were staple crops on the chalklands, the areas where most evidence is available from. Several recent excavations, some, including Potterne in areas of rather different geology are now adding to the picture. The downland site at Black Patch, Sussex, provides a good comparison with Potterne as hulled barley and spelt were among the cereals cultivated. The main difference between the assemblages is that although at Potterne no rachis remains were found to confirm the presence of bread wheat, this group was very probably present, whereas there is no evidence of bread wheat at all at Black Patch, (Hinton in Drewett, 1982). Many of the weed species recorded at Black Patch from pits, post holes and hut floors were also found at Potterne. The recent excavation at Runnymede Bridge also confirms the presence of spelt wheat in the British Bronze Age and barley and rye are also among the cereals present (J. Greig, pers. comm.). Rye was not noted at Potterne or Black Patch. Preservation at Runnymede is particularly good with carbonised and contemporary waterlogged plant remains preserved in a riverside situation. The present important excavations in the Fens should also add much detail to knowledge of Bronze Age crop husbandry. Evidence for the use of pulses in the Bronze Age is slight and future analysis of deposits at both Runnymede and Potterne may provide more information on the importance of these protein-rich food sources.

3. Table 2 shows the species identified from the carbonised seeds of wild or weedy plants. Habitat information is taken from Clapham, Tutuin and Warburg (1962). The range of species represented is quite large, though the numbers relatively small, particularly bearing in mind the

VALERIANACEAE																								
Valerianella dentata(L.) Poll.	Corn salad	-	1	-	-	1	-	-	-	-	-	-	-	2	-	-	1	2	-	3	2	-	-	-	Da
VIOLACEAE																								
Viola sp.	Violet, Pansy	-	-	-	1	-	2	-	-	-	-	2	-	-	-	21	-	-	-	-	3	-	-	-	D,Da
c.f. Viola sp.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	D,Da
unidentified B - bud, + - fragment		3	-	2	-	11+	2+	6+B	2	+	6+	6	9	25	4	52	9	21	3	16	17	2	6	-	

Habitat preferences :
- D - disturbed ground, field margins, waysides
- Da -disturbed ground, including arable
- G - grassland
- M - marsh
- B - bankside
- H - heaths
- W - woods
- S - scrub
- V - varied
- e - edible

Table 2. Columns 88 and 89 : wild species.

TAXA		1 88	89	2 88	89	3 88	89	4 88	89	5 88	89	6 88	89	7 88	89	8 88	89	9 88	89	10 88	89	11 88	89	Pre- midden	Habitat preferences
BORAGINACEAE																									
Lithospermum arvense L.	Corn gromwell	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	Da
CAPRIFOLIACEAE																									
Sambucus nigra L.	Elder	3+	-	-	-	-	1	-	-	-	-	-	-	2	-	-	-	-	1	-	1	-	-	-	W,S,D,e
CARYOPHYLLACEAE																									
Cerastium sp.	Chickweed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	D,Da,G
Lychnis flos-cuculi L.	Ragged robin	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	M,W,G,damp
Myosoton aquaticum (L.) Moench	Water chickweed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	M,Vdamp
Silene sp.	Campion	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V
Spergula arvensis L.	Corn spurrey	-	-	-	-	1	-	-	-	-	-	-	-	1	-	2	2	1	-	-	-	-	-	-	Da,calcifuge
Stellaria sp.	Stitchwort	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	V
gen. et sp. indet.		1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	V
CHENOPODIACEAE																									
Atriplex sp.	Orache	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-	-	Da
Atriplex sp./Chenopodium sp.	Atriplex/Chenopodium	-	-	-	-	3	1	-	-	-	-	-	-	-	-	8	1	-	4	1	3	-	-	-	V
Chenopodium album L.	Fat hen	-	-	-	-	-	1	-	-	4	-	-	1	-	-	-	-	-	-	-	-	1	-	6	D,e
Chenopodium sp.		-	-	1	4	1	-	1	1	2	1	3	1	-	2	3	2	2	-	4	-	-	-	-	V
COMPOSITAE																									
Anthemis cotula L.	Stinking mayweed	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	D,Da
cf. Chrysanthemum segetum L.	c.f. Corn marigold	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Da, acid
Tripleurospermum maritimum (L.) Koch.	Scentless mayweed	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	1	1	-	-	2	D,Da
gen. et sp. indet.		-	-	2	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-	V
CORYLACEAE																									
Corylus avellana L.	Hazel	-	-	-	-	-	-	+	-	+	+	+	+	+	+	+	+	-	+	+	+	-	-	-	M,S,e
CRUCIFERAE																									
Brassica sp.	Rape, Turnip etc.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	V,e
c.f. Brassica sp.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	V,e
gen. et sp. indet.		-	-	1	-	-	1	1	1	-	-	-	-	1	1	-	-	1	-	-	1	-	-	-	
CYPERACEAE																									
Carex spp.	Sedges	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	2	1	2	3	-	-	-	M,V
Eleocharis S. Palustres	Spike rush	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	M,D, pond margins
gen. et sp. indet.		-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	5	-	1	1	-	-	-	-	V, damp
EUPHORBIACEAE																									
Euphorbia helioscopia L.	Sun spurge	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	Da
GRAMINEAE																									
Arrhenatherum elatius var. tuberosum	Onion couch bulbils	-	-	-	-	-	-	-	-	-	-	-	-	-	-	44	-	-	-	-	-	-	-	-	Da, G
gen. et sp. indet. culm nodes		1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	G,V
gen. et sp. indet. grass/cereal culm nodes		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	1	-	-	-	G,V
gen. et sp. indet. caryopses		-	-	-	-	-	-	7	-	1	-	4	2	3	-	48	6	8	7	3	8	2	3	8	G,V
gen. et sp. indet. spikelet forks		1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G,V
gen. et sp. indet. glume bases		-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G,V
gen. et sp. indet. stem fragments		+	+	-	-	+	-	+	-	+	-	-	-	+	-	+	+	+	+	+	+	-	-	-	G,V
LABIATAE																									
gen. et sp. indet.		-	-	-	-	1	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V
LEGUMINOSAE																									
c.f. Vicia sp./Lathyrus sp.	c.f. Vetch/Tare	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G,V
Vicia sp./Lathyrus sp.	Vetch/Tare	-	-	-	-	2	-	-	2	-	1	2	3	+	1	7	3	2	1	6	14	1	1	4	G,V
gen. et sp. indet.		-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	1	-	-	-	V
PORTULACACEAE																									
c.f. Montia sp.		*	-	-	-	2	-	-	-	-	-	-	-	-	-	-	2	-	-	1	-	-	-	-	damp
PLANTAGINACEAE																									
Plantago lanceolata L.	Ribwort Plantain	-	-	-	-	1	-	-	-	-	-	-	-	2	-	2	-	1	-	-	1	-	-	1	D
POLYGONACEAE																									
Polygonum aviculare agg.	Knotgrass	-	-	-	-	-	-	-	-	-	-	-	-	5	1	20	2	7	3	1	2	-	-	-	Da
c.f. P. convolvulus L.	c.f. Black bindweed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	1	4	D,Da
P. convolvulus L.	Black bindweed	-	-	-	-	-	-	-	-	-	-	-	1	2	1	17	3	9	5	2	3	-	-	1	D,Da
P. lapathifolius/nodosum		-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	D,Da. Laside ponds
P. c.f. persicaria L.	c.f. Persicaria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	4	-	-	-	-	-	-	B(ponds),Da
Polygonum sp.		-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	1	1	-	-	-	-	V
Rumex acetosella agg.	Sheep's sorrell	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	6	-	-	-	-	-	-	Da,G,H,acid
Rumex spp.	Docks	2	-	5	1	4	3	1	2	-	-	2	1	3	3	13	3	1	2	3	3	3	-	2	V
RANUNCULACEAE																									
Ranunculus auricomus L.	Goldilocks	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	W
R. flammula L.	Lesser spearwort	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	V,wet
ROSACEAE																									
Agrimonia sp.	Agrimony	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	D,H
Aphanes sp.	Parsely Piert	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	Da,G
Crataegus monogyna Jacq.	Hawthorn	-	-	-	-	-	-	1	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	W,S
c.f. Prunus spinosa L.	c.f. Blackthorn	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	W,S
P. spinosa L.	Blackthorn, Sloe	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	+	+	-	-	-	W,S
P. spinosa/avium	Blackthorn/Cherry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	W,S
Rosa sp.	Rose	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	W,S
RUBIACEAE																									
c.f. Galium sp.		-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-	-	1	
Galium spp.	Bedstraws	-	2	-	1	1	-	1	-	-	-	2	3	-	-	10	5	1	+	4	2	1	1	1	V
Galium aparine L.	Cleavers	1	-	-	-	2	-	4	-	1	1	-	-	3	-	7	-	1	-	1	2	1	+	1	D,Da,S
SCROPHULARIACEAE																									
Euphrasia sp./Odontites verna (Bell.) Dum.	Eyebright/Red Bartsia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	6	-	-	-	-	-	1	D,Da
Veronica hederifolia L.	Ivy-leaved speedwell	-	-	1	1	-	2	-	1	-	-	-	-	-	-	-	1	1	1	1	-	-	-	-	Da
SOLANACEAE																									
Hyoscyamus niger L.	Henbane	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	w	1	-	-	-	-	-	D, sandy
Solanum nigrum L.	Black nightshade	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	D
gen. et sp. indet.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	V
URTICACEAE																									
Urtica dioica L.	Stinging nettle	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	2	1	-	-	S,G,W,e

large volume of soil processed. Although numbers of unidentified seeds appear to be large, many were in a very poor state of preservation.

As many plants will colonise more than one specific habitat it is sometimes difficult to be sure of the conditions in which the plants grew. However, as the charred seeds are associated with cereal grain (mostly wheat) and chaff, as can be expected, many of them are arable weeds or plants of disturbed ground or cultivated land; in this case probably cultivated land. These groups are present throughout the midden as shown in Figure 1. A general increase in numbers is seen in levels 7-10. Of the arable/disturbed ground flora, the presence of Anthemis cotula (Stinking mayweed) and Arrhenatherum elatius (Onion couch) is of interest. Stinking mayweed is not usually found in pre Roman deposits, though it has been recorded in early contexts in Wessex before (W. Carruthers, pers. comm.). The onion couch has been found, for example, in association with Bronze Age cremations (Godwin, 1975; Jones, 1978) and in earlier deposits at Hazleton chambered cairn (Straker 1985). It has been suggested (M. Robinson pers. comm.) that this grass which can also occur as an arable weed or on abandoned arable land, would make useful tinder for starting fires, possibly why it is found in association with creamtions and in the present context. Galium aparine (Cleavers) is also a noteworthy arable weed as it associated with the autumn sowing of crops, a practice now though to date as far back as at least the Bronze Age (Jones, 1981).

Woods, scrub and hedgerow conditions are represented by small numbers of seeds throughout levels 3-10, but not beneath the midden. The hazelnuts and sloes were probably eaten and the refuse burnt with the waste from cereal cleaning; whereas the others (Rose and Ranunculus auricomus, Goldilocks) may suggest that the cultivated land bordered on woods or hedgerows - small numbers of woodland plants are often found in cereal dominated assemblages.

Plants which have a preference for damp or wet conditions are also present in the midden. As Figure 1 shows, they appear intermittently in the upper part of the midden, and in greater, though still small numbers in levels 7-10. Although it could be suggested that early in the accumulation of the midden the cereals were being grown on more marginal, wet land, and later the settlement was supplied with crops from better drained areas, as the numbers of seeds are so small, further columns need to be examined to see if the pattern is repeated.

Certain arable weeds (Lithospermum arvense, Chenopodium sp., Galium aparine, Valerianella dentata, Polygonum aviculare and P. convolvulus) are found in both the carbonised and mineralised assemblages, however Thlaspi arvense (Field pennycress) and Papaver dubium/argemone (Poppy) are found only in the mineralised state. If these species were ever present as weeds of the cereal fields supplying the settlement, their absence from the carbonised arable flora may be due to removal during crop processing. Absence of some arable weeds in the mineralised assemblage is to be expected due to difficulties of preservation as well as the fact that the two assemblages owe their composition to different domestic activities. For this reason, the carbonised seeds contain few species which are nitrophilous, a group noted particularly in the lower levels of the midden by W. Carruthers.

5. One of the main objectives of the sieving and sampling programme was to see if the method selected was providing adequate carbonised and mineralised plant remains to be considered representative of the deposits in general. The deposits were sampled in 10cm spits, and, for the carbonised material the whole spit was sieved (ie. 10cm x 1m x 1m). This meant that the volume of soil was very large, ranging (except for spit

Figure 1. Taxa included in habitat groups

D *Chenopodium album*, *Agrimonia* sp., *Hyoscyamus niger*, *Solanum nigra*.

D, Da *Cerastium* sp., *Anthemis cotula*, *Tripleurospermum maritimum*, *Polygonum convolvulus*, *P. lapathifolium/nodosum*, *Galium aparine*, *Euprasia* sp./ *Odontites verna*, *Viola* sp. *Arrhenatherum elatius* var. *tuberosum*.

Da *Lithospermum arvense*, *Aphanes* sp., *Spergula arvensis*, *Atriplex* sp., *Euphorbia hydroscopia*, *Rumex acetosella*, *Veronica hederifolia*, *Valerianella dentata*.

W, S *Corylus avellana*, *Crataegus monogyna*, *Prunus* spp., *Rosa* sp., *Ranunculus auricomus*.

Damp *Carex* spp., *Eleocharis* S. *Palustres*, *Montia* sp., *Ranunculus flammula*, *Lychnis flos-cuculi*.

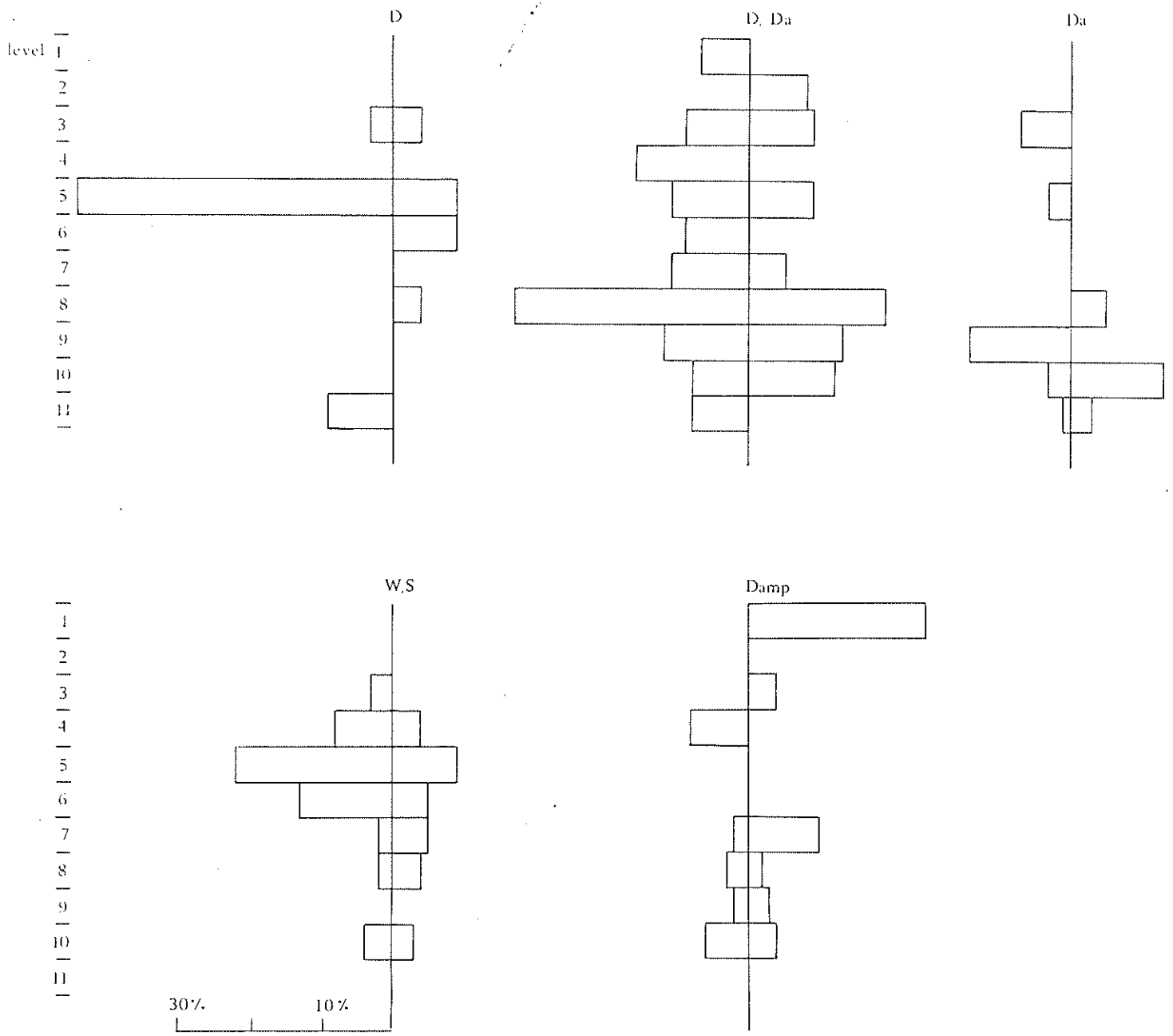

Figure 1. Percentages of weed seeds from disturbed ground, arable/cultivated land, woods/scrub/hedgerows and damp conditions. Left - column 88, right - column 89.

11) from 124-187 litres in column 88 and 120-170 litres in column 89. However as Table 3 and Figure 2 show, the density of carbonised material was low (from 0.08 to 3.55 items/litre in column 88 to 0.03 to 3.87 items/litre in column 89). The greatest quantities were obtained from levels 6-10, though as Fig. 1 shows the quantities at each level were not always very similar between adjacent columns, level 6 being particularly anomalous in this respect. The preliminary results suggest therefore that deposition of the plant remains was a piecemeal process, as might be expected, 'basketfulls' perhaps being dumped at a time. The examination of the other columns is necessary to study the extent of lateral variation which could be very great.

The question of how large an assemblage can be considered representative of the deposit as a whole is open to debate; depending to a great extent on the questions being asked of the material. One method that can be considered is to take successive subsamples and plot the occurrence of new species on a graph. When the rate of increase is so small that the extra information does not justify the time spent in extracting the material (as demonstrated, for example, by Green, 1979), then no further samples are examined. This does require that very large soil samples are collected in case they are needed. A rather different approach suggested recently is to use a number as a cutoff point, in the manner of pollen analysts counting a predetermined number of grains. Van der Veen and Fieller (1982) have suggested by means of statistical analysis that around 400 seeds are necessary for estimates with a 5% accuracy of relative proportions of seeds in a sample at a confidence level of 95-98%. If Table 3 is consulted, it is clear that for Potterne recovery is very low in terms of seeds or other items per litre. Whatever method is preferred it is clear that larger samples are required. As the top 3 levels are disturbed by later cultivation and the volume of plant material fairly high in levels 8-10, then perhaps larger

TABLE 3 POTTERNE : CARBONISED AND MINERALISED SEEDS

LEVEL	VOL.SOIL (L)	TOTAL C.	TOTAL M.	TOTAL C+M	C/LITRE	M/LITRE	TOTAL/LITRE
COLUMN 88							
1	186	16	14	36	.08	.07	.15
2	160	24	15	39	.15	.09	.24
3	187	72	77	149	.38	.41	.79
4	168	115	22	137	.57	.13	.70
5	124	71	20	91	.57	.16	.73
6	137	78	20	98	.55	.14	.71
7	125	226	47	273	1.80	.37	2.17
8	147	522	77	599	3.55	.52	4.07
9	140	265	285	550	1.89	2.03	3.92
10	163	508	597	1102	3.11	3.66	6.77
11	34	111	62	173	3.26	1.82	5.08
COLUMN 89							
1	138	5	3	8	.03	.02	.05
2	170	17	35	52	.10	.20	.30
3	188	60	7	67	.31	.04	.35
4	157	94	52	146	.59	.33	.92
5	124	89	35	124	.71	.28	.99
6	135	175	21	196	1.29	.15	1.44
7	120	115	162	277	.95	1.35	2.30
8	137	133	329	462	.97	2.40	3.37
9	154	255	512	767	1.65	3.32	4.97
10	163	632	441	1073	3.87	2.70	6.57
11	26	66	187	253	2.53	7.19	9.72
PRE MIDDEN FEATURES							
posthole 3531	18	147	178	325	8.16	9.88	18.05
pit 3710	130	77	485	562	0.59	3.73	4.32
pit 3716	64	50	334	384	0.78	5.21	6.00

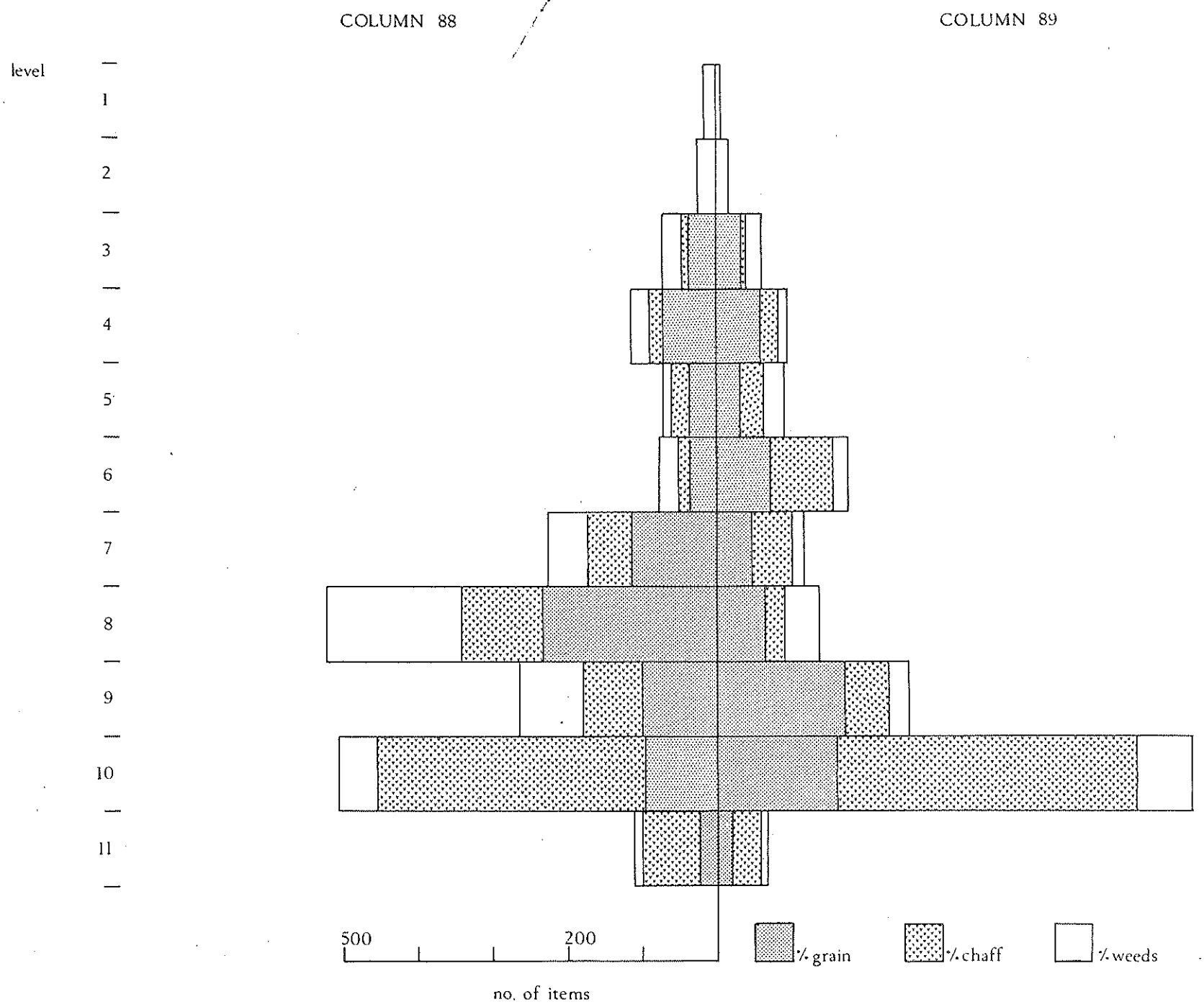

Figure 2. Variation in size of assemblage between adjacent columns and throughout the midden. The approximate percentages of grain, chaff and weed seeds

samples are only required from levels 4-7. The problem with this approach is that if there is, as there appears to be, great local variation, other areas of the midden may not comparable with columns 88 and 89 in terms of concentration of plant remains at depth in the midden. The site is very large and the two sample columns only represent 2.3% of the area excavated in 1984.

Suggested sampling strategy

1. Size of columns increased to 2 square metres (i.e. 4 times previous sample). This may cause problems in terms of cost and time as sieving and sorting is very slow owing to the nature of the deposits (Carruthers 1985). If the soil is processed as cumulative subsamples on site as time/personnel allowed, more could be be sieved if required, or discarded if the frequency of new species recorded as the subsamples are examined was low enough. Some samples would probably need to be stored and sieved during the post-excavation analysis if necessary.
2. The sample columns would be positioned either to cover as wide an area of the site as possible or at random.

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