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TITLE	Fruits & seeds from Roman deposits at Ilchester

Fruits and seeds from Roman deposits at Ilchester

Peter Murphy, Department of Archaeology, University of Southampton.

Plant remains from 33 one kilogram soil samples from sites B2/S, R9/S and R10/S were received for examination. Most of the samples, consisting largely of carbonised material, had been wet-sieved before they were received, using a double thickness of stocking nylon as a fine mesh, but since quantities of soil, grit and small pebbles were still present, a final separation by simple flotation in water proved to be necessary. Flotation was only carried out after checking small portions of the samples to ensure that re-wetting did not cause fragmentation of the carbonised material. The dried flot consisted almost entirely of carbonised fruits, seeds and spikelet parts, and sorting through a 5cc. portion of flot from each sample was found to produce an adequately large number of carbonised fruits and seeds.

Two samples - F3 L6 and F150 L4 - contained botanical material preserved in anaerobic, waterlogged conditions. F3 L6 had been wet-sieved before it was received, but the material was still wet. Fruits and seeds were extracted from 500cc. of soil from F150 L4 by paraffin/water flotation (Coope and Osborne 1967).

The fruits and seeds extracted and identified are listed in Table 1. The nomenclature follows Clapham, Tutin and Warburg (1962); cereals are listed at the top, weed grasses below and other weed species appear at the bottom, the order of families being that of Clapham et al.

Botanical description.

(a) Wheats

Many of the wheat caryopses in these samples are badly distorted since they had germinated before becoming carbonised. The basal portions of such grains are shrivelled and there are grooves running along the dorsal sides, which often contain the remains of the developing sprouts (Fig. 1,c). Loose sprouts detached from the grains are common most samples. However, the better preserved grains are in general rather long, with flat broad ventral sides and blunt apices, typical of spelt, Triticum spelta L. (Figs. 1 a,b). A few slender grains reminiscent of emmer, Triticum dicoccum Schubl., are also found. In F41 L12 there is a single grain with its maximum width just above the embryo, which may possibly be of bread wheat, Triticum aestivum L., although this form of grain may be an artefact of carbonisation (Fig. 1,e). F41 also produced a grain which closely resembles spelt grains harvested at the immature 'doughy-ripe' stage (Fig. 1,d.). As only small numbers of well-preserved grains could be isolated no measurements have been made.

The spikelet parts are much more helpful in defining the different wheat species present. Spikelet forks of spelt, which are rather broad with internodes fractured at their upper ends are present in many of the samples (Fig. 2,a.). By contrast emmer forks are much less common. F361 L9 contains entirely typical emmer forks, in which the internodes have fractured at their lower ends (Fig. 2,b), and emmer forks lacking internodes also occur in F420 L3. These forks, measured across the articulation point, (Helbaek 1952, 217), are considerably narrower than spelt forks. There are also a few apical forks, which lack articulation scars and are extremely narrow (Fig. 2,c.). Dimensions of spikelet forks are given in Table 2.

Table 2: Wheat spikelet fork widths (mm.)

	T. dicoccum	T. spelta	Apical fork.
Bf 88b.	-	2.1, 2.2	-
F41 L10	-	2.2	-
F41 L16	-	2.1, 2.2	1.4
F361 L9	1.8 - 2.0	-	-
F420 L3	1.5 - 1.6	2.0 - 2.5	-

In two samples - F420 L3 (R9/S) and BF 88b - there are short sections of immature glume-wheat rachis, each comprising three internodes which have not fragmented (Fig.).

Feature number		1	3	5	9A	9A	31C	41	41	41	41	41	41	41	84W	41
Sample no.		4	6	5	3	7	3	5-13	7	9	10	12	13	16	18	19
Cereal indet.	ca	10		14	19	27	3	8	24	10	11	3	6	15	5	21
Triticum sp.	ca	6		15	50	52	3	11	24	26	13	17	25	22	3	14
Hordeum sp.	ca											1				2
Avena vulgare	ca				2	2										
Avena sp.	ca	4								1		1				1
Triticum sp.	spf	1		3		1			4	4			3	3		4
Triticum spelta	spf				1	2		2	3	2	3	2	3	10		
Triticum dicoccum	spf															
T. spelta and T. dicoccum	gb	63		258	1	6	83	246	287	223	301	285	165	259	103	171
Hordeum sp.	ri													2		4
Avena sativa	fb									1						
Avena fatua	fb									1				2		1
Cereal indet.	cn										1					
Lolium perenne	ca	4		4			3	13	3	8	9	19		2	1	
Danthonia sterilis	ca											1				
Bromus mollis/secalinus	ca	11		5	4	4	5	47	64	46	34	116	109	62+	29	56
Gramineae indet. (l)	ca	12		18		3	2	34	25	43	44	19	18	35	19	68
Gramineae indet. (s)	ca	4		6			3	10		1	3	20		1	1	7
Brassica/Sinapis sp.	s															
Raphanus raphanistrum	sj								1							
Stellaria media	s															
Montia fontana	s															
Chenopodium sp.	s															
Polygonum aviculare/persicaria	s			1			3							1	2	1
Vicia cf. tetrasperma	s															
Vicia sp. (l)	s			4												
Vicia sp. (s)	s			1												
Leguminosae indet.	s						2									
Filipendula ulmaria	a		3													
Rubus fruticosus	fs		2													
Urtica dioica	fs		1													
Galium aparine	fr															
Polygonum convolvulus	nu			1												
Carex acutiformis	nu		14	4				2	3							
Polygonaceae indet.	nu															
Urtica urens	nu															
Urtica dioica	nu		11													
Corylus avellana	ns															
Cyperus niger	s															
Solanum dulcamara	s		4													
Rubus europaea	nu		1													
Galium aparine	fr			1												
Sambucus nigra	s		2													
Pleurospermum maritimum	cy	1		1												
Hordeum/Secale sp.	cy		1													
Graminae indet.	nu															
Indeterminate		3	10				1	1	2						2	

Table 1: Fruits, seeds etc. identified in the Ilchester samples. (Sheet 1)

The following abbreviations are used:

a - achene	fs - fruitstone	nu - nutlet
ca - caryopsis	fr - fruit	ri - rachis internode
cn - culm node	gb - glume base	s - seed
cy - cypsela	indet. - indeterminate	sj - siliqua joint
fb - floret base	ns - nutshell	spf - spikelet fork.

Vicia sp. (l) Unidentified vetches, greater than 2mm. diameter
Vicia sp. (s) " " , smaller, " " "
Gramineae (l) Unidentified grass caryopses, probably Bromus or Avena.
Gramineae (s) Unidentified small grass caryopses.

ple number		47	47	50	60	68	80	81	81	150	213	271	306	361	361	420
.		3	4	7	5	7	3	3	4	4	3	3	3	5	9	13
l indet.	ca	33	33	5	2	6	12	33	39		6	10	5	30	9	21
eum sp.	ca	18	35	9		9	8	36	32		4	15	6	41	12	11
um sp.	ca	2	1						1			1				
um vulgare	ca						1								1	
sp.	ca														1	
icum sp.	spf			3	4	4			2		2	3	1	2	6	2
icum spelta	spf	1		2	2	2			1			3			3	5
icum dicoccum	spf														3	2
pelta and T. dicoccum	gb			99	102	328	40	58	9		299	305	103	72	270	351
eum sp.	ri														1	1
a sativa	fb													1	1	
a fatua	fb															
eal indet.	cn				1											1
ium perenne	ca				1	10						5	2	4	4	12
ssentha sterilis	ca															
rus mollis/secalinus	ca		2	8	4	2		2			41	29	7	21	20	22
minaceae indet. (l)	ca	4		10	2		4	3	6		21	33	4	21	10	19
minaceae indet. (s)	ca			2	2	20	4				2	9	13	1	1	4
strica/Sinapis sp.	s									2						
phanus raphanistrum	sj															
llaria media	s				1					2						
ia fontana	s				1											
opodium sp.	s									1						
plex patula/hastata	s				6	2							1	2	15	5
a cf. tetrasperma	s												1			
a sp. (l)	s			8											1	1
a sp. (s)	s															
minosae indet.	s															
pandula ulmaria	a															
fructicosus	fs															
ecus monogyna	fs															
m maculatum	fr									17						
onum convolvulus	nu															
crispus	nu				2					1	1				5	4
onaceae indet.	nu															
urens	nu									3						
dioica	nu															
evoliana	ns									1						
mus niger	s									1						
dulcamara	s															
europaea	nu															
aparine	fr			2												
nigra	s									3						
rospermum maritimum	cy				2										1	1
Carduus sp.	cy															
ae indet.	nu									5						
inate.				1						2			1	1		

Table 1: Fruits, seeds etc. identified in the Ilchester sampl (Sheet 2).

The following abbreviations are used:

a - achene	fs - fruitstone	nu - nutlet
ca - caryopsis	fr - fruit	ri - rachis internode
cn - cul node	gb - glume base	s - seed
cy - cypsela	indet. - indeterminate	sj - siliqua joint
fb - floret base	ns - nutshell	spf - spikelet fork.

		R10/S		R2/S
...ple number		78	205	6F88
...r.		3	5	b
...l indet.	ca	2	17	14
...icum sp.	ca	4	8	4
...eum sp.	ca			
...um vulgare	ca			
...a sp.	ca			
...icum sp.	spf	1	3	32
...icum spelta	spf		1	4
...icum dicoccum	spf			
...spelta and T. dicoccum	gb	154	347	136
...deum sp.	ri			
...na sativa	fb			
...m fatua	fb			
...eal indet.	cn			
...ium perenne	ca	10	22	
...santha sterilis	ca			
...mus mollis/secalinus	ca	4	2	
...minaceae indet. (l)	ca	8	4	9
...minaceae indet. (s)	ca	8	5	
...sica/Sinapis sp.	s			
...hanus raphanistrum	sj			
...llaria media	s			
...tia fontana	s			
...nopodium sp.	s			
...plex patula/hastata	s			
...a cf. tetrasperma	s			
...ia sp. (l)	s			
...ia sp. (s)	s			
...minosae indet.	s			
...pendula ulmaria	a			
...s fruticosus	fs			
...cegus monogyna	fs			
...um maculatum	fr			
...volvulus convolvulus	nu			
...crispus	nu	5	2	
...ceae indet.	nu	1		
...urens	nu			
...a dioica	nu			
...us avellana	ns			
...mus niger	s			
...m dulcamara	s			
...s europaea	nu			
...aparine	fr			
...us nigra	s			
...rospermum maritimum	cy			
.../Carduus sp.	cy			
...ae indet.	nu			
...minate.				

Table 1: Fruits, seeds etc. identified in the Ilchester sample (Sheet 3).

The following abbreviations are used:

a - achene	fs - fruitstone	nu - nutlet
ca - caryopsis	fr - fruit	ri - rachis internode
cn - culm node	gb - glume base	s - seed
cy - cypsela	indet. - indeterminate	sj - siliqua joint
fb - floret base	ns - nutshell	spf - spikelet fork.

Lower glume bases are much more common than spikelet forks, and in particular strongly-nerved spelt bases, xxxxx occur in large numbers (Fig. 2,d.). Measurements of the glume base widths fall for the most part within a range appropriate for spelt (Table 3). Any samples, however, contain one or two narrower emmer glume bases, and F361 L9 and F60 L5 contain rather more emmer bases.

Table 3: Wheat glume base widths (mm.).(Unless otherwise indicated 30 specimens from the best-preserved sample from each feature have been measured).

Sample number	Width range	
BF 86b	0.98 - 1.28	
F1 L4	0.82 - 1.24	(n=22)
F5 L5	0.80 - 1.36	
F9A L7	1.08 - 1.20	(n=6)
F31C L3	0.76 - 1.28	
F41 L12	0.88 - 1.44	
F50 L7	0.86 - 1.44	
F60 L5	0.74 - 1.34	
F68 L7	0.86 - 1.32	
F80 L3	0.90 - 1.42	(n=16)
F81 L4	1.02 - 1.16	(n=3)
F213 L3	0.90 - 1.42	
F271 L3	0.90 - 1.24	
F306 L3	0.82 - 1.36	
F361 L9	0.80 - 1.42	
F420 L3	0.72 - 1.56	
F78 L3	0.90 - 1.36	
F205 L5	0.92 - 1.58	

The combined evidence of grain and spikelet parts shows that spelt is by far the commonest wheat species in these samples, with a little emmer and just possibly some bread wheat. In F78 L3, from site R10/3 it is clear that a xxxxx bearded spelt is represented, as fragments of barbed xxxxx awns occur in that sample (Fig. 2,k.).

(b) Barley

Barley occurs in 11 of the samples in small quantities. The grains appear to be all hulled, having a characteristically angular cross-section, and the presence of twisted grains from lateral spikelets shows that the six-row hulled species Hordeum vulgare L. emend. Lam. is represented. Fine details of grain morphology, including the form of grain base have not survived. A caryopsis in F41 L12 shows clear evidence of insect attack in the form of a neat cylindrical hole passing right across the width of the grain (Fig. 1,f).

The barley rachis internodes are in poor condition, with little trace of pubescence. Both long internodes, probably approaching 3 mm. in length, and shorter types of about 2mm. are present, but only the short internodes from F41 L16 are intact (Figs. 2,f,g). Certainly a lax-eared variety is represented, but in addition these shorter internodes may be from a dense-eared form, or alternatively from the basal part of a lax ear.

(c) Oats

Oat grains, long and thin in shape with clearly hairy surfaces occur sporadically in the samples (Fig. 1g,h.). The flower bases show that both wild and cultivated oats are represented. Bases with 'cucker-mouth' fractures, belonging to the wild oat Avena fatua L. are found in three samples, whilst bases with broad fracture surfaces, characteristic of cultivated oats Avena sativa L. occur in a further three (Figs. 2 h,i). Fragments of twisted oat awns are common (Fig. 2,l.).

(d) Weed grasses.

By far the commonest weeds in the carbonised samples are grass caryopses, almost all of which are of four xxxxx species, including Avena fatua. Other species are represented by a few naked caryopses, but these were not identified.

A species of Bromus, either B. mollis or B. secalinus, is the most frequent grass. The caryopses are thin and flat with rounded apices. At the apex lines of radiating cells are clearly visible (Fig. 1,i). 30 grains from the best-preserved sample, F41 L12, were measured and their dimensions and indices appear in Table 4.

Table 4: Dimensions in mm. and indices of Bromus caryopses.

	Length	Breadth	Thickness	L/B x 100	T/B x 100
minimum	4.3	1.6	0.9	232	47
mean	5.17	1.90	1.14	273	61
maximum	6.1	2.2	1.5	358	83

A single caryopsis of barren brome, Anisantha sterilis, was found in F41 L12. It is thin and elongate, but unfortunately damaged at base and apex (Fig. 1,j.)

Caryopses of ryegrass, Lolium perenne, occur in most samples. These boat-shaped 'seeds' are mostly still contained within their lemmas and paleas. The rachilla tapers towards its base. The pattern of cells visible on the bare caryopsis closely matches that of modern reference specimens. Twelve well-preserved specimens from F41 L12 have been measured.

Table 5: Dimensions in mm. and indices of Lolium caryopses.

	Length	Breadth	Thickness	L/B x 100	T/B x 100
minimum	2.4	0.8	0.6	227	54
mean	2.71	1.00	0.75	274	76
maximum	3.4	1.1	0.9	340	100

Germinated caryopses of Avena, Bromus and Lolium are present.

(e) Other weed species

Since the remaining seeds of weed plants are almost all very common species, detailed descriptions are not given. Table 6 gives a range of maximum lengths of the specimens, with brief remarks on the seeds. All have been identified by comparison with modern reference specimens. One species which is slightly more unusual is, however, dicussed in a little more detail below.

Table 6: Notes on the weed seeds. (Carbonised specimens are indicated by a letter C, waterlogged seeds by a letter W.)

	Range of lengths(mm.)	Remarks.
Brassica/Sinapis sp.	1.4 - 1.6	W. Surfaces eroded.
Raphanus raphanistrum L.	3.3	C. Ribbed siliqua joint
Stellaria media (L) Vill.	0.95 (C), 1.0 - 1.05 (W).	Low, irregular tubercules.
Chenopodium sp.	-	W. Testa fragment.
Atriplex patula/hastata.	1.0 - 1.5.	C. Rugose surfaces at radicle base.
Vicia cf. tetrasperma (L) Schreb.	2.0 (hilum 1.1)	C. Long thin hilum.
Filipendula ulmaria (L) Maxim.	-	W. Damaged, spirally twisted
Rubus fruticosus agg.	2.1	W. Small, oval fruitstone.
Crataegus monogyna Jacq.	6.4	W. Oval ribbed stone
Conium maculatum L.	2.3 - 4.0.	W. Ribs mostly missing.
Polygonum convolvulus L.	2.3.	C. Puffed, sub-spherical.
Rumex crispus L.	1.7 - 2.2	W. Nodules on laminae of perian
Urtica urens L.	1.7 - 1.8	W. Nutlet with keel.
Urtica dioica L.	1.0 - 1.4	W. Smaller, lacks keel.
Corylus avellana L.	-	W. Nutshell fragment.
Hyoscyamus niger L.	1.7	W. Fine minute reticulation.
Solanum dulcamara L.	2.0 - 2.1	W. Flattened seeds, reticulate
Lycopus europaea L.	1.3	W. Quadrilateral nutlet with margin.
Galium aparine L.	2.0 - 2.3.	C. Surface eroded.
Sambucus nigra L.	3.0.	W. Flattened with transverse ridges.

cont .....

cont...

Tripleurospermum maritimum (L) Koch.	1.4 - 1.8.	C. Ribs broken away.
Cirsium/Carduus sp.	3.3.	W. Surface eroded.
Cyperaceae indet.	damaged.	T. Mutlets without utricles.

Montia fontana L. ssp. chondrosperma. The carbonised seeds of this species from F60 F5 is 0.95 mm. long and coarsely tuberculate. Clapham, Tutin and Warburg (1962,267) note that this plant is commonly found in damp habitats and also occurs nowadays as an arable weed in S.W. England.

Discussion.

(a) Environment.

The seed assemblages preserved in anaerobic conditions in F3 L6 and F150 L4, a ditch and well respectively, both from site B9/3, give a picture of the local flora and hence of the immediate environment at the time when the sediments sampled were being formed.

The second century ditch F3, a field boundary parallel to the Fosse Way, produced seeds of two species commonly found alongside drainage ditches - meadowsweet (Filipendula ulmaria) and gipsywort (Lycopus europaeus). The presence of a seed of blinks (Montia fontana) in the carbonised cereal sample from F60 certainly suggests that these fields on the flood plain of the River Yeo were very wet and drainage was definitely necessary. The combination of damp conditions and the heavy clay soil of the area must have made cultivation very difficult. Besides these species of wetlands the sample from F3 produced seeds and fruitstones of shrubs and bushes such as bramble (Rubus fructicosus), elder (Sambucus nigra), hawthorn (Crataegus monogyna) and bittersweet (Solanum dulcamara), which suggest that there were areas of scrub or hedgerow close to the ditch. Species of disturbed ground - docks (Rumex), nettles (Urtica dioica) and thistles (Cirsium or Carduus) - are also in evidence.

F150, a fourth century well, produced a rather similar range of species. An additional scrub plant in the sample from this feature is hazel,(Corylus avellana). There are also a number of species characteristic of nitrogen-rich habitats such as farmyards or dung-hills, including the small nettle (Urtica urens), henbane (Hyoscyamus niger) and hemlock (Conium maculatum).

These two seed assemblages are typical of low-lying occupied areas, and compare closely with the flora of first century deposits at Cathedral Green, Winchester, to take a nearby contemporary example (Murphy, forthcoming). The absence of remains of cultivated plants in these deposits indicates that domestic food refuse was not being disposed of in either feature. No seeds suggestive of ritual function for F150 were recovered.

(b) Cereal farming

Spelt wheat is the main crop represented in each of the 31 samples containing carbonised cereals. Of these samples, three contain definite remains of cultivated oats, eleven contain grains and internodes of hulled six-row barley, two certainly contain emmer wheat and a further six almost certainly do, and finally one sample contains a tentatively identified grain of bread wheat. The oats, barley, emmer and bread wheat are, however, present in such small quantities that it seems doubtful whether they should be considered as more than mere contaminants of the spelt crop. The cultivated oats, for example, are no more common than wild oats in these samples. Thus at Ilchester, as at many Roman sites in this country, the evidence is that spelt production was the most important feature of arable farming from the 1st. century to the 4th.

From an examination of the composition and context of carbonised cereal deposits it is possible to make an outline reconstruction of agricultural activities on the site, an approach discussed in detail by Dennell (1972). For present purposes carbonised deposits can be considered to have three components; cereal grains, weed seeds and chaff. The chaff component consists of material with a high surface area:volume ratio, best removed from crops by winnowing. This can be considered to include not only glumes, rachis fragments and flower

bases, but also large grass caryopses such as Bromus, when fresh and enclosed in their lemma and palea. By contrast most other weed seeds have a low surface area:volume ratio and are small. These are best removed from the cereals with a riddle.

The percentage composition of each of the samples in terms of these three components has been calculated and is shown graphically in Fig. 3 . Clearly there are two main groups, and since all samples have been treated in an identical manner these groups must reflect different processes of formation, accumulation and deposition. The larger group, to the lower right hand portion of Fig. 3. consists of samples which are composed almost entirely of chaff - particularly spelt glumes and Bromus caryopses. The smaller group is of six samples from F9A, F47 and F81, which consist mainly of cereal grains with relatively small amounts of chaff.

It seems reasonable to assume that the larger group consists of samples which represent waste residue from crop cleaning activities, and reflects processing of the harvested spelt crop on quite a large scale. This waste material was burnt, and the fraction which survived in a carbonised state became incorporated into the fillings of a variety of features, principally the layers of refuse and natural silting in 1st. - 2nd. century pits (F1, F41,F50,F60,F68, F80,F306 and F561 on site R9/S and F205 on site R10/S), but also into ditches (F5 and F31 on site R9/S), occupation layers (F205 on R9/S) and the filling of the military ditch F38b on site R2/S. On site R10/S a deposit of this kind was recovered from the rake-out associated with an oven or furnace, F78 L3. The composition of this particular sample, calculated on a simple numerical basis, is 3% cereal grains, 79% cereal chaff, 6% Bromus caryopses and 12% other weed seeds.Carbonised cereal deposits from late Roman grain dryers normally contain a much greater proportion of cereal grains and it therefore seems unlikely that the sample in question represents part of the crop accidentally carbonised during drying. A more plausible explanation is that chaff and other waste residue from crop cleaning was being used as fuel for the furnace and that the sample from F78 is a surviving portion of such material. A historical parallel for such a practice is to be found in 19th. century Scotland, where oat hulls were widely used as the fuel for drying the oat crop (Findlay 1956,174). However the furnace need not necessarily have been a grain dryer, even if it was fuelled with cereal chaff.

The remaining six samples from the postholes F47 and F81 and the main boundary ditch F9A consist of between 80 and 99% cereal grains, with a few impurities. The two samples from F9A may well be composed of grain carbonised during stubble burning, which subsequently was washed or blown into this field boundary ditch. Quite large amounts of carbonised grain and straw are to be seen strewn over the soil surface in newly burnt stubble fields today, and the accumulation of such material in ditches would certainly not be surprising. Such grain is usually puffed and in poor condition, as are the cereals in F9A. It seems unlikely that weed seeds would survive such a process in a recognisable state, and the absence of such seeds in F9A need not, therefore,indicate that the crop was particularly 'clean' If stubble burning was indeed the means by which these grains became carbonised, the standing crop would appear to have been a fairly pure wheat crop, slightly contaminated with barley.

The presence of cereal grains in the postholes is presumably merely fortuitous, but the grains themselves were certainly carbonised at a late stage in their preparation, either accidentally during drying, cooking or storage or deliberately as a consequence of germination of infestation.

The carbonised samples overall produce a picture of cereal farming based upon spelt production in fields immediately adjacent to the settlement and of processing of the harvested crop closer to the main areas of occupation.

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Captions to illustrations.

Figure 1: Caryopses of cereals and weed grasses.
Scales in millimetres.
a.,b. Triticum spelta. Caryopses. F5 L5 and F9A L7.
c. Triticum spelta. Germinated caryopsis. F9A L7.
d. Triticum spelta. Immature caryopsis. F41 L12.
e. Triticum cf. aestivum. Caryopsis. F41 L12.
f. Hordeum vulgare. Caryopsis, showing insect attack. F41 L12.
g,h. Avena sp. Caryopses. F361 L9 and F41 L12.
i. Bromus mollis/secalinus. Caryopsis. F41 L12.
j. Anisantha sterilis. Caryopsis. F41 L12.

Figure 2: Cereal and weed grass chaff, straw and awns.
Scales in millimetres.
a. Triticum spelta. Spikelet fork. F41 L16.
b. Triticum dicoccum. Spikelet fork. F361 L9.
c. Triticum sp. Apical spikelet fork. F41 L16.
d. Triticum spelta. Glume. F41 L13.
e. Triticum cf. dicoccum. Rachis section. BF 88b.
f. Hordeum vulgare. Short rachis internode. F41 L16.
g. Hordeum vulgare. Slender rachis internode. F361 L9.
h. Avena fatua. Flower base. F41 L19.
i. Avena sativa. Flower base. F41 L9.
j. Cereal culm node. F41 L10.
k. Triticum cf. spelta. Awn fragment. F78 L3.
l. Avena sp. Awn fragment. F78 L3.

Figure 3: Percentage composition of all carbonised samples.
For full explanation and discussion see text.

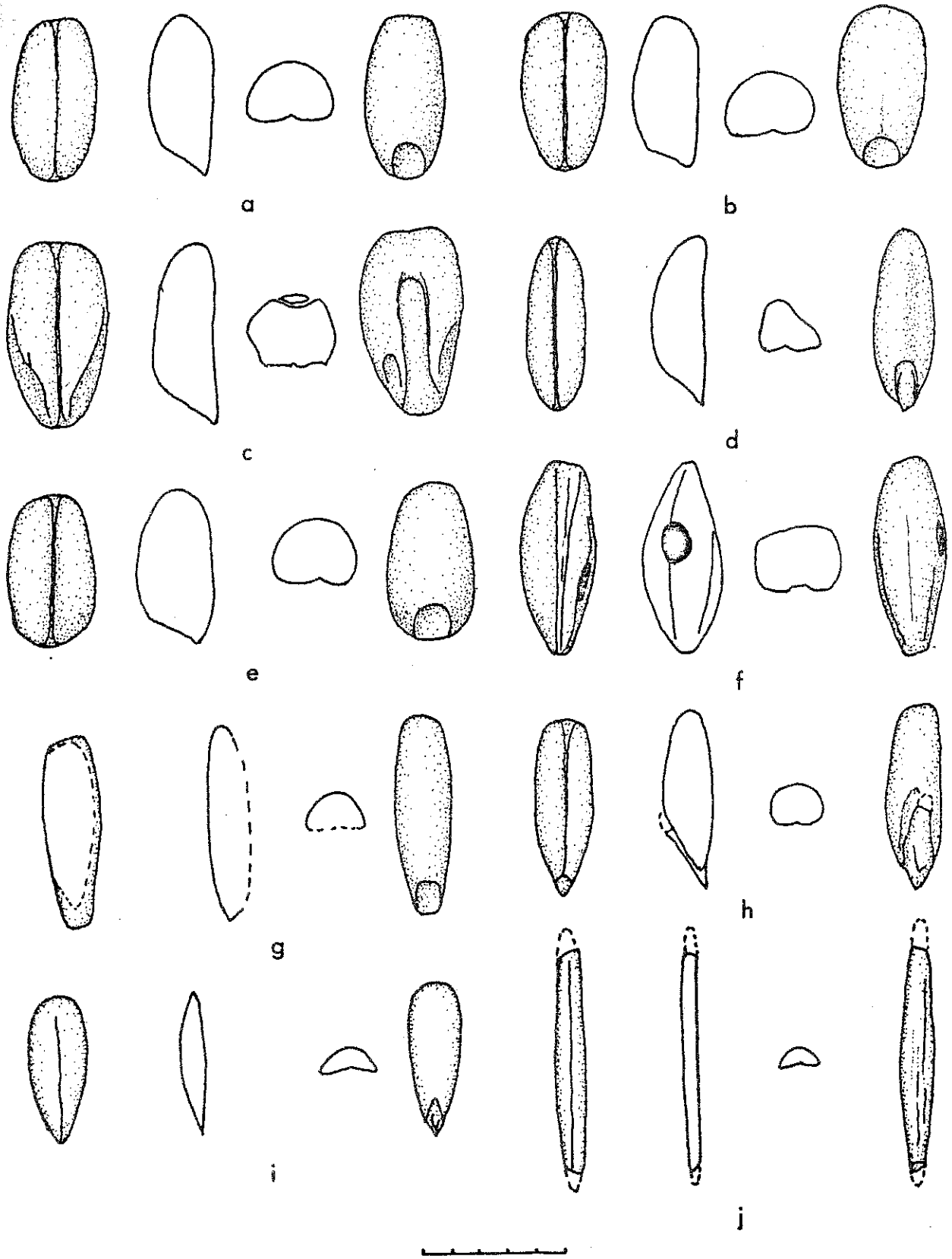

Fig 1.

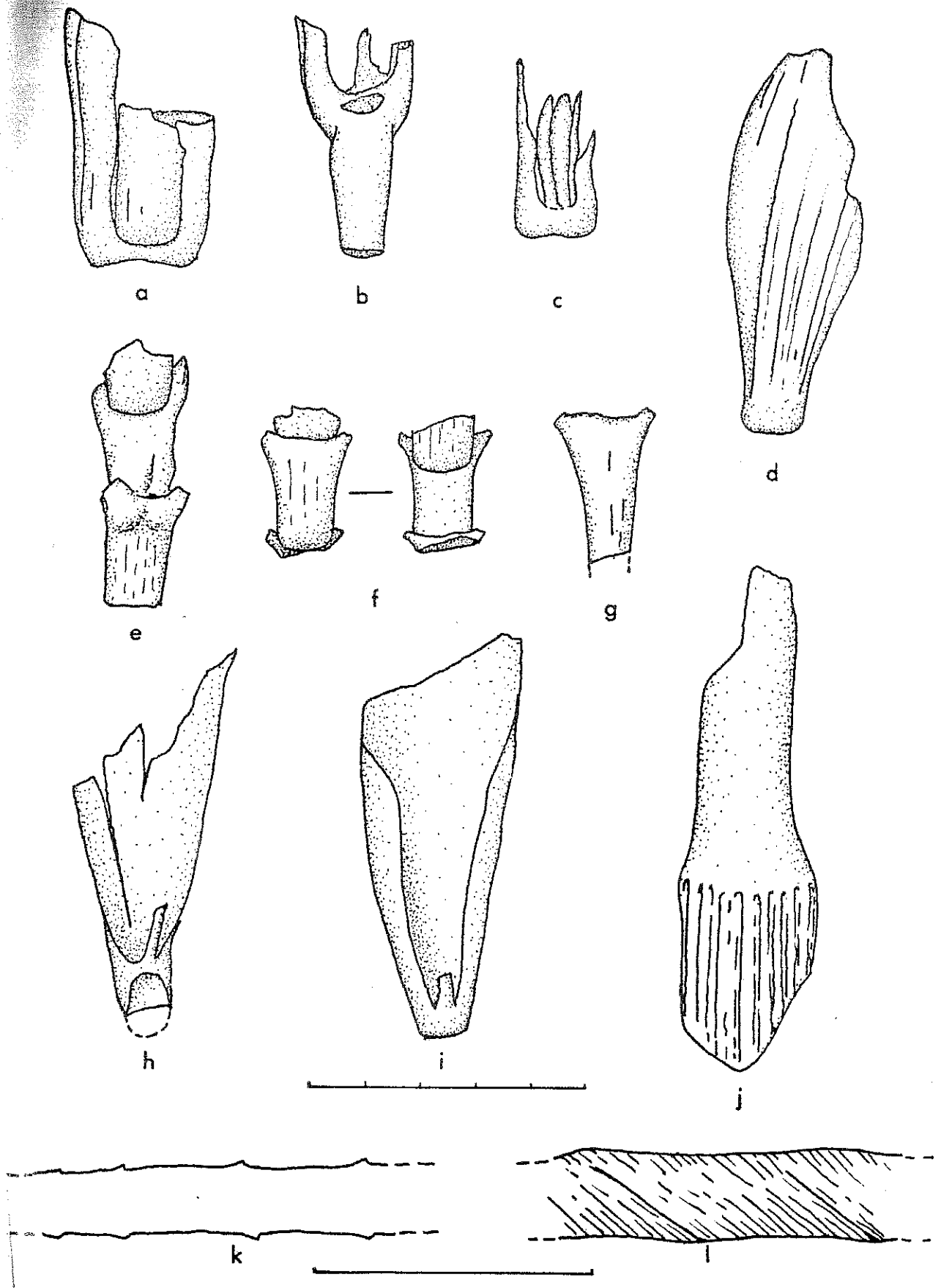

Fig. 2.

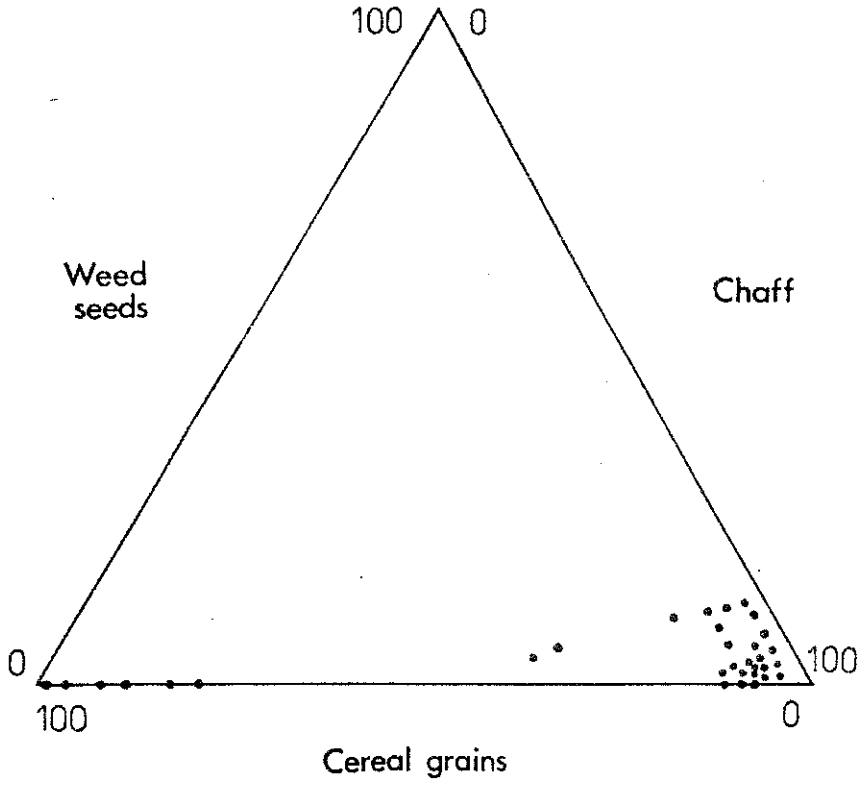

Fig. 3.