3331

Site:	Springfield Barns
Parish:	Chelmsford
County:	Essex
Reference No:	SB80
Type of site:	Terminal of cursus; misc. pits and ditches
Period:	Neolithic and Roman
Geology:	Cover Loam over gravels
Director:	J. Hedges
Type of material:	Plant remains

Introduction

Examination of soil samples from Neolithic features excavated in the 1979 season has shown that there is considerable contamination of archaeological deposits in this area by modern plant remains, introduced primarily via root channels and by earthworm activity (Murphy 1980). Unfortunately it is precisely in these light loam soils, which attracted much early settlement, where contamination is likely to be at its worst. It seems improbable that Neolithic deposits devoid of contaminants will ever be encountered on these soils and it is therefore necessary to make the most of the deposits available. For this reason it was decided to examine contamination in some detail during the 1980 season, noting its extent and character and assessing whether the contaminants present invalidate studies of charred plant remains from the site. The results of this examination are discussed in the first part of this report. In the second part, charred plant remains recovered by machine flotation are described and discussed.

1. Contamination

Sources of contamination have been discussed by Keepax (1977). Having excluded post-excavation contamination of the samples, so far as is practically possible, we are concerned here with three types of potential contamination of the archaeological deposits before excavation.

1. Contamination of deposits by modern uncharred plant remains
2. Contamination of deposits by modern charred plant remains
3. Contamination of Neolithic deposits by charred plant remains of Roman date.

As Keepax notes, contamination of Type 1 is easily distinguished and discounted. Type 2 contamination is potentially more serious since modern charred material is not distinguishable from ancient material of the same species. The only way to determine whether there has been vertical movement of charred cereals, derived from modern stubble-burning or spread on the soil surface with domestic refuse, is to examine the present soil profile. The processes causing contamination of archaeological deposits with modern material were, of course, in action at earlier periods and one must therefore consider the possibility that Neolithic features may be contaminated with charred cereals of Roman date (Type 3 contamination). This problem is considered further in the second part of this report, where the species of charred cereals recovered are discussed.

The extent and character of contamination was studied in two ways: by examining plant remains from the modern soil profile in a test pit to the north of the main area of excavation; and by looking at the contaminants present in flot produced by processing large bulk soil samples from the archaeological deposits.

The main features of the modern soil profile were as follows:

0-24 cm	Brown (10YR 4/3; moist) loam; slightly stony, flints up to 5cm; chalk flecks; very abundant fibrous roots; earthworms; sharp slightly undulating boundary.
25-60cm	Dark yellowish-brown (10YR 4/4; moist) silt loam; very rare small flints; very rare chalk flecks; rare fine fibrous roots; many worm channels lined with topsoil; earthworms observed aestivating near base; merging undulating boundary.
60-90cm +	Heterogenous brown to yellowish brown silt loam to sandy loam matrix, becoming coarse sandy at base; extremely stony, gravel to medium flints and quartz/quartzite pebbles; some flints with black (manganiferous?) coating.

The area was under grass, with Lolium perenne, Dactylis glomerata and Hordeum murinum and with some Trifolium repens, Cirsium spp., Taraxacum officinale and Urtica dioica. It appears that the field had been used for arable in the past; the small chalk flecks in the silt loam must be a result of marling, since such horizons are normally decalcified. The adjacent field was under barley.

Plant and animal remains extracted from small soil samples taken as a column through this profile are listed in Table 1.

As might be expected, contaminants of all types were more common in the surface horizons, with some uncharred seeds penetrating to about 60cm, roots reaching almost to the base of the profile and arthropod remains present in all samples examined. In archaeological samples, however, these uncharred remains would easily have been distinguished as contaminants. Charred remains of barley and grass caryopses were present in the top 25cm, (probably representing an Ap horizon), but were not seen in deeper deposits. Small charcoal flecks were present to a depth of 80cm, but given the long history of occupation at the site these could be of almost any date and need not indicate the extent of modern contamination.

The contaminants from the larger flotated soil samples are listed in Table 2. Clearly all deposits show contamination of type 1. As would be expected, the

larger samples (5, 11, 15) generally show the widest range of contaminants. The presence of fig achenes in the primary fill of the cursus ditch and a grape seed in posthole 1393 should be noted, since these specimens must indicate contamination with 'modern' food debris. It is significant that there are no charred specimens of either barley or bread wheat rachis in the samples, even though uncharred remains of these species occur: the charred cereals present are of quite different species (see below).

In summary, then, it may be concluded that:

(1) Type 1 contamination is widespread, but readily distinguished.

(2) Charred modern cereals are present in the Ap horizon, but there is no evidence for vertical movement of such material into deeper levels.

On these grounds it is thought that contamination does not invalidate the study of charred cereals from the deposits, though obviously it is necessary to exercise caution in the interpretation of the cereal remains.

2. Charred plant remains

These were recovered from large soil samples, using a simple flotation machine of the type described by Williams (1973). The flot was collected in a 0.5mm mesh; finer meshes had been found to clog with silt when processing samples from this site. The dried flot includes very large amounts of fine fibrous roots, together with the contaminants discussed above. Charred plant remains from these samples consist of charcoal, cereal remains and weed seeds (Table 3). The charcoal has not been identified since in most samples only rare very small fragments were present, and the two samples containing larger amounts of charcoal (10 and 14) are not precisely dated.

The cereals and weed seeds

(a) Samples from the cursus ditch

The majority of samples from this ditch produced very few charred plant remains, with small grass caryopses predominating. Many of these are well-preserved, but most have not been identified. A range of forms is present, including *Poa*-sized and *Festuca*-sized caryopses with a single fragment of *Bromus mollis/secalinus*

Other weed seeds include poorly-preserved leguminous seeds of Vicia- and Medicago-type, a fragment of a seed of Galium aparine and an achene of Anthemis cotula.

Cereal grains and spikelet fragments were recovered from four of these ten samples. Well-preserved wheat grains from the primary fill of the ditch (sample 15) are of Triticum dicoccum-type (emmer). These are elongate grains with fairly flat ventral surfaces, some showing rounded asymmetrically triangular cross-sections (Fig). This sample also produced a damaged wheat glume base (Fig). The specimen is broad (width c. 1.2mm but not accurately measureable) falling within the size range thought to be characteristic of spelt, Triticum spelta (Helbaek 1952); the pattern of veins is not clear. A single grain from sample 1 is tentatively identified as bread/club wheat-type (Triticum aestivum s.l.), but the grain is clearly distorted to some extent. (Fig). This is from the secondary fill of the cursus ditch, and is therefore not precisely dated.

b) Roman pit 1177 (Sample 9)

The sample contains a fairly typical Roman cereal assemblage comprising brittle-rachis wheat internodes (Fig), spelt glume bases (Fig) and spikelet forks, spelt-type caryopses with broad, flat ventral surfaces and blunt apices (Fig), and a weed flora in which Bromus mollis/secalinus caryopses form the predominant component. An unusual feature is the high proportion of under-developed wheat grains (Fig).

c) Other contexts

The remaining features produced little of interest, apart from context 1152, a post-hole (sample 12). The presence of spelt-type grains and spelt glume bases, as well as several Bromus caryopses suggests that this feature relates to Roman activity at the site.

Discussion

For reasons outlined above, it is believed that the deposits sampled are free from contamination by modern charred cereals. However, in view of the fact that there is clear evidence for Roman activity at the site, resulting in the production of charred cereals, it is necessary to ask whether the Neolithic

deposits could have become contaminated prior to excavation with Roman cereals. Of course, similar considerations apply at all multi-period sites, but the problem is particularly acute here since very few cereals were recovered and any contaminants would therefore have a disproportionately large effect.

The only useful criterion for detecting such contamination is species composition: remains of species not known or rarely reported from Neolithic deposits at other sites must be viewed with reserve. Two specimens fall into this category. A fruit of Anthemis cotula was identified in a sample from the primary fill of the cursus ditch (15). Godwin (1975) gives no pre-Roman records of this species, though Jones (1978) reports it from Iron Age contexts. The lack of earlier records may simply result from the fact that so few deposits of Neolithic crop weeds and cereals have been studied in this country, and thus the fruit from Springfield need not necessarily be a contaminant. Sample 15 also produced a wheat glume base, poorly-preserved, but probably of spelt. Spelt is known from Neolithic contexts in Britain (Henbury, Devon; Field et al 1964, 373) and Germany (Hopf 1968), but does not appear to have been a major crop at this period. It is much more common in Iron Age and Roman contexts. Since the possibility of contamination cannot be entirely excluded it would be unwise, at present, to take this identification from Springfield as a reliable new record of spelt from the Neolithic.

The remaining cereals from the cursus ditch (emmer and probably bread/club wheat) are known from Neolithic charred cereal deposits in N.W. Europe (cf. Hopf 1968, Van Zeist 1970) and as impressions on Neolithic pottery in this country (Helbaek 1952). There seems no reason to doubt that they indicate local cereal production, processing or consumption during the Neolithic. The remains of spelt from the Roman features also reflect activities involving cereals at the site, though since so little material was recovered it is impossible to determine the precise types of activity represented.

In summary, then, there is evidence for cereal farming in the vicinity in both main site phases. It seems improbable that significantly more information would be produced by continued study of comparable deposits associated with the cursus, since the concentration of charred plant remains in the soil is very low, and since the contamination problem necessary places restrictions on their interpretation. Future work along the cursus and associated sites should, if possible, be concentrated on very deep features in which contamination would be less significant and on occupation deposits in which larger quantities of plant remains may be present.

Caption to figure

a,b Triticum dicoccum, caryopses. Neolithic. Primary fill of cursus ditch (1371)

c. Triticum c.f. aestivum s.l., caryopses. Neolithic? Secondary fill of cursus ditch (1120)

d. Triticum c.f. spelta, caryopses. Roman pit (1177)

e. Triticum sp. underdeveloped caryopsis. Roman pit (1177)

f. Triticum sp. brittle-rachis wheat internode. Roman pit (1177)

g. Triticum spelta, glume base. Roman pit (1177)

h. Triticum c.f. spelta, glume base. Neolithic? Primary fill of cursus ditch (1371).

Scales graduated in mm.

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	Depth (cm)	5-15	15-25	25-35	35-45	45-60	60-70	70-80	80-90
Charred plant remains	Charcoal flecks	+	+	+	+	+	+	+	-
	Hordeum sp. rachis internode	+	-	-	-	-	-	-	-
	Gramineae caryopses	+	+	-	-	-	-	-	-
Uncharred roots and seeds	Fibrous roots	+++	+++	++	++	++	++	+	+
	Stellaria media	+	+	+	+	-	-	-	-
	Chenopodium album	++	++	+	+	-	-	-	-
	Atriplex patula/hastata	+	-	+	-	-	-	-	-
	Rubus fruticosus	-	-	-	-	+	-	-	-
	Rumex sp.	-	+	-	-	-	-	-	-
	Polygonum aviculare	+	-	-	-	-	-	-	-
	Polygonum convolvulus	+	-	-	-	-	-	-	-
	Urtica dioica	+	-	-	+	-	-	-	-
	Urtica urens	-	+	-	+	-	-	-	-
Invertebrates	*Cecilioides acicula*	-	-	+	-	-	-	-	-
	Anthropods (insects etc.)	+	+	+	+	+	+	+	+

Table 1 : SB80. Some biological remains from the modern soil profile.

Sample No.	5	15	1	2	3	4
Segment No	857	947	857	857	857	857
Context No	1083	1371	1120	1062	1065	1060
Context	Cursus ditch	1° fill		Cursus ditch		
Coal fragments	-	+	-	-	-	-
Arthropods (insects, woodlice centipedes, millipedes)	+	+	-	+	+	+
Vallonia excentrica	-	+	-	-	-	-
Cecilioides acicula	+	+	+	+	+	+
Fine fibrous roots	+	+	+	+	+	+
Deciduous leaf fragments	+	+	-	+	-	-
Cereal straw fragments	-	-	-	-	-	-
Barley rachis and spikelets	+	+	-	+	-	-
Barley awn fragments	+	+	+	+	-	-
Wheat rachis and glumes	-	+	-	-	-	-
Capsella bursa-pastoris	-	-	-	-	-	-
Stellaria media	+	+	+	+	+	+
Chenopodium album	+	+	+	-	-	-
Atriplex patula	+	+	+	+	-	+
Rubus idaeus	-	+	-	+	-	-
Aphanes arvenis	-	+	-	-	-	-
Polygonum aviculare	-	-	+	-	+	-
Polygonum persicaria	-	-	-	+	-	-
Polygonum convolvulus	-	-	-	-	-	-
Rumex sp.	-	-	-	-	-	-
Urtica dioica	-	-	-	-	-	-
Betula sp.	-	-	-	-	-	-
Solanum nigrum	-	+	+	+	+	+
Veronia hederifolia	-	-	-	-	-	-
Sambucus nigra	-	-	-	+	-	-
Cirsium sp.	-	-	-	-	-	-
Sonchus oleraceus	-	-	-	-	-	-
Gramineae	+	+	-	+	-	-
Ficus carica	+	+	-	-	-	-
Vitis vinifera	-	-	-	-	-	-

Table 3 Contaminants recovered by machine flotation

6	7	8	16	9	11	10	12	13	14
860	941	936	937	-	914	-	-	-	885
1132	1330	1326	1320	1177	1284	1393	1152	1268	1238
	2^{o} fill			Roman pit	Roman ditch	Undated pits and postholes			
-	-	-	+	-	+	-	-	+	-
-	-	+	+	+	+	+	+	-	+
-	-	-	-	-	-	-	-	-	-
-	-	-	-	+	+	+	+	+	-
+	+	+	+	+	+	+	+	+	+
-	-	+	-	-	+	-	-	+	-
-	-	-	-	-	+	-	-	-	+
+	-	-	-	-	+	-	-	+	-
+	-	-	-	+	+	+	+	+	-
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Sample No.		5	15	1	2	3	
Segment No.		857	947	857	857	857	8
Context No.		1083	1371	1120	1062	1065	10
Context		Cursus ditch	1° fill		Cursus ditch		
Cereal indet.	ca.fr	-	+	-	-	-	
Cereal indet	cn	-	-	-	-	-	
Triticum sp.	ca	-	4	1	-	1	
	gb	-	1	-	-	-	
	bri	-	-	-	-	-	
	spb	-	-	-	-	-	
Triticum dicoccum-type	ca	-	3	-	1fr	-	
Triticum spelta- type	ca	-	-	-	-	-	
Triticum spelta	gb	-	-	-	-	-	
	spf	-	-	-	-	-	
Triticum aestivum-type	ca	-	-	1	-	-	
c.f. Avena sp.	ca	-	-	-	-	-	
Leguminosae indet. c.f. Vicia		-	2	-	-	-	
Leguminosae c.f. Medicago lupulina		-	-	-	-	-	
Rumex sp.		-	-	-	-	-	
Galium aparine		-	-	-	1fr	-	
Anthemis cotula		-	1	-	-	-	
Compositae indet. c.f. Anthemis		1	-	-	-	-	
Carex sp.		-	-	-	-	-	
Cyperaceae indet.		-	-	-	-	-	
Bromus mollis/secalinus		-	-	1fr	-	-	
Gramineae indet.		-	1	1fr	-	-	
Charred bud		-	-	-	-	-	
Indet.		-	-	-	-	-	
Charcoal		+	++	+	+	+	
Soil volume processed (nos. of buckets)		$3\frac{1}{2}$	$13\frac{1}{4}$	1	$1\frac{2}{3}$	1	

Table 3 : Charred plant remains recovered by flotation

6	7	8	16	9	11	10	12	13	14
860	941	936	937	-	914	-	-	-	885
1132	1330	1326	1320	1177	1284	1393	1152	1268	1238
	2° fill			Roman pit	Roman ditch	Undated pits and postholes			
-	-	-	-	+	-	-	+	+	-
-	-	1fr	2	-	-	-	fr	-	-
-	-	-	-	13*	-	-	9	-	-
-	-	-	-	12	-	-	-	1	-
-	-	-	-	7	-	-	-	-	-
-	-	-	-	1	-	-	-	-	-
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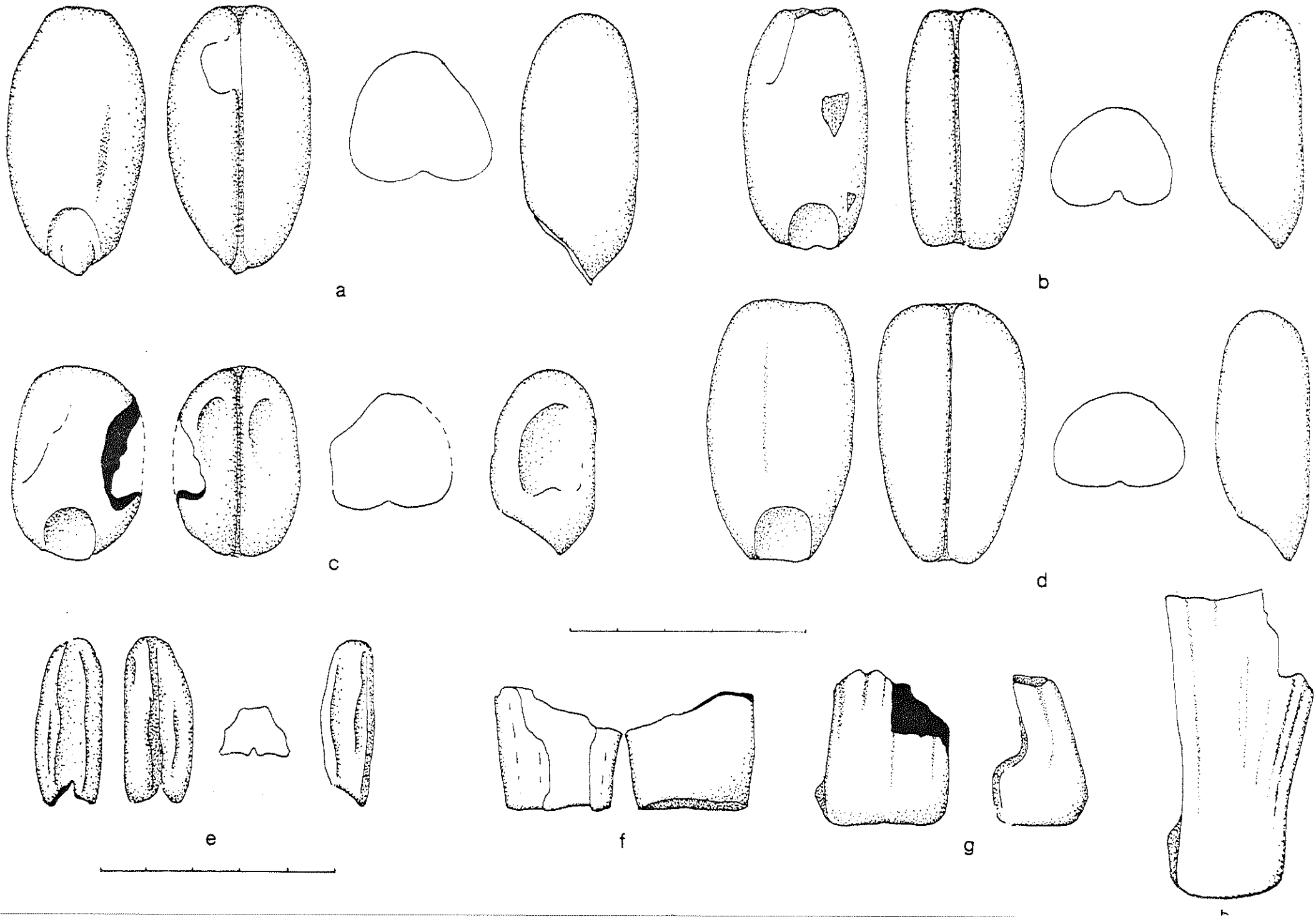
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