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Ancient Monuments Laboratory
Report 147/87

REDGATE HILL, HUNSTANTON, NORFOLK: MOLLUSCA AND PLANT MACROFOSSILS FROM LATE NEOLITHIC AND EARLY BRONZE AGE CONTEXTS.

Peter Murphy BSc MPhil

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Summary

Material mainly collected in 1970-71, under the supervision of Dr Ian Kinnes, was received for examination. Marine mollusc assemblages dominated by mussel, cockle and oyster with rare shells of other (mainly inedible) taxa were retrieved. Shellfish gathering mainly on the intertidal Carstone outcrop is indicated, though molluscs more characteristic of estuarine habitats also occured. The land mollusc assemblages unfortunately contained a proportion of recent, contaminant shells. Detailed quantitative study was therefore not appropriate but the gross composition of the assemblages suggests a late neolithic habitat of open woodland, fully open conditions during the use of a ?Bronze Age enclosure, and subsequent secondary woodland growth. Carbonised grains of emmer (Triticum dicoccum), bread/club wheat (Triticum aestivum/compactum) and naked barley (Hordeum sp. var. nudum) indicate cereal growing, and hazelnut shells (Corylus avellana) reflect gathering in woodland or scrub.

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Introduction

The excavation of the site at Redgate Hill, Hunstanton provided the only opportunity, during recent years, for extensive retrieval of biological remains from a late neolithic/early Bronze Age domestic site in Norfolk. The site is thus of considerable regional significance. Unfortunately there are problems of chronology, in that many features produced no dateable artefacts, and of contamination, since the features were usually shallow and unsealed, directly underlying the modern ploughsoil. Consequently intrusive modern biological material had been introduced, presumably via soil cracks, worm and other animal burrows, and root channels. The effects of these problems are discussed in more detail below. Clearly they limit the value of the material recovered, but in view of the dearth of palaeo-ecological and palaeoeconomic information for this period of prehistory in Norfolk it was thought necessary to salvage the maximum possible information from the samples, rather than just dismissing them as contaminated and therefore unreliable.

Methods

During the 1970 excavations sampling was not possible, but bone and marine molluscs were collected by hand. Dr Kinnes undertook a large-scale sampling programme during 1971. All the fill excavated was wet-sieved manually on site. The mesh size used was not recorded, but was clearly adequate for retention of small apical fragments of land snails: it must have been approximately 0.5mm. The sieved fraction was dried and sorted, extracting mollusc shells, charcoal, carbonised cereals and seeds.

The material received by the writer consisted of macrofossils extracted from the sieved fractions of these samples. Due to a misunderstanding a small proportion of this material was discarded. The remaining samples were examined under a binocular microscope at low power extracting, for identification and counting, all carbonised cereal grains and seeds, and all remains of marine invertebrates, and noting those samples which contained land mollusc assemblages sufficiently large to be worth more detailed study. Subsequently some of the largest snail assemblages were re-examined. The presence of any contaminants was also noted.

Marine invertebrates

Remains of marine molluscs and barnacles are common in the sieved samples, though intact shells are less frequent: most of the material consists of quite small fragments. Unlike the land mollusc assemblages, there is no reason to suppose that any contamination by recent marine mollusc shell has occurred. Lack of dating evidence for most contexts is, however, a problem and all the remains of marine invertebrates from the site are therefore considered here as a single aggregate. Full lists of identifications are given in Appendix Tables A and B, and the results are summarised in Table 1. Here the frequencies of taxa are presented in terms of the numbers of contexts or layers in which each taxon was identified, since quantification in terms of counts of apices or hinges is impossible for most samples. Some of the more unusual or interesting taxa are illustrated in Plate 1.

Discussion

By far the commonest marine mollusc in these samples is the mussel, Mytilus edulis. Mussel shell fragments occurred in the majority of contexts sampled, and several larger assemblages of mussel shell, comprising up to 152 valves, were retrieved. The shell surfaces are often quite weathered or obscured by secondary calcite growth, and they show no obvious signs of encrusting or boring organisms. A few valves show discolouration from the effects of burning notably in B 6400/2300 (1) (context 186). From the entire site only sixty intact valves were recovered, ranging from 33-50mm. in length (mean 41.4mm). The relatively small size of these valves suggests that they came from a fairly high intertidal population (cf. Tebble 1976,41). A likely source for these mussels is the intertidal outcrop of Carstone at the base of the cliffs at Hunstanton, which would have provided a suitably firm substrate for attachment. A few shells of gastropod species common on rocky shores were also retrieved (Littorina littorea, Gibbula sp, Nucella lapillus, Nassarius sp), and it seems possible that these were accidentally collected with mussels.

Shells and fragments of oysters (Ostrea edulis) are roughly one fifth as frequent as those of mussels. Intact valves are rare, and of these some are from juveniles, too small to have been collected for food. The valves show borings of a variety of organisms, including Polydora sp. Suitable habitats would have occurred on the Carstone outcrop from below about low water.

		Frequency
Mytilus edulis L.		266
Ostrea edulis L.		54
Cerastoderma sp(p)		84
Macoma balthica (L)		2
Scrobicularia plana (da Costa)		3
Spisula sp.		1
Indeterminate bivalve (abraded hinge)		1
Indeterminate bivalve (non-hinge frags)	(a)	26
cf. Gibbula sp.		1
Littorina littorea (L)		3
Littorina sp.		3
cf. Littorina sp. (small whorl frags)		6
Hydrobia ulvae (Pennant)		1
Nucella lapillus (L)		4
Buccinum undatum L.		3
Nassarius sp.		1
Phytia myosotis (Draparnaud)		1
Indeterminate gastropod (whorl/columella frags)	(b)	29
Sepia sp.		1

Table 1: Marine mollusca (summary of identifications)

The figures given for frequency refer to the numbers of contexts/ layers in which each taxon was identified.
Notes (a) Small non-hinge fragments, usually only a few mm. in size, with no distinctive sculpturing. (b) Similar small fragments of whorl with traces of ridges/ribs, or fragments of columella.

Several species of infaunal bivalves characteristic of sandy and muddy substrates have been identified, but of these only cockles (Cerastoderma spp) appear to have been collected as food. Valves are almost one third as frequent as mussel valves. The species of Cerastoderma sp. present is uncertain because no intact adult valves were present. Other infaunal bivalves include Spisula sp, Macoma balthica and Scrobicularia plana. The latter two species are frequent in muddy estuarine habitats, where salinity is lowered (Yonge 1949, 247-254). A shell of the estuarine mudflat snail Hydrobia ulvae was identified, as well as one of Phytia myosotis, a characteristic snail of salt marshes. These few remains of estuarine molluscs imply that food collection was not confined to the nearby rocky shore at Hunstanton, but that areas of the Wash were also exploited.

The distribution of barnacle fragments seems generally to be correlated with the density of mussel valves: for example in contexts 260 and 186 remains of both taxa are common, implying that the barnacles originally encrusted the mussel valves and were incidentally collected with them. In one other case (context 185) barnacle fragments are fairly common but mollusc shell is rare. This, together with the occurence of certain non-edible marine mollusc shells noted above, could perhaps be related to the collection of sea-weed and associated strand-line debris for use as animal fodder or manure (cf. Bell 1981 a). The fragments of cuttle-fish shell (Sepia sp) from Pit 20 could well have reached the site accidentally with such collected material: alternatively the cuttle-fish shell may just have been an attractive object picked up during a food-gathering foray.

The pottery from the site includes crushed marine mollusc shell as temper. Shell fragments of comparable size, belonging to the common species, from the soil samples are usually identifiable from characteristics of colour, thickness, surface texture and fracture (eg. the fibrous fracture of Mytilus or the flaky fracture of Ostrea). However firing the pottery has caused alterations in some of these features, often making identification difficult. Nevertheless the shell in a sample of the pottery is apparently of Ostrea and Mytilus with no other species, apart from very occasional fragments of fossil Inoceramus shell from the chalk.

Land molluscs

Land mollusc shells are present in almost all the samples. However most of the assemblages are very small and include a mixture of ecotypes: palaeoecological interpretation is therefore difficult. A more serious problem is that there is clear evidence for contamination of the deposits by recent molluscs: shells of the alien snails Helix aspersa and Candidula spp. (including C. gigaxii) are present sporadically, and shells of some other species include a proportion of specimens with a very fresh, unweathered, appearance. Clearly any of the samples could include some intrusive molluscs and these might be difficult to detect. In these circumstances it seems doubtful whether full quantitative analysis is appropriate, for the species counts obtained could be misleading. However it is possible to salvage some information: there seems no reason to doubt that in their gross composition the assemblages are reliable for palaeoecological reconstruction, at least in general terms. Consequently the approach adopted has been to examine in outline selected large shell assemblages, in which the effects of any contaminants are less likely to be statistically significant, in order to gain a general idea of their composition. All the molluscs have been retained for possible further study in more detail, should this be thought worthwhile.

The species composition of some of the large assemblages is summarised in Table 2.

Discussion

The assemblages summarised in Table 2 came from contexts thought to be related to three main phases of activity at the site: pits and pit groups of probable or possible late neolithic date; a posthole of the rectangular enclosure, possibly of Bronze Age date; and a pit which cuts two enclosure postholes.

a) Pits and pit groups.

Mollusca from seven pits and pit groups will be considered here (contexts 239,250,283-5,301,379,429-30 and 447). Artefactual evidence for the date of these features is sparse, though 429-30 produced sherds of Peterborough ware (F. Healy, pers. comm). The excavator described all these features as pits, and there is no doubt that some of them were artificially dug. Others, however, were rather irregular in shape, wide and shallow, and the section drawings show some irregular layers set at very high angles. It is possible that these features were of the type described by Evans

Context number	239	250	283-5
Co-ordinates	B5630/0000	B3670/0850	B3790/0960
Layer	1	1	2
Pomatias elegans (Müller)	++	++	++
Carychium tridentatum (Risso)	+++	++	+++
Cochlicopa spp.	+	+	+
Truncatellina cylindrica (Férussac)	+	+	-
Vertigo pusilla Müller	+	-	++
Vertigo substriata (Jeffreys)	-	-	-
Vertigo pygmaea (Draparnaud)	-	-	+
Vertigo spp. [apices only]	-	-	+
Pupilla muscorum (Linné)	+++	++	++
Lauria cylindracea (da Costa)	-	-	+
Vallonia costata (Müller)	++	+	++
Vallonia excentrica Sterki	++	+	+
Acanthinula aculeata (Müller)	+	+	+
Ena obscura (Müller)	+	-	+
Punctum pygmaeum (Draparnaud)	+	+	+
Discus rotundatus (Müller)	+++	+++	++
Vitrina pellucida (Müller)	-	-	-
Vitrea crystallina (Müller)	-	-	-
Vitrea contracta (Westerlund)	+	+	+
Nesovitrea hammonis (Ström)	-	-	-
Aegopinella spp.	+	+	+
Oxychilus spp.	++	+	+
Limacidae	-	+	+
Euconulus fulvus (Müller)	-	+	-
Cecilioides acicula (Müller)	+++	+++	+++
Cochlodina laminata (Montagu)	+	+	+
Clausilia bidentata (Ström)	+	+	+
Candidula spp.	+	+	+
Helicella itala (Linné)	++	+	+
Trichia spp.	++	+	+
Helicigona lapicida (Linné)	-	-	+
Arianta/Cepaea spp.	+	+	+
Cepaea nemoralis (Linné)	+	-	-
Cepaea hortensis (Müller)	+	-	-

Table 2: Land molluscs from selected contexts: summary of relative abundance.

+ - present; ++ - common; +++ - abundant. In most cases shell assemblages had also been retrieved from other layers within these contexts, but these assemblages are almost all very small and are not listed here.

301	379	429-30	447	259	305
B2750/0300	B2950/2200	D6100/8900	D2400/9580	B2070/0800	B1850/0600
5	1	7	1	3	2
+	+	+	+	-	+
++	++	+++	+++	++	++
-	-	+	+	-	+
-	-	-	-	+	-
+	+	-	+	+	-
-	-	-	-	+	-
-	-	-	-	-	-
-	-	+	+	+	-
++	+	++	+	+++	+
-	-	-	-	-	-
+	+	++	++	++	+
+	-	+	-	++	+
-	+	-	+	-	+
-	-	-	-	-	-
+	-	+	-	+	+
++	+++	++	++	+	++
-	+	-	-	-	-
-	-	-	+	-	-
+	+	+	+	+	+
-	-	-	-	+	-
+	+	+	+	-	+
+	++	+	+	-	+
-	+	-	-	-	-
-	+	-	-	-	-
+++	+++	+	++	++	+++
-	+	-	+	+	+
+	+	+	+	-	+
+	-	+	-	-	+
+	+	+	+	+	+
-	++	+	-	-	+
-	-	+	+	-	-
+	+	+	++	-	+
-	+	-	-	-	-
-	+	-	-	-	-

(1972, 219) as 'subsoil hollows'. They are likely to have been hollows left by tree root systems, following collapse and/or decay. However, there seem to be no very marked differences between the mollusc assemblages from features interpretable with confidence as artificial pits (eg. 429) and less well-defined features (eg. 447): in all the large assemblages from these features woodland molluscs predominate. Carychium tridentatum and Discus rotundatus are the two most abundant woodland species, followed by the Zonitidae with other woodland species occuring generally at lower frequencies. The high frequency of Vertigo pusilla in 283-5 is unusual. Pomatias elegans is consistently present, and in 239, 250 and 283-5 is one of the most common taxa. This is likely to indicate disturbance of the soil surface (Evans 1972, 134). Molluscs characteristic of open conditions are also present, and Pupilla muscorum is frequently quite common. It is associated (in overall order of abundance) with Vallonia costata, V. excentrica, Helicella itala and Truncatellina cylindrica. Shells of intrusive Candidula spp. (including C. gigaxii) are present fairly consistently, but at low frequencies. In view of this any detailed quantitative account of assemblage composition would be invalid, but, overall, the assemblages can be interpreted with reasonable confidence as representing a habitat of open woodland, disturbed by human activity.

b) Postholes of the enclosure.

Only one posthole (259) produced a large assemblage of mollusca. In layer 3 of this feature Pupilla muscorum is by far the most abundant snail, and other open-country taxa are also present. Shade-requiring taxa, notably Carychium tridentatum and Discus rotundatus, are present but are comparatively rare. Layers 1 and 2 of this posthole contained sparse assemblages dominated by Pupilla and Helicella itala.

Posthole 229 produced a similar but much sparser assemblage, again dominated by these two species. From this evidence it would appear that the enclosure was constructed in a open habitat. The abundance of Pupilla and apparent absence of Vertigo pygmaea seems to suggest that the soil surface was disturbed and vegetation cover was sparse: conditions which would be expected in and around a stock enclosure or, for that matter, a settlement.

c) Post-enclosure pit.

Pit 305, which cuts two postholes of the enclosure, contained a large assemblage of molluscs in layer 2, and sparser assemblages in layers 1, 4 and 8. The assemblage from layer 2 is composed predominantly of woodland taxa, with lower frequencies of open-country snails, and it seems possible that this layer formed during a phase of secondary woodland or scrub development.

Conclusions

The contamination of these deposits by recent molluscs is regrettable. Nevertheless it has been possible to salvage some palaeoecological information by concentrating attention on the gross composition of assemblages rather than producing species counts of dubious value. On this basis it is suggested that, during the late neolithic, local vegetation consisted of open woodland, already disturbed by human activity, but that fully open-country conditions had been established by the time the enclosure was constructed. There are indications of a phase of secondary woodland or scrub development after the enclosure went out of use. Detailed quantitative studies of mollusca from well-sealed deposits on the chalk of west Norfolk are still clearly required. The problem of contamination is likely to apply to all deposits at open sites of this type. The most potentially informative deep deposits are likely to be colluvial sediments filling dry valleys (cf. Bell 1981b).

Carbonised plant remains

The sieved samples received for examination contain fibrous roots with modern uncarbonised intrusive seeds of Stellaria media, Silene alba, Atriplex sp, Chenopodium album, Malus sylvestris, Aethusa cynapium, Euphorbia helioscopia, Polygonum aviculare, Polygonum convolvulus, Urtica dioica and Gramineae, and some uncharred cereal remains. This type of recent contamination is very common in poorly-sealed archaeological deposits beneath agricultural soils. There is, however, no reason to think that any recent carbonised plant material has contaminated the deposits: the carbonised cereal remains and seeds recovered are almost all badly abraded and encrusted with soil concretions, and the taxa identified are consistent with identifications from late neolithic sites elsewhere.

Carbonised plant remains occur at very low densities in a range of contexts (Table 3) but never in any marked concentrations. Charcoal fragments occur fairly consistently, but most of these are very small, and hence have not been identified.

Identifications

No cereal spikelet or rachis fragments have been recovered. Most of the cereal grains are in an extremely poor state of preservation: the majority are fragmentary, and the intact grains are mostly puffed, deformed, abraded and/or encrusted with soil concretions, with little or no trace of their original surfaces. Three cereal taxa are identifiable, however: short grains of bread or club wheat (Triticum aestivum/compactum-type), an elongate grain of emmer (Triticum dicoccum-type) and grains of barley, including naked barley (Hordeum sp. var. nudum). Illustrations of a few intact or near-intact grains are given in Fig. 1. Dorsal views of the emmer grain and three bread/club wheat grains are shown in Fig. 1 a-d. Fig. 1,e illustrates dorsal, ventral and lateral views, and a cross-section of the naked barley grain from D 9000/8450(1), (Context 381). The rounded cross-section and shallow median groove above the embryo are clearly visible on this grain.

Leguminous seeds and isolated cotyledons occur in four samples. None of these shows any trace of the hilum. On a size basis most of these specimens could be of Vicia/Lathyrus sp. - wild vetches or tares - though there is one large but fragmentary cotyledon which before fracturing would have been more than 4mm. in length.

Nutshell fragments of hazel (Corylus avellana) came from four contexts, but in each case no more than a single nut is represented.

Discussion

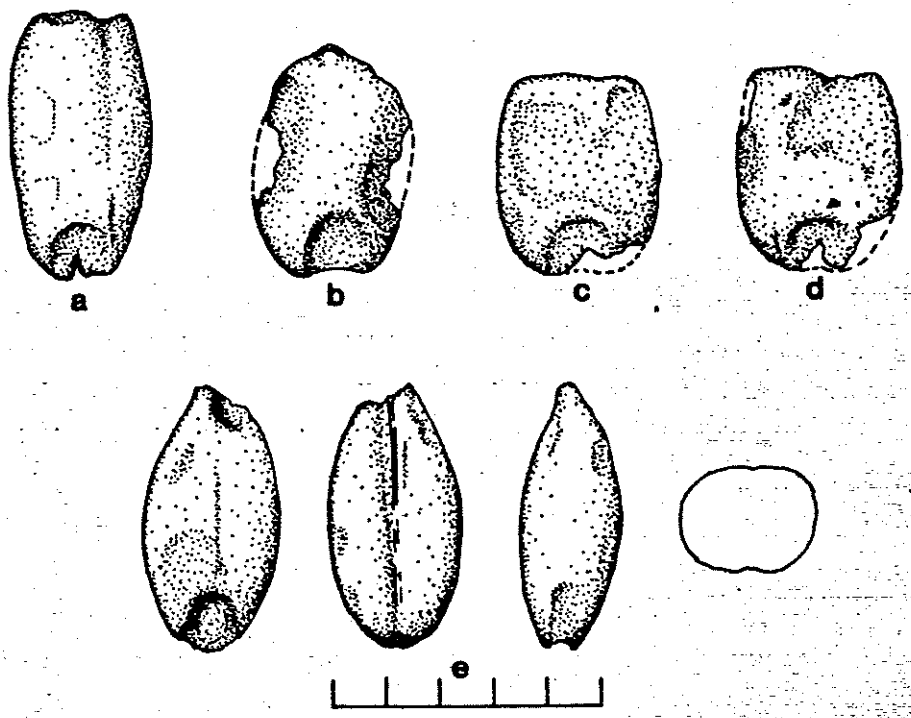
Sparse assemblages of cereal grains with hazel nutshells and rosaceous fruitstones have previously been reported from several late neolithic sites (Jones, 1980; Van der Veen, 1985; Murphy, forthcoming). The main cereal species identified from these sites are emmer, bread/club wheat and naked barley. These cereals, with the addition of hulled barley, are also known from Beaker sites (Helbaek 1952, 204). The results from Redgate Hill, Hunstanton are completely consistent with those from previously-investigated sites, establishing that here, as elsewhere in the country, there was some arable farming during the late neolithic/early Bronze Age. Nutshells are comparatively less common at Redgate Hill than at some other sites, though hazel nutshells from four contexts do suggest some exploitation of woodland food resources.

Caption to figure:

Fig 1: Carbonised cereals.

a	*Triticum dicoccum*-type	B2500/1135(1) 404.
b	*Triticum aestivum/compactum*	B2610/1625(1) 403.
c	*Triticum aestivum/compactum*	D5950/9150(1) 727.
d	*Triticum aestivum/compactum*	D9000/8450(1) 716.
e	*Hordeum* sp. var *nudum*	D9000/8450(1) 716.

Scale graduated in millimetres.


a
b
c
d
e

Co-ordinates	Sample No.	Context No.	
B 0415/0120(1)	325	314	Cereal indet. (frag)
B 1610/0670(1)	292	263	Cereal indet. (frag)
B 1970/0730(1)	330	309	Triticum sp. (frag)
			Cereal indet. (frag)
B 2070/0800(3)	271	259	Triticum cf. aestivum-type (frag)
			Cereal indet. (frag)
B 2235/0940(5)	679	304	Cereal indet. (frag)
B 2400/0505(4)	645	303	Cereal indet. (frags)
B 2400/0505(4)	283	"	Cereal indet. (frag)
B 2460/4600(1)	LXXIII	171	Cereal indet. (frag)
B 2500/1135(1)	404	333	Triticum dicoccum-type (1 grain)
			Corylus avellana (nutshell frag)
B 2610/1625(1)	403	335	Corylus avellana (nutshell frags)
			Triticum aestivum-type (1 grain)
B 2900/5000(1)	163	179	Cereal indet. (frags)
B 2970/0090(3)	278	260	Cereal indet. (frag)
B 3050/1740(1)	501	331	cf. Hordeum sp. (1 grain)
			Cereal indet. (1 grain)
B 3290/1550(1)	(AIP)	-	Cereal indet. (frag)
B 3580/1980(1)	669	369	Cereal indet. (frags)
B 3590/1600(1)	(AIS)	--	Cereal indet. (1 grain)
B 3600/0850(2)	272	254	Cereal indet. (frag)
B 3620/1500(2)	346	348	Indet. (2 large abraded and encrusted 'seeds')
B 3700/0700(1)	381	250	Cereal indet. (2 fragmentary grains)
B 3700/1810(1)	347	356	Hordeum sp. (1 grain, encrusted with soil)
B 3700/1810(2)	353	356	Cereal indet. (frags)
B 3780/1540(1)	723	360	Leguminosae indet. (cotyledon: 3.4mm)
			Cereal indet. (frag)
B 3790/0960(2)	262	283-5	Leguminosae indet. (seed: 3.0mm)
			Cereal indet. (frags)
B 3790/0960(2)	273	-	cf. Triticum sp. (frags)
B 3900/0100(1)	256	251	Cereal indet. (frags)
B 3920/0210(1)	274	"	Hordeum sp. cf. var nudum (1 grain)
			Cereal indet. (frag)
B 4220/4700(1)	-	184	Triticum aestivum-type (1 grain)
B 4920/1100(1)	265	245	Cereal indet. (frag)
B 5630/0000(1)	250	239	Cereal indet. (frags)
B 5630/0000(1)	(PS,RQ,	239	cf. Corylus avellana (?nutshell frags)
	AEK,AIN)		Cereal indet. (frag)
B 5700/6710(1)	642	-	Indet. (large ? seed)
B 5750/0220(1)	306	234	Corylus avellana (nutshell frag)
	(AII)	-	Corylus avellana (nutshell frags); cereal indet.(1 gra

Co-ordinates	Sample No.	Context No.	
B 5830/0970(1)	(QI,PV)	-	Cereal indet. (1 frag)
B 6375/0425(1)	224	229	Leguminosae indet. (fragmentary large cotyledon: > 4mm. long)
B 6710/0130(1)	181	230	Leguminosae indet. (cotyledon: 3.3mm)
B 6710/0130(1)	236	"	Cereal indet. (1 grain)
B 6800/2000(1)	161	209	Cereal indet. (frags)
B 7160/2600(1)	382	-	Indet ?cereal (frag)
B 7430/1330(1)	CXX1	204	Cereal indet. (1 grain)
D 1330/9500(1)	788	459	Cereal indet. (frags)
D 1630/9450(1)	769	454	Cereal indet. (2 grains)
D 5950/9150(1)	727	424	Triticum aestivum-type (1 grain)
			Cereal indet. (1 grain)
D 6760/8620(1)	711	408	Cereal indet. (frags)
D 6950/8820(1)	726	406	Cereal indet. (frag)
D 6950/9020(1)	704	416	Cereal indet. (1 grain)
D 8070/7940(1)	722	392	Cereal indet. (1 grain)
D 8830/8180(1)	706	384	Cereal indet. (frag)
D 8830/8230(1)	705	383	Triticum aestivum-type (1 grain)
D 9000/8450(1)	716	381	Triticum aestivum-type (1 grain)
		"	Hordeum sp. var nudum (1 grain)
		"	Cereal/large grass (1 frag)
D 9000/8450(1)	770	"	Indet. (?large seed frag)

Table 3: Cereals, seeds and nutshell fragments.

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Appendix. Data for presentation on microfiche or in archive.

Table A: Distribution of land and marine molluscs and crustaceans in the contexts sampled.

Notes:

a) Land molluscs. An asterisk indicates contexts containing large assemblages, some of which have been studied in detail.

b) For the three common marine taxa (Mytilus, Cerastoderma and Ostrea) a cross indicates non-hinge shell fragments, counts refer to numbers of hinges (partly estimated from fragments).

c) For details of the 'other taxa' (molluscs only) see Table B.

d) Shell fragments, thought to be of avian eggshell, came from several contexts. Fragments from B 1850/0600(1) and D 7290/9600(1), 0.23mm. and 0.62mm. mean thickness respectively, show outer porous surfaces and inner mammillate surfaces, though in a rather abraded state. Other fragments, from B 2070/0800(1) (0.53mm. thick), B 3920/0210(1) (0.55mm) and D 9000/8450(1) (0.35mm) have less well-defined surface morphology, though faint abraded traces of the internal mammillae can just about be discerned.

	Land molluscs	Mytilus	Cerastoderma	Ostrea	Other taxa
B 0270/0410(1)	+	2+	+		
B 0385/5760(1)	+				
B 0415/0120(1)	+	+			
B 0840/6050(1)	+	+			
B 1285/0145(1)	+	+	+		gastropod
B 1500/0250(1)	+	3+			gastropod, Littorina, Nassarius.
B 1530/0490(1)	+	+			
B 1540/0400(1)	+	+			
B 1550/0320(1)					
B 1580/0300(1)	+	+			bivalve, gastropod
B 1590/0645(1)	+	+		+	
B 1595/5515(1)	+	+			
B 1610/0670(1)					
B 1610/5322(1)	+	+			
B 1620/0400(1)	+	+			
B 1640/5138(1)	+	+			
B 1650/0490(1)	+	2+			
B 1730/0360(1)	+				
B 1750/0820(1)	+	+	+	+	gastropod cf. Littorina
B 1808/6070(2)	+	+	+	+	Scrobicularia, bivalve
B 1830/0480(3)					
B 1850/0600(1)	*	+		+	bivalve, gastropods cf. Littorina
B 1850/0600(2)	*				
B 1850/0600(4)	*	+			
B 1850/0600(8)	*	+			
B 1890/0040(1)	+	+			Littorina, barnacles
B 1910/0770(1)			+		
B 1910/1230(1)	+				
B 1910/1230(3)	+	+			
B 1910/1230(5)	+	+	1+		
B 1970/0730(2)					
B 1970/0730(4)					
B 1980/0825(1)					
B 2030/2170(1)	+	+			bivalve
B 2030/2170(2)	+	+	+		
B 2030/2170(4)	+	+	+	+	
B 2030/2170(5)	+	+	+		
B 2030/2170(6)					
B 2060/0460(1)	+				
B 2070/0800(1)	*	2+			Phytia, barnacle
B 2070/0800(2)	*	+			

	Land molluscs	Mytilus	Cerastoderma	Ostrea	Other taxa
B 2070/0800(5)	*	2+			
B 2080/2170(1)	+	+			
B 2100/0080(1)	+	+			
B 2110/0170(1)	+	+			
B 2110/0170(2)	+	1+			
B 2180/0480(1)	+	1+	1+	+	bivalve,gastropod
B 2180/0650(1)	+	+	+		
B 2180/0650(2)				1+	
B 2180/0650(3)	+	+			
B 2180/0650(5)	+	+		+	gastropod cf. Littorina
B 2180/0650(6)	+	+			
B 2180/0650(9)	+				
B 2235/0940(1)	+	+			
B 2235/0940(2)		+			
B 2235/0940(3)	+	2+			
B 2235/0940(4)	+	+		+	bivalve
B 2235/0940(5)	+	+			
B 2340/4480(1)	+	1+	+		Scrobicularia, bivalve,Buccinum
B 2340/4700(1)	+	+			
B 2350/0650(1)	+	+			Littorina
B 2350/0650(2)					
B 2350/0650(3)	+	+	+	+	
B 2360/4260(1)		+			
B 2460/0505(4)					
B 2430/0540(1)					
B 2460/0500(2)	+	+		+	
B 2460/0500(3)					
B 2460/4360(1)	+	+	+	+	bivalve
B 2460/4600(1)	+	2+	+		
B 2500/1135(1)	+	2+	+		gastropod
B 2600/4500(1)	+	+	+		bivalve,gastropod
B 2610/1625(1)	+	8+	+	1(juv)	bivalve
B 2750/0300(1)	*				
B 2750/0300(2)	*	1+			gastropod
B 2750/0300(3)	*	+			
B 2750/0300(4)	*	+			barnacle
B 2750/0300(5)	*	+	+		
B 2750/0300(6)	*	+			
B 2750/0300(7)	*				
B 2780/0300(2)	+				
B 2860/2170(1)	+	+			
B 2900/5000(1)	+	+	+		

	Land molluscs	Mytilus	Cerastoderma	Ostrea	Other taxa
B 2920/1540(1)	+				
B 2950/2200(1)	*	+	+		
B 2950/2200(2)	*	+			
B 2950/2200(4)	*	+			
B 2970/0090(1)	+	123+		+	gastropod,barnacles
B 2970/0090(2)	+	34+		+	barnacles
B 2970/0090(3)	+	2+			barnacles
B 2970/0090(4)	+	+		+	
B 3000/2100(1)	*	+	+	+	
B 3000/2100(3)	*	+	+		
B 3000/2200(1)	+	+			
B 3000/2200(2)	+	+	+		
B 3000/2200(3)	+				
B 3050/1740(1)	+	+	+	+	
B 3050/1740(2)	+	+			
B 3080/1860(1)	+	+	+		
B 3180/1670(1)	+	+	+		gastropod
B 3180/1810(1)	+	+	+	+	
B 3270/1440(1)	+	+			
B 3290/0210(1)	+	1+	+		
B 3290/1550(1)					
B 3310/1610(1)	+	+	+	+	
B 3350/1950(1)	+	+	+	+	bivalve,gastropod
B 3430/1610(2)	+				
B 3440/1880(1)	+	4+			
B 3500/3190(1)	+				
B 3500/4500(1)					
B 3500/4780(1)					
B 3500/4850(1)	+	+			
B 3520/0250(1)					
B 3580/1980(1)					
B 3590/1600(1)	+	+	1+	+	bivalve,gastropod
B 3600/0850(1)	*	+	+	+	gastropod
B 3600/0850(2)	*	+	+		
B 3600/5215(1)	+	1+			bivalve,barnacle
B 3610/2145(1)	+	9+			
B 3610/2145(2)	+	7+			
B 3610/2145(3)	+	17+			
B 3620/1500(1)	+	+	+		
B 3620/1500(2)	+	+	+		
B 3620/2300(1)					
B 3670/0800(1)	+	+			

	Land molluscs	Mytilus	Cerastoderma	Ostrea	Other taxa
B 3670/0850(1)	*	3+			
B 3670/0850(2)	*	+	+		
B 3700/0700(1)	*	+		+	gastropod
B 3700/1810(1)	+	+			
B 3700/1810(2)	+	+			
B 3700/1810(3)	+	+			
B 3700/1810(1)+(3)	+	+	1		
B 3710/2110(1)	+	83+			barnacle
B 3710/2110(2)	+	108+			barnacles
B 3730/1720(1)	+	+	+		
B 3740/1680(1)	+	+	+		
B 3780/1540(1)	+	+	+		
B 3790/0960(1)	*	+			
B 3790/0960(2)	*	+	+		bivalve
B 3790/0960(3)	*	+	+		
B 3790/0960(1),(2)+(3)	*				
B 3850/2340(1)	+	3+			
B 3850/2025(1)	+	1+			bivalve
B 3900/0100(1)	+	+	+		
B 3900/0320(1)	+	1+			
B 3900/0320(2)	+	+	+	+	
B 3910/0515(1)	+	+	+		
B 3920/0210(1)	*	+	+	+	
B 3960/4150(1)	+	+			
B 3970/2300(1)	+	152+			
B 4000/2920(1)	+	+		+	
B 4000/2920(2)	+				
B 4000/2920(3)	+	1+	+		
B 4000/2920(4)	+	+	+		gastropod
B 4050/2590(1)	+	+			
B 4050/9930(1)					
B 4060/2500(1)	+	3+			
B 4210/0130(1)	+	+			
B 4220/4700(1)	*	1+	+		gastropod
B 4230/2560(1)		7+			
B 4270/2390(1)	+	13+	+		
B 4290/2690(1)					
B 4500/2800(1)	*	1+			Hydrobia,barnacle
B 4630/2040(1)		+			
B 4700/3000(1)					
B 4700/2000(1)	+	2+			
B 4770/3000(1)	+	+			

	Land molluscs	Mytilus	Cerastoderma	Ostrea	Other taxa
B 4920/1100(1)	+	+	+		gastropod
B 4940?/1800(1)	+	+			
B 4950/1000(1)	+				
B 4980/3880(1)	+	+		+	
B 4990/2360(1)	+	+			
B 5000/1450(1)	+				
B 5020/3910(1)	+	1+	+	+	Nucella, bivalve
B 5040/0750(1)	+	+	+	+	
B 5040/4180(1)	+				
B 5160/1575(1)		1+			
B 5380/1390(1)	+	1+			
B 5630/0000(1)	*	1+	+		bivalve
B 5700/6710(1)	+		+		
B 5750/0220(1)	*	+	+		
B 5830/0970(1)	+	+			Littorina
B 5920/0210(1)					
B 5970/0550(1)	+	+	+		
B 6375/0425(1)	*	+	+	+	Scrobicularia
B 6400/2300(1)	+	93+	+	+	Littorina, Macoma barnacles
B 6400/2330(1)	+	80+			bivalve,barnacle
B 6440/0500(1)	+	1+	+	+	
B 6550/0300(1)	+	+			
B 6550/0300(2)	+	2+		+	
B 6500/0330(1)	+	2+			
B 6635/0380(1)	+	+			
B 6705/0450(2)	+				
B 6710/0130(1)	+	4+			gastropod,barnacles
B 6800/2000(1)	+	1+			gastropod cf Littorir
B 6900/1460(1)	+	+			
B 7000/1500(1)	+	+			
B 7000/1500(2)	+	+		+	
B 7080/1410(1)	+	+	+		
B 7160/2600(1)	+	+	+	+	
B 7180/0740(1)	+	+			
B 7190/1880(1)	+				
B 7200/2750(1)	+	1+	+	+	barnacles
B 7220/0775(1)	+	+			
B 7250/0750(1)	+				
B 7250/0775(1)	+				
B 7250/2130(1)	+	+	+	+	
B 7280/0690(1)	+	+			
B 7290/1430(1)	+	+			

	Land molluscs	Mytilus	Cerastoderma	Ostrea	Other taxa
B 7350/1500(1)	+	1+			bivalve
B 7430/1100(1)	+	16+			barnacles
B 7430/1330(1)	+	+			
B 7430/1580(1)	+	+			
B 7430/1585(1)	+	+	+		bivalve
B 7450/1330(1)	+				
B 7460/0900(1)	+	+	+	+	gastropod
B 7460/1290(1)	+	1+			gastropod
B 7530/1280(1)		+			
B 7550/0450(1)	+	+	+		
B 7550/1135(1)		+			
B 7560/1360(1)	+	+			
B 7590/1215(1)	+				
B 7590/1445(1)	+	+		+	gastropod
B 7610/0760(1)	+	+			
B 7700/1340(1)	+	+			Nucella bivalve
B 7840/0720(1)		+		+	barnacles,bivalve
B 7910/1310(1)	+	+			
B 7940/0430(1)	+	+	+		Gibbula
B 7960/0530(1)	+	+	+		
B 8000/0700(1)	+	6+			
B 8000/0700(2)		3+			
B 8050/0940(1)	+	1+			
B 8075/0790(1)	+	6+			gastropod,barnacles
B 8920/8350(1)	+	+			
Temp feature # 14(1)	+	+			
Temp feature # 16(1)	+	+			
Temp feature # 17(2)	+	1+			bivalve
Temp feature # 17(1)		+			
Temp feature # 26(1)	+	+			
Temp feature # 34(1)	+	+			
Temp feature # 35(1)	+	+			
Temp feature # 38(1)	+	+		+	
Temp feature # 39(1)	+	+			
Temp feature # 41(1)	+				
Temp feature # 42(1)	+	+			
Temp feature # 43(1)	+	+			
Temp feature # 46(1)	+	+			
Temp feature # 48(1)	+	+		+	
Temp feature # 50(1)	+	+			Nucella
Temp feature # 51(1)	+	+			bivalve
Temp feature # 55(1)	+	+			

	Land molluscs	Mytilus	Cerastoderma	Ostrea	Other taxa
Sample no. 656	+		+		
Sample no. 751	+		+	+	
Sample no. 806	+				
Pit 1	+	1+			Nucella
Pit 10		14+		6+	
Pit 12	+	110+	+		barnacles
Pit 20		2+			Littorina, Sepia barnacles
Pit 21	+	+		1	
Pit 32	+	26+			barnacle
Pit 34	+	+		1+	
C 9780/9520(1)	+				
C 9800/9650(1)	+	+			
D 0550/9860(1)	+	+			
D 0720/9740?(1)	+	2+			
D 0880/9720(1)	+	4+			barnacle
D 1000/9810(1)	+				
D 1120/9300(1)	+	+			
D 1330/9500(1)	+	+			
D 1420/9600(1)	+				
D 1500/9250(1)	+				
D 1590/9680?(1)	+	+			
D 1630/9450(1)	+	+			
D 1710/9290(1)	1	1+			
D 1790/9150(1)	+	14+			barnacle
D 2400/9580(1)	*	1+	+		
D 2420/9390(1)					Macoma
D 2780/9410(1)	+	+			
D 2850/9950(2)	+	+		+	
D 3220/9430(1)	+	+			
D 3300/9000(1)	+				
D 3300/9070(1)		+			
D 4050/9930(1)	+	+	+	+	
D 4650/9930(1)	+	+	+		
D 4650/8600(1)					
D 4750/8600(1)	+	+	+	+	gastropod,bivalve
D 5140/9250(1)	+	4+			
D 5610/8500(1)	+	4+		1+	barnacles
D 5750/9250(1)	+	+			
D 5950/9150(1)	+	+			
D 6100/8900(1)	*				
D 6100/8900(2)	*	+			
D 6100/8900(3)	*	1+			

	Land molluscs	*Mytilus*	*Cerastoderma*	*Ostrea*	Other taxa
D 6100/8900(4)	*	2+			gastropod
D 6100/8900(5)	*	+	+	+	
D 6100/8900(6)	*	1+			
D 6100/8900(7)	*	+			
D 6110/8900(1)	+				
D 6200/9000(2)	+	+			
D 6350/9640(1)	+	+	+		barnacles, gastropod
D 6400/9000(1)	+	1+			
D 6410/8200(1)	+	4+	+		*Spisula*
D 6535/8350(1)	+	6+	+		barnacle
D 6585/8420(1)	+	3+			
D 6700/8700(1)					
D 6700/8750(1)	+	+	+		
D 6710/8470(1)	+	+			
D 6730/8570(1)		+			
D 6760/8620(1)		3+		+	gastropod cf *Littorin*
D 6700/8750(1)					
D 6800/8800(1)					
D 6950/8820(1)	+	+			
D 6950/9020(1)	+	+			
D 7100/8980(1)	+	4+			
D 7150/9740(1)	+	11+	+		barnacle
D 7280/9200(1)		+			gastropod, bivalve, barnacle
D 7290/9600(1)	+	5+			
D 7460/9420(1)		+			
D 7680/8160(1)	+	+			
D 8070/7940(1)		3+			gastropod
D 8160/8440(1)	+	+			
D 8180/8060(1)	+	+			
D 8330/8280(1)	+	+	+	+	
D 8480/8400(1)		2+			
D 8500/7910(1)	+	+			
D 8645/8485(1)	+	+			
D 8700/8090(1)	+	6+		+	barnacle, *Buccinum*
D 8800/8770(1)	+	+			
D 8830/8180(1)	+	+	+		
D 8830/8230(1)		+	+		
D 9000/8450(1)	+	+			*Buccinum*

B 1285/0145(1)	388	Gastropod frag. (ridged whorl frag).
B 1500/0250(1)	298	Gastropod frag. (ridged whorl frag).
		Littorina littorea 1.
		Nassarius sp. 1.
B 1580/0300(1)	(AES)	Bivalve frag., gastropod frag.
B 1750/0820(1)	289	Gastropod aperture frag. cf. Littorina.
B 1808/6070(2)	LXLI	Scrobicularia plana (2 hinges with chondrophore)
		Bivalve fragment.
B 1850/0600(1)	304	Bivalve frags.
		Gastropod frag. (ridged whorl frag).
		Gastropod aperture frag. cf. Littorina littorea.
B 1890/0040(1)	(AHR)	Littorina littorea 1.
B 2030/2170(1)	650	Bivalve frag.
B 2070/0800(1)	637	Phytia myosotis 1.
B 2180/0480(1)	333	Bivalve frag.
		Gastropod frag.
B 2180/0650(5)	601	Gastropod frag. cf. Littorina littorea.
B 2235/0940(4)	678	Bivalve frag.
B 2340/4480(1)	LX	Scrobicularia plana (1 hinge with chondrophore).
		Bivalve frag.
		Buccinum undatum 1 (apex).
B 2350/0650(1)	(AAB)	Littorina sp. 1 (abraded shell).
B 2460/4360(1)	LXI	Bivalve frag.
B 2500/1135(1)	(ALY)	Gastropod frag. (ridged whorl frag).
B 2600/4500(1)	LXXIV	Bivalve frags.
		Gastropod frag.
B 2610/1625(1)	(AMA,AKW)	Bivalve frag.
B 2750/0300(2)	(PR,QB)	Gastropod columella (large species).
B 2970/0090(1)	(PN,OA,LB)	Gastropod columella frag. (large species).
B 3180/1670(1)	(ALQ)	Gastropod frag. (ridged whorl frag).
B 3350/1950(1)	739	Bivalve frag.
		Gastropod frag. (ridged whorl frag).
B 3590/1600(1)	(AIS)	Gastropod, bivalve frags.
B 3600/0850(1)	(AGI,ADD)	Gastropod aperture frag.
		Gastropod frags. (ridged whorl frags).
B 3600/5215(1)	(EJ)	Bivalve frag.
B 3700/0700(1)	381	Gastropod frags. (ridged whorl frags).
B 3790/0960(2)	262	Bivalve frag.
B 3850/2025(1)	614	Bivalve frag.
B 4000/2920(4)	632	Gastropod frag. (ridged whorl frag).
B 4220/4700(1)	LXXXV	Gastropod frag. (ridged).

B 4500/2800(1)		Hydrobia ulvae 1.
B 4920/1100(1)	184	Gastropod frag. (reticulate).
B 5020/3910(1)	LXXXIII	Nucella lapillus (frag. with siphonal canal).
		Bivalve frag.
B 5630/0000(1)	(PS,RQ,AEK,AIN)	Bivalve frag.
B 5830/0970(1)	(QI,PV)	Littorina sp. 1 (abraded).
B 6375/0425(1)	620	Scrobicularia plana (frag. with chondrophore).
B 6400/2300(1)		Littorina cf. rudis (young juvenile).
		Macoma balthica 1 hinge (cardinal teeth abraded)
B 6400/2330(1)	SCXXII	Bivalve hinge (teeth badly abraded).
		Bivalve frag.
B 6710/0130(1)	236	Gastropod frag. (ridged whorl frag).
B 6800/2000(1)	161/179	Gastropod frags. cf. Littorina sp.
B 7350/1500(1)	LXXXVII	Bivalve frag.
B 7430/1585(1)	CXV	Bivalve frags.
B 7460/0900(1)	154	Gastropod frag. (ridged whorl frag).
B 7460/1290(1)	CI	Gastropod frag. (ridged whorl frag).
B 7590/1445(1)	CIII	Gastropod columella frag.
B 7700/1340(1)	CXLIII	Nucella lapillus (whorl frags).
		Bivalve frags.
B 7840/0720(1)	CXXIX	Gastropod frag. cf. Littorina sp.
		Gastropod frags. (ridged whorl frags).
		Bivalve frag.
B 7940/0430(1)	374	cf. Gibbula sp. (apex: very abraded).
B 8075/0790(1)	156	Gastropod frag. (ridged whorl frag).
D 2420/9390(1)	(ARH)	Macoma balthica L. (intact valve).
D 4750/8600(1)	737	Gastropod frags. (ridged whorl frags).
		Bivalve frags.
D 6100/8900(4)	749	Gastropod frag. (ridged whorl frag).
D 6350/9640(1)	747	Gastropod frags. (ribbed and grooved frag).
D 6410/8200(1)	683	Spisula sp. (hinge).
D 6760/8620(1)	711	Gastropod frag. cf. Littorina sp.
D 7280/9200(1)	702	Gastropod frag. (ridged whorl frag).
		Bivalve frag.
D 8070/7940(1)	722	Gastropod frag. (ridged whorl frag).
D 8700/8090(1)	693	Buccinum undatum (whorl frags).
D 9000/8450(1)	770	Buccinum undatum (apex).
Temp feature # 17(2)	XLVIII	Bivalve frags.
Temp feature # 50(1)	XXX	Nucella lapillus (frag. with top of aperture).
Temp feature # 51(1)	XXVI	Bivalve frags.
Pit 1		Nucella lapillus (frag. with siphonal canal).

Pit 20	*Littorina littorea* 1 (intact shell).
	Sepia sp. (fragments of internal shell).

Table B: Marine mollusca (uncommon taxa).

Notes:

a) Gastropod frag. (ridged whorl frag). Refers to small whorl fragments with strong spiral ridges, usually too abraded or small for specific identification.

b) Bivalve frag. Refers to small bivalve fragments with prominent growth lines but no distinctive shell sculpturing.