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Report 113/88

THE STANSTED AIRPORT PROJECT, ESSEX:
PART 1: COLCHESTER HALL
PART 2: MOLEHILL GREEN

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Summary

Results from analyses of plant macrofossils, mollusca, and avian eggshell at these two rural medieval sites are presented and briefly discussed. The crop plant remains are mainly of compactoid free-threshing hexaploid wheat with one tetraploid-type rachis node, and other crops include barley and oat grains (some germinated- perhaps malting residues), flax and horse-beans. Plant macrofossils and mollusca indicate standing water in moats and ditches, and terrestrial mollusca provide evidence for an area of meadow at Molehill Green. Rare shells of marine molluscs and eggshell fragments from domestic fowl were also recovered.

Author's address :-

Centre of East Anglian Studies
University of East Anglia
Norwich
Norfolk NR4 7TJ

0603-56161

Introduction

As part of the Stansted project later prehistoric, Roman and medieval sites are currently being excavated in advance of airport construction work. In this series of A.M. Lab. reports the results from analysis of soil samples will be presented and briefly discussed. At some of the sites only very small-scale sampling is either necessary or possible and the results are consequently of limited value, considered in isolation. However the project does provide an opportunity to assess changing patterns of land use and agriculture over a long period on this area of heavy Boulder Clay soils. When work on all the sites is completed a final more extended synthesis and discussion of the results will be made.

Methods

Problems associated with processing these clay-based samples have already been considered, and results from experimental processing presented, in Murphy (1987). The most effective method was found to be as follows. Bulk samples were air-dried and pre-soaked in Calgon solution. The partly disaggregated samples were then processed in the field by manual flotation/wet sieving, using 0.5mm meshes throughout. The flots and residues were then dried, and in the laboratory the residues were re-treated by soaking in hot water with or without dispersants as necessary, before a second flotation/wet-sieving was undertaken. By this stage the residue was almost totally disaggregated, apart from iron concretions. Flots and residues were again dried before sorting.

1. Colchester Hall

Excavation showed that the deposits filling the moats at this site were generally of comparatively recent date, most medieval deposits having been removed. Within the moated area very few medieval features were located. Consequently sampling was on a small scale, and several of the samples collected were subsequently discarded when their dating was re-assessed. Samples have been examined from a V-shaped slot at the bottom of a medieval moat (528), a moat (579) and a medieval pit (1074).

a) Plant macrofossils

Plant remains from these three contexts are listed in Table 1. Most of the material is carbonised, though 1074 produced some 'silica skeletons' of

Context no.			528	579	1074
Sample no.			1	3	6
Triticum sp	ca	(a)	51+fr	59+fr	144+fr
Trticium sp	ca	(b)	-	-	5
Triticum sp	rn	(c)	7	13	2
Triticum sp	ri.fr		3	-	1
Triticum sp	gt	(d)	-	-	5
Triticum sp	a.fr	(d)	-	-	+
Hordeum sp	ca		1cf	-	11(i)
Avena sp	ca		4	2cf	6(i)
Cereal indet.	ca		14+fr	16+fr	48+fr
Cereal indet.	sp		-	-	13
Cereal indet.	?cb		1fr	-	-
Leguminosae indet.		(e)	co.fr	co.fr	-
cf. Linum usitatissum L		(f)	-	-	1
Brassica sp			-	-	11
Chenopodiaceae indet.			-	1	-
Vicia/Lathyrus sp(p)			-	-	2co
Rumex sp(p)			-	-	3
Corylus avellana	ns.fr		-	+	-
Anthemis cotula L			1	2	14
Carex sp			1	-	-
Bromus mollis/secalinus			1fr	-	-
Gramineae indet.			-	-	2
Indet.		(g)	-	-	96
Indet. seeds etc			2	1	8
Ranunculus acris/repens/bulbosus		(h)	-	-	+
Stellaria media-type		(h)	-	-	+
Chenopodium album L		(h)	-	-	+
Chenopodiaceae indet.		(h)	+	-	-
Rubus fruticosus agg.		(h)	-	-	+
Polygonum sp		(h)	-	-	+
Rumex sp		(h)	-	-	+(j)
Plantago major L		(h)	-	-	+
Sambucus nigra L		(h)	+	-	-
Lemna sp		(h)	+	+	+
Gramineae indet.		(h)	-	-	+
Sample volume (litres)			8	14	10
% flot sorted			12.5	12.5	12.5

Table 1: Plant macrofossils from Colchester Hall

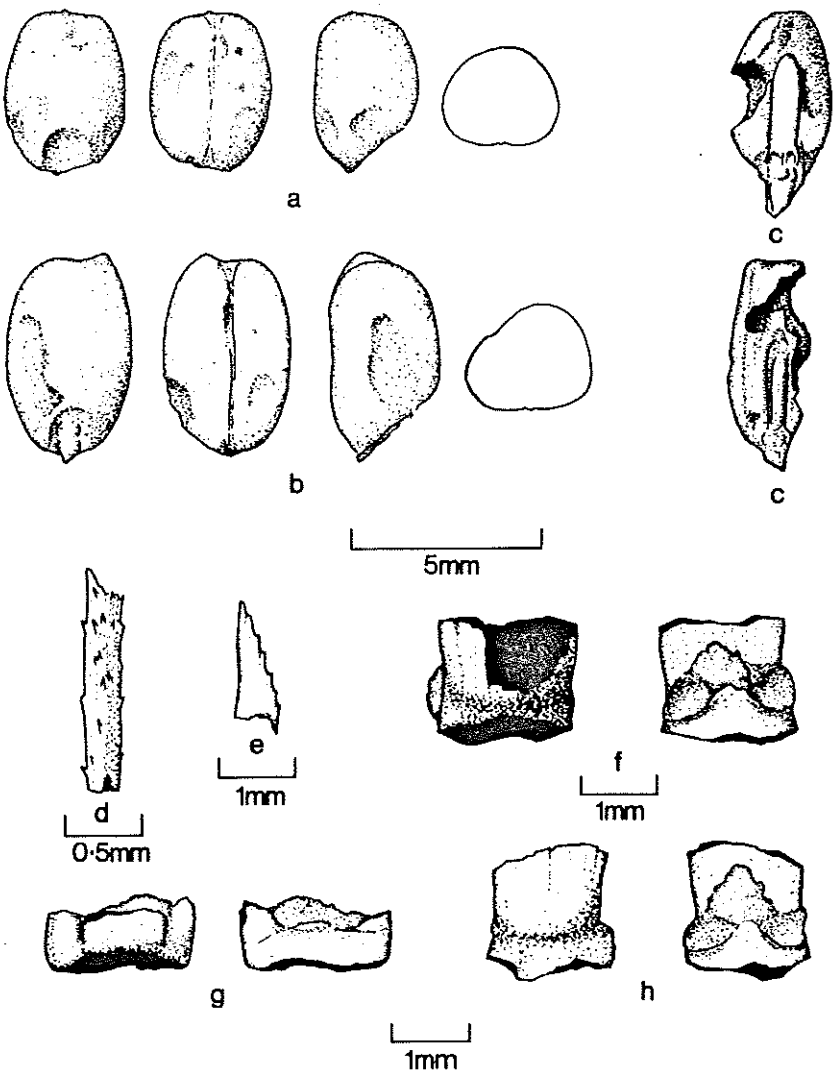
Taxa are represented by carbonised fruits or seeds except where indicated.

Abbreviations: a - awn; ca - caryopses; cb - culm base; co - cotyledons; fr - fragment; gt - glume tip; ns - nutshell; ri - rachis internode; rn - rachis node; sp - 'sprouts'.

Notes: (a) Short-grained hexaploid forms. (b) Slightly more elongate grains. (c) Hexaploid-type. (d) 'Silica skeletons'. (e) Large-seeded Vicia or Pisum. (f) Fragmentary seed with testa cell patterning closely matching flax. (g) Possibly underdeveloped Compositae. (h) Uncarbonised. (i) Mostly germinated grains. (j) Mineralised.

Fig. 1: Some cereal remains from Colchester Hall and Molehill Green

a,b. Wheat grains (Triticum sp) showing range of forms present. CHS 579 and 1074.
c. Germinated barley grains (Hordeum sp). CHS 1074.
d. Wheat awn fragment. CHS 1074.
e. Wheat glume tip. CHS 1074.
f. Hexaploid-type wheat rachis node. CHS 528.
g. Tetraploid-type wheat rachis node. MGS 325.
h. Hexaploid-type wheat rachis node. MGS 325.



glume tips and awns, and all three contexts contained uncarbonised macrofossils preserved in damp conditions. The presence of modern roots, however, indicates that some intrusive plant material is present and hence full quantitative analysis of uncarbonised macrofossils has not been undertaken.

Most of the cereal grains from these features are of short-grained hexaploid wheat (Triticum sp; Fig. 1,a) though there are a few slightly more elongate wheat grains (Fig. 1,b). The wheat rachis nodes are of hexaploid type (Fig. 1,f). Glume tips and awns came from 1074 (Fig. 1,d-e). The wheat from these samples is thus a bearded compactoid free-threshing type. Deformed grains of barley (Hordeum sp) and oats (Avena sp), mostly germinated prior to carbonisation are also present (Fig. 1,c). 528 and 579 produced large legume cotyledon fragments, from beans, peas or large vetches. A fragmentary seed from 1074 has a testa cell pattern closely matching flax (Linum usitatissimum). Associated with the crop plant remains is a sparse assemblage of carbonised weed seeds. 579 produced a carbonised hazel nut shell fragment (Corylus avellana).

The assemblage from pit 1074 is clearly very mixed in character, containing several crop products and waste material. Prime wheat grain is the main component, but light and heavy chaff is also present, together with sprouted barley and oat grains, which may represent charred malting residues. 528 and 579 contained mainly prime wheat grain with some contaminants, mostly rachis nodes.

The uncarbonised macrofossils are of weeds, grassland and scrub species with seeds of Lemna sp. (duckweed) indicating the presence of standing water in the features.

b) Land and freshwater molluscs

Mollusc shells were present in all three features, but only 528 produced an assemblage sufficiently large for any palaeoecological interpretation (Table 2).

The most abundant snail is Armiger crista, a very small aquatic species, which indicates that there was permanent standing water in this slot whilst 528 accumulated. The freshwater 'slum' species Lymnaea truncatula and Anisus leucostoma, which can tolerate stagnant water subject to periodic drying, are also common. Terrestrial species occur at low frequencies. The absence of large obligate aquatic snails presumably indicates that the

Lymnaea truncatula (Müller)	39
Anisus leucostoma (Millet)	77
Armiger crista (Linné)	98
Carychium tridentatum (Risso)	1
Discus rotundatus (Müller)	2
Vitrea crystallina (Müller)	1
Aegoninella nitidula (Draparnaud)	1
Zonitidae indet.	2
Cepaea sp	(+)

Table 2: Mollusca from slot at base of moat, 528, at Colchester Hall

volume of permanent standing water was small.

Molluscs are present in enclosure ditches and moats at other sites excavated during the Stansted project. Comparison of assemblages from a range of contexts could well yield information on changing drainage conditions in this area from later prehistory through to the medieval period. Since soil drainage is a limiting factor for agriculture on these heavy clay soils mollusc ditch faunas may produce data of relevance for an assessment of the agrarian economies of the sites.

c) Marine molluscs

579 produced a single shell of Ostrea edulis (oyster), and the sample from 1074 contained three mussel hinge fragments (Mytilus edulis).

d) Avian eggshell

Fragments were present in the sample from 1074. The distribution of shell thicknesses, measured with a flat-jawed micrometer are shown in Fig. 2. Most fragments were 0.25-0.35mm thick, and fall within the range of shell thicknesses for modern domestic fowl. A single fragment with a thickness of 0.65mm is from a larger bird's egg, comparable to goose, swan or guinea fowl (Keepax 1981, 323).

e) Bone

Bones and fragments of fish, amphibians, small and large mammals were extracted and await identification.

2. Molehill Green

Samples were collected at this small medieval site from moats, field and drainage ditches and pits, in trenches A, B and C.

a) Plant macrofossils

Carbonised plant remains are listed in Table 3, and uncarbonised fruits, seeds etc. in Table 4.

Carbonised remains of cereals predominate. Most of the cereal grains are of short-grained hexaploid wheat Triticum sp; with a small proportion of

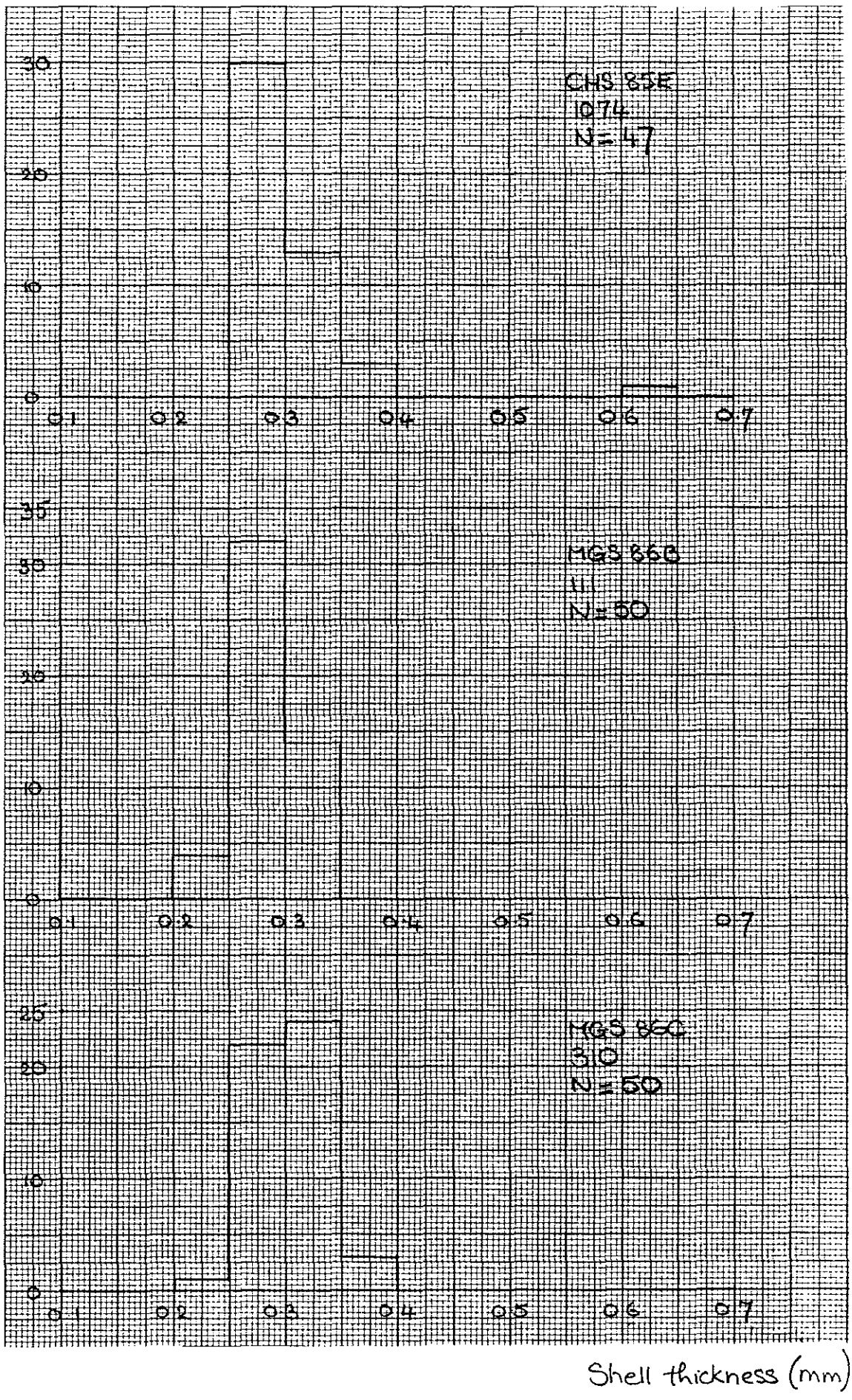


Fig 2 : Thicknesses of avian eggshell fragments

slightly more elongate grains; almost all are in a very poor state of presentation. Many of the wheat rachis nodes are too incomplete for identification, but hexaploid nodes certainly predominate (Fig. 1,h) and some of the detached internodes show clear lines near the outer edges of their convex faces - again typical hexaploid features. Pit C 325 produced a single rachis node with glume bases attached. The form of the internode, and the presence or absence of swellings below the glume inserts cannot be established from this fragmentary specimen, but it appears to be from a tetraploid wheat (Fig. 1,g). In summary the main wheat represented is a hexaploid free-threshing type with some probable tetraploid wheat (T. turgidum/durum).

Other cereals are rare, apart from in B 112, which produced some germinated oat grains (Avena sp). A few barley grains (Hordeum sp) and immature fragments of barley rachis were also identified.

Badly preserved and mainly fragmentary seeds and cotyledons of a large-seeded Vicia or Pisum are present in most samples, but retain no trace of their hilums. Pit C 325, however, produced a seed of Vicia faba var. minor (horsebean).

The sparse weed flora is dominated by Vicia/Lathyrus spp, Rumex spp. and Anthemis cotula. Hazel-nut shell fragments (Corylus avellana) are also present.

The cereal/weed assemblages from the site are remarkably uniform in composition. From the predominance of wheat grains it appears that carbonisation occurred at a late stage in the processing of wheat, after threshing and winnowing. No deposits of crop cleaning waste are present in these samples.

Samples from a few of the larger features at Site C (moat fills 231,235,269, 310 and pit fill 325) and from pit 38 at Site A contained sparse assemblages of uncarbonised plant macrofossils contemporary with the deposition of these fills. It appears that these deposits have not remained permanently water-logged, since the macrofossils are generally poorly preserved and intrusive recent plant material (including woody roots, wheat awns, grass inflorescence bracts and seeds of Medicago lupulina) is present. In these circumstances full quantitative analysis is inappropriate.

Context no.			A15	A20	A38	B111	B112	C231	C273	C310	C325	C376
Sample no.			3	2	1	5	4	9	12	10	13	11
Triticum sp	(a)	ca	3+fr	10+fr	5+fr	4+fr	713+fr	2+fr	20+fr	1	68+fr	-
Triticum sp	(b)	ca	-	-	-	-	-	-	2	-	-	-
Triticum sp	(c)	rn	-	3	-	-	7	-	1	-	7	-
Triticum sp	(d)	rn	-	-	-	-	-	-	-	-	1	-
Triticum sp		rn	1	2	1	-	19	1	-	-	-	-
Triticum sp		ri.fr	-	-	-	-	9	-	-	-	-	-
Hordeum sp		ca	-	-	-	-	4	-	-	-	-	-
cf. Hordeum sp	(e)	rn	-	-	-	-	-	-	-	-	1	3
Avena sp	(f)	ca	2	-	-	1	38	-	1	-	-	1cf
Cereal indet.		ca	2+fr	4+fr	-	3+fr	161+fr	2+fr	6+fr	-	16+fr	-
Cereal indet.		cn	-	-	-	-	-	-	-	-	1	-
Vicia faba L. var minor			-	-	-	-	-	-	-	-	1s+1co	-
Leguminosae indet.(g)			-	co.fr	-	co.fr	7+7co	-	2s+2co	co.fr	3s+2co	1s+1co.fr
Ranunculus acris/repens/bulbosus			-	-	-	-	2	-	-	-	-	-
Brassica sp	(h)		-	-	-	12cf	1	-	-	-	-	-
Atriplex patula/hastata			-	1	-	-	3	-	-	-	-	-
Chenopodiaceae indet.			-	-	-	-	5	-	-	-	-	-
Medicago lupulina-type			-	-	-	-	3	-	-	-	-	-
Vicia/Lathyrus sp(p)(h)			-	-	-	-	17+23co	-	-	-	1s+2co	-
Polygonum convolvulus L			-	-	-	-	-	1	-	-	-	-
Polygonum sp			-	1	-	-	-	-	-	-	-	-
Rumex sp(p)			1	-	1	2	17+4cf	-	-	-	1	1
Corylus avellana L		ns.fr	-	-	-	+	-	-	+	-	-	-
Euphrasia/Odontites sp			-	-	-	-	1	-	-	-	-	-
Galium aparine L			-	-	-	-	-	-	1	-	-	-
Anthemis cotula L			-	1cf	1	-	113	-	1+1cf	-	1cf	-
Lapsana communis L			-	-	-	-	2	-	-	-	-	-
Carex sp			-	-	-	-	1+1cf	-	-	-	-	-
Bromus mollis/secalinus			-	-	-	3	18	-	-	-	1	-
Gramineae indet.			1	1	-	1	7	-	-	1	-	2
Indet. seeds etc			2	-	-	2	11	-	2	2	-	1
Indet. buds			-	-	-	1	1	-	-	-	-	-
Indet. thorns			2	-	-	-	-	-	-	-	-	-
Sample volume (litres)			-	10	12	6	12	20	20	5	10	4
% flot sorted			50	50	50	100	100	50	25	50	25	25

Table 3: Carbonised plant macrofossils from Molehill Green, Sites A, B and C

Taxa are represented by fruits or seeds except where indicated.

Abbreviations: ca - caryopses; cn - culm nodes; co - cotyledons; fr - fragments; ns - nutshell; ri - rachis internodes; rn - rachis nodes; s - seeds.

Notes: (a) Very short hexaploid grains. (b) Slightly more elongate wheat grains. (c) Hexaploid-type nodes. (d) Tetraploid-type nodes. (e) Underdeveloped. (f) Some germinated grains. (g) Large-seeded Vicia or Pisum - no trace of hilum surviving. (h) Difficult to separate where hilums and testa patterning lost.

Context no.	A38	C231	C235	C269	C310	C325
Sample no.	1	9	8	7	10	13
Characeae	-	++	+	+++	-	-
Ranunculus acris/repens/bulbosus	-	+	-	-	-	+
Ranunculus subg. Batrachium	-	-	-	++	-	-
Stellaria media-type	-	+	-	-	-	-
Atriplex sp	+	-	-	-	-	+
Chenopodiaceae indet.	-	-	-	-	-	+
Prunus domestica L subsp insititia	-	-	-	-	+	-
Rubus fruticosus agg.	-	-	+	++	++	-
Potentilla sp	-	+	-	-	-	-
Aethusa cynapium L	-	-	-	-	+	-
Urtica dioica L	-	++	+	++	+	+
Anagallis arvensis-type	-	-	-	-	-	+
Stachys sp	-	-	-	+	+	-
Sambucus nigra L	-	+	-	-	-	-
Sonchus asper (L) Hill	-	+	-	-	-	-
Alismataceae indet.	-	-	-	++	-	-
Lemna sp	+	-	-	++	-	+
Carex spp	-	++	+	+	++	-
Wood fragments	-	-	-	+	+	-
Sample volume (litres)	12	20	24	2	5	10
% flot sorted	50	50	100	100	50	25

Table 4: Uncarbonised plant macrofossils from Molehill Green

Counts have not been made but an indication is given of the relative abundance of taxa.

The taxa identified include a mixture of grassland, weed, scrub and aquatic taxa, probably just representing vegetation colonising these features between phases of filling and cleaning out. The bramble fruitstones (Rubus fruticosus) could possibly represent food waste, as could the small wild-type fruitstones of bullace (Prunus domestica subsp. insititia). Some of the moat fills were evidently formed under standing water, for they produced charophyte oogonia, fruits of crowfoot (Ranunculus subg. Batrachium), Alismataceae embryos and seeds of duckweed (Lemna sp). The abundance of charophyte remains in C269 and to a lesser extent C231 is interesting, since charophytes cannot tolerate turbid or polluted water (Fritsch 1961). In the vicinity of a medieval settlement polluted groundwater might be expected, but clearly here conditions were very clean: no significant amounts of refuse or animal dung were being deposited in the moat whilst these deposits formed.

b) Land and freshwater molluscs

Shell assemblages from the moat fills C231, 235 and 269 and the refuse pit 325 are listed in Table 5. The moat fills produced a fairly diverse range of aquatic taxa and this (together with the presence of charophyte remains) indicates clean water with no evidence for periodic desiccation or organic pollution. By contrast the assemblage from pit 325 is sparser and is dominated by the freshwater slum species Anisus leucostoma: this feature produced no charophyte oogonia.

Terrestrial snails are also quite common in the moat fills, the main taxa being Vertigo pygmaea, Vallonia spp. (mostly V. excentrica) and snails of the Trichia hispida group. These taxa clearly indicate grassland in the vicinity of the moat. V. pygmaea is typically found in stable grassland habitats with a continuous cover of short or long grass (Evans 1972, 143), whilst V. excentrica is also a common grassland snail (ibid, 162). Both snails can tolerate moderately damp soil conditions, though they also occur in dry grassland. Grassland conditions were clearly maintained at this site for the entire period during which the moat was in-filled. The evidence for clean water in the moat itself indicates that the grassland was not grazed - animal droppings would inevitably have caused pollution - and it seems probable that the land in this area of the site was used as hay meadow.

Context no.	231	235	269	325
Sample no.	9	8	7	13
Valvata cristata Müller	8	-	12	-
Lymnaea truncatula (Müller)	-	-	-	1
Lymnaea sp	-	-	-	3
Anisus leucostoma (Millet)	-	-	1	11
Gyraulus albus (Müller)	-	-	1	-
Armiger crista (Linné)	2	-	20	4
Hippeutis complanatus (Linné)	-	-	1	-
Sphaeriidae (frags)	(+)	-	(+)	(+)
Carychium minimum Müller	2	-	1	-
Carychium sp	13	1	1	-
Cochlicopa sp	4	-	-	1
Vertigo pygmaea (Draparnaud)	21	2	2	-
Vertigo sp	26	-	1	-
Vallonia pulchella (Müller)	6+9cf	1	-	-
Vallonia excentrica Sterki	98	2	3	2
Vallonia sp	293	6	18	5
Acanthinula aculeata (Müller)	2	-	-	-
Punctum pygmaeum (Draparnaud)	11	2	3	-
Discus rotundatus (Müller)	-	-	1	-
Arionidae indet.	(+)	-	(+)	(+)
Vitrea contracta (Westerlund)	-	-	1	2
Vitrea sp	1	1	2	10
Aegopinella spp	12	-	4	-
Oxychilus sp	1	1	-	-
Zonitidae indet.	-	-	7	4
Limacidae indet.	-	-	-	1
Cecilioides acicula (Müller)	5	-	1	44
Clausiliidae indet.	-	-	1	-
Trichia hispida gp	63	3	10	1
Cepaea sp(p) (frags)	(+)	-	(+)	-
Helix aspersa Müller (frags)	(+)	-	(+)	-
Indet. apical frags	7	1	5	-

Table 5: Freshwater and land molluscs from moat and pit fills at Molehill Green, Site C.

c) Marine molluscs

The samples produced the following marine mollusc shells and fragments:

Context	15	273	310	325
Ostrea edulis L.	2	1	(+)	1
Cerastoderma sp.	-	(+)	-	-

Compared to samples from contemporary urban contexts in the region only very small quantities of shell were present, perhaps implying that shellfish were not a significant component of the diet.

d) Other invertebrates

The lower moat fills, 269 and 310, at Site C included cladoceran ephippia; 310 also produced ostracods and 269 contained caddis larval cases. These macrofossils provide further evidence for standing water in the moat. Insect remains were present in most samples, but many of these appear to be recent and intrusive.

e) Avian eggshell

Eggshell fragments came from contexts A15, B111, C231, 273, 310 and 325. Distributions of shell thicknesses from the two largest collections of fragments - from 111 and 310 - are shown in Fig. 2. Most fragments fall in the range 0.25-0.35mm thick, and are thus comparable to modern domestic fowl.

f) Bone

The bones of fish, amphibians and mammals from the samples await analysis.

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