

**APPENDIX 8. REPORT ON THE MOLLUSCA FROM PLEISTOCENE
SEDIMENTS RELATING TO THE MEDWAY PROJECT**

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Introduction

Samples were received in various forms from F. Wenban-Smith and R. Briant (Table A8.1). Most had already been processed and I was sent the residues retained by a 0.5 mm sieve, which had been bagged up into various fractions. I already had unprocessed sediment from the East Mersea Restaurant site that I had collected about 15 years ago. Likewise the borehole samples, still retained in plastic guttering, from East Hyde (Tillingham) and Shoeburyness had also been collected by Helen Roe in the early 1990s. During the present project subsamples were analysed quantitatively for Mollusca from each of these two boreholes, although the volume of sediment that could be analysed was extremely low (usually <100g). A small quantity of hydrogen peroxide was needed for disaggregation, since some of these samples were rich in clay. Following wet sieving, the samples were air-dried. All molluscan (and other) remains retained by a 0.5mm sieve were picked and counted in the standard way. Non-apical fragments of gastropods were counted (in addition to apices), if the taxon concerned was otherwise unrepresented in the sample. Full analyses were only undertaken on the borehole samples. Faunal lists were prepared for the other samples based on presence. Any potentially datable material, especially the calcitic opercula of *Bithynia*, was extracted and submitted to Dr Kirsty Penkman (University of York) for amino acid analysis.

Results

The raw data are presented at the end of this appendix in Table A8.2 (Kent sites) and Table A8.3 (Essex sites).

Discussion of results (Kent sites)

Kingsmead Park - KMP 05

A limited fauna recovered from sample <12 (context 15) was dominated by hydrobiids (*Heleobia* sp.). A worn fragment of *Corbicula* was also recovered. No *Bithynia* were detected for dating.

Whittings Farm - WHTT 05

The residues of this sample, number <2> from TP 4, context 42 went missing. At least two species were observed during the assessment, one of them *Pupilla muscorum*.

Ringshill Farm - RHLLF 05

The sample (number <1> from context 42) contained an exclusively terrestrial fauna, consisting of species of open calcareous habitats (*Vallonia costata*, *Pupilla muscorum* and *Trichia hispida*). Nothing diagnostic as to age (could be as young as Late-glacial or Holocene).

Discussion of results (Essex sites)

The Tillingham Channel (East Hyde and Bradwell Hall - BRADH 05)

The samples from the East Hyde borehole and from Bradwell Hall both came from the same palaeo-channel, the Tillingham Channel. Roe (2001) provides a full discussion about the context of the site at East Hyde and has published a pollen diagram (and ostracod diagram) from this borehole, indicating that it accumulated during the late temperate substage of the Hoxnian interglacial (Ho III). Regarding the molluscs, the occurrence of *Theodoxus danubialis* (= *serratiliniiformis*), *Viviparus diluvianus*, *Pisidium clessini* and *Corbicula fluminalis* at East Hyde was already known (Roe & Preece, 1995). These are important elements of the so-called 'Rhenish fauna' that were thought to have entered Britain at a time when the Thames and Rhine drainage systems had become linked. The other classic horizon in the UK with the 'Rhenish fauna' are the upper levels of the Swanscombe aggradation – i.e. the Middle Gravels at Barnfield Pit and their equivalent at Dierden's Pit. At these sites at Swanscombe, a few other species, such as *Valvata naticina* and *Belgrandia marginata* also formed part of the 'Rhenish suite'. These can now be added to the fauna from East Hyde and *Valvata naticina* was also present at Bradwell Hall. One fragmentary operculum from East Hyde may possibly belong to *Parafossarulus crassitesta* but better preserved material needs to be found before this record is confirmed. Interestingly, this species occurs with *V. diluvianus*, *P. clessini*, *B. marginata* and *V. naticina* at Neede, the type-site of the Needian Stage (=Holsteinian) in the Netherlands. Some of the specimens of *Viviparus diluvianus* from Bradwell Hall were fully grown, in marked contrast to the fragmentary material previously recovered from East Hyde. Until recently, species such as *Theodoxus danubialis* were only known in Britain from Swanscombe and East Hyde and were thought to typify fluvial assemblages from calcareous streams with hard-substrates that existed during the later part of the Hoxnian (MIS 11). However, *T. danubialis* is now known from Funtham's Lane near Peterborough in a much younger assemblage, probably dating from MIS 7 (Langford *et al.*, 2004). Interestingly this Funtham's Lane assemblage also appears to have lived towards the end of that interglacial.

The Mollusca from East Hyde and Bradwell Hall are also important in indicating brackish influence. Hydrobiids, principally *Helebia* sp (= *Paladilhia radigueli* auctt.) and other marine taxa (*Cerastoderma glaucum* at Bradwell Hall and barnacles at East Hyde) were recovered from both sites. The ostracod *Cyprideis torosa* was also common. Over thirty species of molluscs are now known from East Hyde, including a number of land snails. The sediments also yielded plant macrofossils and a few beetle remains, including an elytron of *Stenoscelis submuricatus*, a non-British species that inhabits dead wood of various deciduous trees (G.R. Coope, pers. comm.).

Shoeburyness, Essex

Three levels were analysed from this borehole. Only a limited molluscan assemblage was recovered consisting of fluvial taxa *Valvata piscinalis*, *Pisidium henslowanum* and *P. supinum*. There is nothing to suggest date, although there are geological reasons for believing that the sediments, like those from Cudmore Grove, formed during MIS 9. Fortunately, *Bithynia* opercula were recovered and these have been submitted for amino acid dating, so this hypothesis can be tested (cf appendix xx).

East Mersea Restaurant site

Details of the limited molluscan fauna from this site have already been published (Bridgland *et al.*, 1995). Further samples were analysed in order to obtain additional opercula for dating. The site has yielded *Hippopotamus*, and is thought to be Last Interglacial (MIS 5e) in age. At least 10 species of molluscs were recovered, including *Planorbarius corneus*, a new record for the site.

Barling - BLNG 05

A limited fauna was recovered sample <5> (context 18) including *Bithynia* spp., *Valvata piscinalis* and *Pisidium henslowanum* and fragments of *Corbicula fluminalis*. The brackish mud-snail *Hydrobia ulvae* was also present, suggesting quite a strong marine influence. Although hydrobiids (*Heleobia* sp.) were present in the original samples from Barling, *H. ulvae* was not recovered and neither was *B. troschelii*. The assemblage is clearly interglacial in character but it is not easy to relate to the original samples.

Apton Hall Farm - APHF 05

A limited fauna with land snails *Clausilia bidentata* and *Cepaea*. *Bithynia tentaculata* opercula present. Fauna obviously temperate, but not indicative as to age.

References

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- Roe, H.M. 2001 The late Middle Pleistocene biostratigraphy of the Thames Valley, England: new data from eastern Essex. *Quaternary Science Reviews* **20**: 1603-1619.
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Table A8.1. Samples submitted for mollusc analysis

<i>County</i>	<i>Site</i>	<i>Site-code</i>	<i>Samples</i> <>	<i>Original sample volume</i> (lit)	<i>Context /depth</i>	<i>Context description</i>	<i>Postulated sediment body</i>	<i>Sampling notes</i>
Kent	Whittings Farm (test pit)	WHTT 05	<2>	20	42	Very pale brown calcareous silt with vf-m chalk pebbles	Devensian slope-wash and poss. soil similar to Halling	Taken from material recovered by machine bucket
	Ringshill Farm (test pit)	RHLLF 05	<1>	20	42	Lenticular bed c. 5cm thick of vf-f chalk pellets in silt/sand matrix within sand body at least 3m thick (bottom not reached)	Colluvial slopewash? Fluvial deposit?	Sample from darker, siltier seam at base of chalk pebble-rich bed — taken from material recovered by machine bucket
	Kingsmead Park (test pit)	KMP 05	<5>	5	15	Mid-grey clay-silt	Allhallows Channel	Sample taken by hand directly from test pit section
<12>			5	15				
Essex	Apton Hall Farm (borehole)	APHF 05	<3A>	5	5.0 to 5.5 m	Pale brown clayey silt	Rochford Channel	Sample is combined drilling shoe material from 5.0 and 5.5 m
	Barling Gravel Pit (section)	BLNG 05	<5>	10	18	Bedded gravelly sand with clay-silt drapes	Barling Gravel	Sample taken by hand directly from quarry section
	Bradwell Hall (test pits)	BRADH 05	<8>	10	62	Laminated pale grey vf sand with shelly beds and common "race" nodules	Tillingham Channel	Samples taken by hand directly from test pit 6 section
			<13>	20	72	Sandy clay-silt with sub-horizontal "race" and sand beds	Ditto above	These samples taken by hand directly from larger test pit 7 section; samples are in stratigraphical sequence, heading down to basal gravel; samples 13 and 15 are from same deposit and roughly same level as sample 8
			<15>	20	73	Laminated pale grey sand/clay-silt		
			<17>	20	75	Shell-rich sandy flint gravel (med. to coarse)		

Table A8.2. Raw data from analysis (Kent)

Kingsmead Park, KMP 05, <12> (15)
<i>Heleobia</i> sp.
<i>Valvata piscinalis</i>
<i>Corbicula fluminalis</i>
Ostracods

Ringshill Farm, RHLLF 05 (42) <1>
<i>Vallonia costata</i>
<i>Trichia hispida</i>
<i>Pupilla muscorum</i>
<i>Deroceras/Limax</i>
Other

Whittings Farm, WHTT 05
No data

Table A8.3. Raw data from analysis (Essex)

Shoeburyness, Essex			
Depth (m)	14.6	14.3	13.9
Sample weight (g)	50.5	59.1	90.3
<i>Valvata piscinalis</i>	-	1	?1
<i>Bithynia tentaculata</i> (shells)	-	-	1
<i>Bithynia tentaculata</i> (opercula)	3	2	9
<i>Pisidium supinum</i>	-	-	1
<i>Pisidium henslowanum</i>	-	-	1

Bradwell Hall, Essex (BRADH 05)				
Sample	<8>	<13>	<15>	<17>
Freshwater taxa				
<i>Theodoxus danubialis</i>	+	+	+	+
<i>Viviparus diluvianus</i>	+	+	+	+
<i>Valvata naticina</i>	+	+	+	+
<i>Valvata piscinalis</i>	+	+	+	+
<i>Heleobia</i> sp.	+	+	+	+
<i>Bithynia tentaculata</i> shells	+	+	-	+
<i>Bithynia tentaculata</i> (opercula)	+	+	-	+
<i>Bithynia troschellii</i>	-	+	-	-
<i>Lymnaea</i> sp.	+	+	-	-
<i>Corbicula fluminalis</i>	+	+	+	+
<i>Pisidium amnicum</i>	+	-	+	+
<i>Pisidium subtruncatum</i>	+	-	-	-
<i>Pisidium supinum</i>	+	-	-	+
<i>Pisidium henslowanum</i>	+	-	-	-
<i>Pisidium moitessierianum</i>	+	-	-	-
Marine shells				
<i>Cerastoderma glaucum</i>	-	-	-	+

East Mersea Restaurant site, Mersea Island. Sample 3 (1 kg)				
Freshwater taxa				
<i>Valvata piscinalis</i>	18			
<i>Bithynia tentaculata</i> shells	2			
<i>Bithynia tentaculata</i> (opercula)	11			
<i>Planorbarius corneus</i>	1			
Unionidae	f			
<i>Sphaerium</i> sp.	9			
<i>Pisidium amnicum</i>	6			
<i>Pisidium henslowanum</i>	27			
<i>Pisidium moitessierianum</i>	6			
<i>Pisidium</i> spp (other)	9			
Land snails				
Succineidae	2			
<i>Deroceras/Limax</i>	4			

Barling, BLNG 05, <5> (18)*Valvata piscinalis**Hydrobia ulvae**Bithynia tentaculata**Bithynia troschelii**Corbicula fluminalis**Sphaerium* sp.*Pisidium henslowanum**Cerastoderma* sp.

Plant macros

Apton Hall Farm, APHF 05*Bithynia tentaculata* opercula*Cepaea* sp.*Clausilia bidentata*

Ostracods