CTRL Mollusc Reports

MERSHAM

ASSESSMENT OF THE MARINE MOLLUSCA

Enid Allison

Summary

7.19.1 The small assemblage of marine molluscan remains recovered from the site has been identified and weighed. Oyster, cockle and mussel were represented in several samples, winkle and tellin were represented in single samples; see table One for details.

Introduction

7.19.2 Marine molluscan shells were recovered by hand during excavation and from the bulk sample residues taken from pit and ditch fills.

Methodology

7.19.3 The samples were sieved onto nested 2mm and 1mm meshes after carrying out bucket flotation onto 0.5mm. mesh. The 2mm fractions from each sample were sorted in their entirety and searched for molluscan remains.

Quantification

7.19.4 The marine shells recovered by hand consisted of 54 partial or complete oyster shells with a total weight of 732g. The sieved samples produced a wider range of species. Cockle and mussel shell was common in a few samples, but generally the remains consisted of small quantities of fragmentary oyster, mussel and cockle shell (Table One). Winkle and tellin were recorded in single samples, as were the calcareous tubes of marine annelid worms (commonly found adhering to shells) and a crustacean claw.

7.19.5 Table One

Marine Molluscs

Context	Sample	Group	Sub-Gp	Phase	10-50%	1-10%	<1%	Trace
309	1000	22	139	3			Oyster	
309							Mussel	
309							Cockle	
314	1001	17	32	3				Shellfish
314								Crustacean Claw
330	1003	26	36	4			Oyster	
330							Mussel	
328	1004	10	33	3				Oyster
328								Mussel
324	1005	10	141	3				Oyster
324								Mussel
341	1006	0	0	0			Mussel	

347	1007	6	25	3			Mussel	
353	1009	33	99	5				Mussel
350	1011	10	166	3				Shellfish
362	1012	22	167	3				Shellfish
374	1016	7	26	3			Cockle	
366	1017	11	27	3				Mussel
383	1019	6	131	3	Mussel			
403	1022	11	129	3	Mussel			
403					Cockle			
414	1023	6	130	3				Mussel
419	1024	6	130	3				Mussel
440	1028	11	164	3		Cockle		Mussel
432	1029	12	146	3				Oyster
432								Mussel
499	1039	12	179	3			Oyster	
499							Mussel	
510	1042	20	120	3				Mussel
515	1044	6	180	3			Mussel	
516	1045	6	180	3			Shellfish	
518	1047	6	180	3				Mussel
518								Cockle
519	1048	14	65	3			Mussel	
567	1064	13	107	3			Shellfish	
570	1067	23	111	3		Mussel		
573	1070	4	101	2				Mussel
574	1071	4	101	2		Oyster	Cockle	
584	1075	4	171	2			Mussel	
584							Cockle	
587	1076	13	162	3				Mussel
589	1077	9	13	3				Mussel
599	1080	13	161	3			Mussel	
622	1089	2	160	2			Cockle	
618	1090	3	115	2			Mussel	

Provenance

7.19.6 All of the material described above is of marine origin, and it suggests that East Kent fishermen were either providing these resources at Mersham markets, or that, in the light of the documentary evidence (see Appendix 7.21), some of the Mersham fishermen had access to marine resources.

Conservation

7.19.7 All of the material is inherently stable and has been packaged for long-term storage.

Comparative material

7.19.8 Marine molluscs were found in abundance at Townwall Street (Dover) in early medieval contexts. Most of that material has not been studied in any detail, however, and there is a general lack of analysis of marine remains from East Kent sites. This enhances the value of the Mersham assemblage, which,

although small, is worthy of publication in a summary form at least, as a significant part of the dietary evidence for the site, particularly in the early medieval period, in particular (25 of the 34 samples are from Phase 3).

Potential for further work

7.19.9 The lack of comparative studies from elsewhere in East Kent is to be regretted, but that does not diminish from the value of this assemblage which appears to represent not inconsiderable component of the dietary regime (and thus the trading connections) of Mersham in the early medieval period. The material is generally unspectacular and there is too little for any detailed quantification to be carried out. No further work is required on the specimens. Nonetheless, the material does warrant summary publication, as valuable evidence for the presence of marine molluscs prepared for consumption at an inland site.

7.20 ASSESSMENT OF THE LAND SNAILS

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Summary

7.20.1 A sample of flot from washover floatation was presented for assessment. The assemblage contained a number of large and apical fragments of *Helix aspersa,* which is a Roman introduction, and also one *Candidula* sp., which is a medieval one. The assemblage is post-Roman and probably medieval or later. The composition of the assemblage indicates terrestrial, synanthropic habitats. No further work is recommended.

Introduction

7.20.2 One sample was received from CAT for assessment of the land snails. The sample (number 1025) was from a flot from washover floatation. It was from one of the fills of an early medieval pit (context 422, sub-group 63, Group13, Phase 3) that appears to have been cut specifically to dispose of metal-working debris.

7.20.3 The assessment aims were to;

- quantify shells to indicate if statistically viable analysis was possible;
- characterise the assemblage;
- indicate if there was change in the local environment over time;
- examine if the assemblage will determine whether ditches or other features contained water;
- indicate the potential resolution of interpretation.

Methodology

7.20.4 The available material was scanned under a x10 to x30 stereo-binocular microscope to identify the basic mollusc taxa/species present and, crudely, quantify the total numbers in the fractions received, from which it can be determined whether the total assemblages are likely to be statistically viable for analysis.

7.20.5 For assessment of the snails it is normal to assess the flots that contain the majority of the floating shells. There is some minor inherent bias in the flots as some species and shell fragments will not have floated and may only be present in the unextracted residues. The flot is likely to contain shells that are less likely to break (*i.e.*, larger robust species and very small species). Nevertheless the flots normally contain the majority of the shells in any sample and are more representative of the total assemblage. By contrast the residues usually contain shell fragments, the majority of which are non-apical and undiagnostic.

Quantification

7.20.6 The residue was very 'dirty' and contained a large quantity of fine sand. Although shells were very abundant, the taxonomic range was very limited and thus, with high numbers of shells, simple quantification was of little significance.

7.20.7 The results are given in Table 1 and are presented in habitat preferences rather than taxonomic order for ease of reference.

7.20.8 Table One

Land Snails

Context	***422***
Sample	***1025***
OPEN COUNTRY	
Candidula sp	A
CATHOLIC SP	
Trichia hispida	A
Monachia cf *cantiana*	A
Helix aspersa	C
SHADE LOVING	
Discus rotundatus	C
Aegopinella nitidula	B
Oxychilus sp.	B
BURROWING SPECIES	
Ceclioides acicula	B
	100+

KEY: A 10 items or more
B 5 to 9 items
C 4 items or fewer

Provenance

7.20.9 The assemblage contained a number of large and apical fragments of *Helix aspersa,* which is a Roman introduction, and also one *Candidula* sp., which is a medieval introduction. The assemblage is post-Roman and probably medieval or later. The composition of the scanned assemblage seems to indicate strongly terrestrial habitats; many of the species present although classed shade-loving (according to Evans 1972), are synanthropic and may be found in garden habitats, debris and rock rubble.

Conservation

7.20.10 All of the material is inherently stable and has been packaged for long-term storage.

Comparative material

7.20.11 Comparable material is ubiquitous but of little value in terms of addressing the Fieldwork Event Aims or Landscape Zone Priorities.

Potential for further work

7.20.12 Very high shell numbers were present and statistically viable analysis is possible. To provide a total assemblage would require sorting the residue, ideally to 0.5mm, in order to recover other species. However, the assessed assemblage indicates a regime favouring synanthropic species and further analysis would probably not be of great environmental value for this site.

7.20.13 Bibliography

Evans, J.G. 1972; *Land Snails in Archaeology*, London Seminar Press.

WHITEHILL ROAD BARROW

APPENDIX 10: ASSESSMENT OF MOLLUSCS

Alan Pipe

1. Introduction

Mollusc shells were recovered during excavation works at the watching brief sites (ARC 330 98) and Whitehill Road Barrow (ARC WHR 99).

Mollusc shells were recovered by wet-sieving/flotation of bulk samples taken in the field. These were washed using a modified Siraf tank fitted with 1.0mm and 0.25mm flexible nylon meshes to retain the residue and flot fractions respectively. These fractions were air-dried and visually sorted for mollusc remains, which were bagged and labelled as individual sample groups.

The material was assessed to determine any possible value to the Fieldwork Event Aim:

to establish a record of the changing palaeo-environment for all time periods present and the interaction with past economies.

Methodology

All samples containing mollusc remains were recorded onto a table template in terms of habitat preference and approximate quantification as specified in the CTRL project requirements. No sub-sampling of sample groups was carried out. Preliminary identifications of taxa were made using a binocular microscope and following Cameron & Kerney 1976; allocations of habitat preference followed Kerney 1999.

Quantifications

The material is in good condition and presents no difficulty in terms of species identification. The value of the assemblage will not be affected by factors of preservation.

A total of four small groups of mollusc shells, an approximate total of 65 shells, were assessed. This material derived entirely from terrestrial species; there were no marine or freshwater forms. The identified taxa recovered were *Cecilioides acicula*, *Retinella sp*., *Vallonia pulchella*, *Cepaea nemoralis*, *Hygromia sp*., *Pomatias elegans*, and *Discus rotundatus*.

The table below groups this material in terms of habitat preference and relative abundance as specified by the CTRL assessment template.

Provenance

The snail shells come from the complex of ditches at Fawkham Junction, dated c AD50 to AD100 and from the outer ditch fill of the Whitehill Road Barrow, dated c 2000 – 1600 BC.

Conservation

Further analysis of this material would involve more detailed examination under a binocular microscope in order to ensure precise identification of all species present. There is no reason why such work would damage the shells or impose any restriction on long-term storage procedures.

The shells are mainly small and fragile and therefore liable to accidental damage by crushing. They should therefore all be stored by context/sample group in glass tubes or clear plastic boxes, each contained within labelled plastic

bags. The complete assemblage should then be stored in an archive quality 'shoe-box'.

The mollusc assemblage should be retained for comparison with other sites of similar dates in Area 330.

Comparative material

Although the very small size of this assemblage does not justify detailed inter-site comparison with any other particular site, for completeness it should be included in any overall review of the CTRL Zonal molluscan groups.

Potential for further work

The assemblage has very little potential for further study in terms of quantification of species, or of ecological interpretation. Identification of all species present will allow some comment on the general nature of the local environment at ARC WHR 99 only. It will not be possible to specify spatial and temporal variation resulting from changes in landuse.

All species would be identified and counted in order to maximise data retrieval from this very small group.

Bibliography

Cameron, R A D, & Redfern, M, 1976 British land snails *Linnean Society synopses of the British fauna no.6* London

Kerney, M, 1999 *Atlas of the land and freshwater molluscs of Britain and Ireland,* Colchester

Table 1: Assessment of molluscs from Zone 1

Event code	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC WHR 99**
Column/Sectn				
Sample	62	63	104	17
Context	316	318	403	69
Date/ interpretation	/fill	/fill	/fill	/ditch
Depth				
Catholic species				
Open country species				
Shade-loving species	+++	+++	+	
Burrowing species				+
Aquatic species				
Approx totals	**35**	**25**	**2**	**5**

+ present (0-5 items), ++ some (6-10 items), +++ many (11+).

ZONE 2

APPENDIX 8: ASSESSMENT OF MOLLUSCS

Alan Pipe

2. Introduction

Mollusc shells were recovered during excavation works at the sites ARC SSR 99 and ARC STP 99.

Mollusc shells were recovered by wet-sieving/flotation of bulk samples taken in the field. These were washed using a modified Siraf tank fitted with 1.0mm and 0.25mm flexible nylon meshes to retain the residue and flot fractions respectively. These fractions were air-dried and visually sorted for mollusc remains, which were bagged and labelled as individual sample groups.

The material was assessed to determine any possible value to the Fieldwork Event Aims:-

to establish changes in the local environment through the recovery of suitable palaeo-environmental samples from the fill of cut features
to determine the spatial organisation of the landscape, and changes through time

Methodology

All samples containing mollusc remains were recorded onto a table template in terms of habitat preference and approximate quantification as specified in the CTRL project requirements. No sub-sampling of sample groups was carried out. Preliminary identifications of genus and species were made using a binocular microscope and following Cameron & Kerney 1976; allocations of habitat preference followed Kerney 1999.

Quantifications

A total of seven small groups of mollusc shells, an approximate total of 87 shells, were assessed. This material derived entirely from terrestrial species; there were no marine or freshwater forms. The identified taxa recovered were:

Cecilioides acicula, Vallonia sp., Retinella sp. and Helicella sp.

The table below groups this material in terms of habitat preference and relative abundances specified by the CTRL assessment template.

The assemblage included open country (*Helicella sp., Vallonia sp*.), shade-loving (*Retinella sp*) and burrowing forms (*Cecilioides acicula*). Although the bulk of the shells derived from *C.acicula*, ARC SSR 99 also produced shade-loving species, and ARC STP 99 produced a few open-country snails.

Provenance

The material is in good condition and presents no difficulty in terms of species identification. The value of the assemblage will not be affected by factors of preservation.

Conservation

Further analysis of this material would involve more detailed examination under a binocular microscope in order to ensure precise identification of all species present. There is no reason why such work would damage the shells or impose any restriction on long-term storage procedures.

The shells are mainly small and fragile and therefore liable to accidental damage by crushing. They should therefore all be stored by context/sample group in glass tubes or clear plastic boxes, each contained within labelled plastic bags. The complete assemblage should then be stored in an archive quality 'shoe-box'.

There is no reason to discard any of the mollusc assemblage.

Comparative material

Although the very small size of this assemblage does not justify detailed inter-site comparison with any other particular site, for completeness it should be included in any overall review of the CTRL zonal molluscan groups.

Potential for further work

The assemblage has very little potential for further study in terms of quantification of species, or of ecological interpretation, and will be of little value for either of the selected Fieldwork Event Aims. Identification of all species will allow some comment on the general nature of the local environments at ARC SSR 99 and ARC STP 99. It will not be possible to specify spatial and temporal variation resulting from changes in landuse or to accurately define the characteristics of the habitat at each site.

Bibliography

Cameron, R A D & Redfern, M, 1976 British land snails *Linnean Society of London synopses of the British fauna no. 6* London

Kerney, M, 1999 *Atlas of the land and freshwater molluscs of Britain and Ireland* Harley Books. Colchester

Table 2: Assessment of molluscs from Zone 2

Event code	**ARC SSR 99**	**ARC SSR 99**	**ARC SSR 99**	**ARC STP 99**	**ARC STP 99**	**ARC STP 99**	**ARC STP 99**
Column/Sectn							
Sample	2	7	11	15	16	17	23
Context	13	35	43	63	65	67	88
Date /interpretation	/ditchfill	/demolition oven feature	Modern/pitfill	fill stakehole	fill stakehole	fill stakehole	modern/pitfill
Depth							
Catholic species							
Open country species				+			+
Shade-loving species	+		+				
Burrowing species	+	+		+++	+++	+	+++
Aquatic species							
Approx totals	**2**	**5**	**5**	**20**	**30**	**5**	

+ present (0-5 items), ++ some (6-10 items), +++ many (11+).

WEST OF NORTHUMBERLAND BOTTOM

APPENDIX 13: ASSESSMENT OF MOLLUSCS
Alan Pipe

3. Introduction

Mollusc shells were recovered during excavation works at West of Tollgate (ARC TGW 97), West of Northumberland Bottom (ARC WNB 98), the Area 330 watching brief (ARC 330 98) and Hazells Road diversion (ARC HRD 99).

Study of the molluscan shell was intended to assist the following Fieldwork Event Aims:

to determine the palaeo-economy of settlement through recovery of palaeo-economic indicators
to establish changes in the local environment through the recovery of suitable palaeo-environmental samples from the fills of cut features
to determine the late and immediate post-Roman landscape.

Methodology

In each case, the soil was processed using a modified Siraf-type tank fitted with 1.0mm and 0.25mm flexible nylon meshes to retain the residue and flot fractions respectively. The flot and residue fractions were air-dried in a warm drying cabinet and then visually sorted for mollusc shell.

Each sample was roughly quantified and then scanned under a binocular microscope to determine the species-composition of the assemblage. Taxonomic identifications were made using the MoLSS reference collection in conjunction with Cameron & Redfern 1976; and Kerney & Cameron 1979. Allocation of identified taxa to habitat groups, as specified by the CTRL post-excavation assessment report template, followed these sources together with Kerney 1999.

All mollusc groups were examined; no sub-sampling was required.

Quantification

ARC TGW 97 produced nine sample groups containing approximately 160 shells from cut features. The mollusc group from the monolith sequence was, in general poorly preserved, but still produced identifiable species remains.

ARC 330 98 produced six sample groups containing approximately 80 shells from cut features.

ARC WNB 98 provided a total of 14 column sample groups containing approximately 402 shells from ditch [332]; the fills of which dated to the Middle/Late Iron Age. These groups were recovered from column samples taken at measured depths at 0.1m intervals. A further 41 sample groups containing approximately 4,900 shells, were wet-sieved/floated from bulk samples from pits, postholes, ditches and other cut features.

ARC HRD 99 produced a total of 18 sample groups containing approximately 160 shells from cut features.

The material derived almost entirely from terrestrial species with a very minor component of edible marine species; there were no freshwater species.

Identified terrestrial taxa recovered were Oxychilus sp., Vallonia sp., Vallonia *pulchella, Vallonia costata, Cepaea nemoralis, Helix aspersa, Hygromia sp., Retinella sp., Helicella sp.*, *Helicigona lapicida*, *Ena montana*, *Cochlicopa lubrica, Pupilla muscorum, Columella edentula, Pomatias elegans*, *Clausilia sp., Balaea perversa, Cecilioides acicula* and *Discus rotundatus.* Shells of common whelk *Buccinum undatum*, common mussel *Mytilus edulis*, common cockle *Cardium edule,* and common/flat oyster *Ostrea edulis* were also recovered.

The Table (below) groups this material in terms of habitat preference and relative abundance as specified by the CTRL assessment template.

Provenance

The material comprised almost entirely of terrestrial species with no freshwater forms, with minor recovery of edible marine species. The terrestrial assemblage included catholic, shade loving, open country, and burrowing species.

The material is, in general, from well dated Iron Age, Roman and medieval features (see tables below), is in good condition and presents no difficulty in terms of species identification. The value of the assemblage will not be affected by factors of preservation.

Conservation

Further analysis of this material would involve more detailed examination under a binocular microscope in order to ensure identification and quantification of all species present. There is no reason why such work would damage the shells or impose any restriction on long-term storage procedures.

The shells are mainly small and fragile and therefore liable to accidental damage by crushing. They should therefore all be stored by context/sample groups in glass tubes or clear plastic boxes, each contained within labelled plastic bags. The complete assemblage should then be stored in an archive quality 'shoe-box'.

There is no reason to discard any of the mollusc assemblage.

Comparative material

The material from these sites can be compared directly with similarly dated deposits from other sites within the CTRL project.

Comparison may also be made with north Kent sites summarised in Philp 1984; and Philp, Parfitt, Willson & Williams 1999.

Potential for further work

The assemblage has some potential to contribute to study of each of the listed Fieldwork Event Aims related to the nature of local habitats and landuse. The molluscs have considerable potential for further study in terms of species identification and accurate quantification. Once this work is done, it will then be possible to detect spatial and temporal variation resulting

from changes in local conditions, such as shading, and to consider their implications for changes in landuse.

It may also be possible to obtain Accelerator Mass Spectrometry (AMS) radiocarbon dates on the snails obtained from the bulk samples (Contexts [2] and [3] from ARC TGW 97), if required. AMS dating of the snails would probably be the best way of dating the sediment sequence seen in the monolith sequence. Unfortunately there were no snails preserved in the lowest redeposited soil material.

The very sparse marine fauna does not generally provide potential for further study although the large group of oyster shell from ARC WNB 98 [238] subgroup (38) has some potential for metrical analysis which may give an insight into the nature of the exploited oyster population.

Bibliography

Cameron, R A D & Redfern, M, 1976 British land snails *Linnean Society synopses of the British fauna no.6* London

Kerney, M, 1999 *Atlas of the land and freshwater molluscs of Britain and Ireland* Colchester

Kerney, M P, & Cameron, R A D, 1979 *A field guide to the land snails of Britain and north-west Europe* London

Philp, B, 1984 Excavations in the Darent Valley, Fourth Report in the Kent Monograph Series. *Kent Archaeological Rescue Group 71*

Philp, B; Parfitt, K; Wilson, J & Williams, W, 1999 The Roman villa site at Keston, Kent. *Eighth Research Report in the Kent Monograph Series*

Table 3: Assessment of molluscs from ARC TGW 97

+ present (0-5 items), ++ some (6-10 items), +++ many (11+).

Event code	**ARC TGW 97**	**ARC TGW 97**	**ARC TGW 97**	**ARC TGW 97**	**ARC TGW 97**	**ARC TGW 97**	**ARC TGW 97**	**ARC TGW 97**	**ARC TGW 97**
Column/Section									
Sample	5	6	7	8	9	14	16	13	15
Date/interpretation	natural	Natural	natural	natural	natural	/ditch	/ditch		/ditch
Context	2	2	2	3	3	101	124	154	170
Depth (m)									
Catholic species				+			+		
Open country species	++	+++	+		+		+		++
Shade-loving species							+++	+	+++
Burrowing species									
Aquatic species									
Marine species									
Approx totals	10	25	5	1	1	0	50	1	65

Table 4: Assessment of molluscs from ARC WNB 98

Event code	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**
Column/Section							
Sample							
Date/interpretation	IA/ditch	IA/ditch	IA/ditch	IA/ditch	IA/ditch	IA/ditch	IA/ditch
Context	[332]	[332]	[332]	[332]	[332]	[332]	[332]
Depth (m)	0-0.1	0.1-0.2	0.2-0.3	0.3-0.4	0.4-0.5	0.5-0.6	0.6-0.7
Catholic species	+++	+	+	+		+	+
Open country species				+			+
Shade-loving species	+++	+	+++	+++	+++	++	+++
Burrowing species							
Aquatic species							
Approx totals	110	2	21	25	16	12	36

Event code	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB98**
Column/Section							
Sample							
Date/interpretation	IA/ditch	IA/ditch	IA/ditch	IA/ditch	IA/ditch	IA/ditch	IA/ditch
Context	[332]	[332]	[332]	[332]	[332]	[332]	[332]
Depth (m)	0.7-0.8	0.8-0.9	0.9 –1.0	1.0-1.1	1.1-1.2	1.2-1.3	1.3-1.4
Catholic species					+	+	+
Open country species						+	
Shade-loving species	+++	+++	+++	+++	+++	+++	+++
Burrowing species							
Aquatic species							
Approx totals	30	25	25	13	16	34	37

Event code	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**
Column/Section									
Sample	38	35	34	75	77	36	1	37	2
Date/interpretation	/ditch	/ditch	/ditch	/oven	/oven	/ditch		/ditch	
Context	238	268	269	292	292	296	302	362	372
Depth (m)									
Catholic species	+++					+++		+++	
Open country species						+			
Shade-loving species	+++	+	+++			+++		+++	
Burrowing species		+++	+++	+	+++		+++		+++
Aquatic species									
Marine species	+++								
Approx totals	320	150	40	5	120	755	25	80	20

Event code	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**
Column/Section								
Sample	3	10	17	18	24	28	30	16
Date/interpretation	/ditch	/ditch	/ditch	/ditch	/pit	/pit	/pit	/crem
Context	381	392	397	421	447	451	510	518
Depth (m)								
Catholic species				+				
Open country species			+					
Shade-loving species	++		+++	++	++			++
Burrowing species	++	+++			++	+++		
Aquatic species								
Marine species	+++						+++	
Approx totals	45	20	50	20	20	50	75	10

Event code	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**
Column/Section									
Sample	59	73	5	6	7	8	11	12	13
Date/interpretation	/ditch	/fill	/phole	/pit	/pit	/pit	/pit	/pit	/pit
Context	526	565	1004	1008	1009	1026	1027	1032	1033
Depth (m)									
Catholic species		+							
Open country species	+								
Shade-loving species	+++	+++			+++	+++		+++	
Burrowing species	++	+++	+++	+++	+++			+++	+++
Aquatic species									
Marine species	+						+		
Approx totals	30	120	30	500	400	30	3	200	50

Event code	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**
Column/Sectn										
Sample	14		26	27	55	54	65	56	58	63
Date/interpretation	/pit		/pit	/pit	/ditch	/ditch	/kiln	/ditch	/phole	/grave
Context	1036	1037	1043	1046	1048	1051	1056	1063	1099	1191
Depth (m)										
Catholic species					+			+		
Open country species	+				++	+		++		
Shade-loving species	+++	+	+++	+++	+++	+++	+++	+++	++	+
Burrowing species	+++	+	+++	+++	+++	+++	+++	+++	++	+
Aquatic species										
Marine species	+					+				
Approx totals	600	10	200	95	240	120	40	140	25	10

Event code	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**
Column/Section				
Sample		70	78	81
Date/interpretation		/ditch	/oven	/?crem
Context	1202	1279	1281	2163
Depth (m)				
Catholic species		+		
Open country species		+		
Shade-loving species		++	+	
Burrowing species	+++	+++	+++	+++
Aquatic species				
Approx totals	100	40	20	75

Table 5 : Assessment of molluscs from ARC 330 98

Event code	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**
Column/Section						
Sample	21	80		57	67	144
Date/interpretation	M/LIA/pit	M/LIA/pit				/quarry pit
Context	141	324	325	338	344	561
Depth (m)						
Catholic species	+				+	+
Open country species						
Shade-loving species			+++	+		++
Burrowing species		+		+		
Aquatic species						
Marine species						
Approx totals	5	1	50	5	1	15

Table 6: Assessment of molluscs from ARC HRD 99

Event code	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**
Column/Section										
Sample	1	2	43	5	6	10	34	16	35	40
Date/interpretation	Rom/hearth	/hearth	ext.occ				med/ditch	med/ditch	med/ditch	LRom/pit
Context	2	3	7	15	20	26	53	60	77	80
Depth (m)										
Catholic species	+							+		+
Open country species					+					
Shade-loving species		+	++		+++	+	+	+	+	+
Burrowing species				+						+
Aquatic species										
Marine species							+			
Approx totals	1	5	10	2	25	3	5	5	5	10

Event code	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**
Column/Section								
Sample	27	36	37	38	53	45	46	54
Date/interpretation		/ditch	med/ditch	LRom/ditch	LRom/ditch	med/ditch	med/ext.surf	
Context	98	104	105	106	131	156	163	213
Depth (m)								
Catholic species	+	+			+	++	+	
Open country species	+			+	+	++		
Shade-loving species	+	+	+	+	+	++		+
Burrowing species	+							
Aquatic species								
Marine species						+	+	
Approx totals	15	10	5	10	5	30	5	5

ZONE 4

APPENDIX 12: ASSESSMENT OF MOLLUSCS FROM AREA 330 ZONE 4

Alan Pipe

Introduction

Mollusc shells were recovered during excavation works at Tollgate ARC TGS 97 and ARC TLG 98 and from the watching brief excavations ARC 330 98.

Mollusc shells were recovered by wet-sieving and flotation of bulk samples taken in the field. The material was processed using a modified Siraf tank fitted with 1.0 mm and 0.25 mm flexible nylon meshes to retain the residue and flot fractions respectively. The residues and flots were then air-dried, bagged and labelled as sample groups. Each group was then visually sorted for mollusc shells.

All samples containing mollusc remains were recorded onto a table template in terms of habitat preference and approximate quantification as specified in the CTRL project requirements. No sub-sampling of sample groups was carried out. Preliminary identifications of taxa were made using a binocular microscope and following Cameron & Kerney 1976; and Hayward, Nelson-Smith & Shields, 1996. Allocations of habitat preference followed Kerney 1999.

Methodology

In each case, the soil was processed using a modified Siraf-type tank fitted with 1.0mm and 0.25mm flexible nylon meshes to retain the residue and flot fractions respectively. The flot and residue fractions were air-dried in a warm drying cabinet and then visually sorted for mollusc shell.

Each sample was roughly quantified and then scanned under a binocular microscope to determine the species-composition of the assemblage. Taxonomic identifications were made using the MoLSS reference collection in conjunction with Cameron & Redfern 1976; and Kerney & Cameron 1979. Allocation of identified taxa to habitat groups, as specified by the CTRL post-excavation assessment report template, followed these sources together with Kerney 1999.

All mollusc groups were examined; no sub-sampling was required.

Quantification

A total of 26 small groups of mollusc shells, an approximate total of 129 shells, were assessed. This material derived almost entirely from terrestrial species with a few very fragmented shells of marine species. There were no open-country or freshwater species. The identified taxa recovered were *Cecilioides acicula*, *Vallonia sp*., *Cepaea nemoralis*, *Helix aspersa*, Clausilidae, *Pomatias elegans*, *Retinella sp*., *Helicigona lapicida, Hygromia sp., Oxychilus sp.,* common/flat oyster *Ostrea edulis,* common cockle *Cerastoderma edule*, and common mussel *Mytilus edulis*.

The table below groups this material in terms of habitat preference and relative abundance as specified by the CTRL assessment template.

Provenance

The material is in good condition and presents no difficulty in terms of species identification.

Mollusc shells were recovered from ARC TGS 97 ([102], a Late Iron Age/Romano-British pit), ARC TLG 98 (four undated samples {1}-{4}), and ARC 330 98. The material from ARC 330 98 derived from an early Iron Age pit fill [741] (Pit [740] Figure 6), a Late Iron Age/Romano-British pit fill [1193] (Pit 1172, Figure 6), a Romano-British pit fill[160] (Pit [160], Figure 11), a medieval hearth fill [418] (Hearth 419, Figure 11), ditch fill [1136] (Ditch 1135), and pit fill [773] (Pit [1148], Figure 8) together with a small group of undated pit, ditch, external, ?furnace and unknown contexts.

Conservation

Further analysis of this material would involve more detailed examination under a binocular microscope in order to ensure precise identification of all species present. There is no reason why such work would damage the shells or impose any restriction on long-term storage procedures.

The shells are mainly small and fragile and therefore liable to accidental damage by crushing. There should therefore all be stored by context/sample group in glass tubes or clear plastic boxes, each contained within labelled plastic bags. The complete assemblage should then be stored in an archive quality ‘shoe-box’.

There is no reason to retain the very limited material from ARC TGS 97 and ARC TLG 98; the larger and more diverse group from ARC 330 98 should be retained for further identification and quantification.

Comparative material

Although the very small size of this assemblage does not justify detailed inter-site comparison with any other particular site, for completeness it should be included in any overall view of the CTRL zonal molluscan groups.

Potential for further work

The assemblage has generally little potential for further study in terms of quantification of species, or of ecological interpretation, indeed the material from ARC TLG 98 all derived solely from the burrowing species *C.acicula*.

Further identification of species present will allow some comment on the general nature of the local environment. This is mainly applicable to the catholic and shade-loving species recovered from ARC TGS 97 and, particularly, ARC 330 98. Identification of the species in the catholic and shade-loving assemblages may allow some interpretation of the local habitat, in terms of vegetation and drainage, in view of the known current distribution of these species in SE England (Kerney 1999). There is no potential for further study of the marine species or of the entirely *C.acicula* group from ARC TLG 98.

Bibliography

Cameron, R A D, & Redfern, M, 1976, 'British land snails' *Linnean Society synopses of the British fauna no. 6* London

Hayward, P, Nelson-Smith, A, & Shields, C, 1996, *Sea shore of Britain and Europe* London

Kerney, M, 1999, *Atlas of the land and freshwater molluscs of Britain and Ireland* Colchester

+ present (0-5 items), ++ some (6-10 items), +++ many (11+).

Table 7: Assessment of molluscs from ARC TLG 97 and ARC TLG 98

Event code	**ARC TGS 97**	**ARC TLG 98**	**ARC TLG 98**	**ARC TLG 98**	**ARC TLG 98**
Column/Sectn					
Sample	6	1	2	3	4
Context	102				
Date/interpretation	?Late Iron Age/Romano-British/ pit	unknown	Unknown	unknown	unknown
Catholic species					
Open country species					
Shade-loving species	++				
Burrowing species		+	+	+	+++
Aquatic species					
Marine species					
Approx totals	**6**	**3**	**5**	**5**	**11**

Table 8: Assessment of molluscs from Area 330 Zone 4

Event code	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**
Column/Sectn						
Sample	29	45	102	146	204	165
Context	161	198	418	426	575	617
Date/ interpretation	Romano-British/pit	unknown/ditch	medieval/ hearth	unknown/mech fixture	unknown/destr debris	unknown/ditch
Catholic species		+	+	+	+	+
Open country species						
Shade-loving species			+		+	
Burrowing species		+				
Aquatic species						
Marine species	+					
Approx totals	**2**	**5**	**2**	**1**	**5**	**5**

Event code	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**
Column/Sectn								
Sample	181	178	183	188	203	211	224	238
Context	638	656	684	688	710	741	773	805
Date/ interpretation	unknown	unknown /furnace	unknown /ditch	unknown/ ditch	unknown/ furnace	Early Iron Age/pit	medieval/ pit	unknown/ external
Catholic species				+		+	+	
Open country species								
Shade-loving species		+++	+				+	+
Burrowing species						+		
Aquatic species								
Marine species	+							
Approx totals	**1**	**35**	**1**	**2**	**1**	**2**	**5**	**5**

Event code	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**
Column/Sectn							
Sample	240	241	244	282	340	315	345
Context	814	818	825	890	1193	1136	1215
Date/ interpretation	unknown/ pit		pit		Late Iron Age/early Romano-British/pit	medieval/ditch	
Catholic species	+	+				+	+
Open country species							
Shade-loving species				+	+		+
Burrowing species							
Aquatic species							
Marine species			+				
Approx totals	**5**	**5**	**1**	**1**	**1**	**2**	**10**

CUXTON

APPENDIX 12: ASSESSMENT OF MOLLUSCS
Alan Pipe

4. Introduction

A total of 26 small groups of mollusc shells were recovered from 26 samples taken during excavation. All were assessed.

Eleven groups of molluscs were recovered from bulk samples; the remaining 15 were recovered from spit samples taken at measured depths through the dry valley. In each case, the soil was processed using a modified Siraf-type tank fitted with 1.0 mm and 0.25 mm flexible nylon meshes to retain the residue and flot fractions respectively. The flot and residue fractions were air-dried in a warm drying cabinet and then visually sorted for mollusc shell. Study of the molluscan shell was intended to assist Fieldwork Event Aims 5 and 6

- recovering palaeo-environmental remains from ditches and other features
- provide information on Iron Age land-use, environment and economy

Methodology

Each sample was roughly quantified and then scanned under a binocular microscope to determine the species-composition of the assemblage. Taxonomic identifications were made using the MoLSS reference collection in conjunction with Cameron & Redfern 1976; and Kerney & Cameron 1979. Allocation of identified taxa to habitat groups, as specified by the CTRL post-excavation assessment report template, followed these sources together with Kerney 1999.

All mollusc groups were examined; no sub-sampling was required.

Quantification

A total of 26 small groups of mollusc shells, an approximate total of 639 shells, were assessed.

This material derived entirely from terrestrial species but with occasional fragments of the marine bivalve common mussel, *Mytilus edulis*. There were no freshwater species.

Identified terrestrial taxa recovered were *Cecilioides acicula*, *Oxychilus sp., Retinella sp. Vallonia pulchella, V. costata, Cepaea nemoralis, C.hortensis, Helix aspersa, Helicella sp., Cochlicopa lubrica, Pomatias elegans, Pupilla muscorum, Clausilia sp., Discus rotundatus* and *Columella edentula.*

The table below groups this material in terms of habitat preference and relative abundance as specified by the CTRL assessment template.

Provenance

Mollusc shells were mainly recovered from the dry valley, with small numbers of shells also recovered from pits (undated and Early Iron Age) and Anglo-Saxon burials.

Conservation

Further analysis of this material would involve more detailed examination under a binocular microscope in order to ensure identification and quantification of all species present. There is no reason why such work would damage the shells or impose any restriction on long-term storage procedures.

The material is in good condition and presents no difficulty in terms of species identification. The value of the assemblage will not be affected by factors of preservation.

The shells are mainly small and fragile and therefore liable to accidental damage by crushing. They should therefore all be stored by context/sample groups in glass tubes or clear plastic boxes, each contained within labelled plastic bags. The complete assemblage should then be stored in an archive quality 'shoe-box'.

There is no reason to discard any of the mollusc assemblage as further identification and quantification may provide some degree of insight into the characteristics of local habitat(s).

Comparative material

The material could usefully be compared with mollusc samples from other sites along the CTRL and in the Darent valley (O'Connor 1984).

Potential for further work

The site lies within the 'landscape zone' of the North Downs, Medway River Valley.

The assemblage has some potential to contribute to study of each of the main categories as defined by the CTRL Archaeological Research Strategy. It derives from a range of periods and feature types including an Early Iron Age pit [342], Anglo-Saxon graves [315] and [378], together with a complete series of column samples.

farming communities (2000 – 100 BC); context [342]/column samples
towns and rural landscapes (100bc – AD 1700); contexts [315] and [378]/column samples
recent landscapes (AD 1700 – 1945); column samples

Study of the material will produce data with reference to the Fieldwork Event Aims listed below:-

recovering palaeo-environmental remains from ditches and other features.
provide information on Iron Age land use, environment and economy.

The assemblage has considerable potential for further study in terms of species identification and accurate quantification. Once this work is done, it will then be possible to detect spatial and temporal variation resulting from changes in local conditions, such as shading, and to consider their implications for changes in landuse.

Detailed identification and reporting on all the mollusc groups would be required.

Bibliography

Cameron, R A D, & Redfern, M, 1976, 'British land snails' *Linnean Society synopses of the British fauna no.6* London

Kerney, M, 1999, *Atlas of the land and freshwater molluscs of Britain and Ireland* Colchester

Kerney, M P, & Cameron, R A D, 1979, *A field guide to the land snails of Britain and north-west Europe* London

O'Connor, T P, 1984, in Philp, B, *Excavations in the Darent Valley*

Number of sample taken (columns/spot etc.) ; number of samples assessed
+ present (0-5 items), ++ some (6-10 items), +++ many (11+).

Table 9: Assessment of Molluscs from ARC CXT 98

Sample	1	12	22	7	11	23
Context	41	156	315	342	342	378
Depth						
Date/interpretation	pit/no date	tree hole	skel/ Saxon	pit/ EIA	pit/ EIA	skel/ Saxon
Catholic species				+		+
Open country species	+++	+++	+++	+++		++
Shade-loving species	+++					+
Burrowing species	+	++	++	+++	+	+++
Aquatic species						
Approx. totals	**25**	**30**	**25**	**40**	**3**	**1**

Table 10: Assessment of mollusc shell from ARC CXT 98 – dry valley samples

Sample											
Context											
Depth	0-10 cm	10-20 cm	20-30 cm	30-40 cm	40-50 cm	50-60 cm	60-70 cm	70-80 cm	80-90 cm	90-100 cm	100-110 cm
Date/interp.	dry valley	dry valley	dry valley	dry valley	dry valley	dry valley	dry valley	dry valley	dry valley	dry valley	dry valley
Catholic species		+		+	+++						
Open country species		+++	+++	+++	++	+++			++	+	++
Shade-loving species	++	+++	+++	+++	+++	+++	+++	+++	++	+++	+++
Burrowing species	++		+	+	+	++	+	++	+	+	+
Aquatic species											
Approx. totals	**21**	**21**	**30**	**24**	**50**	**45**	**30**	**50**	**25**	**45**	**35**

Sample				
Context				
Depth	110-120 cm	120-130 cm	130-150 cm	150-160 cm
Date/interp.				
Catholic species	dry valley	dry valley	dry valley	dry valley
Open-country species	+++	+		+
Shade-loving species	+++	+	+++	+
Burrowing species	++			+
Aquatic species				
common mussel				+
Approx. totals	**45**	**10**	**20**	**15**

BOWER ROAD

MOLLUSCS

Assessment of Molluscs

by Mark Robinson

Introduction

A total of 31 samples were taken for molluscan analysis from the 2nd-3rd century Roman settlement at Bower Road. The samples were from sections through a pit and ditches. They comprised 2 kg samples cut from the sections as part of 5 columns. The quantities of mollusc samples are listed in Table 9.1.

The samples were floated onto a 0.5mm sieve and the residues sieved down to 0.5mm by the Oxford Archaeological Unit. Both flots and residues were dried and retained.

The samples were taken in accordance with the Fieldwork Event Aims for the site, which are set out in section 2 of the main report, above. The study of the molluscs was intended to provide information on the local contemporaneous environment of the Roman site.

Methodology

It was decided to assess what appeared to be a representative range of samples to cover all the archaeological features that have been sampled. Two columns were assessed from the ditch of the rectangular enclosure (Sections 4 and 39 from Group 171) because they appeared to be of different character.

The flots assessed were scanned under a binocular microscope at magnifications of x10 and x20. The residues were also checked for shells. Many broken and calcium carbonate-encrusted shells, mostly of woodland species, had failed to float in some of the samples. The abundance of taxa in the flots was recorded on a scale of + (present, 1-5 individuals), ++ (some, 6-10 individuals) and +++ (many, 11+individuals). An estimate was made of the total number of individuals in each flot excluding *Cecilioides acicula*. This species was excluded because it burrows deeply and provides no useful information on conditions as a sediment or soil formed. (The other burrowing species listed, *Pomatias elegans*, only burrows just below the surface of loose soil or leaf litter, so does give useful palaeoecological information.) The identifications are divided into species groups in the table of results (Table 9.2). Nomenclature follows Kerney (1999).

Quantifications

Table 9.1 details the breakdown of sample numbers and the number of samples assessed. Recovery of shells by flotation was incomplete in some samples but this would be overcome in any full-scale analysis by sorting the residues as well as the flots.

Provenance

Three faunal elements occur in the flots: shade-loving species of relatively dry woodland, species of dry open habitats and species of stagnant water. The woodland fauna includes the "old woodland" snail *Acicula fusca* and the rare snail *Vertigo pusilla* which no longer occurs in Kent. Many of the shells of woodland snails have encrustation of calcium carbonate on them. The occurrence of an old woodland fauna does not seem entirely compatible with a Roman settlement on the site and the encrustation of some of these shells suggests they had a separate origin from the other shells. It is thought most likely that they had been re-worked from the colluvial sediment and they were earlier Holocene in origin. Unfortunately, the colluvium had not been sampled. The species of open habitats probably represent the contemporaneous fauna of the Roman settlement. They mostly comprise *Vallonia costata* and *V. excentrica* but are not particularly abundant. The aquatic species probably lived in standing water in the archaeological features. They are all "slum aquatic" molluscs, which are able to tolerate stagnant conditions and episodes of drying out. By far the most numerous is *Anisus leucostoma*, which is particularly abundant in Samples 18 and 19 from Section 39. It is possible that this part of the ditch held water for longer than the other contexts.

The high degree of residuality in the molluscan assemblages greatly reduces their value for meeting their research objective. They do show that the archaeological features at least seasonally held standing water. However, it is not possible to use snail evidence to determine whether the Roman settlement was entirely open or had much scrub on it.

Conservation

The mollusc remains are at present stable as dry flots and residues . Further analysis would require sorting of shells from the flots and residues but they would remain stable. If the recommendation that no further analysis is undertaken is followed, it is recommended that the flots and residues should be discarded.

Comparative material

No other sites within the CTRL project have given similar problems with residual material. However, in situ earlier Holocene woodland assemblages were found at White Horse Stone. Residuality is, however, a general problem in molluscan studies.

Potential for Further Work

The following section discusses potential for further work in the light of the Landscape Zone Priorities and Fieldwork Event Aims.

The molluscs from Bower Road appear to have no potential for further useful work, given the problem with residual material.

Recommendations

It is recommended that a very brief summary of the results of the molluscan assessment be incorporated in any final report, including mention of the occurrence of residual earlier Holocene shells of woodland species which had probably been derived from colluvium and the occurrence of contemporaneous snails of stagnant water in the Roman features.

Bibliography

KERNEY, M. P., (1999). *Atlas of the land and freshwater molluscs of Britain and Ireland*. Colchester, Harley Books.

Table 9.1: Quantities of mollusc samples

Number of columns	Number of samples in columns	Number of other samples	Total number of samples taken	Number of columns assessed	Total number of samples assessed
5	31	0	31	4	12

Table 9.2: Mollusc Columns

Column/Section	**54**	**54**	**4**	**4**	**4**	**4**	**4**	**39**	**39**	**39**	**74**	**74**
Sample	**33**	**30**	**14**	**12**	**11**	**9**	**7**	**19**	**18**	**16**	**55**	**54**
Context	**345**	**345**	**515**	**515**	**515**	**508**	**508**	**464**	**463**	**462**	**160**	**160**
Catholic species												
Cochlicopa sp.	-	-	-	+	-	-	-	+	+	-	-	-
Trichia hispida gp.	++	+	+	-	+	-	-	+	+	+	+	+
Arianta arbustorum	-	-	-	+	-	-	-	-	+	-	-	-
Cepaea sp.	-	+	+	-	-	-	-	-	-	-	-	-
Open-country species												
Pupilla muscorum	-	-	+	-	-	-	-	-	-	+	-	-
Vallonia costata	+	-	+	+	-	-	-	+	-	-	-	-
V. excentrica	+	+	+	-	-	-	-	-	-	+	-	-
Vallonia sp.	+	-	+	+	+	-	-	+	-	+	+	+
Shade-loving species												
Acicula fusca	-	-	-	-	-	-	-	-	-	-	+	-
Carychium sp.	++	-	+	++	+	-	-	+++	+	++	+++	-
Vertigo pusilla	-	-	-	-	-	-	-	+	-	-	-	-
Punctum pygmaeum	-	-	-	-	-	-	-	+	-	-	-	-
Discus rotundatus	+	+	+	+	++	-	-	++	+	+	+	-
Vitrea sp.	-	+	+	+	-	-	-	+	+	-	+	-
Nesovitrea hammonis	+	-	-	-	-	-	-	-	-	-	-	-
Aegopinella pura	-	-	-	-	-	-	-	+	-	-	+	+
A. nitidula	+	-	-	-	-	-	-	+	-	-	+	-
Oxychilus cellarius	-	+	+	+	-	-	-	+	-	-	+	-
Euconulus fulvus	-	-	-	-	-	-	-	+	-	-	-	-
Clausilia bidentata	-	-	-	-	-	-	-	+	+	-	+	-
Burrowing species												
Pomatias elegans	-	-	-	-	-	-	-	+	-	-	-	-
Cecilioides acicula	-	-	-	+	-	-	-	+	+	++	-	+
Slum aquatic and amphibious species												
Lymnaea truncatula	+	-	-	+	-	-	-	+	-	+	-	-
L. peregra	-	-	++	-	-	-	-	++	+	-	-	-
Anisus leucostoma	+	-	-	+	-	-	-	+++	+++	+	+	-
Other aquatic species												
Pisidium sp.	-	-	-	+	-	-	-	+	+	-	-	-
Approx Total (excluding Cecilioides acicula)	*50*	*10*	*40*	*35*	*15*	*0*	*0*	*250*	*500*	*30*	*50*	*5*

SHELLS

Oysters and other marine molluscs

By Jessica M. Winder

Introduction

Shells of the common flat oyster *Ostrea edulis* L. together with whelk (*Buccinum undatum* L.), common cockle (*Cerastoderma edule* L.) and a larger cockle species (?*Acanthocardium* sp.) were recovered from excavations at Bower Road.

Shells were recovered by hand retrieval and sieving of bulk samples.

Marine molluscs were retrieved in accordance with the Landscape Zone Priorities and Fieldwork Event Aims for the site, set out in section 2 of the main report, above. It was hoped that the study of marine molluscs would assist in the understanding of the manipulation and consumption by humans of natural resources and the way in which population increase and concentration might have affected natural resource exploitation and accelerate environmental change.

Methodology

The shells from each context were identified, where possible, and counted.

Oyster valves were separated into left and right valves, and further divided into shells suitable or unsuitable for measuring and detailed recording of features.

A sub-sample of contexts containing at least thirty measurable left or right valves would be selected as suitable for use in statistical comparisons of sizes or comparisons of evidence for epibiont infestation (Winder 1993).

Quantification

Table 10.1 presents the number of shells for each context with comments on their condition.

Some 51 oyster shells were recovered, of which only 17 were near complete valves and 34 were unmeasurable. These were recovered from thirty contexts together with fragments of at least two single cockle valves, a fragment of a larger cockle species, and a fragment from a common whelk. There were also fragments of unidentified fossil shell.

The number of shells and shell fragments in each context is very small, and the state of preservation of the shells is almost without exception extremely poor, being worn, powdery and flaky.

Provenance

The molluscs were recovered from a wide range of features across the site, representing all main periods of activity.

Conservation

Long term storage would not be affected by any further analysis, were this feasible.

Long term storage, should it be deemed necessary or desirable, would require the shells to be kept dry, in sealed polythene bags, with minimisation of mechanical damage.

Regarding retention/discard policy, it is suggested that there is little merit in retaining this assemblage of material.

Comparative material

This assemblage of material is not suitable for comparison with material from elsewhere, whether within or from outside the CTRL project.

Potential for further work

The following section discusses potential for further work in the light of the Landscape Zone Priorities and Fieldwork Event Aims.

There is no potential for the data assemblage derivable from this assemblage of marine molluscan material to address the original Landscape Zone Aims and the Fieldwork event Aims.

Bibliography

Winder, J. M. (1993) A study of the variation in oyster shells from archaeological sites and a discussion of oyster exploitation. PhD Thesis, University of Southampton, Department of Archaeology.

Table 10.1: Oysters and other marine molluscs from Bower Road

Context number	Sample number	Left valve (LV) oyster	Unmeasurable LV oyster	Right valve (RV) oyster	Unmeasurable RV oyster	Total valves oyster (P=present)	Other species	Comments on oysters
102		0	0	0	0	0		Fragment RV only
		0	1	1	0	2		Medium, thin, flakey, Pc
103	45 >10mm	0	0	0	0	0		2 frags RV oyster
103		0	0	0	0	0		2 frags oyster
120		0	0	0	0	0		2 frags very large RVs, thin, sharp-edged, good condition but with orange/pink interior in 1 ?burning
162		2	0	0	1	3		LV large thick but delaminating
162	54	0	0	0	1	1		Thin, small
254		0	0	0	0	0		Fragment RV from large shell-blackened ?burning
260		0	0	0	0	0		Small frags -not all shell- some sort of hard translucent material
301		1	4	2	7	14	1 cockle valve	Various sizes, very flakey, lots frags, powdery. Includes stone and ?fossil fragments. Hinge of lge measurable RV with ?imprint shell at heel
304		1	0	0	0	1		Thick, irregular, flakey
324		0	1	0	0	1	Columella of whelk	Stone and oyster fragment
338		1	0	0	0	1	Frag land snail - zonitid- like	Reddy brown colour to interior
349		0	1	3	1	5		Flakey, RVs thin, 1 v large, notches. Pinky pigment externally
366		0	0	0	0	0	Fragments land snail ?Cepea nemoralis	
386		0	1	0	0	1	Frag large cockle species ?Acanthocardia not C. edule	

Context number	Sample number	Left valve (LV) oyster	Unmeasurable LV oyster	Right valve (RV) oyster	Unmeasurable RV oyster	Total valves oyster (P=present)	Other species	Comments on oysters
412		1	0	0	0	1		Large relatively thin >90MW x 100ML, ribbed, sharp edges
424		0	0	0	0	0		3 pieces ? Fossil/limestone
429		0	1	0	0	1		Very flakey, powdery, eroded. Part of large shell. Frags oyster
462	20 >10mm	0	2	0	1	3		LV large, irregular heel. Lots broken pieces incl some RV
462		0	0	1	2	3		Large, Pc, RV slightly convex
466		0	0	1	1	2	1 cockle valve	Pc, medium RV
469		0	0	0	1	1		Frags 1 RV, Pc, v flakey
470		0	1	0	0	1		Frags LV v flakey
484		0	0	1	1	2		1 v large convex RV, Pc, irreg heel, eroded. 3 frags ?fossil
487		0	0	0	0	0		Fossil Gryphea-lik
488		0	1	0	0	1		2 frags v worn oyster + ?frag crab. Oyster worn, powdery
504		0	0	0	0	0		?piece fossil
515	2 >10mm	0	0	0	0	0		2 frags
552		1	0	0	0	1		Very large LV >95MW x 100ML, irreg heel, rel thin
555		0	0	1	0	1		Flakey, medium, Pc
557		0	0	0	1	1		Flakey, medium, Pc
557	3 >10mm	0	0	0	1	1		Flakey frag, v worn
573		0	2	0	1	3		V worn, flakey, Pc
581		0	0	0	0	0		2 frags fossil shell
Totals		*7*	*15*	*10*	*19*	*51*		

NASHENDEN VALLEY

- MOLLUSCS

Assessment of the Molluscs

by Mark Robinson

Introduction

A column of 13 samples, in 0.1 m units, was cut from the top 1.3 m of colluvial sediments exposed in section in a stepped trench through the bottom of Nashenden Valley. 2 kg of each sample was floated onto a 0.5 mm mesh at the Oxford Archaeological Unit and the residue sieved down to 0.5 mm.

The recovery and study of the material was undertaken in accordance with the Fieldwork Event Aims (see section 2, main report), in particular 1-3 and 5. The aim of the assessment is to establish the potential of molluscan analysis to provide palaeoenvironmental information extending from the Mesolithic to the late Iron Age. It is hoped that comparisons can be made with molluscan sequences from the south side of the North Downs.

Methodology

Concentrations of shells are low in the flots. Therefore, it was decided that all the flots would be assessed. The flots were scanned under a binocular microscope at magnifications of x10 and x20. The abundance of taxa was recorded on a scale of + (present, 1-5 individuals), ++ (some, 6-10 individuals) and +++ (many, 11+ individuals). An estimate was also made of the total number of individuals in each flot excluding *Cecilioides acicula*. This species was excluded because it burrows deeply and provides no useful information on conditions as a sediment or soil formed. The identifications are divided into species groups in the table of results (Table 5.1).

Quantifications

All 13 samples were assessed from the single column. Concentrations of shells (excluding *Cecilioides acicula*) are very low (Table 5.1), with useful examples being present in only five flots.

Provenance

What material is present is likely to be contemporaneous with the deposits when they were laid down or last worked. All the samples have little potential related to the research objectives. The preservation of shell is poor.

Conservation

Since the samples have no useful potential for further work, it is recommended they be discarded.

Comparative Material

Much better molluscan assemblages are available for comparison from the south side of the North Downs at White Horse Stone (Robinson in prep). However, there is a

hint of similarity with them, with more shade-loving species from the lowest part of the sequence to contain shells, whereas the shells from the top of the sequence are almost entirely open-country species. Unfortunately, the assemblages are too small to take this comparison further.

Potential for Further Work

The mollusc samples have no useful potential to address the original fieldwork aims or any new research aims. Therefore, no further work is recommended.

Bibliography

Robinson, M, (in prep.) Assessment of molluscs from White Horse Stone, Pilgrims Way, West of Boarley Farm and East of Boarley Farm (ARC WHS 98, ARC PIL 98, ARC BFW 98, ARC BFE 98).

Table 5.1: Nashenden Valley Mollusc Column

Column / Section													
Sample	**7026**	**7012**	**7011**	**7010**	**7009**	**7008**	**7007**	**7006**	**7005**	**7004**	**7003**	**7002**	**7001**
Context	**5006**	**5006**	**5006**	**5006**	**5005**	**5005**	**5005**	**5005**	**5005**	**5005**	**5004**	**5003**	**5003**
Depth (m)	**1.20-1.30**	**1.10-1.20**	**1.00-1.10**	**0.90-1.00**	**0.80-0.90**	**0.70-0.80**	**0.60-0.70**	**0.50-0.60**	**0.40-0.50**	**0.30-0.40**	**0.20-0.30**	**0.10-0.20**	**0-0.10**
Catholic Species													
Cepaea sp.	-	-	-	-	-	-	-	-	-	+	-	-	-
Open Country Species													
Pupilla muscorum	-	-	-	-	-	-	-	-	-	-	-	+	-
Vallonia costata	-	-	-	-	-	-	-	-	-	+	+	-	-
V. excentrica	-	-	-	-	-	-	-	-	-	-	+	-	+
Vallonia sp.	-	-	-	-	-	-	-	-	-	+	-	+	+
Shade-loving Species													
Carychium cf. *Tridentatum*	-	-	-	-	-	-	-	-	-	+	-	-	-
Acanthinula aculeata	-	-	-	-	-	-	-	-	-	+	-	-	-
Discus rotundatus	-	-	-	-	+	-	-	-	-	+	-	-	-
Vitrea sp.	-	-	-	-	-	-	-	-	-	+	-	-	+
Burrowing Species													
Cecilioides acicula	-	-	-	+	+	++	+++	+++	+++	+++	+++	+++	+++
Synanthropic, Exotic and Introduced Species													
Candidula gigaxii	-	-	-	-	-	-	-	-	-	-	-	+	-
Approx total (excluding *Cecilioides acicula*)	-	-	-	-	1	-	-	-	-	8	4	3	6

Key: +=1-5, ++=6-10, +++= >10

APPENDIX 1– ASSESSMENT OF MOLLUSCS

1.1 Molluscs

By Mark Robinson

Introduction

1.1.1 A total of 284 samples were taken for molluscan analysis from four sites belonging to the White Horse Stone group of sites: White Horse Stone, Pilgrim's Way, West of Boarley Farm and East of Boarley Farm. Most of the samples were from the sections of trenches through dry valley sediments. They comprised 2 kg samples cut from the section in 0.05 m units as part of 11 columns. However 2 kg samples were also taken at 0.10 m intervals from a column from a prehistoric ditch, as spot samples at 10 m intervals from a gridded prehistoric palaeosol and as spot samples from tree-throw holes at White Horse Stone.

1.1.2 The samples were sieved down to 0.5 mm by the Oxford Archaeological Unit. The samples chosen for assessment were floated onto a 0.5 mm sieve and the flots dried. Both flots and residues were retained.

1.1.3 The study of the molluscs was to address several of the Fieldwork Event Aims (see section 2.2). The lower parts of some of the dry valley sequences were sampled to determine the Late Glacial landscape and environment within the area (Aim 3). It was also hoped that the columns and the gridded samples would assist with the determination of the local landscape setting of the Medway Megaliths (Aim 4) and the environment of the local late prehistoric communities (Aim 5).

Methodology

1.1.4 It was decided that the best approach to the assessment of the columns was to identify those which gave the best sequences and to assess them in detail. Columns C and F from White Horse Stone were thought to be the most useful because Column C has the longest later Holocene sequence and Column F the best Late Glacial / early Holocene deposits. Both columns spanned several thousand years, so samples were assessed at the closest possible intervals (0.05 m). On the basis of the results obtained, it was decided that it was unnecessary to assess a further four columns through similar deposits at White Horse. A preliminary examination of shells from the four columns from Pilgrims' Way, West of Boarley Farm and East of Boarley Farm suggested that they showed somewhat similar sequences to Columns C and F, so they were assessed at coarser intervals. Much uncertainty had been expressed as to what the deposit at White Horse Stone sampled with Column N represented. Since the concentrations of shells in these samples are low, all the samples were assessed.

1.1.5 It was decided to assess a haphazard selection of 20 samples out of the 60 from the gridded palaeosol at White Horse Stone and use the results to decide whether any more samples required assessment. Little variation was noted between all but one of the samples, so no further samples were assessed. A column from a prehistoric ditch was assessed at 0.2 m intervals because the deposits accumulated over a much shorter period of time than those from the valley bottom columns. The few spot samples from tree-throw holes at White Horse Stone were all assessed.

1.1.6 The flots assessed were scanned under a binocular microscope at magnifications of x10 and x20. The residues were also checked for shells, although the flotation was generally found to have given adequate shell recovery for assessment purposes. The abundance of taxa was recorded on a scale of + (present, 1-5 individuals), ++ (some, 6-10 individuals) and +++ (many, 11+ individuals). An estimate was also made of the total number of individuals in each flot excluding *Cecilioides acicula*. This species was excluded because it burrows deeply and provides no useful information on conditions as a sediment or soil formed. *C. acicula* can be extremely numerous and its inclusion in the total tends to obscure the results from the other species. (The other burrowing species listed, *Pomatias elegans*, only burrows just below the surface of loose soil or leaf litter, so does give useful palaeoecological information). The identifications are divided into species groups in the tables of results (Tables 12.1.2-7: White Horse Stone, Table 12.1.8: Pilgrims' Way, Table 12.1.9: West of Boarley Farm and Table 10: East of Boarley Farm). Nomenclature follows Kerney (1999).

Quantifications

1.1.7 Table 12.1.1 details the breakdown of the number of samples from each site and the number of samples assessed. Tables 12.1.2 - 10 give the range and abundance of shells in each of the samples that were assessed. Most of the samples contain sufficiently large assemblages of identifiable shells (excluding *Cecilioides acicula*) for useful palaeoecological interpretation. Where concentrations of shells are low, for example, in parts of Column F, this itself is of interpretative significance. The only bias noted in the assessment was that shells of *Pomatias elegans* and Limacidae are under-represented in the flots. This would be overcome in any full-scale analysis by sorting the residues as well as the flots.

Table 12.1.1: Quantities of WHS site group mollusc samples

Site Name	Number of columns	Number of samples in columns	Number of other samples	Total number of samples taken	Number of columns assessed	Total number of samples assessed
White Horse Stone	8	120	71	191	4	12
Pilgrims' Way	2	24	0	24	2	11
West of Boarley Farm	1	31	0	31	1	12
East of Boarley Farm	1	38	0	38	1	94
	12	213	71	284	8	129

Table 12.1.2:White Horse Stone, Dry valley mollusc column C

Column / Section	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Sample	262	261	260	259	258	257	218	217	216	215	214	213	212	211	210	209	208	207	206	205	204	203	202	201	200	199	198	250	249
Context	4551	4551	4551	4551	4144	4144	4144	4144	4144	4144	4144	4144	4145	4145	4145	4145	4145	4146	4146	4146	4146	4146	4147	4147	4147	4012	4012	4012	4012
Depth (m)	1.40-1.45	1.35-1.40	1.30-1.35	1.25-1.30	1.20-1.25	1.15-1.20	1.10-1.15	1.05-1.10	1.00-1.05	0.95-1.00	0.90-0.95	0.85-0.90	0.80-0.85	0.75-0.80	0.70-0.75	0.65-0.70	0.60-0.65	0.55-0.60	0.50-0.55	0.45-0.50	0.40-0.45	0.35-0.40	0.30-0.35	0.25-0.30	0.20-0.25	0.15-0.20	0.10-0.15	0.05-0.10	0-0.05
Catholic species																													
Cochlicopa sp.	-	-	-	-	-	-	-	+	-	-	-	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichia hispida gp.	-	-	-	-	-	-	-	+	+	+	+	+	++	+	+	-	+	+	+	+	+	++	+	++	++	++	++	+++	+
Cepaea sp.	-	-	-	-	+	+	+	-	+	+	+	-	+	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
Open-country species																													
Vertigo pygmaea	-	-	-	-	-	-	+	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-
Pupilla muscorum	-	-	+	+	+	+	-	+	+	++	++	+	+	-	-	-	+	+	-	+	-	+	+	+	+	-	+	+	+
Vallonia costata	-	+	+	+	+	-	++	+	+++	+++	+++	+	-	+	-	+	-	+	+	+	+	++	+	+	+	+	+	-	-
V. pulchella	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	+	-	-	-	-	-	-	-	-
V. excentrica	-	-	-	-	+	-	+	+++	+++	+++	+++	+	+	+	+	-	-	+	+	+	+	+++	+	+	+	+	+	+	+
Vallonia sp.	+	+	+	+	+	+	++	+++	+++	+++	+++	+++	+++	+	+	+	+	+	+++	+++	+++	+++	+++	+++	++	+	+++	+++	++
Helicella itala	+	-	-	-	-	-	-	-	+	+	++	+	+	-	+	+	-	+	+	+	++	++	++	++	++	+	+	+	+
Shade-loving species																													
Carychium cf. Tridentatum	-	-	-	-	+	+	+	+	+	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Punctum pygmaeum	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-
Discus rotundatus	-	-	-	-	-	+	+	+	+	-	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
Vitrea sp.	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aegopinella pura	-	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Clausilia bidentata	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
Burrowing species																													
Pomatias elegans	-	-	-	+	++	+	+	++	+	+	+	+	+	+	-	+	+	-	-	-	+	+	-	-	-	+	-	-	-
Cecilioides acicula	-	+	-	-	+	+	+	+	+	+++	++	+++	+++	++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
Candidula intersecta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
Monacha cantiana	-	-	-	-	-	-	-	-	-	-	+	+	+	+	-	-	-	-	-	-	+	+	+	+	-	+	+	+	+
Approx. total (excluding Cecilioides acicula)	5	3	10	30	15	25	70	110	140	110	120	45	30	15	10	13	8	21	30	40	35	85	60	45	40	20	35	45	19

Table 12.1.3: White Horse Stone dry valley mollusc column F

Sample	327	326	325	324	323	322	321	320	319	318	317	316	315	314	313	312	311	310
Context	4936	4936	4936	4935	4935	4935	4934	4934	4934	4933	4933	4933	4933	4144	4144	4144	4144	4144
Depth (m)	0.85-0.90	0.80-0.85	0.75-0.80	0.70-0.75	0.65-0.70	0.60-0.65	0.55-0.60	0.50-0.55	0.45-0.50	0.40-0.45	0.35-0.40	0.30-0.35	0.25-0.30	0.20-0.25	0.15-0.20	0.10-0.15	0.05-0.10	0-0.05
Catholic species																		
Cochlicopa sp.	-	-	-	-	+	+	+	-	-	+	-	-	+	-	-	-	-	-
Limax or Deroceras sp.	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichia hispida gp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	+
Cepaea sp.	-	-	-	-	-	-	+	-	+	-	-	-	-	-	-	+	+	+
Open-country species																		
Abida secale	-	-	-	-	++	+	++	++	+++	+	+	-	-	-	-	-	-	-
Pupilla muscorum	+	++	+	++	+++	+++	+++	+++	+++	+++	+++	+++	++	+	+	-	-	-
Vallonia costata	-	++	+	++	+++	+	+	-	-	-	-	-	-	-	+	-	+	+
V. pulchella	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V. excentrica	-	-	-	-	+	-	+	-	-	-	-	-	-	+	-	-	-	-
Vallonia sp.	+	+	+	+	+++	+++	+++	+	+	+	-	-	-	-	-	-	+	++
Shade-loving species																		
Acicula fusca	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-
Carychium cf. Tridentatum	-	-	-	-	-	-	+	-	-	+	+	-	-	+	-	+	+++	+++
Punctum pygmaeum	-	-	-	+	+++	+	+	+	+	-	-	-	-	-	-	-	-	+
Discus rotundatus	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	++	++
Vitrina sp.	-	+	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-
Vitrea sp.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	+
Nesovitrea hammonis	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
Aegopinella pura	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	+	+
A. nitidula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+
Oxychilus cellarius	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+
Euconulus fulvus	-	-	-	-	+	+	-	+	-	-	-	-	-	-	-	-	-	-
Cochlodina laminata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
Clausilia bidentata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
Burrowing species																		
Pomatias elegans	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	++	+++	+++
Cecilioides acicula	-	-	-	-	+	-	+	-	+	+	-	+	-	+	-	-	+	-
Synanthropic, exotic and introduced species																		
Helicidae indet.	-	-	-	-	+	-	-	+	+	+	+	-	+	+	-	-	-	-
Approx. total (excluding Cecilioides acicula)	2	24	9	40	130	55	95	100	150	80	55	25	11	12	5	16	85	100

Table 12.1.4: White Horse Stone subsoil hollow mollusc column N

Sample	341	340	339	338	337	336	335	334	333	332	331	330	329
Context	4013	4013	4013	4013	4013	4013	4013	4013	4013	4013	4013	4013	4013
Depth (m)	0.60-0.65	0.55-0.60	0.50-0.55	0.45-0.50	0.40-0.45	0.35-0.40	0.30-0.35	0.25-0.30	0.20-0.25	0.15-0.20	0.10-0.15	0.05-0.10	0-0.05
Catholic species													
Cochlicopa sp.	-	-	-	-	-	-	-	-	+	-	-	-	+
Trichia hispida gp.	-	-	-	-	-	-	+	+	+	+	++	+	+
Cepaea sp.	-	-	-	+	-	-	-	-	-	-	-	-	-
Open-country species													
Vertigo pygmaea	-	-	-	-	-	-	+	-	-	-	-	-	+
Pupilla muscorum	-	-	-	-	-	-	+	+	+	+	+	+	+
Vallonia costata	-	-	-	-	-	-	-	+	+	-	+	-	+
V. pulchella	-	-	-	-	+	-	-	-	-	-	-	-	+
V. excentrica	-	-	-	-	-	-	-	+	-	+	+	+	+
Vallonia sp.	-	-	-	-	-	-	+	+	+	-	+	+	+
Helicella itala	-	-	-	-	-	-	+	+	+	+	+	+	+
Shade-loving species													
Carychium cf. Tridentatum	-	-	-	-	-	-	+	-	-	-	-	-	-
Discus rotundatus	-	-	-	-	-	-	+	-	+	-	+	+	+
Vitrea sp.	-	-	-	-	-	-	-	-	+	-	-	-	+
Aegopinella nitidula	-	-	-	-	-	-	-	+	-	-	-	-	+
Oxychilus cellarius	-	-	-	-	-	-	-	-	-	-	-	-	+
Burrowing species													
Cecilioides acicula	-	-	-	-	+	-	+++	+++	+++	+++	+++	+++	+++
Synanthropic, exotic and introduced species													
Monacha cantiana	-	-	-	-	+	-	+	+	-	-	-	-	-
Approx total (excluding Cecilioides acicula)	0	0	0	1	2	0	13	15	16	10	14	14	35

Table 12.1.5: White Horse Stone mollusc gridded palaeosol samples

Column / Section	530E 540N	520E 570N	520E 550N	530E 490N	500E 500N	550E 520N	550E 480N	558E 490N	530E 510N	520E 530N	540E 540N	550E 570N	540E 570N	550E 580N	540E 590N	550E 600N	550E 610N	540E 610N	480E 500N	471E 500N
Sample	54	63	64	65	68	72	77	80	84	88	101	381	382	385	388	396	403	416	880	882
Context	4144	4144	4144	4144	4144	4144	4144	4144	4144	4144	4144	4144	4144	4144	4144	4144	4144	4144	4144	4144
Catholic species																				
Cochlicopa sp.	+	+	+	-	+	+	+	+	-	+	-	-	-	-	-	+	-	+	-	-
Limax or Deroceras sp.	-	-	-	-	+	+	-	-	-	-	+	-	-	-	+	-	-	-	-	-
Trichia hispida gp.	+	+	++	+	++	+++	+	+	++	++	+	++	+	+	+	+	++	++	+++	+++
Cepaea sp.	+	+	+	-	+	+	+	+	-	+	+	-	+	-	+	-	+	+	+	+
Open-country specues																				
Truncatellina cylindrica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
Vertigo pygmaea	+	-	+	-	-	+	+	-	+	-	-	-	-	-	-	-	-	-	-	-
Pupilla muscorum	++	+	-	+	+++	++	+++	+++	+	+	-	+	+	-	+++	+	+	+	-	+
Vallonia costata	++	++	++	-	+++	+++	+++	+++	+++	+	+	+	+	+	+	+	++	+	+++	++
V. pulchella	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-
V. excentrica	+++	+++	+++	+++	++	+++	+++	++	+++	++	+++	+	++	+	++	+	+	+	++	++
Vallonia sp.	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
Helicella itala	+	+	++	++	++	++	++	++	++	+	+	+	+	++	++	+	++	++	+	+
Shade-loving species																				
Acicula fusca	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-
Carychium cf. Tridentatum	+	-	+	+	-	+++	+	+	-	-	-	-	-	-	-	+	-	+	+	-
Acanthinula aculeata	-	-	-	-	-	+	-	-	+	+	-	-	-	-	-	-	-	-	+	-
Ena obscura	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Punctum pygmaeum	+	-	-	-	-	+	-	-	-	-	-	+	-	-	+	-	-	-	-	-
Discus rotundatus	+	-	-	-	-	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-
Vitrina sp.	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-	-	-	+	-
Vitrea sp.	-	-	-	+	-	++	-	-	-	-	-	-	-	-	-	-	-	-	-	+
Nesovitrea hammonis	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	-	-
Aegopinella pura	+	+	-	-	+	+++	+	-	-	-	-	-	-	-	-	-	-	+	+	-
A. nitidula	+	-	-	-	-	+++	-	-	-	+	+	-	-	-	-	-	-	-	+	-
Oxychilus cellarius	+	+	-	-	+	+	+	-	-	+	-	-	-	-	-	-	-	-	-	-
Cochlodina laminata	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	+	-	-	-
Clausilia bidentata	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	+	-	-
Burrowing species																				
Pomatias elegans	++	+	-	+	+	+++	++	++	-	++	+	-	+	+	-	+	+	+	+	+
Cecilioides acicula	+++	+++	+++	+++	+++	+++	-	+	++	+++	-	+++	+++	++	+++	+++	+++	+++	+++	+++
Synanthropic, exotic and introduced species																				
Monacha cantiana	+	+	-	-	+	+	-	-	-	-	-	+	+	+	-	-	+	-	+	+
Helicidae indet.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Approx. total (excluding Cecilioides acicula)	150	75	130	80	110	300	150	160	100	70	70	70	80	35	100	70	95	80	110	100

Table 12.1.6: White Horse Stone mollusc column S408, ditch 4048

Column / Section	408	408	408	408	408	408	408	408
Sample	170	168	166	164	162	159	157	155
Context	4049	4046	4044	4042	4042	4041	4012	4012
Depth (m)	1.75-1.80	1.60-1.70	1.40-1.50	1.20-1.30	1.00-1.10	0.70-0.80	0.50-0.60	0.30-0.40
Catholic species								
Cochlicopa sp.	-	+	++	++	+	++	-	-
Trichia hispida gp.	+++	+++	+++	+++	+++	+++	+++	++
Arianta arbustorum	+	+	-	-	-	-	-	-
Cepaea sp.	+	++	+	+	+	+	+	-
Open-country species								
Vertigo pygmaea	-	-	-	-	-	+	+	+
Pupilla muscorum	+	+	+	+	+	++	++	+++
Vallonia costata	++	+++	+	++	+++	+++	++	++
V. excentrica	-	+	+	+	+	++	+++	++
Vallonia sp.	+++	+++	++	+++	+++	+++	+++	+++
Helicella itala	-	+	+	-	+	+	+	++
Shade loving species								
Carychium cf. Tridentatum	+	-	-	-	-	++	+	+
Acanthinula aculeata	-	-	-	-	-	-	+	-
Ena obscura	-	+	+	+	-	-	-	-
Punctum pygmaeum	-	-	-	-	-	-	+	-
Discus rotundatus	+	-	+++	+++	++	++	+	+
Vitrea sp.	+	+	+	+	+	+	-	-
Aegopinella pura	-	-	-	-	-	+	-	-
A. nitidula	+	-	++	++	+	+	+	+
Oxychilus cellarius	+	+++	++	++	+	+	-	-
Cochlodina laminata	-	-	-	-	-	-	-	+
Clausilia bidentata	-	-	+	+	+	-	-	+
Burrowing species								
Pomatias elegans	+	+	+	-	+	+	+	+
Cecilioides acicula	-	+	+	++	++	+++	+++	+++
Approx. total (excluding Cecilioides acicula)	120	275	80	250	160	220	120	85

Table 12.1.7: White Horse Stone mollusc treethrow hole samples etc

Sample	154	383	656	764	871	875
Context	4516	5127	5278	5354	5388	5395
Catholic species						
Cochlicopa sp.	-	+	-	-	-	-
Trichia hispida gp.	-	-	-	-	+	+
Cepaea sp.	-	+	-	-	-	+
Open-country species						
Abida secale	-	-	-	-	+	-
Pupilla muscorum	-	-	+	-	+++	+
Vallonia costata	-	-	+	-	+	-
V. excentrica	-	+	-	-	-	-
Vallonia sp.	-	+	+	-	++	+
Helicella itala	+	-	-	-	-	-
Shade-loving species						
Acicula fusca	-	+	-	-	-	-
Carychium cf. Tridentatum	-	+++	+	-	+++	++
Discus rotundatus	-	+	+	-	+	+
Vitrea sp.	-	++	-	-	+	-
Aegopinella pura	-	+	-	-	+	-
Oxychilus cellarius	-	+	+	-	+	-
Clausilia bidentata	-	-	-	-	-	+

Trichia striolata (early)	-	+	-	-	-	-
Burrowing species						
Pomatias elegans	+	++	+	+	+	+
Sunanthropic, exotic and introduced species						
Helicidae indet.	-	-	-	-	+	-
Approx. total (excluding Cecilioides acicula)	4	35	9	3	50	20

Table 12.1.8: Pilgrim's Way dry valley mollusc columns

Sample	107	106	105	91	89	86	83	82	81	77	76	73
Context	970	961	960	923	923	923	923	923	857	856	856	856
Depth (m)	0.85-0.90	0.80-0.85	0.75-0.80	1.15-1.20	1.05-1.10	0.90-0.95	0.75-0.80	0.70-0.75	0.65-0.70	0.45-0.50	0.40-0.45	0.25-0.30
Catholic species												
Cochlicopa sp.	-	-	-	+	+	-	-	-	-	-	-	-
Trichia hispida gp.	-	+	++	+++	++	++	+++	++	++	+++	+++	++
Cepaea sp.	-	-	-	+	+	+	-	-	-	-	-	-
Open-country species												
Vertigo pygmaea	-	-	-	-	-	+	-	+	+	+	-	-
Pupilla muscorum	+	-	+	-	-	+	+	+	+	+	+	-
Vallonia costata	-	-	+	+	-	+++	+++	+++	+++	++	+	-
V. pulchella	-	-	-	-	-	-	-	-	-	-	-	+
V. excentrica	-	-	-	+	+	++	+++	+++	+++	++	++	+
Vallonia sp.	+	+	+	+++	++	+++	+++	+++	+++	+++	++	++
Helicella itala	-	-	+	-	-	+	++	+++	++	+	+	+
Shade-loving species												
Carychium cf. Tridentatum	-	-	+	++	+++	+	-	-	-	-	-	-
Acanthinula aculeata	-	-	-	+	-	-	-	-	-	-	-	-
Discus rotundatus	-	-	-	++	+	+	-	-	-	-	-	-
Nesovitrea hammonis	-	-	-	-	+	-	-	-	-	-	-	-
Aegopinella pura	-	-	-	+	+	-	-	-	-	-	-	-
A. nitidula	-	-	-	++	+	+	+	-	-	-	-	-
Oxychilus cellarius	-	-	-	+	-	-	-	-	-	-	-	-
Burrowing species												
Pomatias elegans	-	-	-	+	+++	+	+	+	-	+	-	-
Cecilioides acicula	-	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
Synanthropic, exotic and introduced species												
Monacha cantiana	-	-	+	+	-	-	+	+	+	+	-	++
Approx total (excluding Cecilioides acicula)	2	2	18	70	75	130	100	115	100	60	70	35

Table 12.1.9: West of Boarley Farm dry valley mollusc column

Sample	43	41	39	37	35	33	29	24	20	17	14
Context	1167	1157	1157	1152	1156	1156	1151	1151	1155	1150	1150
Depth (m)	1.80-1.85	1.70-1.75	1.60-1.65	1.50-1.55	1.40-1.45	1.30-1.35	1.10-1.15	1.00-1.05	0.65-0.70	0.50-0.55	0.35-0.40
Catholic species											
Cochlicopa sp.	+	+	+	+	+	+	+	-	+	-	-
Trichia hispida gp.	-	+	+	+	+	++	++	+++	+++	+++	++
Cepaea sp.	-	+	+	+	+	-	+	-	+	+	-
Open-country species											
Vertigo pygmaea	-	+	+	+	-	+	-	+	+	+	-
Abida secale	+	-	-	-	-	-	-	-	-	-	-
Pupilla muscorum	-	++	+++	+++	++	+	+	+	+	+	+
Vallonia costata	-	+	+++	++	++	+++	+++	+++	+++	++	++
V. excentrica	-	++	+++	+++	+++	+++	+++	++	+	-	+
Vallonia sp.	+	+	+++	+++	+++	+++	+++	+++	+++	++	++
Helicella itala	-	+	+++	+++	+	++	++	+++	+	+	++
Shade-loving species											
Acicula fusca	-	+	-	-	-	-	-	-	-	-	-
Carychium cf. Tridentatum	-	++	+	-	-	-	-	+	+	-	-
Acanthinula aculeata	-	+	+	+	-	-	-	-	-	-	-
Punctum pygmaeum	-	-	-	+	+	-	-	-	-	-	-
Discus rotundatus	+	+	-	-	+	-	-	-	-	-	+
Vitrea sp.	-	+	+	-	-	-	+	+	-	-	+
Nesovitrea hammonis	-	-	+	-	-	-	-	-	-	-	-
Aegopinella pura	-	+	-	-	+	-	-	+	-	-	-
A. nitidula	-	+	-	+	+	+	+	-	-	-	-
Oxychilus cellarius	-	-	-	-	-	-	-	-	+	-	-
Clausilia bidentata	-	+	-	+	+	-	-	-	-	-	-
Trichia striolata (early)	+	-	-	-	-	-	-	-	-	-	-
Burrowing species											
Pomatias elegans	-	+++	+++	+++	++	+	+	+	-	-	-
Cecilioides acicula	-	+	+++	+++	+++	+++	+++	+++	+++	+++	+++
Synanthropic, exotic and introduced species											
Monacha cantiana	-	+	-	+	-	-	-	+	+	+	+
Approx total (excluding Cecilioides acicula)	4	110	145	175	130	160	175	190	160	70	50

Table 12.1.10: East of Boarley Farm dry valley mollusc column

Sample	50	48	45	43	40	36	29	26	19	11	7	5
Context	1030	1029	1029	1027	1027	1007	1007	1026	1026	1001	1001	1001
Depth (m)	2.35-2.40	2.25-2.30	2.10-2.15	2.00-2.05	1.85-1.90	1.65-1.70	1.45-1.50	1.30-1.35	0.95-1.00	0.70-0.80	0.30-0.40	0.10-0.20
Catholic species												
Cochlicopa sp.	-	+	-	-	+	-	-	+	+	+	+	-
Limax or Deroceras sp.	-	-	-	-	+	-	-	-	-	-	-	+
Trichia hispida gp.	++	+++	+++	+++	+++	+++	+++	++	+++	+++	++	++
Cepaea sp.	+	+	+	+	+	-	+	+	-	+	-	-
Open-country species												
Vertigo pygmaea	-	-	-	+	+	-	-	-	-	-	-	-
Pupilla muscorum	-	-	-	-	-	-	-	-	+	-	-	-
Vallonia costata	-	+	-	+	-	-	+	+	+	+	+++	++
V. pulchella	-	-	-	-	-	-	+	+	-	-	-	-
V. excentrica	-	+	+	+	+	-	+	-	+	-	+	+
Vallonia sp.	-	+	+	+	+	+	+	++	++	+	+++	++
Helicella itala	-	-	-	+	+	+	-	-	-	+	-	-
Shade-loving species												
Carychium cf. Tridentatum	+	+	+	+	+++	+	+	-	+	-	-	-
Acanthinula aculeata	-	-	-	+	+	-	+	-	-	-	-	-
Punctum pygmaeum	-	-	-	+	+	-	-	-	-	-	+	-
Discus rotundatus	+	+++	+++	+	++	+	-	-	-	-	-	-
Vitrina sp.	-	-	-	-	+	-	-	-	-	-	-	-
Vitrea sp.	+	-	-	+	+	-	-	+	-	-	+	-
Nesovitrea hammonis	-	-	-	-	-	-	-	+	-	-	-	-
Aegopinella pura	-	-	+	-	-	-	-	-	-	-	-	-
A. nitidula	-	+	-	+	+	-	-	-	-	-	-	+
Oxychilus cellarius	-	-	+	-	+	-	-	-	+	-	+	+
Cochlodina laminata	-	-	-	+	-	-	-	-	-	-	-	-
Clausilia bidentata	-	+	+	-	+	-	-	-	-	-	-	-
Burrowing species												
Pomatias elegans	+	+	+	+	+	+	-	-	-	-	-	-
Cecilioides acicula	+	-	-	-	+	+	+++	+++	+++	+++	+++	+++
Marsh species												
Succinea or Oxyloma sp.	-	-	-	-	-	-	-	+	-	-	-	-
Monacha cantiana	-	-	-	+	-	-	-	-	-	+	+	++
Trichia striolata	-	-	-	-	-	-	-	-	-	-	+	-
Approx. total (excluding Cecilioides acicula)	14	50	55	75	70	120	30	45	40	50	85	40

Provenance

1.1.8 The taphonomy of mollusc shells in colluvial deposits and soils is not simple. There are often problems with the movement of shells by earthworm activity, residual shells can be present and shells can be transported in colluvial sediment. However, these are all normal problems facing land snail analysis. The contexts sampled do not present any unusual problems of contamination with recent material or residuality. The potentials of the assemblages have not seriously been affected by factors of preservation.

1.1.9 All the groups of samples assessed represent good groups in the sense that they contain sufficient mollusc shells for environmental interpretations to be made. However, not all the groups have high potential in relation to the research objectives. The importance of the various groups is outlined here and considered again under Section 7, Potential for Further Work.

White Horse Stone Column C (Table 12.1.2)

1.1.10 The lower part of this sequence has sparse assemblages of open-country molluscs, such as *Pupilla muscorum*, which are likely to be Late Glacial in date. However, this part of the sequence is short and shell numbers are low, so it can only make a small contribution to determining the Late Glacial landscape and environment. The remainder of the sequence comprises a late Bronze Age / Iron Age palaeosol sealed beneath later prehistoric colluvial sediments. The palaeosol contains high concentrations of open-country molluscs, particularly *Vallonia costata* and *V. excentrica*. The colluvial sediments also contain the same open-country species, although in lower concentrations. The molluscs from this part of the sequence certainly have the potential to provided information on the later prehistoric environment.

White Horse Stone Column F (Tables 12.1.3)

1.1.11 Most of this sequence is Late Glacial to very early Holocene in date and it includes a palaeosol of possible Allerød date sealed between layers of solifluction debris. Shells of open-country cold-tolerant molluscs, particularly *Pupilla muscorum*, predominate. The palaeosol contains a richer assemblage in which *Vallonia costata* and *Punctum pygmaeum* are also numerous. *Abida secale* becomes more numerous above the palaeosol. These molluscan assemblages have the potential to show changing Late Glacial and early Holocene conditions. The majority of the shells in the top two samples of the column, however, are thermophilous shade-loving species. They are from a soil which probably represents a less disturbed version of the palaeosol in Column C. *Carychium* cf. *tridentatum* and *Discus rotundatus*, which are characteristic of woodland conditions, are well-represented. The "old woodland" snail *Acicula fusca* is also present. High numbers of *Pomatias elegans* possibly reflect surface disturbance, while the occurrence of *Vallonia* sp. suggests tree cover was not complete. It is thought likely that this part of the sequence is Neolithic, perhaps belonging to the period when clearance was beginning on the site. The results from these samples would therefore help to provide information on the environmental setting of the Medway Megaliths.

White Horse Stone Column N (Table 12.1.4)

1.1.12 It was uncertain at the time of excavation whether the deposits of Column N were Late Glacial or later prehistoric in date. The presence of *Discus rotundatus*, a thermophilous species, and *Monacha cantiana*, a late addition to the British fauna, suggests the latter date. However, the low concentration of shells in the samples means that the sequence is unable to contribute much to the reconstruction of the environment of the local late prehistoric communities.

White Horse Stone Gridded Palaeosol (Table 12.1.5)

1.1.13 When the site was being excavated, it was initially believed that the extensive palaeosol in the valley bottom at White Horse Stone, which was sealed beneath colluvial sediments, was Neolithic. A series of samples was taken on a grid at 10m intervals from the exposed surface of the soil with the hope that local variation in the vegetation cover, perhaps even the extent of a Neolithic clearance, could be detected. However, excavation of the soil showed that it had been cultivated and artefacts incorporated into it subsequent to the Neolithic and that it was not sealed by colluvium until the late Bronze Age or Iron Age. The occurrence of shells of *Monacha cantiana* in some of the samples is consistent with an Iron Age or more recent date for the soil. With the exception of one very rich sample (Sample 72) the gridded samples gave similar results, with high numbers of open-country species, particularly *Pupilla muscorum*, *Vallonia costata* and *V. excentrica*. Sample 72, in addition to the open-country species, also contains many shells of woodland species, such as *Carychium* cf. *tridentatum*, *Aegopinella pura* and *A. nitidula*. However, it is possible that this sample included underlying earlier deposits rather than that it reflected a difference in the Iron Age vegetation. The results from the gridded samples do give information on later prehistoric environment but they add little that is not shown by the sequence through the same palaeosol in Column C.

White Horse Stone Bronze Age Ditch Column S408 (Table 12.1.6)

1.1.14 The samples from the Bronze Age ditch at White Horse Stone contain useful quantities of shells and the sequence shows some evidence for environmental change, open-country species such as *Vallonia* sp., which predominated at the bottom of the ditch, being joined by shade-loving species such as *Discus rotundatus*, higher up the profile. This sequence has some potential to fulfil the research objectives.

White Horse Stone Tree-Throw Holes (Table 12.1.7)

1.1.15 The tree-throw holes have given useful but varied results. Sample 383, for example, contains almost entirely shade-loving species, such as *Carychium* cf. *tridentatum* and *Vitrea* sp. However, in Sample 871 they are joined by cold-tolerant open-country species, such as *Pupilla muscorum* and *Abida secale*, which had perhaps been brought up from earlier sediments by the roots of the falling tree. These samples will help with environmental reconstruction for the period of the Medway Megaliths.

Pilgrims' Way Columns (Table12.1.8)

1.1.16 The shorter column (Samples 107-105) extended through Late Glacial sediments beneath late prehistoric sediments. Shells in the Late Glacial sediments are sparse, but as might be expected, tolerate cold open conditions. This part of the sequence only has limited potential. The longer column (Samples 91-73) extended from a late Bronze Age to early Iron Age palaeosol sealed beneath Iron Age to medieval colluvial sediments. The samples from the palaeosol contain both open-country and shade-loving species. Sample 89 has quite a high concentration of *Pomatias elegans* and, given the occurrence of the shade-loving species, it is possible that this assemblage was related to clearance. The molluscs from the overlying sediments are predominantly open-country species, especially *Vallonia costata* and *V. excentrica*, but *Helicella itala* is also well represented in some samples. The sequence from Pilgrims' Way contributes to the later prehistoric research aims.

West of Boarley Farm Column (Table 12.1.9)

1.1.17 The very lowest sample of the sequence contains a mixed assemblage of shells, probably including both Late Glacial (eg *Albida secale*) and mid-Holocene (eg *Discus rotundatus*) material. Above this is a palaeosol assemblage of later prehistoric date, which contains both open-country and shade-loving molluscs. *Pomatias elegans* suggests some disturbance. The palaeosol was sealed by colluvial sediments, which contain shells of open-country molluscs. The results from the West of Boarley Farm sequence will make a useful contribution to determining the later prehistoric landscape.

East of Boarley Farm Column (Table 12.1.10)

1.1.18 Shade-loving species, especially *Discus rotundatus*, predominate in the bottom 0.5m of the column, although open-country molluscs are by no means absent. It was suggested that this part of the sequence was the fill to a hollow way. Above this level, open-country species predominate in colluvial sediments. The degree to which this sequence can address the fieldwork aims will become clearer when the deposits are dated more closely.

Conservation

1.1.19 The mollusc remains are stable in their various states at present: dried sieved samples, flots and residues from flotation. Further analysis would require the sorting of shells from the flots and residues but they would remain stable.

1.1.20 All shells sorted from samples for further analysis should be retained. They will be very compact, stored sample by sample in glass tubes. All flots that were assessed should also be kept. They are stored in small "minigrip" plastic bags and are likewise very compact. However, it is recommended that all the residues from the assessment that are not sorted and the sieved samples that were not assessed should be discarded. Sorting residues should also be discarded. All are both heavy and bulky.

Comparative Material

1.1.21 There are no other sites within the CTRL project yet identified with useful comparative material. There are, however, two major studies that have been

undertaken on Chalk valley sequences in Kent which have included molluscan analysis, at Brook (Kerney *et al*. 1964) and Holywell Coombe, Folkestone (Preece and Bridgland 1999). Both sites yielded very important Late Devensian and Flandrian molluscan sequences and included the discovery of an Allerød soil at Holywell Coombe. Both these sites are of greater importance to Quaternary studies than the White Horse Stone group of sites. However, the Late Devensian - early Holocene deposits at White Horse Stone were laid down under drier conditions than the other two sites, so their mollusc assemblages are not identical. The archaeology related to the later deposits has been studied in more detail for the White Horse Stone group of sites than at Brook.

Potential for Further Work

1.1.22 The molluscs from the White Horse Stone group of sites have the potential to address, at least to some degree, most of the specified Fieldwork Event Aims that had been intended of them before fieldwork began. The sequence from White Horse Stone Column F has the potential to provide information on the changing Late Glacial environment and the transition to the early Holocene. Two aspects of this can be seen as of national significance in Quaternary studies: the palaeoenvironmental evidence from the possible Allerød soil and the evidence for the transition to the Holocene.

1.1.23 The samples from the top of White Horse Stone Column F and also from some of the White Horse Stone tree-throw holes have the potential to contribute information on the environmental setting of the Medway Megaliths. The results will be of use for interpreting the local environment of the Neolithic settlement at White Horse Stone and providing information towards building up a picture of the degree of tree cover in the region during the Neolithic. It is possible that Neolithic clearance was very local in Kent.

1.1.24 The sequences of White Horse Stone Columns C and S408, Pilgrims' Way Columns, West of Boarley Farm Column and possibly East of Boarley Farm Column all have the potential to assist with the determination of the environment of the local late prehistoric communities. There is at least a hint from the assessment results that the valley bottoms were not completely cleared until the late Bronze Age and agricultural intensification was late, which would certainly be of regional significance.

1.1.25 One additional research aim to have emerged from the assessment of the molluscs is that of adding to knowledge of the development of the British mollusc fauna. Some of the samples in Column F contain a species of Helicidae, which no longer occurs in Britain. It is possibly *Trochoidea geyeri*, although further work is necessary to confirm its identity. It is known from some deposits of Late Glacial age in Britain (Kerney 1999). *Monacha cantiana*, which is regarded as a possible Roman introduction to Britain (Kerney 1999), is present in some of the pre-Roman deposits at White Horse Stone. It is very plausible that *M. cantiana* was introduced to Britain via Kent in the prehistoric period. It is possible that a closely related species, *Monacha cartusiana*, which is now of very restricted distribution, is also present. This information would be of national significance.

Updated research questions

1.1.26 Themes concerning the late Glacial and Holocene environment and landscape history can be addressed.

Pleistocene-Holocene environment

What is the character of the late glacial and early Holocene environment? What evidence is there for environmental change during the late glacial and early Holocene periods?

Recommended further work

1.1.27 It is recommended that molluscs from White Horse Stone Columns C, F and S408 and the White Horse Stone tree-throw holes be analysed in full to address the research aims described above.

1.1.28 It is further recommended that the results of the assessment of White Horse Stone Column N and the White Horse gridded samples be used in any final report but that no further analysis is necessary of these samples. Analysis of the remaining columns from White Horse Stone is unnecessary. This would entail the full analysis of 61 of the 191 samples taken from White Horse Stone.

1.1.29 It is also recommended that samples be analysed in full from the columns from Pilgrims' Way, West of Boarley Farm and East of Boarley Farm. It will not be necessary to analyse the molluscs from the colluvial parts of these sequences at intervals as close as 0.05m, so the work would involve the full analysis of about 50 samples out of the total of 93 from these sites.

APPENDIX 2– ASSESSMENT OF MARINE SHELL

2.1 Marine shell

By Jessica M. Winder

Introduction

2.1.1 Shells of the common flat oyster *Ostrea edulis* L. together with mussel (?*Mytilus* sp.), whelk (*Buccinum undatum* L.) and common cockle (*Cerastoderma edule* L.) were recovered from excavations at White Horse Stone (ARC WHS 98), Pilgrims Way (ARC PIL 98) and West of Boarley Farm (ARC BFW 98).

2.1.2 Shells were recovered by hand retrieval and sieving of bulk samples.

2.1.3 It was hoped that the study of marine molluscs would assist in the understanding of the manipulation and consumption by humans of natural resources (1.4.c) and the way in which population increase and concentration might have affected natural resource exploitation and accelerate environmental change (2.4.b)

2.1.4 The recovery and study of this assemblage was undertaken in accordance to the original Fieldwork Event Aims (see Section 2.2), in particular those concerning the diet of prehistoric communities (aims 6, 11 and 13).

Methodology

2.1.5 The shells from each context were identified, where possible, and counted. Oyster valves were separated into left and right valves, and further divided into shells suitable or unsuitable for measuring and detailed recording of features. A sub-sample of contexts containing at least thirty measurable left or right valves would be selected as suitable for use in statistical comparisons of size or comparisons of evidence for epibiont infestation (Winder 1993).

Quantifications

2.1.6 Table 13.1.1 gives a breakdown of the assemblages by context.

2.1.7 From White Horse Stone (ARC WHS 98) only two complete valves and 28 small fragments of oyster were recovered from twenty contexts together with fragments of at least 6 mussel valves, a single cockle valve and a body whorl fragment from a common whelk. From the Pilgrims Way excavation (ARC PIL 98) 6 oyster valves and 4 fragments were recovered from two contexts. From the West of Boarley Farm excavation 29 oyster valves and 113 fragments were recovered from seven contexts together with 20 mussel fragments. The number of shells and shell fragments in each context is very small.

Table 13.1.1: A breakdown of the assemblages by context

Event code	Context number	Sample number	Left valve(LV) oyster	Unmeasurable LV oyster	Right valve(RV) oyster	Unmeasurable RV oyster	Total valves oyster (P = present)	Other species
ARC WHS98	2013					1F	P	
	2106	3					P	
		10-4mm						
	2136		1				1	
	2261						P	
	2264	29					P	?mussel
		10-4mm						
	4051	49					P	?mussel
		10mm						
	4138	93					P	
		10-4mm						
	4181	96					P	
		10-4mm						
	4342	124					P	
		10mm						
	4512	150						1 valve Cerastoderma edule
		10mm						
	4831	533						
		10-4mm						
	4930	635						
		10-4mm						
	4947							
	4997	294						3 fragments of ?Mytilus sp.
		10mm						
	5316	742						1 minute fragment ? mussel
		10-4mm						
	6085	616					P	
		10mm						
	6097	419						1 minute fragment ?mussel
		10-2mm						
	8014	705						1 body whorl fragment Buccinum undatum
		10mm						
	8024	714						1 fragment ?mussel
		10-4mm						

Event code	Context number	Sample number	Left valve(LV) oyster	Unmeasurable LV oyster	Right valve(RV) oyster	Unmeasurable RV oyster	Total valves oyster (P = present)	Other species
	9012		1				1	
ARC PIL 98	343		1			1	2	
	368		3			1	4	

Provenance

2.1.8 The provenance of the marine mollusc material cannot be determined. The state of preservation of the shells is almost without exception extremely poor. The quality of the shell material totally denies it any potential for further investigation.

Conservation

2.1.9 Long term storage would not be affected by any further analysis, were this feasible. Long term storage, should it be deemed necessary or desirable would require the shells to be kept dry, in sealed polythene bags, with minimisation of mechanical damage. Regarding retention/discard policy, it is suggested that there is little merit in retaining this assemblage of material.

Comparative material

2.1.10 This assemblage of material is not suitable for comparison with material from elsewhere, whether within or from outside the CTRL project.

Potential for further work

2.1.11 There is no potential for the data assemblage derivable from this assemblage of marine molluscan material to address the original Landscape Zone Aims and the Fieldwork event Aims.

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APPENDIX 3 - MOLLUSCS

by Mark Robinson

3.1 Assessment of the Molluscs

3.1.1 Samples taken from the Roman well 11010 at Thurnham Roman Villa for waterlogged plant remains were simultaneously scanned for the presence of molluscs.

3.1.2 Molluscs and insects were present in four of the seven samples.

3.1.3 During the assessment of these samples for insect remains (see Appendix 13), the presence of molluscs was noted.

3.1.4 Shells of land snails were present in all four samples (10347, 10351, 10352 and 10293). Their concentration is of the order of 60 shells per kg. The majority are species of woodland or shaded habitats such as *Discus rotundatus, Aegopinella nitidula and Marpessa laminata*. There are very few shells of open-country species.

3.1.5 Some molluscs are highly habitat-sensitive, and can provide additional evidence for subtle variations, both temporal and spatial, in the surrounding environment. The molluscs from the well support the other evidence for local scrub regeneration around the well, and will thus contribute to study of the decline of the villa, and its contemporaneous local environment. Only a small number of samples contained suitable remains, and the study of molluscs should be undertaken in conjunction with other sources of environmental data.

3.1.6 It is recommended that molluscs are extracted from the samples to be analysed for waterlogged macroscopic remains, and identified by species, and reported upon.

WEST OF SITTINGBOURNE ROAD

Oysters and Other Marine Molluscs

Oysters and Other Marine Molluscs

by Jessica M. Winder

Introduction

Shells of the common flat oyster *Ostrea edulis* L. together with a single specimen of common whelk (*Buccinum undatum* L.) were recovered during the watching brief. Shells were recovered by hand retrieval and sieving of bulk samples. It was hoped that the study of marine molluscs would assist in the understanding of the manipulation and consumption by humans of natural resources and the way in which population increase and concentration might have affected natural resource exploitation and accelerated environmental change.

Methodology

The shells from each context were identified, where possible, and counted. Oyster valves were separated into left and right valves, and further divided into shells suitable or unsuitable for measuring and detailed recording of features. A sub-sample of contexts containing at least thirty measurable left or right valves would be selected as suitable for use in statistical comparisons of size or comparisons of evidence for epibiont infestation (Winder 1993) were it available.

Quantification

Table 6 presents the numbers of shells from each context with comments on their condition. Thirty-four oyster valves and eleven fragments were recovered from four contexts together with a single whelk. The number of shells and shell fragments in each context is therefore very small.

Provenance

The provenance of the marine mollusc material cannot be determined. The state of preservation of the shells is generally fair with robust and thick shells that are broken but have not been etched or worn. The quantity of the shell material is insufficient to allow any further investigation by means of statistical comparisons.

Conservation

Long term storage, should it be deemed necessary or desirable, would require the shells to be kept dry, in sealed polythene bags, with minimisation of mechanical damage. Regarding retention/discard policy, it is suggested that there is little merit in retaining this assemblage of material.

Comparative material

This assemblage of material is too small and poorly preserved to be of value for comparison with material from elsewhere, whether within or from outside the CTRL project.

Potential for further work

There is no potential for this assemblage of marine molluscan material to address the original Landscape Zone Aims or the Fieldwork Event Aims.

Bibliography

Winder, J M, 1993, A study of the variation in oyster shells from archaeological sites and a discussion of oyster exploitation, unpublished PhD thesis, University of Southampton

Table 6: Summary of marine molluscs

Context number	**Left valve (LV) oyster**	**Unmeas-urable LV oyster**	**Right valve (RV) oyster**	**Unmeas-urable RV oyster**	**Total valves oyster (P = present)**	**Other species**	**Comments on oysters**
8	2	3	-	4	9	-	Plus 1 fragment each of LV and RV. Thick, robust, broken but not etched, eroded or worn. Irregularities. Triangular shape to 1.
11	-	2	-	2	4	-	Plus approx. 10 minute fragments.
						-	
13	2	2	2	F	6	-	1 LV exceptionally large and thick with massive hinge scar.
14	2	2	10	1	15	1 *Buccinum undatum* intact	Mixture thin & thick and various sizes. I v. thick & heavy. RV. Broken but not worn or eroded. Glossy interiors ?organic content

HOLM HILL

1.1 Assessment of Mollusca

Dr M J Allen

Introduction

1.1.1 As noted above, bulk disturbed samples were taken for macroscopic plant remains and charcoal, no samples were specifically taken for Mollusca.

1.1.2 In terms of addressing fieldwork event aims, the recovery and assessment of these samples is primarily to establish the economic basis of agricultural communities, and to determine the local environment of the site through recovery of such palaeo-environmental data.

Methodology

1.1.3 Samples were selected for processing according to the following criteria;

- *A broad range of feature types was to be examined,*
- *Samples should be spatially arranged across the entire site, and*
- *Where possible, all chronological periods should be examined at the site*
- *Standard processing methods were used.*

Quantifications

1.1.4 See **Table 15**.

Provenance

1.1.5 These data will provide good local evidence for the site environment.

Conservation

1.1.6 Analysis would include extraction and sorting of mollusc remains from residues, facilitating storage and archive compilation.

Comparative material

1.1.7 These data are site-specific; there is very little known in archaeological terms, particularly for the prehistoric periods, concerning mollusca in the general area to compare and contrast with Holm Hill.

Potential for further work

1.1.8 Analysis and identification will provide some detail of the local flooding/ water regimes contemporary with ditch **360303** and burnt-out tree stump **1009**.

Table 15: Quantification of Ecofacts

					Flot						Residue
Feature type and number	**Context**	**Sample**	**Size (litres)**	**Flot size (ml)**	**Grain**	**Chaff**	**Weed Seeds Uncharred**	**Charred**	**Charcoal >5.6mm**	**Other**	**Charcoal >5.6mm**
HOL99 Excavation											
BTS 1001	1002	3001	10	625 $^{6.25}$			+	+	++		
BTS 1001	1013	3004	10	20 ^{2}			+	+	+		
BTS 1009	1010	3006	2	50 $^{2.5}$			+		++	Moll-f (+)	
BTS 1023	1024	3008	10	225 ^{5}			+	+	++		
BTS 1028	1027	3010	10	250 $^{12.5}$			+	+	++		
BTS 2068	2066	3512	10	700 ^{7}			+	+	++		
Ditch 4001	2029	3507	10	10 $^{6.5}$			++	+	-		
Ditch 4004	2085	3513	10	5 $^{0.5}$	+		+	+(h)	+	Burnt bone	
Ditch 4005	2105	3514	10	1 $^{0.1}$	+	+	+	+	-		
Hearth 1033	1034	3012	10	1000 ^{10}			+	+	++		
Pit 1029	1030	3011	10	1000 ^{10}			+	+	+++		
Pit 2003	2001	3501	10	350 $^{3.5}$	+++		+	+	++		
Pit 2043	2041	3509	10	750 $^{7.5}$			+	+	++		
HOL98 Evaluation											
Crem. 359604	359605	19	10	60 ^{6}	+	+	+	+	++	Burnt bone	+++
Crem. 359606	359607	20	15	175 $^{1.75}$	+		++		++	Burnt bone	
Crem. 359609	359608	21	15	500 ^{5}	+		++		++	Burnt bone	
Ditch 360303	360304	2	15	20 ^{2}	+	+	+	+(h)	+	Moll-f (+)	
Ditch 359205 (=4010)	359202	22	10	30 ^{2}	+	+	++	+	+		
Ditch 359205 (=4010)	359203	23	0.7	3 $^{0.3}$	++		++	+	-		
Ditch 360507	360508	18	15	35 $^{3.5}$	+	+	++		+		
Ditch 361204	361203	26	15	20 ^{12}	+	+	++	++			
Layer	352006	1	5	800 ^{8}	+		+		+++		+

Key: BTS = Burnt-out tree stump; Flot size in $^{\text{superscript}}$ = ml of rooty material; h = hazelnut; Moll-f = freshwater mollusc
+ = 1-10, ++ = 11-50, +++ = 51-100

1.2 Assessment of Molluscs

Michael J. Allen and Sarah F. Wyles

Introduction

1.1.9 As the site was situated on Folkestone and non-calcareous Beds, the archaeological deposits were not conducive to snail life or shell survival, and the area is generally poor for land snail preservation (cf Evans 1972). The research objectives of land-use and landscape in the later prehistoric to Saxon periods are not ones of general landscape type (i.e. woodland vs open country) that can be undertaken with moderate snail assemblage. They seek to determine the landscape type at 'high resolution' (i.e. type of land-use: arable, vs short-grazed, vs open trampled, vs long grassland), requiring sequences of well-preserved land snails.

Methodology

1.1.10 No samples were taken and processed specifically for land snails (cf. Evans 1972), however the presence of land snails was noted in the assessment of the bulk samples

Quantification and Provenance

1.1.11 During the processing of bulk soil samples for the recovery of charred plant remains and charcoals, snails were noted, and recorded in the flots. The presence of snails in these flots is assessed below. None of the shells (WA) were noted to be fresh- or brackish-water species.

1.1.12 Snails were not noted in any of the Neolithic flots. One sample from Early Bronze Age barrow ditch C4744 and one from Middle Bronze Age pit C3615 contained snails. Few Late Bronze Age/ Early Iron Age features contained shells, although pit C2805 consistently recorded the presence of snails. Preservation here may be due to micro-environmental conditions created by the pit fills (i.e. calcium phosphate input in the form of ash). The presence of snail shells in the samples from this pit is noteworthy. Only one Early to Middle Iron Age sample contained a few shells (less than 5) in the flot, whilst only ditch C2308 from the undiagnostic prehistoric category contained any shells.

1.1.13 Several Late Iron Age/ Romano-British samples (13) contained shells, however the contexts they were noted from (cremation C8; ditch C5; pit C1; and hollow C1) at this period, and the level of preservation make their presence of little significance. The preponderance of survival in cremation-related contexts is due the increased levels of calcium (bone) and calcium phosphate (burnt bone and ash).

1.1.14 Nine Anglo-Saxon graves and four other contemporaneous features contained some shell in the flots. Again low levels of preservation here are likely to be due to the higher calcium carbonate content created by bone (albeit often dissolved and poorly preserved).

Conservation

1.1.15 What little shell that survives is stable in dry condition in either dried flots or residues. They are suitable for long term storage, if necessary, in the current form.

Comparative Material

1.1.16 Due to the poor preservation of snails on non-calcareous geologies there are no comparative records in the immediate area. However, the chalkland of Kent and Sussex have provided detailed records of landscape change from the early post glacial and prehistoric periods in Kent, such as at Brook (Kerney *et al*. 1964) and Holywell Combe (Kerney *et al*. 1980), which provide a general environmental background. For the Neolithic the seminal paper by Thomas (1982) drawing on work from various Neolithic causewayed enclosures (various publications), and that of landscape blocks e.g. Caburn-Malling Down, East Sussex (Allen 1995a), show the potential for land snail analysis. This work provides some parallels for the Kent landscape. At Saltwood Tunnel, however, survival is not good enough to allow anything but specific and localised comment, rather than an integral interpretation of environment, environment change and land-use in the wider local landscape.

Potential for further work

1.1.17 Shell survival was so poor as to not facilitate any significant contribution. In periods post 2000 BC good preservation of shells is needed to facilitate detailed interpretation of land-use. Prior to this period where more general statements on woodland can be determined through poorer survival, either the contexts themselves are lacking or shells do not survive.

1.1.18 However snails from any earlier prehistoric features (e.g. particular features such as ditch C4744 and Middle Bronze Age pit C3615) will be of use in defining the nature of the earlier landscape at Saltwood, and broad evidence of local land-use. Snails from Late Bronze Age/ Early Iron Age pit C2805, where preservation is better, may aid in determining function and use of the feature (see molluscan remains from other Iron Age pits e.g. Balksbury, Hants; Allen 1995b).

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