

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	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	++	++
Vitrea 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	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 provide 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 (Table 12.1.8)

- 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

- 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.

