Cambourne New Settlement

Iron Age and Romano-British settlement on the clay uplands of west Cambridgeshire

Volume 2: Specialist Appendices

Web Report 15

Molluscs, *by Michael J. Allen*

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Iron Age and Romano-British Settlement on the Clay Uplands of West Cambridgeshire

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Part 2. Ecofacts

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Molluscs

By Michael J. Allen

Introduction and methods

Shell survival across the Cambourne Development Area was patchy and localised even within individual excavations. Although samples were taken specifically for snails other assemblages were preserved in bulk samples taken and assessed for charred plant remains. After a comprehensive programme of assessment a relatively small suite of 50 samples from ten sites was selected for analysis.

Samples taken specifically for snails or sub-sampled from bulk samples were processed following standard methods (Evans 1972). Bulk samples, however, were processed by flotation with flots retained on 0.5 mm mesh (comparable to Evans 1972), but only residues greater than ½ mm were retained and sorted. Thus fragments of <½ mm normally retained were not recovered. These assemblages may contain inherent bias, and thus the interpretation of these assemblages is treated with some caution.

Analysis followed standard methods (Evans 1972), with molluscan groupings following Evans (1984), and nomenclature after Kerney (1999). Aquatic species are considered by ecological groups based on Sparks (1961) and Robinson (1988); ie, Amphibious species (Sparks group 1), Catholic aquatic species (Sparks group 2), Ditch and aquatic species (Sparks group 3), Moving water species (Sparks group 4).

Diversity indices and histograms were only constructed on assemblages with greater than 25 shells. The use of the Shannon Index (*H'*) provides an indication of sample richness. Indices are usually between 1.5 and 3.5, with measurements above 2.3 in palaeo-mollusc assemblages being considered high.

The closely allied Brillouin index (*HB*) takes account of total populations (unlike the Shannon index) as well as numbers of species and individuals. The significance of this is that the comparison of the two indices allows some measure of the completeness of the assemblage and thus indicates how representative the subfossil assemblage is of the original fauna from which it was derived. Thus close Shannon and Brillouin indices may indicate ecologically representative subfossil assemblages and suggest their suitability for the application of delta indices ($\Delta 2$ and $\Delta 4$). These enable some measurement of the diversity of the ecological mosaic, allowing examination of the nature of the environment wider than that in the immediate proximity of the sampled location.

Many of the Cambourne assemblages contained both a terrestrial and aquatic component indicating some autochthonousness. Where a significant proportion of the assemblage was aquatic the species diversity indices were calculated for the terrestrial component only. In the few instances were just a few shells of predominately amphibious species were present, then the species diversity indices were calculated for the whole assemblage and this is indicated in the tables.

North Caxton By-pass

Shells were recorded in 12 of the 16 bulk samples, and many included freshwater or semi-aquatic taxa. Two samples were selected for analysis in order to characterise the 2nd–4th century Romano-British landscape and land-use. One sample from pit 30185 was taken and processed specifically for snails (cf. Evans 1972), with the other from pit 30171 (**Table Molluscs 1**).

The sample from pit 30171 unfortunately contained relatively few shells, almost wholly from open country species. More informative was the rich (954 shells) assemblage from pit 30185. The terrestrial assemblage in contrast to that from pit 30171 was mixed. The shade-loving element in part reflected a possible microhabitat in the pit, but also of long dank grassland refugia in the immediate vicinity. The open country species *Vallonia* spp. were high in numbers, but the large number of shade-loving and catholic taxa and high species diversities, give rise to the suggestion of both a rich local ecology, and one of introduced material and shells into the pit (cf. Thomas 1977; Shackley 1976). More significant were the very large numbers of aquatic species (over 80% of the assemblage) which was overwhelmingly dominated by two species; *Anisus leucostoma* and *Gyraulus crista*. This suggests standing water as a result of seasonally wet ground, and perhaps ponding and puddling in the pit.

Overall this gives the impression of a not very intensively utilised landscape local to the sampled pits. There is certainly no indication of tillage, and this is probably a landscape of long pasture. As such it even questions the nature, extent and intensity of human activity as depicted by the pits.

Table Molluscs 1. North Caxton Bypass

Period	*Middle - late Romano-British*	
Phase	*3*	
Group Type	*Pits*	
Group		
Feature	*30171*	*30185*
Context	*30170*	*30193*
Sample	*31008*	*31013m*
Depth)	*spot*	*spot*
Vol (L)	*10 l*	*1 l*
LAND		
Carychium tridentatum (Risso)	-	26
Carychium spp.	-	17
Cochlicopa spp.	-	4
Vertigo pygmaea (Draparnaud)	-	1
Vallonia costata (Müller)	[1]	35
Vallonia excentrica Sterki	12	22
Vallonia spp.	-	2
Acanthinula aculeata (Müller)	-	4
Punctum pygmaeum (Draparnaud)	-	4
Discus rotundatus (Müller)	-	1
Vitrea contracta (Westerlund)	-	3
Nesovitrea hammonis (Ström)	-	1
Aegopinella nitidula (Draparnaud)	-	9
Oxychilus cellarius (Müller)	-	6
Limacidae	1	7
Cecilioides acicula (Müller)	2	-
Helicella itala (Linnaeus)	2	-
Trichia hispida (Linnaeus)	-	30
Cepaea/Arianta spp.	+	3
FRESH- /BRACKISH-WATER		
Lymnaea truncatula (Müller)	-	10
Lymnaea spp.	-	12
Anisus leucostoma (Millet)	1	465
Gyraulus crista (Linnaeus)	-	253
Planorbids	-	33
Pisidium sp. (valves)	-	6
Taxa	4	19
Terrestrial total	15	175
Freshwater total	1	779
TOTAL	16	954
Shannon Index	0.63	2.12
Brillouin Index	0.48	1.99
Shannon Index – Brillouin Index	0.15	0.14
Delta 2	0.34	0.84
Delta 4	0.57	5.57

Lower Cambourne

A total of 97% of a series of 323 bulk samples contained snails, and 53% of these contained fresh or brackish water species; 14 of the 18 sub-samples processed specifically for snails contained more than four shells. Seventeen were selected for analysis (**Table Molluscs 2**) on the basis that they were from secure datable contexts and the represented sequences, where possible, covered a representative range of phases.

The earliest samples were from post-glacial palaeochannels (587 and 850); they contained very few shells, of which aquatic or amphibious species were hardly present. Similarly, a single sample from the possible Bronze Age roundhouse (487) contained very few shells. All that can be noted from these is that open country and grassland species are present while shade-loving or rupestral species are absent in all of the samples. We might tentatively take this to indicate an open unwooded landscape.

Although variable, samples from the Late Iron Age/early Romano-British (Phase 2C) contexts, especially enclosure ditch 3080/1356, ditch 5481 and drip gully 29, were rich in shells. The enclosure ditch (3080) was particularly interesting, as unlike many samples from Cambourne a relatively large number of shade-loving species are present, especially *Discus rotundatus* and *Carychium tridentatum*, and a good range of taxa. Although these collectively represent 84% of the assemblage, the characteristics are more in keeping with long grass, garden habitats and shady environments provided by the ditch itself, rather than indicating woodland cover. The very presence of these species does, however, indicate suitable refugia for them within the immediate locality, tentatively suggesting the presence of hedges, scrub, and other overgrown, unkempt habitats in and around the enclosure ditch. There is some echo of these habitats in ditch 5481, but this shallower ditch has a less specific micro-environment and indicates shady habitats in a probably grass and open environment. This is confirmed by the very open short grass type of habitats indicated by the assemblage from gully 29. In all samples aquatic species were present, indicating high ground-water levels, and the presence of temporary pools of standing water in the deep ditches particularly. Certainly on drying this would give rise to denser mesic vegetation which accommodated the shade-loving groups discussed above.

A series of samples from Phase 3A, mid–late 2nd–3rd century Romano-British features (eg, enclosure ditch 49, ditches 1369 and 5430) were rich in shells and show subtly different local microenvironments to those reported above. Ditches 1369 and 5430 indicated damp ditch micro-environments, probably set in open country, with the deeper ditch (enclosure ditch 49) retaining water seasonally and holding a rich aquatic and amphibious fauna, but being set in a very dry, open, probably grazed grassland.

Most of the other Romano-British features examined contain too few shells to make any significant comment. However, the assemblage from waterhole 1001 suggests temporary bodies of water that were subject to summer drying, set in open dry grassland. In short, these assemblages indicate an open Romano-British landscape probably of pasture, with high ground water tables that are reflected in the deeper ditches. There is also a hint of a ‘garden-type’ occupied landscape.

Two samples were from Saxon contexts, and both were exceptionally rich, containing mixed assemblages commensurate with long dank grassland (ungrazed), high local ground watertables but a generally open landscape. The two samples, however, were not necessarily wholly representative of the Saxon environment.

Change though time

When examined chronologically we must consider that different types of feature have been sampled and that the wetter, more mesic nature of the features may be due to feature depth and location in relation to local ground water conditions, rather than any real chronological change in land-use. Nevertheless there is slight hint of drier shorter (grazed) grassland in the Romano-British period, which may hint at intensification of landuse. While only two very context-specific samples were examined from the Saxon period, the wider range of species might suggest a decline in the intensity of land-use in this period.

Table Molluscs 2. Lower Cambourne

Period	*Post-Glacial*			*BA*	*Late Iron Age/early - mid Romano-British*					*Mid-Late Romano-British*						*Saxon*	
Phase	*0*	*0*	*0*	*1*	*2C*	*2C-3*	*2C-3*	*2C*	*3*	*3A*	*3A*	*3*	*3A*	*3*	*3*	*4*	*4*
Group Type	*Palaeochannel*			*RH*	*Enclosure ditch*			*Drip-gully*	*Ditch*	*D-encl*	*Ditch*		*RH*	*Pit*	*W'hole*	*Pit*	*Vessel*
Group				*487*	*3080/1356*	*3023/1154*	*1077*	*29*	*5481*	*49*	*1369*	*5430*	*1090*		*1001*		
Feature	*587*	*850*		*206*	*1340*	*2791*	*2759*	*252*	*5707*	*657*	*1421*	*5088*	*1095*	*1336*	*1074*	*5249*	*1234*
Context	*588*			*463*	*1339*	*2793*	*2764*	*253*	*5709*	*488*	*1422*	*5089*	*1096*	*1337*	*2667*	*5247*	*562*
Sample	*34*	*41*	*40*	*18*	*152*	*280*	*328*	*9*	*573 m*	*24*	*148m*	*562 m*	*107*	*172*	*275*	*560*	*330*
Depth (cm)	*spot*	*23-44*	*0-23*	*spot*	*spot*	*spot*	*spot*	*spot*	*spot*	*spot*	*spot*	*spot*	*spot*	*spot*	*spot*	*spot*	*spot*
Vol (L)/ Wt (g)	*9 l*	*10 l*	*10 l*	*10 l*	*10 l*	*10 l*	*10 l*	*10 l*	*2000g*	*10 l*	*1500g*	*2000g*	*10 l*	*8 l*	*4 l*	*10 l*	*6 l*
LAND																	
Carychium minimum Müller	-	-	-	-	23	-	-	-	12	-	2	22	-	-	-	39	8
Carychium tridentatum (Risso)	-	-	-	-	261	-	-	-	42	-	9	62	1	-	-	45	60
Carychium spp.	-	-	-	-	76	-	-	-	55	-	5	111	-	-	-	21	65
Succinea/Oxyloma	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-
Cochlicopa lubrica (Müller)	-	-	-	-	1	-	-	-	4	-	-	2	-	-	-	1	2
Cochlicopa luricella (Porro)	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	1	-
Cochlicopa spp.	-	-	-	-	6	1	-	-	15	-	1	27	-	-	-	8	9
Vertigo pygmaea (Draparnaud)	-	1	-	-	4	4	3	2	-	2	-	1	2	5	-	5	6
Vertigo spp.	-	-	-	-	-	1	-	1	2	-	1	-	1	-	-	5	12
Pupilla muscorum (Linnaeus)	-	-	-	-	2	2	1	3	1	3	-	2	-	1	4	2	8
Vallonia costata (Müller)	-	-	1	-	43	3	8	22	44	71	11	19	4	4	-	16	56
Vallonia excentrica Sterki	1	2	4	9	10	12	14	75	5	26	3	20	15	20	20	18	54
Vallonia spp.	-	-	-	-	-	-	-	3	-	3	1	3	-	-	-	2	2
Acanthinula aculeata (Müller)	-	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-	-
Ena obscura (Müller)	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Punctum pygmaeum (Draparnaud)	-	-	-	-	2	-	-	-	-	1	-	7	-	-	-	4	8
Discus rotundatus (Müller)	-	-	-	-	492	1	2	-	36	-	-	18	-	+	-	24	150
Vitrina pellucida (Müller)	-	-	-	-	5	-	-	-	6	2	-	8	-	-	-	-	8
Vitrea contracta (Westerlund)	-	-	-	-	34	-	-	-	1	-	-	1	-	-	-	-	-
Aegopinella pura (Alder)	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
Aegopinella nitidula (Draparnaud)	-	-	-	-	48	-	-	-	24	1	3	22	-	-	1	7	12
Oxychilus cellarius (Müller)	-	-	-	+	64	-	-	-	27	1	2	52	-	-	-	10	40
Limacidae	-	-	4	-	12	3	2	3	83	-	3	61	2	7	-	15	73
Cecilioides acicula (Müller)	-	8	2	2	-	3	-	-	-	-	-	1	11	-	-	-	-
Cochlodina laminata (Montagu)	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-
Clausilia bidentata (Ström)	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-

Period	*Post-Glacial*			*BA*	*Late Iron Age/early - mid Romano-British*					*Mid-Late Romano-British*						*Saxon*	
Phase	*0*	*0*	*0*	*1*	*2C*	*2C-3*	*2C-3*	*2C*	*3*	*3A*	*3A*	*3*	*3A*	*3*	*3*	*4*	*4*
Group Type	*Palaeochannel*			*RH*	*Enclosure ditch*			*Drip-gully*	*Ditch*	*D-encl*	*Ditch*		*RH*	*Pit*	*W'hole*	*Pit*	*Vessel*
Group				*487*	*3080/1356*	*3023/1154*	*1077*	*29*	*5481*	*49*	*1369*	*5430*	*1090*		*1001*		
Feature	*587*	*850*		*206*	*1340*	*2791*	*2759*	*252*	*5707*	*657*	*1421*	*5088*	*1095*	*1336*	*1074*	*5249*	*1234*
Context	*588*			*463*	*1339*	*2793*	*2764*	*253*	*5709*	*488*	*1422*	*5089*	*1096*	*1337*	*2667*	*5247*	*562*
Sample	*34*	*41*	*40*	*18*	*152*	*280*	*328*	*9*	*573 m*	*24*	*148m*	*562 m*	*107*	*172*	*275*	*560*	*330*
Depth (cm)	*spot*	*23-44*	*0-23*	*spot*	*spot*	*spot*	*spot*	*spot*	*spot*	*spot*	*spot*	*spot*	*spot*	*spot*	*spot*	*spot*	*spot*
Vol (L)/ Wt (g)	*9 l*	*10 l*	*10 l*	*10 l*	*10 l*	*10 l*	*10 l*	*10 l*	*2000g*	*10 l*	*1500g*	*2000g*	*10 l*	*8 l*	*4 l*	*10 l*	*6 l*
Clausiliidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Helicella itala (Linnaeus)	1	3	-	3	2	-	-	2	6	1	2	5	-	1	-	1	11
Trichia hispida (Linnaeus)	1	-	2	-	93	8	7	9	48	38	8	122	9	7	1	54	435
Cepaea nemoralis (Linnaeus)	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Cepaea hortensis (Müller)	-	-	-	-	-	-	-	-	2	-	-	7	-	-	-	-	1
Cepaea/Arianta spp.	+	+	1	+	10	+	+	+	18	+	+	31	+	1	+	8	33
FRESH- /BRACKISH-WATER																	
Aplexa hypnorum (Linnaeus)	-	-	-	-	-	-	-	-	-	-		-	-	-	-	58	-
Lymnaea truncatula (Müller)	-	-	1	-	155	-	2	22	-	319	11	2	-	-	-	276	20
Lymnaea cf *truncatula* (Müller)	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Lymnaea glabra (Müller)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	38	-
Lymnaea peregra (Müller)	-	-	-	-	7	-	-	-	-	212	-	-	-	-	-	-	-
Lymnaea spp.	-	-	-	-	27	1	-	-	-	87	-	3	1	-	1	27	3
Anisus leucostoma (Millet)	-	-	-	-	636	-	-	-	1	273	134	1	1	1	-	989	-
Gyraulus crista (Linnaeus)	-	-	-	-	154	1	-	-	-	27	6	-	-	-	74	-	5
Hippeutis complanatus (Linnaeus)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47	-
Pisidium sp. (valves)	-	-	-	-	-	-	-	-	-	2	4	-	-	-	-	23	-
Taxa	3	3	6	3	26	10	8	8	17	16	16	21	8	9	6	24	19
Terrestrial total	3	6	12	12	1195	35	37	120	431	152	53	606	34	46	26	288	1054
Freshwater total	0	0	1	1	979	2	2	22	1	920	155	6	2	1	75	1458	28
TOTAL	3	6	13	13	2174	37	39	142	432	1072	208	612	36	47	101	1746	1082
Shannon Index	1.10	1.01	1.45	0.56	1.77	1.77	1.63	1.14	2.32	1.41	2.14	2.35	1.45	1.64	0.74	2.36	1.04
Brillouin Index	0.60	0.68	1.08	0.45	1.75	1.50	1.40	1.06	2.25	1.31	1.85	2.29	1.24	1.43	0.61	2.25	2.00
Shannon Index – Brillouin Index	0.50	0.33	0.37	0.11	0.04	0.27	0.23	0.08	0.07	0.10	0.29	0.06	0.21	0.21	0.14	0.11	0.04
Delta 2	0.67	0.61	0.64	0.38	0.74	0.79	0.76	0.54	0.88	0.67	0.85	0.87	0.71	0.74	0.38	0.88	0.78
Delta 4	0	2.75	4.08	0.69	2.86	4.36	3.59	1.21	7.44	2.11	6.37	6.73	2.72	3.17	0.66	7.26	3.65

Poplar Plantation

Three later Iron Age samples from a suite of 36 bulk samples were selected to analyse the land and aquatic snails. All three were from shallow drip-gullies around Iron Age houses (**Table Molluscs 3**) dated to Phase 2A.

Only one assemblage, from gully 72140, had enough shells to make significant palaeo-environmental comment, and surprisingly this seems different in composition to the assemblages from the two other gullies, 72314 and 72001. Unlike most assemblages from Cambourne there is a significant shade-loving component (43%) in the sample from gully 72140. The majority of this was represented by *Discus rotundatus* which is nearly ubiquitous in moderately moist and sheltered places, and is particularly common in leaf litter. It is accompanied by the Zonitids; *Vitrea contracta, Nesovitrea hammonis, Ageopinella nitidula* and *Oxychilus cellarius*, and the presence of the rupestral species, *Clausilia bidentata*, is noted by non-apical fragments. Although found with an open country assemblage dominated by the xerophile *Vallonia excentrica*, this tends to suggest shady long grass conditions or even synanthropic 'garden-type' habitats that one might find under the eaves of a structure. The open country elements (*Vallonia* spp., *Pupilla muscorum, Vertigo pygmaea,* and *Helicella itala*) confirm the presence of open, short grazed or trampled grassland, and thus we may consider that this assemblage represents two habitats. If so, the presence of *Carychium tridentatum* indicates longer damper elements of the grassland habitats, or the mesic shady 'garden' environment. Rather surprisingly the shade-loving element (the Zonitids) is virtually absent from the other two samples from supposedly contemporaneous and similar features, and although only 32 and 39 shells respectively were present, the assemblages were dominated by open country species and tend to suggest open grazed or trampled grassland, but with high ground-water levels giving some dampness to the ground surface and vegetation.

Table Molluscs 3. Poplar Plantation

Period	*Later Iron Age*		
Phase	*2A*	*2A*	*2A*
Group Type	*Drip-gully*		
Group	*72140*	*72314*	*72001*
Feature	*72137*	*72317*	*72124*
Context	*72139*	*72315*	*72126*
Sample	*74033*	*74018*	*74020*
Depth	*spot*	*spot*	*spot*
Vol (L)	*9*	*10*	*9*
LAND			
Carychium tridentatum (Risso)	4	-	-
Carychium spp.	2	1	-
Cochlicopa spp.	3	-	-
Vertigo pygmaea (Draparnaud)	1	2	2
Vertigo spp.	-	1	-
Pupilla muscorum (Linnaeus)	3	2	1
Vallonia costata (Müller)	2	1	-
Vallonia cf. *pulchella* (Müller)	7	2	5
Vallonia excentrica Sterki	22	13	11
Vallonia spp.	1	-	2
Punctum pygmaeum (Draparnaud)	-	1	-
Discus rotundatus (Müller)	26	2	-
Vitrea contracta (Westerlund)	2	-	-
Nesovitrea hammonis (Ström)	1	-	-
Aegopinella nitidula (Draparnaud)	8	-	-
Oxychilus cellarius (Müller)	4	1	-
Limacidae	8	-	11
Cecilioides acicula (Müller)	7	-	+
Clausilia bidentata (Ström)	+	-	-
Helicella itala (Linnaeus)	1	3	2
Trichia hispida (Linnaeus)	7	3	4
Cepaea/Arianta spp.	4	+	1
FRESH- /BRACKISH-WATER			
Lymnaea truncatula (Müller)	1	6	4
Taxa	17	12	9
Terrestrial total	106	32	39
Freshwater total	1	6	4
TOTAL	107	38	43
Shannon Index (of assemblage)	2.35	2.11	1.88
Brillouin Index (of assemblage)	2.12	1.75	1.62
Shannon Index – Brillouin Index	0.23	0.36	0.26
Delta 2 (of assemblage)	0.87	0.83	0.81
Delta 4 (of assemblage)	7.00	5.70	5.02

Mill Farm

Sixteen of the 22 bulk samples contained shells, most with moderate numbers, and four were selected for analysis. All the samples came from mid–late 2nd–4th century Romano-British features, and included spot samples from enclosure ditches 50015, 40018 and 40024, and one from waterhole 40016 (40116) (**Table Molluscs 4**).

Enclosure ditches

Numbers of terrestrial snails were low to moderate in the enclosure ditches, but not predominately from open-country species, as seen on many of the other sites. The richest sample, from ditch 40015, has high numbers of *Aegopinella nitula* and *Trichia hispida*, both of which are common in tall unkempt grassland. Other species present do not contradict this interpretation, but the presence of the ubiquitous marsh species *Vertigo antivertigo* and Succineidae, as well as *Vallonia* cf. *pulchella*, suggest some marsh and wet mesic grassland. This is in keeping with the only aquatic species present, the amphibious *Lymnaea truncatula*. It is recorded in floodplain meadows (Robinson 1988), and here may indicate a rich, not intensively grazed grassland.

Enclosure ditches 40018 and 40024 have too few shells to make detailed comment. That they contain less shade-loving elements and more open county species may suggest less mesic, open grassland conditions. Some aquatic species are present, but are dominated in all cases by *L. truncatula*, with *L. palustris* and *Gyraulus crista* being recorded in low numbers. It is likely that the ditches held shallow pools of water seasonally. The high presence of *L. truncatula*, which is the immediate host to the sheep liver fluke (*Fasciola hepatica*), might suggest that it is more likely that cattle or horses were the main stock rather than sheep, as Robinson (unpubl.) argues for Claydon Pike, Oxfordshire.

Waterhole 40016 (40116)

The assemblage from an upper fill of the ramped waterhole (probably the upper secondary fill) was very rich, with 1070 shells recorded, of which 40% were terrestrial, indicating the environment and land-use around the waterhole. The terrestrial component was predominantly open country species (58%) dominated by *Vallonia costata* and *V. excentrica* in almost equal proportions, the catholic taxa *Trichia hispida* and Limacidae. A number of shade-loving species and more mesic-loving species (*Carychium tridentatum, Vitrea contracta, Aegopinella, Oxchilus*) suggest damper conditions, either within the water hole itself or long ungrazed grass. The aquatic element was rich and seven taxa were represented, indicating that water existed in the feature, but begging the question of their origin. The fauna must have originated from floodplain meadow habitats and flooding events. It comprises predominately *Anisus leucostoma* (62%) with *Aplexa hypnorum* and *L. truncatula* all of which are typical of poor habitats subject to drying. Only a very small percentage (<2%) of the aquatic taxa represent permanent water (*Pisidium nitidum* and *Gyraulus albus*) and even these prefer poor water conditions and not what might be expected in clean water. This would be commensurate with a large waterhole subject to animal visitation and summer drying. The very high numbers of snails and their location within the waterhole suggest the partial formation of a buried soil during periods of drying in the latter part of the waterhole's useful life.

From this analysis we can suggest that the aquatic assemblages in part represent a floodplain meadow, but it is noticeable that the terrestrial assemblages contain none of the marsh or wetter species that one might expect such as *Vertigo antivertigo,* Succineidae, *Zonitoides nitidus, Vallonia pulchella* (Robinson 1988), except *C. minimum*. Furthermore, the waterhole contained water, but not permanently, nor in the best condition. A water-course running close to the site represents a suitable source of clean, fresh water, but representative taxa from this source do not appear to have colonised this habitat (cf. O'Conner 1988).

Conclusions

This is one of the few sites showing evidence of long, wetter and more mesic grassland, albeit in a very open countryside, and suggestions of floodplain meadow. The presence of these habitats in the Romano-British period suggests a near-by water-course that probably had grazed meadow adjacent to it, although it might be noted that the silted palaeochannel at the southern margins of the site would appear to have become infilled a long time prior to this period. The waterhole was subject to seasonal drying, and the water conditions within it were poor.

Table Molluscs 4. Mill Farm

	Period	*Middle Romano-British*			*RB*	
	Phase	*3A*			*3*	
	Group Type	*Enclosure Ditch*			*Waterhole*	
	Group	*40015*	*40018*	*40024*	*40016*	
	Feature	*40031*	*40117*	*40062*	*40116*	
	Context	*40033*	*40119*	*40063*	*40114*	
	Sample	*42001*	*42007*	*42003*	*42013*	
	Depth	*Spot*	*Spot*	*Spot*	*Spot*	
	Vol (L))	*8*	*10*	*5*	*4*	
LAND						
Carychium minimum Müller		-	-	-	6	
Carychium tridentatum (Risso)		-	-	1	15	
Carychium spp.		-	1	-	4	
Succinea/Oxyloma spp.		-	4	-	-	
Cochlicopa spp.		-	1	-	3	
Vertigo substriata (Jeffreys)		-	1	-	-	
Vertigo pygmaea (Draparnaud)		1	-	1	24	
Vertigo spp.		-	-	-	15	
Pupilla muscorum (Linnaeus)		-	-	2	19	
Vallonia costata (Müller)		3	9	2	91	
Vallonia cf. *pulchella* (Müller)		2	3	-	-	
Vallonia excentrica Sterki		7	8	6	87	
Vallonia spp.		-	-	-	6	
Punctum pygmaeum (Draparnaud)		-	1	-	-	
Discus rotundatus (Müller)		-	-	-	5	
Vitrina pellucida (Müller)		3	-	-	-	
Vitrea crystallina *(Müller*)		-	-	-	3	
Vitrea contracta (Westerlund)		4	-	-	11	
Nesovitrea hammonis (Ström)		-	-	-	2	
Aegopinella pura (Alder)		-	-	-	2	
Aegopinella nitidula (Draparnaud)		72	1	-	9	
Oxychilus cellarius (Müller)		8	1	-	14	
Limacidae		2	-	3	32	
Cecilioides acicula (Müller)		-	-	-	2	
Cochlodina laminata (Montagu)		-	-	-	1	
Helicella itala (Linnaeus)		-	1	-	12	
Trichia striolata (C. Pfeiffer)		-	2	-	-	
Trichia hispida (Linnaeus)		28	10	3	73	
Cepaea/Arianta spp.		-	1	+	5	
FRESH- /BRACKISH-WATER						
Valvata cristata *Müller*		-	-	-	3	
Bithynia tentaculata		-	-	-	3	
Aplexa hypnorum (Linnaeus)		-	-	-	72	
Lymnaea truncatula (Müller)		15	86	8	66	
Lymnaea palustris (Müller)		-	2	-	-	
Lymnaea spp.		-	-	-	87	
Anisus leucostoma/vortex (Millet/Linnaeus)		-	-	-	389	
Gyraulus albus (Müller)		-	-	-	3	
Gyraulus crista (Linnaeus)		-	-	1	-	
Pisidium nitidum (Jeyns) (valves)		-	-	-	2	
Pisidium sp. (valves)		-	-	-	6	
Taxa		11	16	9	26	
Terrestrial Total		130	44	18	439	
Freshwater Total		15	88	9	631	
TOTAL		145	132	27	1070	
Shannon Index		1.43	2.20	1.77	2.31	
Brillouin Index		1.32	1.84	1.38	2.22	
Shannon Index – Brillouin Index		0.11	0.36	0.39	0.08	
Delta 2		0.64	0.85	0.80	0.86	
Delta 4		1.80	6.95	5.65	6.74	

Knapwell Plantation

Of the 36 bulk samples taken from later Iron Age and Romano-British features, all but four contained shells in their flots. Four were selected for analysis. These included two samples from pits (60186 and 60479) and one from a roundhouse gully (60245) from the later Iron Age, Phase 2, and one from enclosure ditch 60140 dated to the late Romano-British, Phase 3 (**Table Molluscs 5**).

Phase 2, later Iron Age

Samples from pits provide some potential problems of interpretation, as the origin of the shells is subject to question (Shackley 1976; Thomas 1977). If the pits were open and silted naturally then they would reflect the immediately local environment and the micro-environment within the pit itself; if, however, they arrived with debris and material discarded into the pit then there origin is unknown. In the cases of the two pits discussed here, the samples come from what were considered to be natural silting deposits rather than layers with much dumped or discarded matter. The numbers of shells is not high, and in both are predominantly terrestrial species. Both assemblages are dominated by *Vallonia excentrica* and *V. costata*, with *Pupilla muscourm, Vertigo pygmaea,* and *Trichia hispida* also present. This assemblage is typical of open, generally dry, short-turfed grassland with the presence of *P. muscorum* and *V. pygmaea* hinting at possible patches of bare earth.

This interpretation is slightly at odds with the few aquatic species present. In pit 60477 (probably later Iron Age in date) the presence of a single species of the amphibious species *Lymnaea truncatula* may indicate damp meadow or poor water sources liable to drying up locally. However, pit 60186 contains specimens of *Pisidium* spp. (nine) and *Gyraulus crista* (six) that live in permanent bodies of water and therefore must have been brought to the site. These are accidental incorporations in the pit and suggest the exploitation or riverine or stream resources lower down the ridge, perhaps for water, reeds (thatching, matting) or mud/clay (walling) as suggested for the Iron Age pits from Balksbury, Hampshire (Allen 1995).

Phase 3B, Romano-British (3rd–4th centuries)

A single sample from enclosure ditch 60140 differed from those above in that aquatic species comprised 60% of the assemblage, albeit dominated by one species, *Anisus* cf. *leucostoma*, itself representing nearly 96% of the aquatic assemblage. Within the terrestrial component (144 shells), *Vallonia excentrica, Trichia hispida,* and Limacidae are the most important elements. This, along with the few shade-loving species and taxa preferring open but shady environments (*Punctum pygmaeum, Nesovitrea hammonis)*, suggests a slightly damp, longer, lightly grazed, open grassland. The aquatic species are predominantly amphibious species (*A. leucostoma* and *L. truncatulata*), the only other species, *Hippeutis complanatus*, while more typical of closed ponds, is recorded in ditches (Kerney 1999; Pfleger and Chatfield 1988). Although these could be autochthnous, it is noteworthy that Knapwell Plantation is on the top of a ridge, and this suggests a water source and potential floodplain meadow in the vicinity.

Summary

Although the highest site investigated, there is clear evidence of both wetland conditions nearby and exploitation of these wetlands. The area seems to have been open grassland, possibly slightly less grazed in the Romano-British period than has been inferred from the Iron Age samples.

Table Mollusc 5. Knapwell Plantation

Period	*Later Iron Age*			*Late RB*	
Phase	*2*	*Unph'd*	*2A*	*3B*	
Group Type	*Pit*	*Pit*	*RH gully*	*Enclosure ditch*	
Group	*60800*		*60245*	*60140*	
Feature	*60186*	*60479*	*60340*	*60142*	
Context	*60432*	*60480*	*60342*	*60225*	
Sample	*62042*	*62047*	*62041*	*62012*	
Depth	*Spot*	*Spot*	*Spot*	*Spot*	
Vol (L)	*10*	*8*	*8*	*10*	
LAND					
Cochlicopa lubrica (Müller)	1	-	2	-	
Cochlicopa spp.	-	-	1	1	
Vertigo pygmaea (Draparnaud)	3	3	5	3	
Vertigo spp.	2	3	1	-	
Pupilla muscorum (Linnaeus)	1	4	-	-	
Vallonia costata (Müller)	7	5	4	19	
Vallonia cf. *pulchella* (Müller)	-	5	-	-	
Vallonia excentrica Sterki	13	26	11	38	
Vallonia spp.	-	1	-	2	
Ena obscura (Müller)	-	-	-	1	
Punctum pygmaeum (Draparnaud)	-	-	[1]	1	
Vitrina pellucida (Müller)	-	1	-	-	
Vitrea contracta (Westerlund)	-	1	-	-	
Nesovitrea hammonis (Ström)	-	-	1	-	
Aegopinella nitidula (Draparnaud)	-	-	1	3	
Oxychilus cellarius (Müller)	-	-	-	2	
Limacidae	3	1	-	26	
Cecilioides acicula (Müller)	-	-	1	-	
Clausilia bidentata (Ström)	+	-	-	1	
Candidula sp.	1	-	-	-	
Helicella itala (Linnaeus)	1	-	1	7	
Trichia hispida (Linnaeus)	5	5	9	38	
Cepaea/Arianta spp.	+	2	1	2	
FRESH- /BRACKISH-WATER					
Lymnaea truncatula (Müller)	+	-	-	6	
Lymnaea sp.	-	1	-	-	
Anisus leucostoma/vortex (Millet/Linnaeus)	-	-	-	204	
Gyraulus crista (Linnaeus)	6	-	-	-	
Hippeutis complanatus (Linnaeus)	-	-	-	3	
Pisidium spp	9	-	-	-	
Taxa	11	11	9	16	
Terrestrial total	37	57	37	144	
Freshwater total	15	1	0	213	
TOTAL	52	58	37	357	
Shannon Index	1.82	1.75	1.83	1.85	
Brillouin Index	1.54	1.53	1.55	1.73	
Shannon Index – Brillouin Index	0.28	0.22	-.28	-/13	
% Shade-loving species	0.79	0.73	0.81	0.81	
% Intermediate species	4.46	2.96	4.79	4.18	
% Open country species	0	1.8	2.7	4.9	
Delta 2	24.3	15.8	37.8	47.2	
Delta 4	75.7	82.5	59.5	47.9	

Jeavons Lane

No samples were taken specifically for land snails, but snails were noted in all but one of the flots from the 69 bulk samples. Sub-samples were taken from selected contexts in the enclosure ditches and specifically processed for snails, two of which were analysed and are designated with an 'm' after the sample number (**Table Molluscs 6**). Shells were present, but sparse, in most sub-sampled contexts, however, a few richer samples, along with some that had a large proportion of freshwater/amphibious species, were analysed from the bulk samples.

Seven samples were selected for analysis to aid in characterising the land-use and to examine any significant change, in particular, between the Iron Age and Romano-British phases. Two came from a possible later Iron Age, Phase 2, enclosure ditch, four from two mid–late 2nd–late 4th century Romano-British, Phase 3, enclosure ditches, and a final sample from a broadly contemporary Romano-British pit.

The results of both the 8–10 litre bulk samples and a 2 litre snail samples are presented. Although the snail sample (82099m) is a sub-sample of the bulk, the processing included the recovery of material from the 0.5 mm residue (cf. Evans 1972).

The overall environment seen for the later Iron Age to Romano-British phases is one of open landscape with local high groundwater levels and consequent moist, though not marshy, vegetation.

Samples examined from later Iron Age contexts contained too few terrestrial snails to make any detailed comments, except that both indicate very open environments, with that from enclosure ditch 80004 dominated (91%) by the amphibious species *Lymnaea truncatula*. This suggests wet moist grassland and possibly sources of water locally, as seen on other sites at Cambourne. Normally preservation is poor, and the shells that survive are near complete or are larger more robust species, and the presence of material in the 0.5 mm fraction is non-existent. Here, however, the two samples are subtly, yet significantly different, and we can only attribute this to a combination of variation within the bulk sample and recovery of finer fraction. This is demonstrated by the increased level of small *Limax* (slug) plates from the smaller sample processed to finer level.

The three samples from the Romano-British ditch 80122 are interesting. Notable in the open country taxa unusual is the presence of a significant proportion of *Vertigo pygmaea* in the secondary fill of enclosure 81122 (context 80821) which, with the preponderance of *V. excentrica* (the xerophile of the genus over *V. costata*) suggests drier local habitats. With *H. itala* and *T. hispida* this may be suggestive of short drier grazed grassland, trampled grassland or even arable conditions. Nevertheless, the ditch also contained a proportion (17%) of fresh and aquatic water species, predominantly amphibious species (*L. truncatula* and *Anisus leucostoma*) but also *Aplexa hypnorum*. The latter is generally considered to be aquatic and is often found in shallow water especially amongst *Glyceria fluitans*, but Ellis (1969, 115) reports that it is commonly found out of water and often occurs in ditches. All of the aquatic taxa recorded here live in poor water conditions and are either amphibious (Robinson 1988) or can tolerate periods of drying out and drought.

Two further samples were examined from slightly later Romano-British contexts. In essence these show similar open environments to those seen above and subtle differences are more likely to reflect variation in taphonomy and preservation.

Table Molluscs 6. Jeavons Lane

Phase	*Later Iron Age*		*Romano-British*			*Romano- British*	
Phase	*2*		*3*			*3*	
Group Type	*Enclosure Ditch*		*Enclosure Ditch*			*Enclosure ditch*	*Pit*
Group	*80044*	*80044*	*80122*	*80122*	*80122*	*80089*	
Feature	*80233*	*80458*	*80819*	*80819*	*80819*	*80656*	*80830*
Context	*80237*	*80461*	*80821*	*80821*	*80822*	*80657*	*80831*
Sample	*82015*	*82075*	*82099*	*82099m*	*82100*	*82083 m*	*82102*
Depth	*spot*	*spot*	*spot*	*spot*	*spot*	*spot*	*spot*
Vol (L)/Wt (g)	*8 l*	*8 l*	*9 l*	*1 l*	*9 l*	*2000 g*	*8 l*
LAND							
Carychium minimum Müller	-	-	4	-	-	-	-
Carychium tridentatum (Risso)	-	1	21	1	-	-	-
Carychium spp.	-	-	4	2	-	-	-
Cochlicopa lubrica (Müller)	-	-	1	-	-	-	-
Cochlicopa spp.	+	1	1	2	-	-	-
Vertigo pygmaea (Draparnaud)	-	2	76	6	6	-	1
Vertigo spp.	-	-	52	2	5	-	1
Pupilla muscorum (Linnaeus)	-	1	5	2	5	3	5
Vallonia costata (Müller)	3	2	80	11	64	31	2
Vallonia cf. *pulchella* (Müller)	-	-	-	-	2	-	-
Vallonia excentrica Sterki	4	5	277	25	26	8	25
Vallonia spp.	-	1	10	-	3	2	2
Punctum pygmaeum (Draparnaud)	-	2	12	1	-	7	1
Vitrina pellucida (Müller)	-	-	1	-	-	-	1
Vitrea contracta (Westerlund)	-	-	2	-	1	-	-
Nesovitrea hammonis (Ström)	-	1	-	-	-	-	-
Aegopinella nitidula (Draparnaud)	-	-	6	1	1	1	1
Oxychilus cellarius (Müller)	-	-	2	2	-	1	-
Limacidae	1	-	26	40	3	13	14
Cecilioides acicula (Müller)	8	-	-	-	-	1	4
Clausilia bidentata (Ström)	-	-	-	-	+	-	-
Helicella itala (Linnaeus)	1	-	5	-	-	-	[1]
Trichia hispida (Linnaeus)	-	-	116	22	12	11	3
Cepaea/Arianta spp.	+	1	5	-	2	+	-
Helix aspersa (Müller)	-	-	-	+	-	-	-
FRESH- /BRACKISH-WATER							
Aplexa hypnorum (Linnaeus)	-	-	3	-	-	-	-
Lymnaea truncatula (Müller)	-	89	88	6	6	3	4
Lymnaea spp.	-	8	42	-	2	-	-
Anisus leucostoma (Millet)	-	-	7	-	2	-	-
Gyraulus crista (Linnaeus)	3	1	-	-	5	1	-
Taxa	4	11	12	19	13	10	10
Terrestrial Total	9	17	117	706	130	77	56
Freshwater total	3	98	6	140	15	4	4
TOTAL	12	115	123	846	145	81	60
Shannon Index	1.21	1.96	1.80	1.77	1.51	1.63	1.52
Brillouin Index	0.87	1.46	1.66	1.73	1.41	1.49	1.33
Shannon Index – Brillouin Index	0.45	0.50	0.14	0.04	0.11	0.15	0.19
Delta 2	0.67	0.82	0.79	0.76	0.67	0.75	0.69
Delta 4	3.0	6.56	3.85	3.20	2.19	3.10	2.37

Broadway Farm

All 15 bulk samples from this site contained shells, and three were analysed from later Iron Age enclosure ditches 50100 and 50103 and curvilinear drip-gully 50007. Enclosure ditch 50100 contained too few shells to comment except that they are in keeping with the larger assemblages from the other ditches (**Table Molluscs 7**) and indicate open country conditions and locally some damp or wet ones.

In contrast to ditch 50100, the two other assemblages, from ditch 50103 and drip-gully 50007, contained high numbers of shells. The terrestrial components from both were broadly similar, and dominated by *Vallonia excentrica, V. costata,* and *Pupilla muscorum,* suggesting open grassland conditions. A number of species, such as *Caryhium tridentatum, Aegopinella,* and *Oxychilus* are also present, and may suggest some patches of longer grassland.

Aquatic species were common in enclosure ditch 50103, with over 1500 shells, and this outnumbers the terrestrial component by 3:1. It is, however, dominated by only two species, *Bithynia tentaculata* and *Lymnaea truncatula* which together comprise 99% of the aquatic species. This is particularly interesting as *L. truncatula* is an amphibious species that can live in water, but also on floodplains; in contrast, *B. tentaculata* prefers larger bodies of water, often flowing, and weedy conditions. It is improbable that this latter species would have lived in a closed, shallow ditch habitat, and from this we can conclude that it may not be autochthonous, and this is in part confirmed by the fact that only two opercula to 834 shells were recovered. This instead may suggest overbank flooding from the streams to the east and west of the site (cf. O'Connor 1988). If we conclude this, then it is possibly that the *Lymnaea* may have been living in the ditch, and the meadow floodplain.

In contrast, the curvilinear gully 50007 contains no *Bithynia* and 98% of the assemblage is *Lymnaea* species, indicating only temporary stands of water, with less impact from flooding, and possibly seasonally damp meadow in the vicinity.

Table Molluscs 7. Broadway Farm

Phase	*Later Iron Age*		
Phase		*2a/b*	
Group Type	*Enclosure ditch*		*Drip-gully*
Group	*50100*	*50103*	*50007*
Feature	*50061*	*50040*	*50043*
Context	*50062*	*50041*	*50044*
Sample	*51009*	*51004*	*51005*
Depth	*Spot*	*Spot*	*Spot*
Vol (L)	*10*	*10*	*8*
LAND			
Carychium minimum Müller	-	4	1
Carychium tridentatum (Risso)	-	12	1
Carychium spp.	-	9	-
Succinea/Oxyloma spp.	-	1	-
Cochlicopa lubricella (Porro)	-	2	-
Cochlicopa spp.	-	1	-
Vertigo pygmaea (Draparnaud)	-	5	6
Vertigo spp.	-	2	5
Pupilla muscorum (Linnaeus)	-	72	53
Vallonia costata (Müller)	5	68	41
Vallonia excentrica Sterki	-	169	336
Vallonia excentrica/pulchella Sterki/(Müller)	14	-	-
Vallonia spp.	-	10	19
Acanthinula aculeata (Müller)	-	[1]	-
Vitrea contracta (Westerlund)	-	-	1
Aegopinella nitidula (Draparnaud)	3	7	7
Oxychilus cellarius (Müller)	-	34	1
Limacidae	2	13	-
Helicella itala (Linnaeus)	-	29	5+[1]
Trichia hispida (Linnaeus)	-	2	[1]
Cepaea/Arianta spp.	+	1	-
FRESH- /BRACKISH-WATER			
Bithynia c.f *tentaculata* (Linnaeus)	-	834	-
Bithynia tentaculata (Linnaeus) operculum	-	2	-
Lymnaea truncatula (Müller)	1	677	80
Lymnaea glabra (Müller)	-	6	7
Lymnaea spp.	-	-	152
Gyraulus crista (Linnaeus)	2	-	5
Taxa	6	17	13
Terrestrial total	24	441	476
Freshwater total	3	1519	244
TOTAL	27	1960	720
Shannon Index	1.11	1.85	0.93
Brillouin Index	0.93	1.79	0.90
Shannon Index – Brillouin Index	0.18	0.06	0.03
Delta 2	0.59	0.77	0.43
Delta 4	1.63	3.47	0.75

Little Common Farm

Of thirty-four bulk samples, shells were present in 85% and three were selected for analysis. Two were samples from the main Iron Age enclosure ditches (90006 and 90037), and one from a Romano-British boundary ditch (90236) (**Table Molluscs 8**).

Phase 2, later Iron Age

The sample from enclosure ditch 90006 was rich (734 shells) of which over 60% were aquatic/amphibious species. The overwhelming presence of *Lymnaea truncatula* (over 50% of the entire assemblage) suggests a marshy or wet pasture grassland, while the presence of *Hippeutis complanatus* indicates the presence of well vegetated, possibly closed water (ponds rather than ditches). This may be significant in view of the general distance from running water of this site and we may very tentatively suggest the presence of waterholes, dewponds or the like in the vicinity. The terrestrial component was dominated by *Vallonia excentrica* and *Trichia hispida*, which together comprised 76% of the terrestrial element and suggest typical open country. The assemblage from enclosure ditch section 90037, contained fewer shells but was essentially the same, but only 5% of the assemblage was aquatic or slum species; both probably represent grassland.

Romano-British

A single sample from boundary ditch 90236 was examined. Although thought possibly to be modern, no Introduced Helicellids were present, which are very common on the ground today. Only 57 shells were identified, dominated by *Trichia hispida.* A few amphibious specimens were present but, like Iron Age enclosure ditch 90037, represent a small (11%) proportion of the assemblage. This assemblage is indicative of an open, grassland environment.

Conclusion

The assemblages here show open lush pasture, but the prevalence of amphibious species in Iron Age enclosure ditch 90006 suggests wet or even marshy conditions, while the presence of *H. complanatus* may indicate small closed pools or ponds of water in the vicinity.

Table Molluscs 8. Little Common Farm

Phase	*Late Iron Age*		*Romano-British?*
Phase	*2*		*3?*
Group Type	*Main enclosure*		*boundary ditch*
Group	*90006*	*90037*	*90236*
Feature	*90135*	*90193*	*90406*
Context	*90130*	*90189*	*90407*
Sample	*93006*	*93009*	*93017*
Depth (cm)	*spot*	*spot*	*spot*
Vol (L)	*10*	*10*	*10*
LAND			
Carychium spp.	1	-	-
Vertigo pygmaea (Draparnaud)	-	-	2
Pupilla muscorum (Linnaeus)	23	-	-
Vallonia costata (Müller)	18	37	-
Vallonia excentrica Sterki	107	6	8
Vallonia spp.	3	3	-
Punctum pygmaeum (Draparnaud)	1	-	-
Discus rotundatus (Müller)	1	-	-
Aegopinella nitidula (Draparnaud)	1	3	-
Limacidae	10	-	5
Cecilioides acicula (Müller)	-	1	23
Cochlodina laminata (Montagu)	-	1	-
Helicella itala (Linnaeus)	8	-	1
Trichia hispida (Linnaeus)	107	4	41
Cepaea/Arianta spp.	+	+	-
FRESH- /BRACKISH-WATER			
Aplexa hypnorum (Linnaeus)	3	-	-
Lymnaea truncatula (Müller)	376	3	-
Lymnaea cf *truncatula*	-	-	5
Lymnaea spp.	47	-	-
Anisus leucostoma (Millet)	-	-	2
Hippeutis complanatus (Linnaeus)	28	-	-
Taxa	13	6	7
Terrestrial total	280	54	57
Freshwater total	454	3	7
TOTAL	734	57	64
Shannon Index	1.42	0.89	0.92
Brillouin Index	1.36	0.78	0.81
Shannon Index – Brillouin Index	0.06	0.11	0.10
Delta 2	0.69	0.43	0.45
Delta 4	2.22	0.78	0.86

Great Common Farm

Three samples were analysed from the 1.2 m deep Romano-British enclosure ditch 10092. The three assemblages are difficult to compare directly because of the variation in sample size (10 litres vs 1500 g) and the potential inherent bias and loss of small apical fragments in the larger samples processed by flotation. Nevertheless, one duplicate sample was processed following standard methods for snails (Evans 1972) and only limited bias was noted. Shell numbers were moderate (**Table Molluscs 9**) and all three assemblages indicate a ditch constructed and surviving in a very open landscape, as the open country elements always exceeded *c.* 40% and rise to 70.5% of the assemblage. The assemblage is dominated by *Vallonia excentrica* and *V. costata* with *Helicella itala,* and *Trichia hispida,* which suggest very open dry conditions, probably short grazed or trampled grassland (Chappell *et al.* 1971). There is not enough indication of bare earth or broken ground to suggest tillage locally, but the presence of *V. excentrica* over *V. costata* and significant levels of *H. itala* may hint at xerophile arable conditions. Shannon and Brouilloin species diversity indices are moderately high indicating an established mollusc community rather than one of the early stages of grassland succession (Cameron *et al.* 1975). A few more shade-loving species are present and may suggest some longer grass existed locally, perhaps even on the sides and edges of the ditch itself.

In contrast to these dry and probably trampled or grazed grassland conditions surrounding the ditch, the majority of the assemblages (85–92%) were aquatic, and presumable largely autochthonous. The numbers of aquatic shells was very high, exceeding over 1000 in two samples, and over 4650 were identified. In light of the lack of marsh species (Evans 1972), and more mesic terrestrial components, for example *Vallonia pulchella* and some of the wetland Vertingnids and Succiniedia, it is suggested that this assemblage largely inhabited the ditch itself as opposed to coming from the local environment beyond it. *Anisus* cf. *leucostoma, Lymnaea truncatula,* and planorbids are dominant, and these along with most of the other aquatic species are those most commonly found in ditches. Of the planorbids, *Gyraulus crista* is the most abundant. In view of the very highly xerophile terrestrial component we assume the aquatic species were living in the ditch, and suggest high local ground water tables and moderate levels of water in the ditch most of the year.

Table Molluscs 9. Great Common Farm

Phase	*Romano-British*		
Phase	*3*		
Group Type	*Ditch*		
Group	*10092*		
Feature	*10108*	*10108*	*10100*
Context	*10109*	*10109*	*10099*
Sample	*11001*	*11001M*	*11004*
Depth	*Spot*	*Spot*	*Spot*
Vol /Wt	*10 l*	*1500 g*	*10 l*
LAND			
Succinea/Oxyloma sp.	1	-	-
Cochlicopa lubrica (Müller)	1	-	-
Cochlicopa spp.	2	-	-
Vertigo pygmaea (Draparnaud)	8	2	1
Vertigo spp.	1	2	-
Pupilla muscorum (Linnaeus)	2	1	-
Vallonia costata (Müller)	45	13	6
Vallonia excentrica Sterki	102	41	7
Vallonia spp.	2	1	1
Punctum pygmaeum (Draparnaud)	-	3	2
Discus rotundatus (Müller)	7	-	-
Vitrea crystallina (Müller)	-	-	2
Vitrea contracta (Westerlund)	1	1	1
Nesovitrea hammonis (Ström)	3	-	-
Aegopinella nitidula (Draparnaud)	2	1	2
Oxychilus cellarius (Müller)	1	-	1
Limacidae	5	4	2
Helicella itala (Linnaeus)	19	2	6
Trichia hispida (Linnaeus)	76	17	22
Cepaea/Arianta spp.	1	-	+
FRESH- /BRACKISH-WATER			
Aplexa hypnorum (Linnaeus)	2	7	-
Lymnaea truncatula (Müller)	127	72	12
Lymnaea glabra (Müller)	3	2	1
Lymnaea spp.	162	17	5
Planorbis planorbis (Linnaeus)	8	42	60
Planorbis carinatus (Müller)	207	12	5
Planorbis spp.	201	83	-
Anisus leucostoma/vortex (Millet/Linnaeus)	1750	467	193
Gyraulus crista (Linnaeus)	412	236	23
Pisidium spp.	39	76	7
Taxa	23	18	18
Terrestrial total	279	88	53
Freshwater total	2911	1014	306
TOTAL	3190	1102	359
Shannon Index	1.73	1.59	1.86
Brillouin Index	1.64	1.44	1.61
Shannon Index – Brillouin Index	0.08	0.15	0.25
Delta 2	0.75	0.71	0.77
Delta 4	3.13	2.51	3.70

The Grange

Only four of 62 bulk samples were selected for analysis, all from sub-samples processed specifically for snails and selected from a sequence though the 2nd–4th century Romano-British enclosure ditch (**Table Molluscs 10**). It includes a sequence of three contiguous samples taken from the western ditch (20723) of enclosure 20846 and a spot sample from near the south-western corner (20758) of the same enclosure.

All the samples examined reflect typical open country habitats, however, those from ditch 20723 contained, albeit in low numbers, shade-loving species not commonly encountered elsewhere at Cambourne. The basal sample (context 29724) was dominated by *Vallonia* species and *Trichia hispida*, with a large number of aquatic/amphibious species. This is clearly an open county habitat, and the presence of the catholic and shade-loving species *Carychium tridentatum, Nesovitrea hammonis,* and *Vitrea contracta* suggest some shade afforded by longer grass. Within the main fill of the ditch (context 20729) snail numbers drop and there is a reduction in shade-loving species both numerically and in the range of taxa represented. A decline in the relative abundance of *T. hispida* and *V. costata* is concomitant with a rise in *V. excentrica*, and may suggest shorter dry grassland, although wet conditions and damp meadow is indicated locally and in the ditch by the presence of the amphibious species *Lymnaea truncatula*, which is still prevalent. The upper context (20631) has a rise in shell numbers, and sees the re-establishment of *T. hispida* as the dominant species, indicative of a return to longer grassland and less uniform local environments.

Within the ditch, including a recut, there is evidence not just of damp conditions, indicated by the amphibious species *L. truncatula* and *Anisus leucostoma*, but of both intermittent and permanent standing water seen by the presence of several specimens of *Aplexa hypnorum*, *Hippeutis complanatus*, and *Pisidum* sp. This must relate to high groundwater levels in the Romano-British period, rather than flooding of local water courses.

In summary, the later phases of the enclosure (the recut ditch) indicate open moist grassland pasture, with long damp grass, and possibly small puddles of water in the ditches, supporting grassy vegetation. There is a hint towards the end of the enclosure ditch's use of a drier phase (main fill of recut 20723). This may tentatively be ascribed to increased human activity, trampling and drier conditions, followed by a return to less activity and moister local conditions.

Table Molluscs 10. The Grange

Phase	*Early/middle – late Romano-British*			
Phase	*3*			
Group Type	*Enclosure Ditch*			
Group	*20846*	*20846*	*20846*	*20846*
Feature	*20723*	*20723*	*20723*	*20758*
Context	*20724*	*20729*	*20631*	*20764*
Sample	*22044*	*22045*	*22046*	*22050*
Depth (cm)	*0.55-0.75*	*0.35-0.55*	*0.0-0.35*	*0.25-0.35*
Wt (g)	*2000*	*2000*	*2000*	*2000*
LAND				
Carychium minimum Müller	1	-	3	-
Carychium tridentatum (Risso)	4	7	25	1
Carychium spp.	1	1	13	-
Cochlicopa lubrica (Müller)	1	1	1	-
Cochlicopa spp.	4	2	5	-
Vertigo pygmaea (Draparnaud)	6	4	10	1
Vertigo spp.	-	7	10	-
Pupilla muscorum (Linnaeus)	1	6	11	-
Vallonia costata (Müller)	75	42	62	-
Vallonia excentrica Sterki	36	82	79	3
Vallonia spp.	5	6	6	-
Punctum pygmaeum (Draparnaud)	28	2	7	-
Vitrina pellucida (Müller)	1	-	-	-
Vitrea contracta (Westerlund)	5	2	4	-
Nesovitrea hammonis (Ström)	21	-	5	-
Aegopinella nitidula (Draparnaud)	2	4	10	-
Oxychilus cellarius (Müller)	-	3	2	-
Limacidae	7	14	24	1
Cecilioides acicula (Müller)	-	-	-	1
Helicella itala (Linnaeus)	4	8	17	2
Trichia hispida (Linnaeus)	104	20	113	5
Cepaea hortensis (Müller)	2	-	-	-
Cepaea/Arianta spp.	-	1	2	-
FRESH- /BRACKISH-WATER				
Aplexa hypnorum (Linnaeus)	5	-	-	-
Lymnaea truncatula (Müller)	32	7	61	-
Lymnaea cf *truncatula* (Müller)	-	3	-	-
Lymnaea spp.	7	-	7	-
Anisus leucostoma (Millet)	561	-	176	2
Hippeutis complanatus (Linnaeus)	63	-	-	-
Pisidium sp. (valves)	12	-	1	-
Taxa	21	15	19	7
Terrestrial total	308	212	409	13
Freshwater total	680	10	245	2
TOTAL	988	222	654	15
Shannon Index	1.92	1.91	2.15	1.59
Brillouin Index	1.83	1.80	2.07	1.18
Shannon Index – Brillouin Index	0.09	0.11	0.08	0.41
Delta 2	0.79	0.77	0.84	0.76
Delta 4	3.86	3.45	5.34	4.57

Twelve excavations were carried out by Wessex Archaeology within the Cambourne Development Area. Situated on the clay uplands west of Cambridge, which have seen little previous archaeological investigation, the results presented here are important in demonstrating the ebb and flow of occupation according to population or agricultural pressure.

Short-lived Bronze Age occupation was followed in the Middle Iron Age by small farming communities with an economy based on stock-raising and some arable cultivation. The Late Iron Age seems to have seen a recession, perhaps partly due to increased waterlogging making farming less viable.

From the mid-1st century AD new settlements began to emerge, possibly partly stimulated by the presence of Ermine Street, and within a century the area was relatively densely occupied. Several farmsteads were remodelled in the later Romano-British period, though none seems to have been very prosperous.

Dispersed occupation may have continued into the early 5th century at least, followed by a hiatus until the 12th/13th century when the entire area was taken into arable cultivation, leaving the ubiquitous traces of medieval ridge and furrow agriculture.

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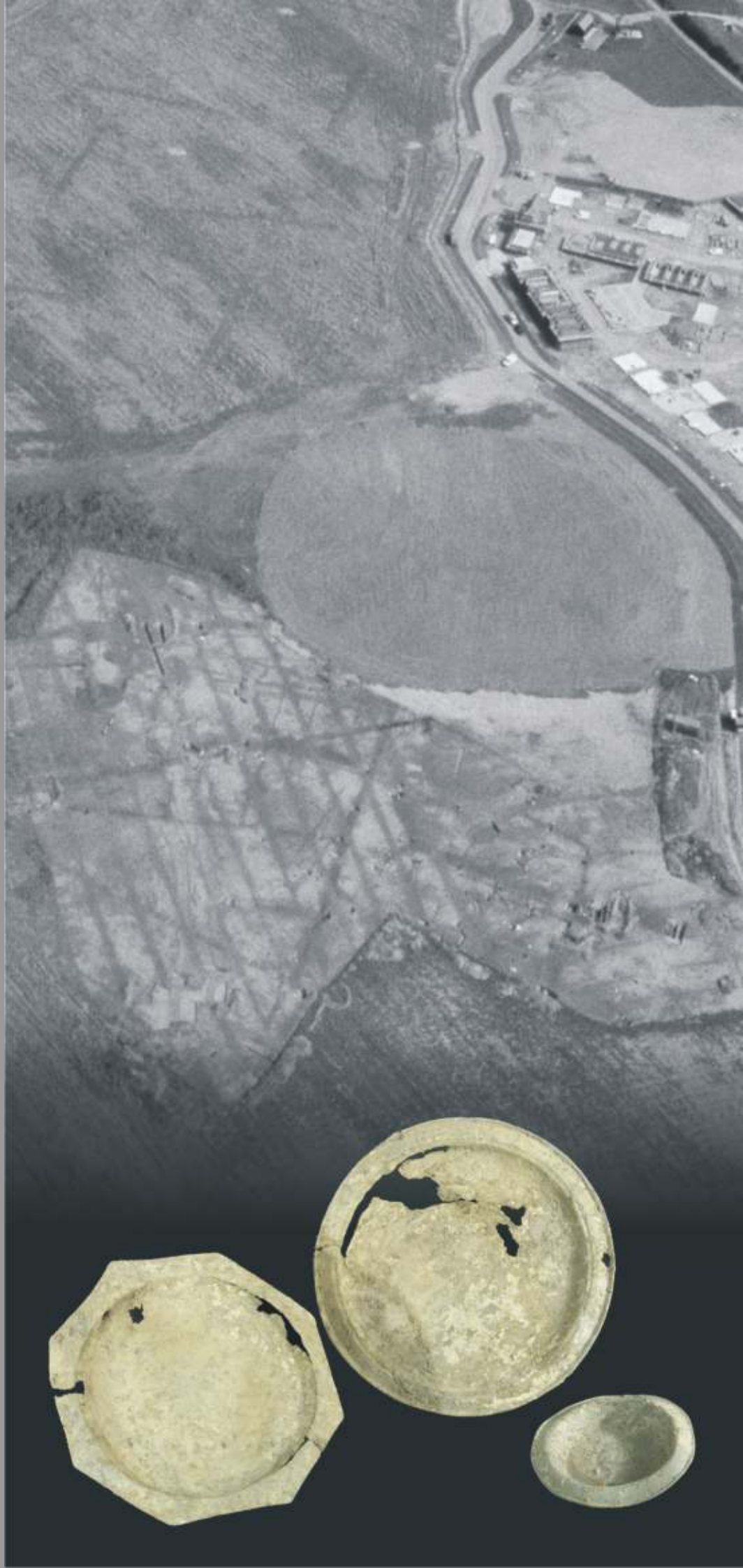

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