AML Report: 3526

Site:	Chignall Roman Villa
Parish:	Chignall St James
County:	Essex
Code:	CRV 81
Director:	P. Clark
Type of site:	Ditched enclosure
Period:	Belgic
Geology:	Chalky Boulder Clay (Springfield Till)
Type of material:	Molluscs, small vertebrates, ostracods, charred plant remains.

Chignall St James Essex: The Belgic Enclosure Ditch

Samples were taken from ditch 731 (Section II, North Face) for the extraction of mollusca and other macrofossils.

The ditch fills

The modern topsoil had been stripped mechanically before sectioning and sampling. The section showed primary and secondary fills of slightly stony clay loam with chalk fragments (8, 10, 7). These fills were gleyed, varying in colour from predominantly greyish at the base to predominantly yellowish-brown above. Because of this gleying the primary and secondary fills were not easily distinguishable, though a sloping 'tip-line' of flints was present at about 78cm. A buried soil was present between 40-46cm (5). Above this were interdigitating wedges of brown clay loam and charcoal-rich brown clay loam (1, 2) comprising the tertiary fill and the base of the modern plough-soil.

0-10cm	Brown (10YR 5/3 to 4/3; moist) clay loam; rare small chalk fragments and flints; rare charcoal fragments; very sharp boundary.
10-16cm	Similar matrix, but with much charcoal, daub, and some heat-shattered flints; very sharp boundary.
16-25cm	As 0-10cm; very sharp boundary.
25-40cm	As 10-16cm; very sharp boundary.
40-46cm	Buried soil. Brown (10YR 4/3; moist) clay loam, 10YR 4/2 on ped faces; common small (< 1cm) chalk fragments and rare small-medium flints; Cepaea shells abundant; sharp boundary.
46-78cm	Yellowish-brown (10YR 5/4; moist) clay loam; some reddish, ochreous and greyish mottles; common small chalk fragments and small-medium flints; boundary indistinct but 'tip-line' at 78cm.
78-110cm	Similar lithology, but with more greyish mottling; boundary indistinct.
110-120cm	Similar lithology, but colour predominantly greyish with distinct reddish and ochreous mottles.

Methods

A central column sample, subdivided at 10cm intervals within layers was taken from the section. 3kg sub-samples were air-dried, immersed in hot water, allowed to stand overnight, and then washed out over a 0.5mm mesh sieve. The residues were treated with 100 vol. hydrogen peroxide to complete disaggregation before a second washing over the sieve. The dried residues were sorted under low power of a binocular microscope, extracting ostracods, molluscs, bone and charred plant remains.

The molluscs were identified with reference to Evans (1972) and Kerney and Cameron (1979) and all identifications were confirmed by comparison with modern reference specimens.

Animal and plant remains extracted from the samples are listed in Tables 1 and 2.

Derived fossils

Since the ditch fills consisted of re-deposited Chalky Till (Springfield Till) they contained numerous derived fossils. Mesozoic fossils, mainly from the chalk, included foraminifera, serpulids, echinoid radioles, belemnites, bivalves (mainly oysters) and a gastropod. The samples also produced rare incompletely fossilised and abraded bivalve fragments. These are generally thick, some showing crenulate margins and very marked growth ridges but are too poorly preserved for identification. They are thought to be marine bivalves derived from Tertiary or Quaternary deposits. The land and freshwater molluscs identified are mostly fresh and unweathered in appearance, and there seems no reason to suppose that any derived Pleistocene terrestrial or freshwater shells are present.

Discussion

The deposits below 40cm clearly formed by natural processes with a minimum of human disturbance. The calculated numbers of shells per kg. of deposit (Table 1) provide a crude measure of surface stability and sedimentation rates. Below 66cm the deposits contained less than 5 shells/kg indicating that the fill below this accumulated rapidly, largely as a result of weathering of the steep ditch sides, allowing little opportunity for colonisation by molluscs. Above 66cm the concentration of shells increases, indicating slower sediment accumulation as a stable profile was approached and vegetation cover developed. The buried soil between 40-46cm contained around 134 shells/kg.

The very low concentration of shells in the primary fill and the lower part of the secondary fill makes detailed palaeoecological reconstruction impossible. However, the presence of Valvata piscinalis and Bithynia tentaculata in these lower deposits suggests that, when first dug, the ditch contained some flowing water. B. tentaculata never occurs in small stagnant dosed bodies of water and V. piscinalis is recorded from running ditches only; both snails normally require well-oxygenerated flowing water (Boycott 1936, 140). These conditions evidently did not persist once natural infilling had raised the base of the ditch above groundwater level since above 78cm freshwater and marsh molluscs are rare. Nevertheless Bithynia opercula and a Valvata shell are present sporadically in samples from higher levels in the ditch where there is no doubt that predominantly terestrial habitats obtained. Remains of other aquatic organisms from the secondary fill include ostracod valves and small fish vertebrae.

Molluscs are more abundant in the top of the secondary fill and in the buried soil. Shade-loving snails (Carychium tridentatum, Acanthinula aculeata, Ena obscura, Punctum Pygmaeum, Vitrea contracta, Aegopinella spp. and Clausilia bidentata) characteristic of leaf-litter and rupestral habitats account for 16% of snails at 46-56cm and 27% in the buried soil at 40-46cm. However snails indicating open grassland habitats are more common in these samples comprising 69% of snails at 46-56cm and 59% in the buried soil. Truncatellina cylindrica, Vertigo pygmaea and Pupilla muscorum are present, but by far the most abundant open-country snails are Vallonia spp. Within this genus V. costata shows a marked increase in its abundance relative to V.excentrica and V. pulchella. It is absent below 56cm, but in the buried soil at 40-46cm it is by far the commonest snail. Lymnaea truncatula is present at low frequencies (4% at 46-56cm; 1% at 40-46cm).

The interpretation of such ditch assemblages is complicated by uncertainties about the size of catchment area from which snails were derived, but it is assumed that the snails in these deposits represent a resident ditch fauna together with some shells washed in from the area immediately surrounding the ditch. On this basis, it appears that at the stage of soil formation the ditch itself was relatively dry: the low frequencies of Lymnaea truncatula need indicate no more than small impersistent puddles. The increase in frequencies of species characteristic of shaded habitats reflects the development in and immediately adjacent to the ditch of tall grass, herbs or a hedgerow. However the levels of open-country taxa remain high in the

buried soil and this is thought to indicate that dense vegetation cover was not continuous and that the area immediately around the ditch remained open. The predominance of Vallonia costata in the buried soil probably indicates that the soil surface adjacent to the ditch was dry; V. costata is more tolerant of dry habitats than other Vallonia spp. V. costata may also have been colonising rupestral habitats on vegetation within the ditch itself. This species is rarely found in ploughed fields and it is therefore thought that the surrounding open ground was grassland, at this stage rather than arable (Evans 1972, 153-162).

The small mammal bone from the buried soil and the top of the secondary fill includes teeth of Microtus agrestis (short-tailed vole) and Sylvaemus sylvaticus (wood mouse). Both of these rodents are found in hedgerows and scrubby woodland fringes, and M. agrestis is particularly common in rough grassland (Southern 1964; Van den Brink 1967).

The tertiary fill between 10 and 40cm is of artificial origin representing material dragged into the ditch by ploughing perhaps with some deliberate back-filling. The sparse mollusc assemblages from these layers consist predominantly of open-country species and there is a sharp decline in the frequencies of shade-loving snails and a rise in the relative frequencies of 'catholic' taxa (Cochlicopa, Limacidae, Trichia hispida, Cepaea). Within the open-country group Vallonia costata declines from 37.1% of the total assemblage in the buried soil to levels of around 11% in the tertiary fill. These changes indicate clearance of the vegetation in and around the ditch. The reduced frequencies of V. costata probably result from ploughing. A few shells of Candidula spp. were present in these samples. Both C. intersecta and C. gigaxii are post-Roman introductions to this country. It is, however, difficult to be sure that these few shells are not intrusive in these relatively shallow deposits and consequently the presence of Candidula spp. does not provide reliable dating evidence.

Mandibles of Microtus agrestis and Micromys minutus (harvest mouse) were recovered from samples of this tertiary fill. The characteristic habitat of M. minutus is cornfields and surrounding hedgerows, though it also occurs in reedbeds and tall grass (Southern 1964, 297). In the present context the presence of this species appears to provide some further evidence for arable farming in the vicinity.

Samples of the tertiary fill also produced a charred damaged glume base of a brittle-rachis wheat, probably spelt, and a charred seed of Galium aparine (goosegrass). These could be the products of stubble burning, but equally could be derived from domestic refuse. Similarly, the abundant charcoal at 10-16cm and 25-40cm could be derived from one of two sources: it could represent domestic hearth-sweepings or alternatively could have been produced during clearance for ploughing of hedgerow or scrub growing on the buried soil in and adjacent to the ditch. The charcoal identified in these layers was of Rhamnus catharticus (buckthorn), Prunus sp. (blackthorne ?) and Crataegus-group (hawthorn - group). These shrubs could clearly have formed a thorny hedge in and alongside the enclosure ditch. However they could also have provided good kindling for domestic hearths; ploughing over nearby domestic refuse pits containing hearth-sweepings could easily have resulted in charred material being dragged into the ditch. The interpretation of these charred plant remains must therefore be conjectural, but it is at least plausible that they represent products of stubble burning and the remains of an earlier thorn hedge. The existence of such a hedge at this point on the perimeter of the enclosure ditch would provide an explanation for the absence of re-cutting, seen elsewhere in section.

The top 10cm of the ditch fill was effectively the base of the modern ploughsoil. The mollusc assemblage from this level is similar to those from 10-40cm, dominated by open country species. The only significant change is an increase in frequencies of Candidula spp. C.gigaxii is particularly characteristic of arable habitats (Evans 1972, 179). A charred free-threshing wheat rachis node also came from this level.

In summary, the ditch deposits and their included biological remains at the point of sampling are thought to indicate the following sequence of local habitat change:

1. 78-120cm Some flowing water in ditch. Rapid weathering and in-filling.
2. 46-78cm Development of vegetation cover, rate of weathering slowing. Base of ditch now above mean groundwater level.
3. 40-46cm Stable profile. Soil formation. Ditch fairly dry, with rare, impersistent puddles. Shaded vegetation in ditch itself, open grassland in surrounding area.
4. 10-46cm Clearance of vegetation in ditch (charcoal suggests this included buckthorn, blackthorn and hawthorn). Possibly some deliberate back-filling. Ploughing and levelling.
5. 0-10cm. 'Modern' arable farming. Ditch completely levelled.

References:

Boycott, A.E. (1936) 'The habitats of freshwater Mollusca in Britain' J. Animal Ecology 5, 116-86

Evans, J.G. (1972) Land Snails in Archaeology London

Kerney, M.P. and Cameron, R.A.D., (1979). A Field Guide to the Land Snails of Britain and North-West Europe. London

Southern, H.N. (1964) The Handbook of British Mammals. Oxford

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I am most grateful to Peter Lawrence and John Goldsmith of the Natural History Department, Castle Museum for their identifications of small vertebrate remains.

Depth (cm)	0-10	10-16	16-25	25-40	40-46	46-56	56-66	66-78	78-90	90-100	100-110	110-120
Layer No.	1	2	1	2	5	8	8	8	10	10	10	10/7
Valvata c.f. piscinalis (Müller)	-	-	-	-	-	-	-	-	-	1	1	-
Valvata sp.	1	-	-	-	-	-	-	-	-	-	-	-
Bithynia tentaculata (Linné)	-	-	(0)	-	2(0)	-	2(o)	-	-	3(0)	-	1+1(0)
Carychium tridentatum (Risso)	-	-	-	-	11	2	-	-	-	-	-	-
Carychium sp. (a)	-	(1)	-	-	17	-	-	-	-	-	-	-
Lymnaea truncatula (Müller)	-	-	-	-	5	3	-	-	1	-	-	-
Anisus leucostoma (Millet)	-	-	1	-	-	-	-	-	-	-	-	-
Cochlicopa spp.	-	1	-	-	7	1	-	-	-	-	-	-
Truncatellina cylindrica (Férussac)	-	-	-	-	3	-	-	-	-	-	-	-
Vertigo pygmaea (Draparnaud)	-	1	1	-	3	-	-	-	-	-	-	-
Vertigo sp. (a)	-	1	1	-	4	1	-	-	-	-	-	-
Pupilla muscorum (Linné)	(1)	(3)	-	-	7	-	-	-	-	-	-	-
Vallonia costata (Müller)	2	6	7	3	149	21	-	-	-	-	-	-
Vallonia pulchella (Müller)	3	1	4	-	9	8	1	-	-	-	-	-
Vallonia excentrica Sterki	2	7	4	-	6	4	5	1	-	-	-	-
Vallonia sp. (a)	8	18	22	12	60	17	-	2	-	1	1	-
Acanthinula aculeata (Müller)	-	-	-	-	1	-	-	-	-	-	-	(1)
Ena obscura (Müller)	-	-	-	-	2	-	-	-	-	-	-	-
Punctum pygmaeum (Draparnaud)	-	-	-	-	13	4	-	-	-	-	-	-
Discus rotundatus (Müller)	-	-	(+)	(+)	-	-	-	-	-	-	-	-
Vitrea contracta (Westerlund)	-	-	-	-	13	2	1	1	-	-	-	-
~~Vitrea sp.~~	-	-	-	-	-	-	-	-	-	-	-	-
Aegopinella c.f. pura (Alder)	-	-	-	-	1	-	-	-	-	-	-	-
Aegopinella cf. nitidula (Draparnaud)	-	-	-	-	20	-	-	-	-	-	-	-
Oxychilus sp.	-	-	-	1	-	-	-	-	-	-	-	-
Zonitidae indet.	-	-	1	2	26	3	-	1	-	1	(+)	-

Limacidae indet.	2	3	5	-	15	1	3	-	-	1	-	-
Cecilioides acicula (Müller)	1	27	23	7	6	4	2	2	-	-	-	-
Clausilia bidentata (Ström)	-	1	-	-	1	-	-	-	-	-	-	-
Clausiliidae indet.	(+)	-	1	1	4	(1)	-	(1)	-	-	-	-
Candidula intersecta (Poiret)	(+)	-	(1)	-	-	-	-	-	-	-	-	-
Candidula gigaxii (Pfeiffer)	2	-	-	-	-	-	-	-	-	-	-	-
Candidula sp.	5	-	-	2	1	-	-	-	-	-	-	-
Helicella itala (Linné)	-	-	-	2	-	-	-	1	-	-	-	-
Trichia hispida (Linné)	1	6	6	-	3	1	-	-	-	-	-	-
Cepaea sp.	-	-	-	-	19	-	-	-	-	-	-	-
Cepaea/Arianta	-	2	2	4	-	1	-	-	-	-	-	-
Helicidae indet. (b)	(+)	-	-	-	-	-	(+)	(+)	(+)	(+)	(+)	-
Pisidium spp. (c)	-	-	-	-	-	-	(1)	(1)	(1)	(1)	-	(1)
Mytilus edulis Linné	(+)	-	-	-	-	-	-	-	-	-	-	-
Unidentified	4	3	4	-	-	-	-	-	-	-	-	-
Nos of shells/kg (calculated; excluding Cecilioides acicula)	11	18	21	9	134	23	5	3	1	3	1	1

Table 1 : Mollusca from Ditch 731 (Section II, North Face)

Numbers refer to apices or hinges apart from: (+) small fragments; (1) almost complete shell, lacking apex or hinge; (0) opercula; Limacid plates.

Notes:

(a) Immature/fragmentary shells without aperture

(b) Large helicid whorl fragments (probably Cepaea);noted only where Cepaea apices not present

(c) Immature and fragmentary hinges

Depth (cm)	0-10	10-16	16-25	25-40	40-46	46-56	56-66	66-78	78-90	90-100	100-110	110-120
Layer number	1	2	1	2	5	8	8	8	10	10	10	10/7
Large mammal bone												
Indeterminate fragments	+	+	+	+	+	+	+	+	+	+	+	+
Small mammal bone												
Microtus agrestis (L) mandible + cheekteeth	-	-	1	-	-	-	-	-	-	-	-	-
cheekteeth	-	-	-	-	5	-	-	-	-	-	-	-
Micromys minutus (Pallas) mandible + cheekteeth	-	1	-	-	-	-	-	-	-	-	-	-
Sylvaemus sylvaticus (L) cheek teeth	-	-	-	-	-	1	-	-	-	-	-	-
Indeterminate incisors	-	2	1	-	2	-	-	-	-	-	1	-
" cheek teeth	-	-	-	1	1	-	-	-	-	-	-	-
" limb-bones etc.	-	+	+	+	+	+	-	-	-	+	-	+
Amphibian bone												
Indeterminate limb-bone frags.	-	1	-	-	-	1	-	-	-	-	-	-
Amphibian/fish-bone												
Indeterminate Mandible/maxilla frags.	-	-	-	-	1	-	-	-	-	-	-	-
Fish bone												
Indeterminate vertebral centra (c. 1.5mm)	-	-	-	-	-	1	-	1	-	-	-	-
Ostracods												
Valves	-	-	-	-	-	-	1	3	-	-	-	-
Charred plant remains												
Triticum sp.(free-theshing rachis node)	1	-	-	-	-	-	-	-	-	-	-	-
Triticum sp.(glume base)	-	1	-	-	-	-	-	-	-	-	-	-
Indeterminate cereal (caryopsis)	-	-	-	-	-	-	-	1	-	-	-	-
Galium aparine L. (seed)	-	-	-	1	-	-	-	-	-	-	-	-
Corylus avellana L. (nutshell frag.)	-	-	-	-	+	-	-	-	-	-	-	-

Charcoal (total charcoal content)	++	+++	++	+++	++	+	+	+	+	+	+	+
Crataegus - group		+		+								
Prunus sp.		-		+								
Rhamnus catharticus L.		+		+								

Table 2: Other plant and animal remains from Ditch 731 (Section II, North Face)

Small vertebrate remains identified by Messrs J. Goldsmith and P. Lawrence, Norwich Castle Museum. Only cheek teeth of small mammals have been identified to species. Charcoal has been identified only from samples at 10-16cm and 25-40 cm.

+ = present ++ = common +++ = very abundant