

Site: Ivy Chimneys, Witham

County: Essex

Code: IC 79-80

Director: R. Turner

Type of contexts: Ditches, artificial pond

Period: Iron Age - Roman

Geology: Chalky Till

Type of material: Mollusca, charred plant remains (principally).

Ivy Chimneys, Witham, Essex

Introduction

Although the sediments filling the pond and associated features at Ivy Chimneys were mostly deposited in shallow water, and some of these layers were wet when excavated, periodic drying has occurred in the past. This has resulted in the humification of the organic component of the deposits. Uncharred plant macrofossils and insects have not survived. Samples from the pond have been examined by Dr R. Scaife for pollen, but with negative results. However, the surviving biological remains (molluscs, ostracod valves, bone, avian eggshell fragments, charred plant remains and charophyte oogonia) provide some information on former local habitats and foodstuffs.

Methods

Column samples, sub-divided at 5 or 10cm intervals as appropriate, were taken from the pond, adjacent depressions and ditches. Single samples were also taken from further deposits of particular interest, such as the marginal layer of shelly detritus (2026) at the edge of the pond, or from the basal fills of ditches where complete column sampling was thought unnecessary.

1-2kg sub-samples of these deposits were examined in the laboratory. The stiff clay loam sediments at this site were unusually difficult to disaggregate, but after experiment the most effective method was found to consist of initial thorough air-drying and treatment with hydrogen peroxide overnight, before washing the samples over an 0.5mm mesh sieve. In several cases a second treatment was necessary, and even after this some soil aggregates remained.

The sieved fraction was dried and sorted under a binocular microscope. Molluscs were identified using Evans (1972), Kerney and Cameron (1979) and Macan (1969), and by comparison with modern reference specimens. Fragmentation, abrasion (with loss of surface detail) and incrustation with sediment prevented complete identification of many specimens. The Sphaeriidae included a high proportion of immature and fragmentary valves, and these bivalves have not, therefore, been closely identified in most cases. Complete separation of young juvenile snails

within a certain taxa (eg. Trichia, Lymnaea and the Zonitidae) has not been attempted where it was thought that the additional ecological information gained would not justify the necessary expenditure of time. Mr Philip Cambridge and Mr Gordon Osborn identified some problematical specimens, notably in the Sphaeriidae, Zonitidae, the genus Trichia.

Other macroscopic biological remains were extracted with the molluscs and are discussed below.

Land and freshwater molluscs

The molluscs from the pond (contexts nos 1792, 1770, 1821, 1863, 2026) adjacent depressions (94, 95 and 3278) will be discussed in some detail. Samples from other contexts produced only small and heterogenous assemblages, which are not readily interpretable: brief notes on these samples are given below.

The species identified are characteristic of a very wide range of habitats, from well-oxygenated flowing water to dry, open terrestrial conditions, indicating a very diverse local environment. This presents some problems of interpretation which do not occur in simpler situations. In the following discussion ecological information is taken from Boycott (1936), Evans (1972), Kerney and Cameron (1979) and Sparks (1961).

1. The pond

At the point of sampling, the sediments filling the pond were as follows:

- 0 -45cm (1752) Dark greyish-brown clay loam with medium distinct strong brown mottles; slightly stony, rare small flints and very rare chalk fragments; coarse angular blocky peds; common fine pores and fissures; common fibrous and fleshy roots; narrow boundary.
- 45-60cm (1770) Very dark greyish brown clay loam with medium distinct brownish mottles; slightly stony, rare small flints and very rare small chalk fragments; medium-fine angular blocky peds; common fine pores and fissures; fibrous and fleshy roots.
- 60-68cm (1821) Similar matrix to 1770 but with large tile fragments; sharp boundary.
- 68-80cm (1863) Very pale brown clay loam with common distinct yellowish-brown to strong brown mottles; very stony, abundant small-medium chalk fragments.

Euconulus fulvus (Müller)	1	-	-	-	-	-	-	-	-
<u>Vitrea crystallina</u> (Müller)	2	-	-	-	-	-	-	-	-
Zonitidae (c)	56	-	-	-	-	-	-	-	-
Limacidae (plates)	6	-	-	-	-	-	-	-	-
Sphaeriidae (valves) (d)	14	-	-	-	-	-	14	2	-
Indeterminate	10	-	-	-	-	-	-	-	-

Notes

- (a) Mainly juveniles; in 2026 includes L.palustris, L. stagnalis, L. peregra.
- (b) Mainly juveniles; adult T.striolata and T.plebeia present in 2026
- (c) High proportion of abraded and juvenile shells. Oxychilus helveticus and Aegopinella nitidula adults present in 2026
- (d) Count refers to intact valves, which include Pisidium sp. Sphaerium corneum and S.rivicola. Abundant fragments equivalent to about 50 further valves.
- + refers to non-hinge or non-apical fragments

Table : Mollusca from the pond

1752 was a more weathered form of 1770; the distinction between these two horizons did not reflect a depositional change. 1863 was the disturbed till surface. 1863 was calcareous (vigorous effervescence with dilute HCl), but 1752 and 1770 were largely decalcified (weak effervescence).

Closer to the edge of the pond, sediments equivalent to 1770 contained a layer of shelly detritus (2026) some 6cm thick. Given its marginal situation this seems to represent accumulation of shells at the water's edge over a considerable period.

Molluscs recovered from these sediments are listed in Table

The mollusc assemblages from the former pond margins (2026) and from what must at one stage have been its floor (1863, 68-72cm) differ in size, but in both contexts Gyraulus crista and Lymnaea spp. (L.palustris, L.stagnalis, L.peregra) were the most abundant snails with some (mainly fragmentary) valves of Sphaeriidae (S.corneum, S.rivicola and Pisidium sp.). Other aquatic snails occurring at lower frequencies include Valvata piscinalis, Bithynia sp. Gyraulus albus, Bathymorphus contortus, Segmentina complanata and Acroloxus lacustris. This range of species is quite in keeping with the characteristics of the habitat: a pond on calcareous till with a slow but consistent through-flow of water from springs further upslope. Species tolerant of poor conditions (eg. Lymnaea truncatula, Anisus leucostoma) are absent from these samples and it thus seems that a fairly constant water level was maintained. Only one marsh species (Succinea c.f. putris) has been identified, and this must reflect the unusually sharp distinction between aquatic and terrestrial habitats in this artificial pond. There are small numbers of terrestrial snails including shade-loving species (Carychium tridentatum, Clausilia bidentata, Discus rotundatus, Euconulus fulvus and Zonitids), open-country species (Vertigo pygmaea, Vallonia costata) and synanthropic species (Trichia striolata, Limacidae), all derived presumably from the area surrounding the pond.

The few shells from the upper, decalcified, pond fill may be intrusive, having been introduced via soil cracks and earthworm burrows. No information is therefore available on the subsequent environmental history of the pond itself.

2. 94 and 95: 2nd-4th century depression

From the quantities of tile, bone, marine molluscs, charcoal and charred cereals

Context No.	94	95	95
Depth (cm)	40-50	50-60	60-65
Sample weight (kg)	1	1	1
<u>Bithynia</u> sp. (operculum)	2	-	-
<u>Lymnaea</u> sp.	2	1	2
<u>Carychium tridentatum</u> (Risso)	2	-	-
<u>Carychium</u> sp.	1	1	-
<u>Cochlicopa</u> sp.	-	2	-
<u>Vertigo pygmaea</u> (Draparnaud)	2	-	-
<u>Acanthinula aculeata</u> (Müller)	1	1	-
<u>Vallonia</u> sp.	7	3	-
<u>Cecilioides acicula</u> (Müller)	11	4	2
<u>Trichia</u> sp.	5	-	-
<u>Discus rotundatus</u> (Müller)	2	2	+
<u>Nesovitrea hammonis</u> (Ström)	2	-	-
Zonitidae indet	3	-	-
Limacidae	1	1	-
<u>Pisidium</u> sp. (a)	33(+108)	51(+50)	42(+22)

Note

(a) Figure in brackets refers to estimated number of valves represented by fragments.

Table : Mollusca from the hollow 94/95

in 94 it is clear that this deposit includes a large proportion of dumped refuse. By comparison with assemblages from the pond itself this depression produced very few species. Valves of Pisidium predominate, but these have not been determined to species. The snails are mainly terrestrial, characteristic of both shaded and open habitats, though a few young juvenile apices of Lymnaea were present, and 94 produced opercula of Bithynia.

Clearly the fills of this depression accumulated in at least damp conditions, but detailed ecological interpretation is not possible from the material identified.

3. 3278 : 2nd-4th century depression

A high proportion of shells recovered from this feature are of restricted value for palaeoecological interpretation, as a result of incomplete identifications or wide habitat ranges in the living animals. However, considering only 'informatives' it is possible to distinguish a number of ecological groups whose frequencies vary through the deposit (Table).

		0-5	5-10	10-15	15-20	20-base
Freshwater	<u>Sphaeriidae</u>	9.4	7.4	22.4	35.9	13.6
	<u>Valvata, Bithynia, Lymnaea</u> }	8.2	10.1	15.1	28.7	55.2
	<u>Physa, Planorbidae</u>					
Marsh	<u>Succineidae, Vertigo antivertigo</u>	2.5	4.0	4.6	1.5	4.8
Terrestrial shaded habitat	<u>Discus rotundatus</u>	15.1	22.5	19.6	3.6	6.4
	Zonitidae	12.6	17.8	10.5	7.7	3.2
	<u>Lauria, Clausiliidae, Punctum</u>	1.9	2.7	3.7	1.0	0.8
Terrestrial open habitat	<u>Vertigo pygmaea, Vallonia costata, V. excentrica, Helicella</u>	1.3	2.7	2.3	3.6	2.4
Synanthropic	<u>Helix aspersa</u>	2.5	3.0	0.5	0.5	0
	Total number of molluscs	159	298	219	195	125

Table : Percentage frequencies of selected groups in 3278 (Total number of molluscs omits Cecilioides acicula and Bithynia opercula)

Depth (cm)	0-5	5-10	10-15	15-20	20-ba:
Sample weight	2	2	2	2	2
<u>Valvata piscinalis</u> (Müller)	-	-	1	4	6
<u>Valvata</u> sp.	-	3	7	8	12
<u>Bithynia tentaculata</u> (L) opercula	12	12	22	33	41
apices	4	1	7	10	19
<u>Carychium</u> sp.	13	24	7	6	-
<u>Lymnaea truncatula</u> (Müller)	5	8	9	6	4
<u>Lymnaea/Bithynia</u> sp. ap.	-	6	4	24	25
cf. <u>Physasp.</u>	-	-	-	-	cf.1
<u>Bathyomphalus contortus</u> (L)	4	10	4	3	1
<u>Segmentina complanata</u> (L)	-	2	-	-	-
<u>Planorbis</u> sp.	-	-	1	1	1
<u>Succinea</u> sp.	2	11	8	3	6
<u>Cochlicopa</u> sp.	9	8	7	3	3
<u>Vertigo antivertigo</u> (Draparnaud)	1+cf.1	1	2	-	-
<u>Vertigo pygmaea</u> (Draparnaud)	-	cf.1	-	-	-
<u>Lauria cylindracea</u> (da Costa)	1+cf.1	5	7	2	-
<u>Vallonia costata</u> (Müller)	2	6	4	6	2
<u>Vallonia pulchella</u> (Müller)	cf.7	cf.1	cf.2	cf.2	-
<u>Vallonia excentrica</u> Sterki	-	-	cf.1.	-	-
<u>Vallonia</u> sp.	19	16	4	5	7
Clausiliidae	(+)	3	-	-	1
<u>Cecilioides acicula</u> (Muller)	54	62	83	56	58
<u>Cepaea nemoralis</u> (L)	-	-	-	-	-
<u>Cepaea</u> sp.	3	3	2	-	-
<u>Helix aspersa</u> Müller	4	9	1	(+)	-
<u>Trichia</u> spp.	13	21	7	7	5
<u>Helicella itala</u> (L)	-	-	-	1	1
<u>Punctum pygmaeum</u> (Draparnaud)	-	-	1	-	-
<u>Discus rotundatus</u> (Muller)	24	67	43	7	8
<u>Vitrea contracta</u> (Westerlund)	4	2	-	-	-
<u>Vitrea</u> sp.	-	-	-	1	-
<u>Nesovitrea hammonis</u> (Strom)	2	-	-	-	-
<u>Aegopinella</u> sp.	2	-	-	3	-
Zonitidae indeterminate	12	51	23	12	4
Indeterminate gastropod apices	7	13	8	5	1
Limacidae	3	4	10	6	1
Sphaeriidae (valves)	29	43	97	140	34

Table : Molluscs from 3278

At the base of the deposit freshwater gastropods are abundant. Since Bithynia tentaculata and Valvata piscinalis are fairly common a through-flow of well-oxygenated water may be inferred. Valves of Sphaeriidae are present at this level, but are more abundant in the sample at 15-20cm whilst freshwater gastropods are in general rarer at this level, though Lymnaea truncatula, which is able to tolerate poorer aquatic habitats, shows a very slight rise in frequency. Since the bivalves have not been identified the significance of this change cannot be established with certainty, but a plausible interpretation is that flow became more sluggish. In samples from the upper 15cm of the deposit all aquatic taxa show a decline, with some fluctuations, whilst terrestrial species characteristic of shaded conditions, notably Discus rotundatus, increase in abundance.

In summary, this sequence is thought to indicate the initial deposition of shells and sediment in flowing water, with a subsequent natural change to a quieter sedimentary environment and ultimately to the development of dryer and more shaded conditions, probably scrub, subject to periodic flooding. The presence of marine mollusc shells, bone fragments and charred plant remains probably indicates some refuse dumping, but the mollusc assemblages and the apparently continuous sedimentation suggest an essentially natural process of infilling

4. 1061 : the Roman inlet ditch for pond

The fill of this ditch is obviously related to a period after the ditch itself had ceased to function as part of the drainage system of the site, and this no doubt accounts for the extreme rarity of freshwater molluscs in samples from this feature. Many of the mollusca present are characteristic of shaded conditions, and this probably indicates the development of tall herb vegetation or scrub in the defunct ditch.

5. 1613 : Overflow ditch from pond

In contrast to ditch 1061 freshwater molluscs are present throughout the fill of this overflow ditch. This seems to indicate that it continued to function as a drain whilst it became infilled with sediment. Terrestrial species are present at all levels but snails particularly characteristic of shaded conditions are not common and there is therefore no evidence for scrub development in the ditch.

Context No.	1061	1061	1130
Depth (cm)	0-10	10-20	20-25
Sample weight (kg)	1	1	1
c.f. <u>Bithynia</u> sp.	1	-	-
<u>Carychium tridentatum</u> (Risso)	1	-	2
<u>Carychium</u> sp.	4	7	1
<u>Cochlicopa</u> sp.	4	3	-
<u>Vallonia pulchella</u> (Müller)	3	-	-
<u>Vallonia excentrica</u> (Sterki)	2	-	-
<u>Vallonia</u> sp.	4	1	4
<u>Clausilia bidentata</u> (Ström)	3	1	1
Clausiliidae indet.	-	-	1
<u>Ceciloides acicula</u> (Müller)	24	45	48
<u>Cepaea/Arianta</u> sp.	2	2	2
<u>Helix aspersa</u> Muller	2	1	+
<u>Trichia</u> spp.	9	3	4
c.f. <u>Helicella itala</u> (L)	-	1	-
<u>Discus rotundatus</u> (Müller)	24	7	8
<u>Euconulus fulvus</u> (Müller)	-	1	-
<u>Vitrea crystallina</u> (Müller)	2	-	-
<u>Vitrea contracta</u> (Westerlund)	1	1	-
<u>Vitrea</u> sp.	2	-	-
<u>Aegopinella pura</u> (Alder)	-	1	-
<u>Oxychilus</u> sp.	-	1	-
Zonitidae indet. (a)	13	5	1
Limacidae	7	6	2
Sphaeriidae (b)	-	1	1
Indeterminate	-	-	2

Notes:

(a) Includes some Aegopinella nitidula in 1061 0-10

(b) Small fragments

Table : Mollusca from 1061

Context No.	1613	1613	1613	1634
Depth (cm)	0-10	10-20	20-30	30-37
Sample weight (kg)	1	1	1	1
<u>Valvata piscinalis</u> (Müller)	1(?)	-	3	3
<u>Bithynia tentaculata</u> (L)	-	3	1	-
<u>Bithynia leachi</u> (Sheppard)	-	-	2	-
<u>Bithynia</u> sp. (operculà)	3	6	13	7
<u>Bithynia</u> sp. (apex)	-	-	-	1
<u>Carychium tridentatum</u> (Risso)	1	-	-	-
<u>Carychium</u> sp.	3	6	1	1
<u>Lymnaea truncatula</u> (Müller)	-	-	2	1(?)
<u>Lymnaea peregra</u> (Muller)	-	-	-	1
<u>Lymnaea</u> sp.	1	-	4(?)	1
<u>Planorbis planorbis</u> (L)	-	4	5	1
<u>Planorbis</u> cf. <u>leucostoma</u> Millet	-	-	-	2
<u>Planorbis</u> sp.	1	-	1	-
<u>Succinea</u> sp.	-	1	1	1
<u>Cochlicopa</u> sp.	-	1	3	-
<u>Vertigo</u> sp.	-	1	-	-
<u>Vallonia costata</u> (Muller)	-	4	1	-
<u>Vallonia pulchella</u> (Muller)	-	-	5	-
<u>Vallonia excentrica</u> Sterki	2	1	4	-
<u>Vallonia</u> sp.	6	13	19	7
<u>Cecilioides acicula</u> (Muller)	34	50	55	89
<u>Cepaea/Arianta</u> sp.	1	1	-	1
<u>Cepaea nemoralis</u> L.	-	-	1	-
<u>Trichia</u> sp. (a)	8	12	3	4
<u>Punctum pygmaeum</u> (Draparnaud)	-	1	-	-
<u>Discus rotundatus</u> (Muller)	3	2	1	3
Zonitidae indet.	2	4	3	6
Linacidae	-	-	1	1
Sphaeriidae (b)	(5)	(7)	(7)	3 + (3)

Notes

(a) 1613 10-20 includes T.striolata and T.plebeia adults

(b) Numbers of valves estimated from fragments.

Table : Mollusca from ditch 1613

6. Other contexts

Brief notes on molluscs from other contexts samples are given here. The assemblages from these samples are far too small to be reliable even for outline ecological interpretation, though the presence of aquatic species is worth noting.

1. 707/710 Iron Age ditch. Three samples from bottom 30cm. Few molluscs, all terrestrial species.
2. 1046/1209 Roman 'inlet' ditch. Central column sample. Predominantly terrestrial spp. though Pisidium valve at 10-20cm and Lymnaea truncatula at base.
3. 1693 Roman ? 'inlet' ditch. Single sample from base. Terrestrial species, no aquatics.
4. 1719 Iron Age ? ditch. Single sample from base. Small assemblage of terrestrial species.
5. 1729 Roman ? 'inlet' ditch. Single sample from base. Mainly terrestrial, two Pisidium valves.
6. 2148 ? Single sample. Mainly terrestrial molluscs, but includes Pisidium valves, Bithynia operculum, Lymnaea sp. and Anisus leucostomia.
7. 2569 ? Single sample. Mainly terrestrial molluscs, includes Bithynia operculum.
8. 3509,4075, Roman depression. Column sample. Assemblages broadly similar to 3278, which is adjacent. Aquatics present at low frequencies throughout deposit, comprising Valvata, Bithynia, Pisidium, Lymnaea.
9. 3714/3713 Roman building slot. Deposits below 40cm in this feature were sampled. Mixed assemblages of freshwater and terrestrial snails are present, though there is no way of determining whether these represent a resident fauna post-dating demolition, or shells dumped into this slot with soil brought from elsewhere at the site.

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Marine molluscs

Fragments of marine mollusc shell were present in most samples (Table). As many of these are non-hinge and non-apical fragments, direct counting is impossible, though the frequencies with which fragments of different species occur in these samples are thought to be a reasonably reliable indicator of their relative importance.

	Number of samples in which present	
	Iron Age	Roman
<u>Ostrea edulis</u> L.	3	28
<u>Mytilus edulis</u> L.	-	25
<u>Cerastoderma</u> sp.	1	2
c.f. <u>Buccinum undatum</u> L.	-	1
<u>Hydrobia ulvae</u> (Pennant)	-	1

Table : Marine molluscs (fragments)

Oysters and mussels clearly predominate. These shellfish were presumably shipped up-river from the Blackwater estuary. The badly abraded shell of Hydrobia ulvae (from 4080) was probably accidentally imported with the edible shellfish. A few shell fragments from an Iron Age ditch (707-710) indicate that this importation of shellfish was of pre-Roman origin.

Other biological remains

The pond and ditch sediments at this site contained some remains of aquatic organisms other than molluscs. 3278 (20-base) produced a single oospore of Chara sp. Ostracod valves were present in most deposits. Amphibian and fish-bone occurred sporadically. Some of the fish-bone represents food refuse, but the bulk of the material is from small fish, including a stickleback spine, and is clearly derived from the resident fish fauna of these ponds and ditches. Besides the marine molluscs and charred cereals, other food debris comprises avian eggshell fragments, bird and large mammal bone fragments. Small mammal bone was recovered from several samples. These miscellaneous biological remains have not been studied in detail, but have been retained for future examination should this be thought worthwhile.

Charred plant remains

The soil samples produced small quantities of charred plant material. Small charcoal fragments were present in most samples, but since the source of this charcoal is unknown, no identifications have been made. With the exception of a charred hazel-nut shell fragment from an Iron Age ditch (710) the remaining material consists of cereal and crop weed remains. Grains, (some of which had germinated before carbonisation), rachis internodes, glume bases and spikelet forks of brittle-rachis wheats comprise the bulk of the cereal remains. Spelt (Triticum spelta) is the predominant species, though a few glume bases are tentatively identified as emmer (Triticum dicoccum). Remains of oats (Avena sp.) occur in small quantities, though it is not possible to determine whether these are from wild or cultivated oats. A few weed 'seeds' are present including Bromus and other grass caryopses, and a single fruit of Anthemis cotula (stinking mayweed), a common weed of cereal crops on clay soils.

94, a layer filling a hollow adjacent to the pond, included comparatively large quantities of bone fragments, oyster shells charcoal and cereal remains, and evidently represents a midden-type deposit. Other contexts at the site produced only thin scatters of cereals.

The activities which produced this material are difficult to reconstruct in these circumstances, but the use of cereal straw and incompletely threshed ears as kindling for domestic hearths and fires could account for its presence.

Context No.	710	94	95	95	1613	1613	1613	1729	1863	2026	2569	3278	3278	3509	3714	37
Depth (cm)	70-80	40-50	50-60	60-55	0-10	10-20	20-30	80-92	68-72	-	-	10-15	15-20	-	40-50	50-
Period	1A								ROMAN							
Indeterminate cereal fragments	-	+	-	-	1	1	2	-	-	1	-	-	-	1	-	-
<u>Triticum</u> sp. (caryopses)	-	11+3*	1+1*	2	-	-	1	-	-	-	1	1	-	-	1*	2
<u>Triticum</u> sp. (sprouts)	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Triticum</u> sp. (spikelet bases)	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Triticum</u> sp. (internodes)	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-
<u>Triticum</u> sp. (internode and glume fragments)	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Triticum spelta</u> L. (glume bases)	-	32	1	-	-	-	-	-	1	-	-	3	1	-	-	-
<u>Triticum spelta</u> L (spikelet fork)	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Triticum</u> cf. <u>dicoccum</u> Schübl (glume bases)	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Avena</u> sp. (caryopses)	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Avena</u> sp. (awn fragments)	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Bromus</u> sp. (caryopses)	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Gramineae indet. (caryopses)	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
<u>Corylus avellana</u> L. (nutshell frag.)	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Anthemis cotula</u> L. (cypsela)	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table : Charred cereals, crop weeds etc.

Germinated grains indicated by asterisk