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Ancient Monuments Laboratory
Report 128/90

A120 TRUNK ROAD, ESSEX:
ASSESSMENT OF ENVIRONMENTAL
ARCHAEOLOGICAL IMPLICATIONS

Peter Murphy BSc MPhil

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Summary

Borehole logs and soil samples from trial pits along the new road-line, traversing some 19km on the Boulder Clay of NW Essex, were examined. The road also crossed six stream and river valleys. It is concluded that at sites on interfluve areas preservation of mollusca, eggshell and bone will be good but fully waterlogged deposits are unlikely to be found. Construction work in the river valleys will, however, expose sections through organic channel fills and other alluvial sediments, suitable for macro - and micro - fossil analysis. From these two complementary sources of information an unusually full picture of palaeoenvironments and economies can be gained. Sampling strategies to maximise the data gained from contractors' and archaeological excavations are outlined.

Author's address :-

Peter Murphy BSc MPhil

Centre of East Anglian Studies
University of East Anglia
Norwich
Norfolk

A120 Trunk Road: Assessment of Environmental Archaeological Implications.

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Peter Murphy, November 1990.

1. Introduction

The new A120 trunk road will traverse a 19km length of NW Essex, crossing the valleys of the Pincey Brook, Roding, Hoblong's Brook, Chelmer, Stebbing Brook and Ter and interfluve areas on the Chalky Boulder Clay Plateau. As part of the field-walking and assessment work undertaken by Maria Medlycott for Essex County Council Archaeology Section records were made of sections exposed in contractors' test pits and small soil samples were collected for assessment purposes. Further data were available from the contractors' bore logs. In this report the information available is summarised and its significance for future archaeological and palaeoenvironmental investigations considered.

2. Objectives

These were as follows:

a) To assess soil conditions on the interfluve areas with a view to establishing the likely preservation conditions for biological remains at sites on dry soils.

b) To establish the depth, extent and types of alluvial deposits in the river valleys and to determine the potential of these deposits for detailed analysis of pollen and macrofossils.

c) To recommend, in outline, sampling strategies for dry sites on the interfluves and alluvial sediments in river valleys.

3. The interfluve areas

These plateau areas between the main river valleys are on Chalky Boulder Clay, on which are developed soils of the Hanslope Association (Hodge et al 1984, 209). Chalky Boulder Clay was seen in a more or less unweathered state at the bases of many of the trial pits. It showed some variation in lithology and colour depending upon the chalk content and whether iron in the clay matrix was oxidised or reduced. Matrix colour varied from dark grey to light yellowish-brown. Typically, however, there was a very firm brown to greyish-brown clay loam matrix, mottled yellowish-brown, containing abundant rounded to subrounded chalk fragments. Surface horizons commonly had a brown clay loam matrix which was partly or wholly decalcified. Most trial pits in the number range 303-318, 323-339, 355-369, 375-398 and 403-404 were cut into Chalky Boulder Clay, though there were some exceptions to this generalisation, notably the deep brownish-yellow silt loam in 304 and some pits on valley slopes where apparently colluvial 'head' deposits derived from the Chalky Boulder Clay were sectioned.

It is therefore clear that most archaeological sites on the interfluves will provide preservation conditions comparable to those encountered during excavations at Stansted Airport (eg Murphy 1988) which were also on the Chalky Boulder Clay with some decalcified surface deposits. It can be anticipated that mollusc shells, avian eggshell and bone will be well-preserved in most archaeological deposits. Carbonised plant material will be present but permanently waterlogged, structured organic deposits are unlikely to be found. Previous experience at Stansted shows that problems of disaggregation are likely to be encountered which may limit the scale of bulk sampling. In summary, the sites are likely to yield useful data on farming economies (from bone and charred cereals etc.) and on <u>local</u> palaeoenvironments (from land molluscs). However, to place sites in a wider context it will be necessary to examine organic alluvial deposits in valley floors and to obtain samples for macro and microfossil analysis from them.

4. <u>The river valleys</u>

Information on the extent and depths of alluvial sediments is provided by the contractors' Borehole logs, whilst the Trial pit sections and samples taken from them provide much more detailed information on the particular types of sediments present.

(i) Pincey Brook
Borehole logs 6 and 508-512 with trial pit 303.

The samples from the trial pit indicate the presence of weathered decalcified almost stoneless till over unweathered till: brown/yellowish-brown clay loam mottled greyish-brown at top (1)-(2); very firm dark greyish-brown clay loam at base (4). In the light of these samples it appears that the superficial clayey deposits recorded in the boreholes are all either weathered till or head, derived from the till, except perhaps in borehole 6, where 'vegetative matter' is recorded in a stiff grey clay at 2.5-2.7m depth. This might be an alluvial sediment. In borehole 510 probable Glacial Lake Deposits are recorded between 3.20 and 10.80m.

(ii) River Roding
Borehole logs 525-6, with trial pit 319 (Fig 1).

From pit 319 samples of the following deposits were examined (Fig 5c):

1. Brown silt loam; fine porous struture; almost stoneless but with rare subangular flints up to 25mm; some fine fibrous roots.

2. Greyish-brown clay loam; yellowish and reddish-brown mottles; moderately stoney with subrounded to subangular flints up to 35mm.

3. Light brownish-yellow coarse sand; rounded to subangular flints up to 15mm.

These evidently represent a thin mineral alluvium up to about 1m thick over Pleistocene gravels. A similar 'brown clay' over gravel is recorded in borehole 526.

(iii) Hoblong's Brook
Borehole logs 46-9 and 535-6.

No samples were available but the borehole logs seem to indicate thin clayey deposits over London Clay and London Clay head. None of the deposits can be confidently interpreted as alluvial sediments.

(iv) River Chelmer
Borehole logs 541-8 with trial pits 352-3 (Fig 2).

Samples from the trial pits were examined. In 353 brown clay loam on dark brown sandy clay loam overlay sands and gravels.

In 352 there was, however, a deep sequence of alluvial sediments, as follows (Fig 5d):

1. Brown clay loam; moderately firm; slightly moist; very slightly stoney with occasional flint and quartzite rounded pebbles up to 20mm; shells of freshwater molluscs (*Armiger crista*, *Pisidium* spp.) and terrestrial taxa (*Pomatias elegans*, *Carychium* spp, *Vallonia* spp, *Vertigo pygmaea*, *Discus rotundatus*, *Trichia hispida*); calcified ?charophyte remains; carbonised wheat grain.

2. Dark greyish-brown silty clay; soft; waterlogged; virtually stoneless; slightly organic with twigs, buds, acorn cupule fragments and fruits/seeds including *Ranunculus sceleratus*, *R.* subg. *Batrachium*, *Cirsium* sp and Alismataceae.

3. Dark greyish-brown silty clay; soft; waterlogged; virtually stoneless; highly organic with abundant leaf fragments, leaf galls, twigs, thorns, buds, mosses, acorn cupules, hazel nuts and fruits/seeds of *R.* subg *Batrachium*, *Filipendula ulmaria*, *Carex* spp. etc; beetles; shells of freshwater molluscs including *Armiger crista*, *Anisus vortex*, *Hippeutis complanatus*, *Bithynia tentaculata*; *Pisidium* spp.

4. Brown clay loam; very stoney with rounded and subangular flints up to 4-0mm; some twigs, leaf fragments, buds, acorn cupule fragments; poorly preserved fruits and seeds; beetles; molllusc shell fragments.

5. Dark greyish-brown clay loam; firm; waterlogged; rare wood and twig fragments.

These deposits, *c.* 2m thick, relate to the valley of Martel's Brook, a tributary of the Chelmer. Some of the borehole logs also apparently record organic alluvial sediments; as follows:

541	0-0.95m	Topsoil on firm brown very silty clay.
	0.95-1.10m	Soft dark brown very silty organic clay, in parts slightly sandy. Occasional fine quartz gravel.
	1.10-1.30m	Brown sandy clay with a little subangular to rounded fine to medium gravel.
543	0-1.50m	Topsoil on firm brown clay with rare fine chalk gravel. At 1.00m rare shell frags.
	1.50-2.80m	Grey brown clay becoming very silty with some black carbonised woody matter. Rare shell fragments.
	2.80m +	Angular to rounded, fine to coarse, flint gravel with occasional quartzite.

The remaining logs record either mineral alluvium less than 1.5m thick on gravel or terrace gravel or head directly beneath the topsoil.

(v) Stebbing Brook
Borehole logs 557-8; trial pits 372/372A (Fig 3).

Trial pit 372A provided a long E-W section, whilst 372 showed slightly deeper deposits. Samples from both pits were examined.

These were as follows (Fig 5 a,b):

1.Brown clay loam; faint yellowish-brown mottles; slightly moist; firm; stoneless; mollusc shells including Lymnaea truncatula, planorbid frags; Pisidium spp; Vertigo pygmaea, Vallonia spp, limacids and Trichia hispida gp.

1A (372A). Thin highly calcareous band within 1; abundant calcified charophyte remains; shells of Succinea sp, Vallonia excentrica, V. sp., Aegopinella pura, Nesovitrea hammonis, Trichia hispida gp.

2.Very dark greyish-brown organic clay loam; slightly moist; slightly firm; stoneless; fairly well humified but with twigs, small wood fragments, fruits and seeds of Lycopus europaeus, Berula erecta, Alisma plantago-aquatica and Carex spp; beetle remains.

3.Greyish-brown silty clay; wet; soft; stoneless; some plant detritus, fruits/seeds of Ranunculus acris/repens/bulbosus, Eleocharis sp, Gramineae; beetle remains.

4A/4B. Black highly organic silty clay; wet; soft; well humified but including some twigs, degraded monocot stem fragments and occasional fruits/seeds of Ajuga reptans, Urtica dioica and Sambucus nigra. Large piece of wood (50 x 8cm) in 4 (372A) is a radially split segment of oak.

5.(372A) Grey clay; wet; plastic; stoneless; very slightly organic with some fine plant detritus.

Borehole 557 just records topsoil on gravels but 558 and 558A show remarkably deep organic 'alluvial' deposits. Down to 9.00m highly organic silts with plant remains and gastropods are recorded and alluvial-type sediments, predominantly mineral but with shell fragments continue to a depth of 18.00m. Apparently this borehole intercepted a Pleistocene channel, into which the Holocene river valley is incised.

(vi) River Ter
Borehole logs 86-7 and 571-2; trial pit 402 (Fig 4).

Samples from alluvial sediments in pit 402 were as follows (Fig 5e):

1.Greyish-brown clay loam; slightly firm; slightly moist; yellowish-brown mottles; virtually stoneless.

2.Dark greyish-brown silty clay loam; moist; slightly stoney with rounded to subangular flints and quartzites up to 30mm; organic, with twigs, fine plant detritus; rare fruits and seeds including Apium and Carex spp; rare fishbones.

3.Brown coarse sandy clay loam; small yellowish-brown mottles; moist; very stoney with rounded to subangular flints and quartzites up to 50mm

4.Grey clay loam; yellowish-brown mottles; very firm; moist; abundant small rounded to subrounded chalk pebbles and rare very small flint pebbles.

The somewhat organic deposit (2) filled a small channel-like feature which could perhaps be artificial. The borehole logs record only mineral sediments, some of which may be alluvial.

(vii) Conclusions

In general terms the trial pits and borehole logs from the river valleys show silty and clayey mineral alluvium usually no more than 1.5m thick over gravels. At some locations deeper alluvial deposits including organic sediments were intercepted and these seem to be channel fills, of Holocene date, though occasionally deep Pleistocene organic sediments are recorded. It was obviously just a matter of chance as to whether the pits and boreholes penetrated sub-alluvial channels.

A provisional interpretation of the sequence in Trial Pits 372/372A in the valley of the Stebbing Brook is as follows:

i) A channel was incised, presumably into sub-alluvial gravels (though these were not seen), or into earlier alluvial sediments.

ii) A basal clay channel fill (5) was formed in a tranquil sedimentary environment, apparently isolated from the main river. The sediment is too fine-textured to indicate stream flow.

iii) Channel infilling continued with deposition of a twiggy detritus mud (4). Humification implies periodic desiccation. The absence of macrofossils from freshwater organisms suggests continued isolation from the main channel.

iv) An alluvial clay (3) was deposited by over-bank flooding over the infilled channel. Macrofossils present imply a wet grassland environment.

v) Conditions in the valley floor became wetter and an orgnic clay loam (2) developed

vi) There was renewed deposition of mineral alluvium by overbank flooding. Mollusca indicate a fairly open, probably grassland environment, intermittently flooded, allowing formation of thin tufaceous deposits.

Trial pit 352 at the valley of Martel's Brook, a tributary of the Chelmer seems to show a broadly similar sequence. The base of the section seems to be through a channel fill including some stoney lag deposits (4) indicating continued stream flow. The upper presumed channel fills (2,3) are highly organic woody detritus muds which may have formed in a locally wooded catchment. The upper mineral alluvium (1) is similar in lithology to, and contains a broadly comparable range of molluscs and charophyte remains to, that in Trial Pit 372.

The date(s) of these channel fills are at present conjectural, though clearly complex sequences such as that in Pit 372 must represent a considerable time-span. Radiocarbon dates on organic sediments elsewhere in Essex river valleys are given in Table 1. Those from the Chelmer valley and Sandon Brook are definitely channel fills overlain by mineral alluvium; the Stansted Brook sections were small but the sediments are likely to have been channel fills also. The limited data available seem to suggest a phase of increased alluviation between about 3800-3200 BP,

River	Site	Depth(cm)	Sediment	Date (uncalibrated)
Stansted Brook	British Rail Culvert.	117-121cm	Fine detritus mud.	1430 ± 60 BP (HAR-9238)
		228-238cm	Woody detritus mud.	3810 ± 80 BP (HAR-9239)
Chelmer	Chelmer Bridge (A12 Chelmsford By-Pass).	185-207cm	Woody detritus mud.	3710 ± 80 BP (HAR-6682) at base. 3200 ± 70 BP (HAR-6683) at top.
Chelmer	Little Waltham (Peglar and Wilson 1978)	250-325cm	Detritus mud.	3360 ± 80 BP (Lab.no not given)
Sandon Brook	Sandon Culvert (A12 Chelmsford By-Pass)	105-143cm	Woody detritus mud.	1770 ± 70 BP (HAR-6580) at base. 860 ± 70 BP (HAR-6570) at top.

Table 1: Dated organic alluvial sediments from Essex river valleys

Data: Murphy (unpublished) except where otherwise indicated.

perhaps related to Bronze Age woodland clearances and agriculture with consequent increased run-off and soil erosion. Some of the channel fills are, however, much later in date. Obviously further dated deposits would help to establish whether the changes in valley sedimentation observed are related to widespread penecontemporaneous changes in land use or whether each catchment had its own distinctive land-use history.

Preservation of biota in these deposits was generally good: all of them included plant macrofossils and pollen was well-preserved, except in the Chelmer Bridge detritus mud, which showed evidence of periodic desiccation. In general, however, valley sediments in this area will yield good palaeoenvironmental data relating to vegetational change.

5. Recommendations for future work

At excavated archaeological sites on the road-line large-scale sampling and flotation/bulk-sieving to retrieve bone, shell and carbonised plant material should be undertaken. Since the clay-based deposits at sites on the Chalky Boulder Clay are difficult to disaggregate the samples will have to be processed manually, using the methods outlined in Murphy (1987): machine flotation would be totally ineffective. This will pose limitations on the soil volume which it is possible to process but experience at Stansted Airport shows that perfectly adequate assemblages of material can be obtained. The logistics of sampling and processing have been well-established at Stansted and identical procedures can be followed.

Contractors' excavations in the river valleys need to be closely monitored. These will be of two types. Where embankments are to be constructed removal of potentially unstable sediments (alluvial clays and detritus muds) down to the terrace gravels will be undertaken. At the sites of bridges and culverts new channels will be dug prior to lining with concrete and diversion of rivers from their former courses. Both types of excavation will expose extensive sections across floodplains but experience at the A12 Chelmsford By-Pass shows that such sections are commonly exposed only for very brief periods. Close liaison with the contractors will therefore be needed to ensure that no exposures are missed. The rational for studying floodplains has been outlined by Needham (1989). The objectives here will be to record sections, to define channel morphology and alluvial parcels, (so far as the sections allow), to obtain samples for radiocarbon dating from appropriate contexts and to collect samples for analysis of pollen and macrofossils. Obviously, at the same time, archaeological deposits or structures <u>within</u> the alluvial sequence (which may include wooden structures) and <u>beneath</u> it (these may include surface-intact sites) need to be recorded.

In summary, construction of the new A120 provides an excellent opportunity to obtain complementary data from dry-land archaeological sites and river valley deposits. Contractors' excavations through the latter will provide - free of charge - sections which, if undertaken as part of an archaeological survey, would call for substantial funding. It is important that the opportunity to investigate both dry and wet sites should not be neglected.

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Figure Captions

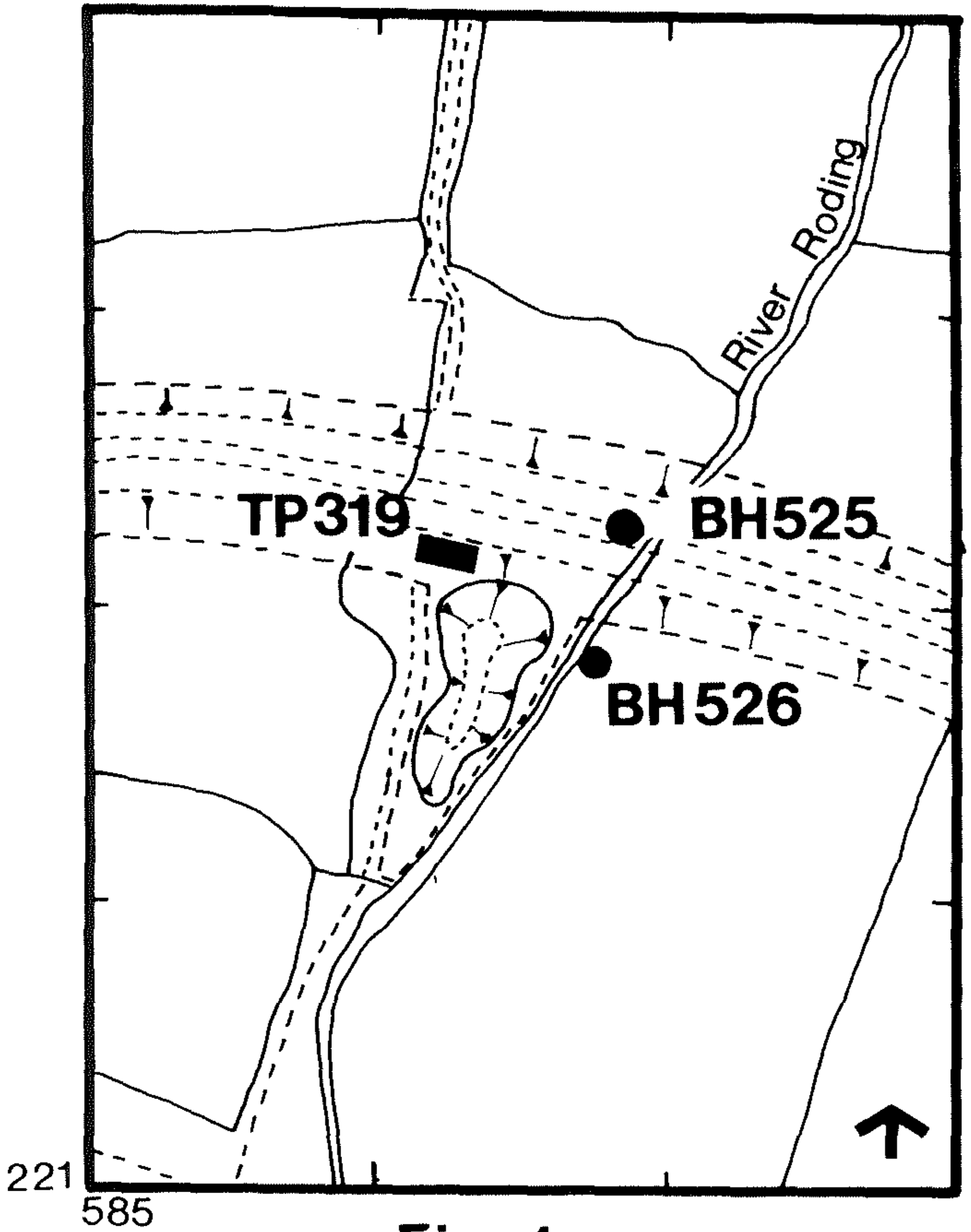
Fig 1: Roding Valley. Locations of trial pits and boreholes.

Fig 2: Chelmer Valley. Locations of trial pits and boreholes.

Fig 3: Valley of the Stebbing Brook. Locations of trial pits and boreholes.

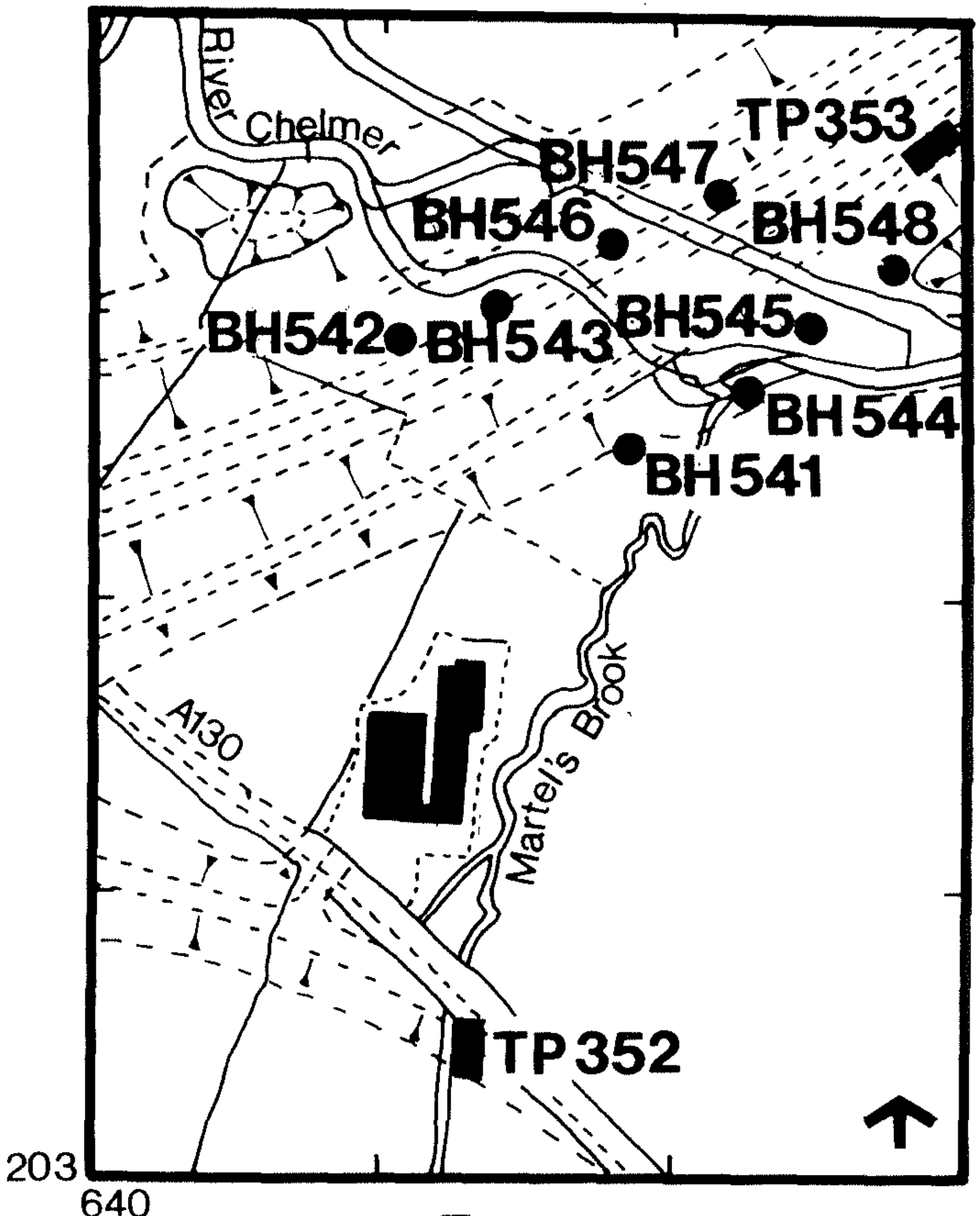
Fig 4: Ter Valley. Locations of trial pits and boreholes.

Fig 5: Sections in Trial pits 319, 352, 372 and 402. Organic sediments shown black, predominantly mineral sediments white, top soil cross-hatched. For full sediment descriptions see text.



River Roding
TP319
BH525
BH526
221
585

Fig. 1



River Chelmer
TP353
BH547
BH546
BH548
BH545
BH542
BH543
BH544
BH541
A130
Martel's Brook
TP352
203
640

Fig. 2

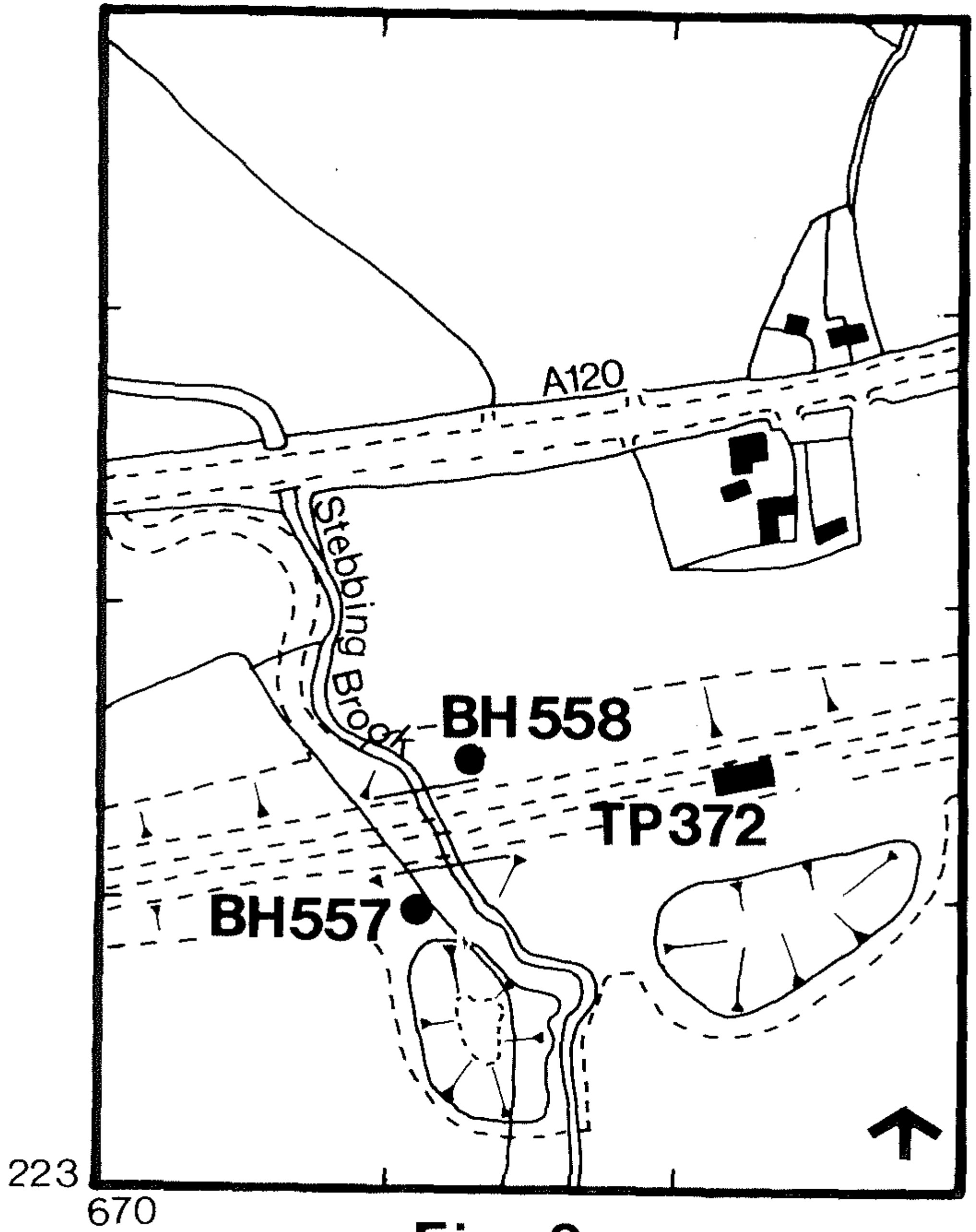

A120
Stebbing Brook
BH 558
TP372
BH557
223
670

Fig. 3

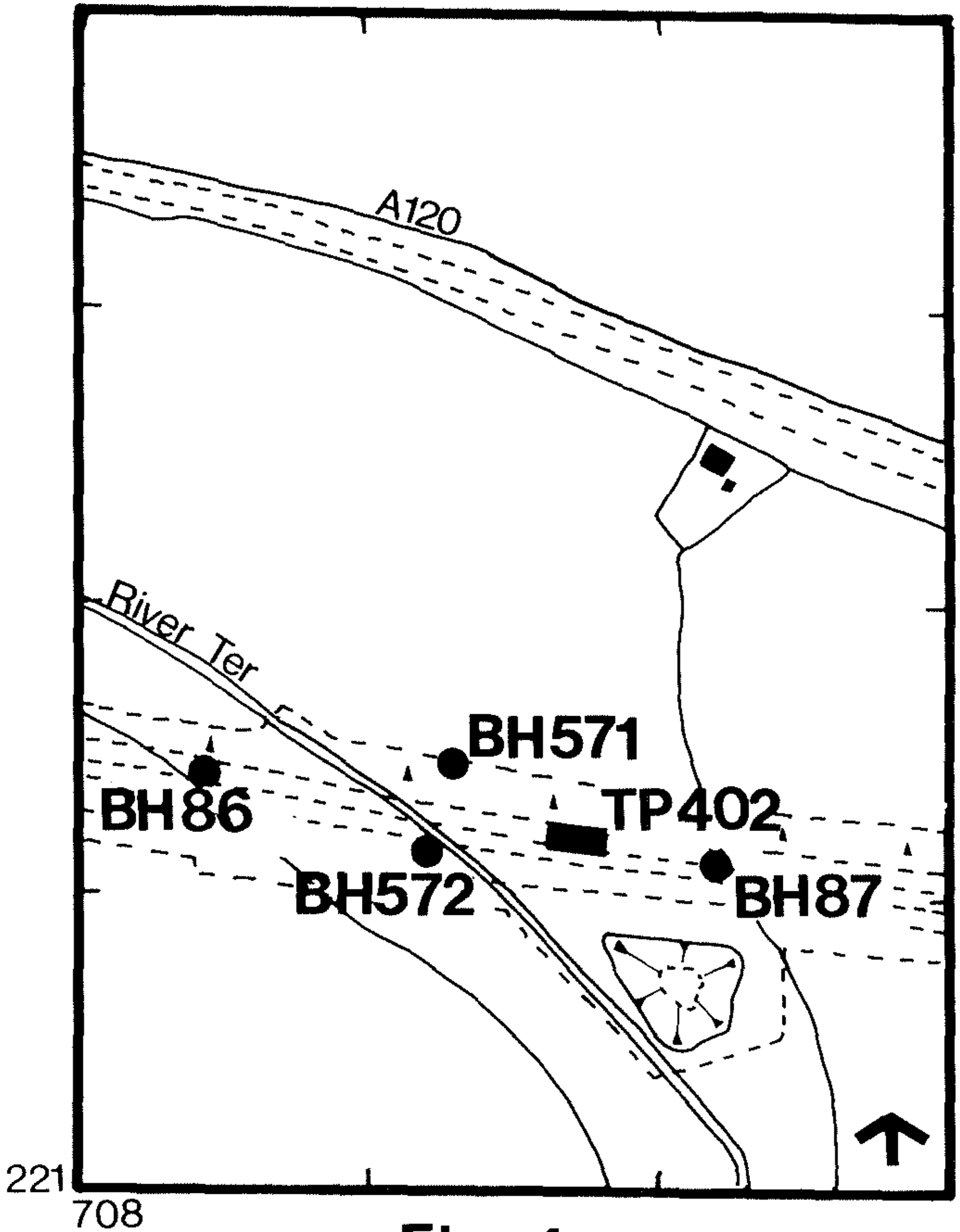
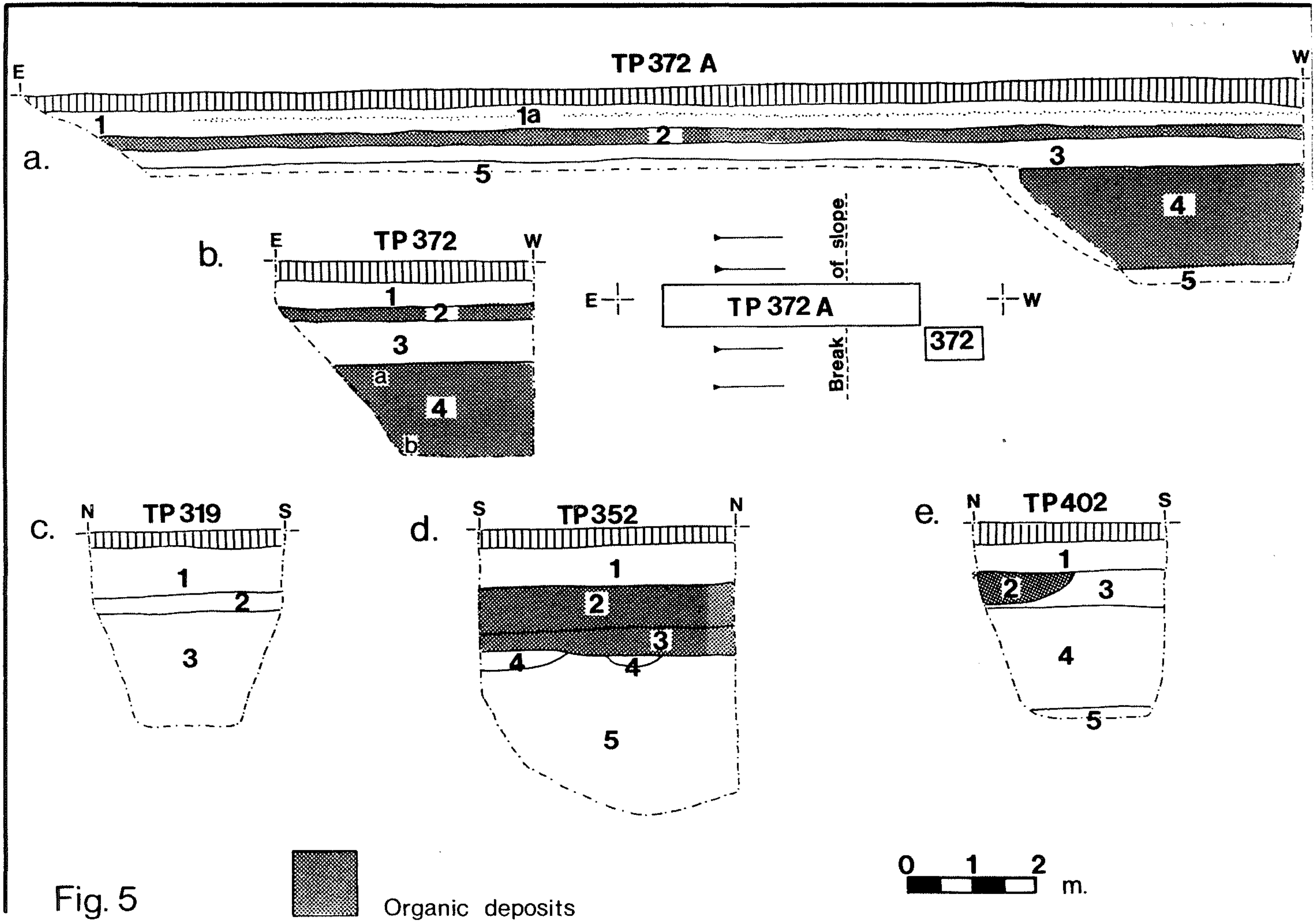

A120
River Ter
BH571
BH86
TP402
BH572
BH87
221
708

Fig. 4



TP 372 A
E
W
1
1a
2
3
4
5
a.
b.
TP 372
E
W
1
2
3
4
a
b
E
W
TP 372 A
372
of slope
Break
c.
TP 319
N
S
1
2
3
d.
TP 352
S
N
1
2
3
4
4
5
e.
TP 402
N
S
1
2
3
4
5
Organic deposits
0
1
2
m.

Fig. 5

Appendix: Cultural layers in trial pits

Samples from contexts containing artefacts were examined.

Trial pit 306, Layer 1

In this pit, north of Takeley, a small medieval feature was sectioned. It was cut into Chalky Boulder Clay and its fill was of re-worked Till. The fill included a few fragments of charcoal with shell fragments of *Trichia* sp. but there was no indication of the feature's function.

Trial pit 336, Layer 1

This pit was on high ground, on the Boulder-Clay S.W. of Great Dunmow. A thin layer of fired clay (1) was noted beneath the topsoil. A sample contained fired clay fragments, burnt flint and small charcoal flecks with shells of *Candidula* and *Vallonia* spp. but these provide no information on the function of the feature.

Trial pit 359, Layer 1

The pit, to the east of Dunmow showed a thin decalcified clay loam (1) over chalky till. It produced medieval sherds and charcoal flecks but nothing more.

Trial pit 363, Layer 1

This layer was the clayey fill of a post-medieval ditch, cut into apparently decalcified clay, just to the S.E. of 359. It produced a well-preserved mollusc fauna in which 'shade' taxa (*Discus*, *Clausilia*, Zonitids) predominate. Interpretation as a field ditch with adjacent hedgerow seems probable.

Trial pit 374, Layer 1

This pit was located on the slope at the eastern edge of the valley of the Stebbing Brook. Beneath the topsoil a 20cm thick layer of ? sandy clay loam, with medieval pot,(1), overlay gravel on loose sand deposits. It included abundant charcoal with carbonised grains and rachis nodes of bread wheat (*Triticum aestivum* s.l.), a barley rachis node (*Hordeum* sp.) and some arable weed seeds including *Silene* sp. Fired clay fragments were present. From the small sample available it is only possible to say that some form of cereal processing in the vicinity is indicated.

In summary, these layers in the trial pits are not particularly informative but do serve to confirm that good preservation of mollusca and, hence, bone can be expected at most sites.