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The Fenland Project, Number 1: THE LOWER WELLAND VALLEY, Volume 2

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EAST ANGLIAN ARCHAEOLOGY

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Archaeology and Environment in the Lower Welland Valley Volume 2

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Cover Illustration Cropmarks in the region of the East Field, Maxey, photographed in ripening corn (21.6.66), looking North.
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by W.G.Simpson

Introduction

In 1960 the Royal Commission on Historical Monuments (England) published *A Matter of Time*, a survey which highlighted the increasing threat of gravel quarrying to extensive areas of ancient settlement revealed by aerial photography on the alluvial and glacial sands and gravels of England. This problem had already been of concern to the Council for British Archaeology for some years. Its Welland Valley Research Committee, whose members included amateur and professional archaeologists and representatives of local authorities and gravel quarry companies, had, from the late 1950s, organized rescue excavations on some of the more important threatened monuments on the extensive gravels of South Lincolnshire and North Cambridgeshire. Following publication of this survey the time seemed ripe to appoint a full-time archaeologist to plan and co-ordinate a programme of rescue excavation. The (then) Ministry of Works and the Pilgrim Trust agreed to provide the greater part of the financial backing for a period of three years and, in addition, a public appeal for funds was launched. In July 1962 the writer took up the appointment of the Welland Valley Research Committee's first full-time archaeologist.

A number of areas of cropmarks on the Welland gravels were under threat of destruction from quarrying at that time. Of these perhaps the most important was a large 'henge-like' monument associated with a cursus and other ring-ditches and rectangular enclosures at Maxey (OSGR TF 125 077), north Cambridgeshire. The site was one of the most impressive discoveries made on the Welland gravels by air photography in the immediate post-war period by Dr J.K.St.Joseph, flying from Cambridge. Quarrying in the late 1940s had already destroyed a small part of the site and in 1957 another larger part of the complex was again under immediate threat. In the closing days of 1957 and the early part of 1958, in the worst of winter weather Dr John Alexander, travelling daily, with volunteers, from Cambridge, undertook a gallant two week rescue excavation financed by the Ministry of Works. Although Dr Alexander was able to achieve most of his limited objectives (see Chapter 1, part II), clearly a site of this size and complexity deserved a longer and more thorough examination. It was therefore most fortunate that the immediate threat receded and did not re-emerge until the time of the writer's first acquaintance with the Welland valley in 1962.

By this time gravel quarrying had already begun in the western part of field OS 125 in which part of the site lay. The quarry owner, Mr A.Crowson, readily gave permission for excavations to be undertaken and greatly assisted the work by allowing stripping of topsoil to be undertaken on a number of occasions with the quarry dragline-excavator under the direction of the site supervisor. The site was excavated in three stages — the West area July-October, 1962; the North area, April-June 1963; and the Central (mound) area, July-September, 1963.

I. The Site and its Setting

The site of the excavations lies on First Terrace gravel at an average height of 9.40m OD, immediately west of the excavations described in Chapter 2 (Figs.14,40). The early form of the place-name is *Macuseige* meaning Maccus's Island. The identity of Maccus is now lost, but evidence of the island can be seen in the topography of the medieval and modern landscape. The precise size and shape of the 'island' would have changed over time, but the site we are concerned with lies towards the south-central part of the 'island', as defined by soils (Figs.3,5). Soils and geology are discussed by Dr French in Chapter 1, part III.

A very good impression of the site's setting is provided by Dr St.Joseph's air photograph (Pl.I; also R.C.H.M. 1960, frontispiece). The Maxey cursus is clearly visible. It runs diagonally across the 'island' from the bank of the river in the north-west to the former flood channel (the Maxey Cut) in the south-east. About the middle of its course, in the foreground of the photograph, it changes direction by about 12° to northward. Unfortunately the actual point of this change was destroyed by a gravel pit in the 1940s.

The other major monument is the large, circular henge-like ditch *c.*126m in diameter with, at its centre, a more substantial circular ditch *c.*40m in diameter enclosing a mound (Fig.168,IV). The outer ditch can be seen to have an entrance gap on the east side but the central ring-ditch is continuous.

Apart from these two major monuments — the cursus and the henge — other shorter linear features and smaller circular and rectilinear enclosures can be seen on air photographs of the site. At the extreme north two parallel ditches defining a droveway or road are clearly visible (Pl.I; Fig.168, VII). The droveway can be traced as a cropmark westward to the vicinity of the church where it becomes lost in the dense tangle of cropmarks. It can also be traced across the next two fields to the east to a series of rectangular enclosures (Chapter 2, Phases 7-9). Collection of surface pottery indicates considerable

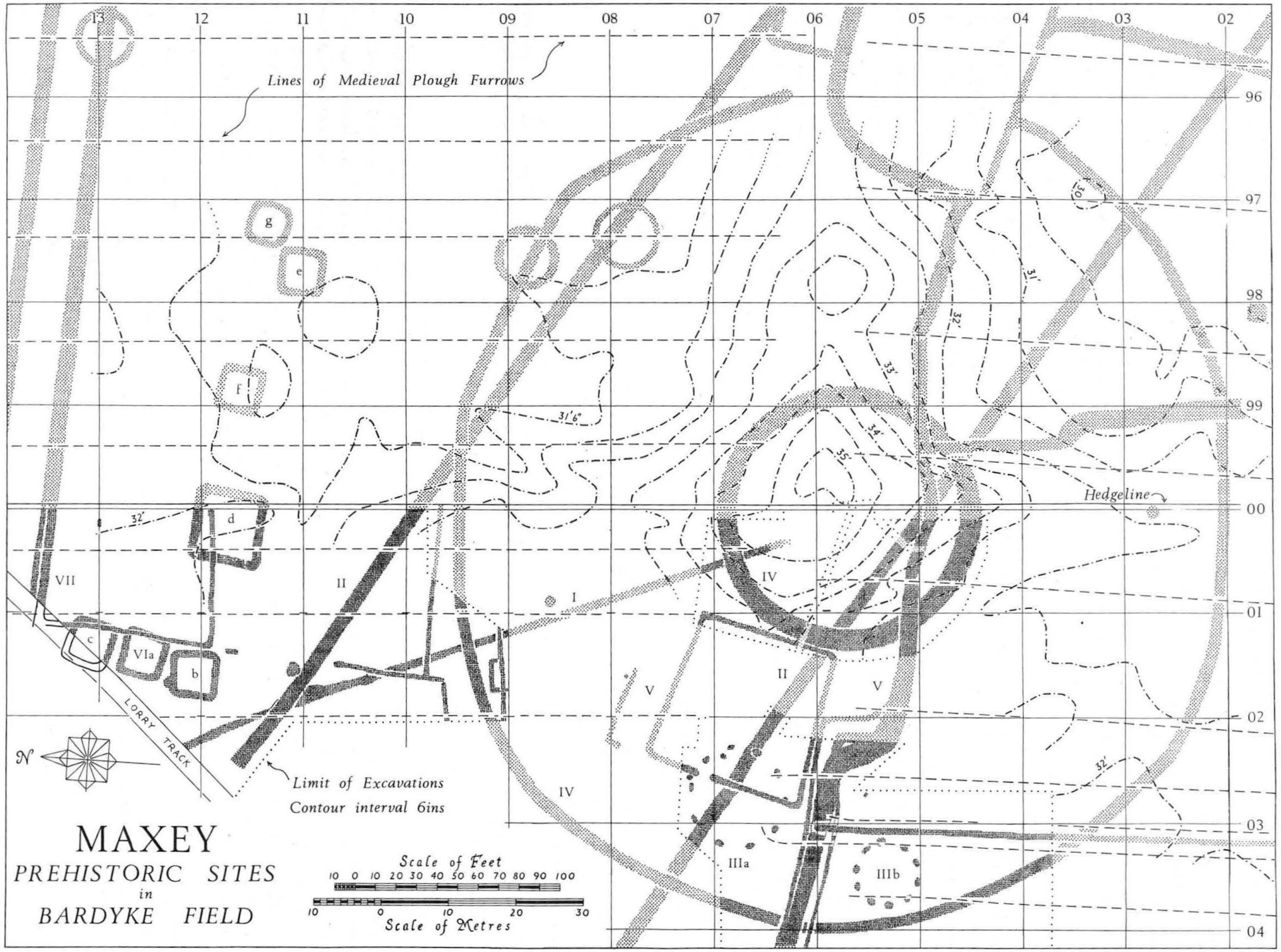


Fig.168 Maxey, Bardyke Field: site plan. The Roman numerals refer to groups of features discussed in the text. Note orientation. Scale *c.* 1:800.

settlement of these periods around the church also. The distance between the two settlements is over half a mile.

The linear features generally show up well in the air photographs. Apart from the ditches of the cursus (Fig.168, II) two others intersect the ditches of the henge and its central mound (IV). A straight ditch-like feature (I) extends from the central mound north- west until it is truncated by the lorry track along the edge of the old quarry.

The other feature (V) follows a much more sinuous course in an east to west direction. It extends right across the henge monument (IV) but avoids passing through the centre of the mound by making an abrupt turn to the south for a distance of *c.*10m. Whether this was to avoid disturbing any burial which might have been presumed to lie there, or whether to avoid some other feature of the landscape, such as a large tree, is not obvious. Adjacent to the ditch at this point, between it and the ring-ditch of the central mound, can be seen, on some air photographs, the faint outlines of a rectangular enclosure. The linear ditch ends just beyond the east side of the henge where it makes a T-junction with a ditch running north to south (Fig.168, Site Grid 954 038). In the north-west angle of the junction is another rectangular enclosure, slightly larger than that just mentioned. This latter ditch cannot be traced very far north of the T-junction but to the south it extends for a distance of *c.*280m. Another north to south ditch (Site Grid 994 050 - 990 020), which seems to join the main ditch (V) in the area of the central mound, can also be traced south for a similar distance. To the west of the henge monument the main ditch (V) can only be traced on air photographs for a distance of *c.*90m. It seems to decrease in width and its cropmark becomes increasingly obscured by the greater depth of soil of a medieval plough headland which overlies the course of the ditch for its total length of *c.*230m.

The most ubiquitous linear cropmarks over Welland gravels are the parallel lines which mark the deeply cut 'furrows' dividing the individual sections or strips, usually *c.*8-15m wide, of the medieval Open Field System. Because they are made by ploughing and usually cut into the gravel the extent of their damage to ancient monuments is often considerable and is discussed below. On air photographs of this site they can be clearly seen running north to south and are marked on the site plan as dashed lines (Fig.168). It will be noticed that the furrows to the south of site grid line 06 are on a slightly different alignment to those north of it. This east to west line corresponds on the ground with the centre line of an earthen bank *c.*45m wide, which is visible on air photographs, and is, to some degree, picked out by the contour survey made of its eastern part (Fig.168). An early 18th century survey of Maxey-with-Deepingate, drawn about a century before the Parish was enclosed by act of parliament, marks this and other banks or 'ways' and shows them defining furlongs or subdivisions of the Open Field (see Northants. Record Office: *Fitzwilliam Miscellany* 99). Documentary sources as early as the 14th century refer to them by the same names as are used in the 18th century survey, showing that they were also a feature of the medieval landscape (Perrott 1980; for a general discussion of medieval fields in the Welland region see Hall, Chapter 1, part IV). Both these sources identify the field in which the site lies as Bardyke Field.

The lesser monuments of the site—rectangular enclosures, shallow circular features and pits—do not generally show up well on the air photographs. For example, the small square and rectangular monuments at the north end of the site (Fig.168, VI a-d) were almost wholly unsuspected until revealed following the stripping of topsoil by the gravel company in preparation for quarrying. Subsequent search of air photographs showed that they were discernible as very feint cropmarks and that others, showing more clearly, could be identified in the next field to the east (VI e-g). Of the larger rectangular enclosures (VII) defined by shallow ditches which, in places, overlie them, no trace can be seen on air photographs. They presumably relate to, and are contemporary with, the droveway or road defined by ditches to the north of them.

Three ring-ditches, of diameter 8-10m, can be identified in the unexcavated north-east sector of the site. They are likely to enclose small burial mounds of the Bronze Age. The excavation of one of these, on the line of the outer ditch of the henge (976 087), would be helpful in establishing the period of construction of the latter more precisely. The two circles of pits in the west part of the site (III a & b) both show as cropmarks on air photographs but the smaller (III b) shows up very much more clearly than the larger (III a) as the latter lies beneath the accumulated soil of the medieval boundary bank. Apart from these pit-circles, individual pits are remarkable for their almost total absence, not only on the air photographs, but also in the areas which were examined by excavation.

II. The Excavations

A note on the site grid

The grid is based on 50ft. squares (Fig.168), sub-divided into tenths. Grid references are given in 5ft. increments westing and northing.

Soils and geology

The soils and geology of the region have been discussed at length by Charles French (Chapter 1, part II) and need not be considered further here. Periglacial features, however, often closely resembled archaeological features and an example is illustrated (Figs.168, I; 169, top left). Original drawings and photographs of this feature have been shown to Mr Ian Bryant, Dept. of Geology, University of Nottingham. He was able to identify it as an ice-wedge (*cf.* Evans in Wainwright 1972, 77-86). The characteristic features are its width and depth, the clay filling with a darker (organic) clay at its centre, the sagging of the layers and the way the strata of the surrounding gravel had run in down the sides.

The Cursus (Figs.168, II; 169-72)

Both ditches of the cursus monument were located. They are *c.*58m apart and 2m wide and surprisingly shallow, usually not more than 30cm deep and hardly cutting the gravel surface. The reason for this might be that there are areas of the gravels which are strongly calcified and where this occurs they have the hardness (and appearance) of concrete. If it was important for the builders of the cursus that the ditch bottom should be level then shallow ditches dug only into the soil levels were practically the only possibility.

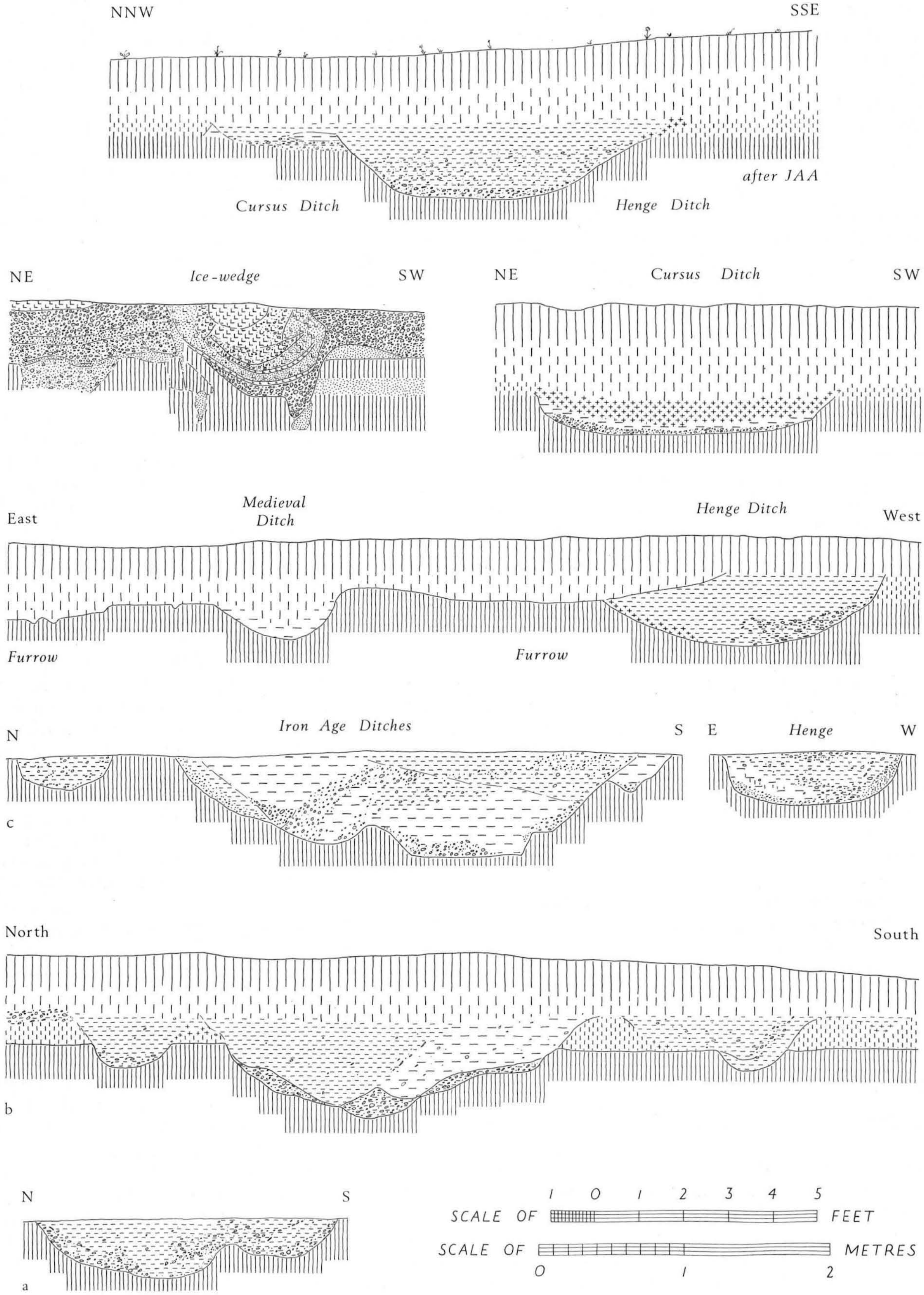


Fig.169 Maxey, Bardyke Field: sections through the ice-wedge, cursus, henge ditch and Iron Age boundary ditch. Scale *c.* 1:40.

This problem was particularly apparent with the north ditch which does not show on air photographs. The soil cover was cleared from the ground surface in this area by mechanical excavator. Only the NW part of the ditch (NW of Site Grid 014 109) was cut a few centimetres into the gravel. To the SE the gravel surface as far as the eastern limit of the site was much calcified and the course of the ditch was only apparent from a few surviving patches of fill or staining on the gravel surface. On plan (Fig.168) this part of the ditch is projected from that which was found to the NW rather than being observed and planned on the ground. The only remarkable fact about the north ditch was that it came to an abrupt, square-cut end just inside the NW boundary of the site. Whether this marks one side of an entrance into the enclosure or the start of the cursus on its new alignment, or both, is unfortunately not clear.

By contrast the south ditch was located in the two areas examined, surviving to a depth of *c.*30cm. In the area of pit-circle IIIa (Fig.169) it had been protected from recent plough damage by the overlying plough headland and, further to the east, was still better protected by the prehistoric mound within the ring-ditch (IV). The excavations showed the ditch to be earlier than all other features of the site with which it came into contact (IIIa, inner and outer ditch of IV, and enclosure V with boundary ditch).

Dr Alexander located the south ditch at two points on his Site 3 in trench XIII, at its intersection with the outer ditch of the henge (IV) and just inside pit-circle IIIa (see Fig.170A). His section across the intersection is shown in Fig.169(top). It is aligned approximately north to south and so cuts both ditches obliquely. At the north end of the section the cursus ditch, *c.*22cm deep, can be seen underlying the tail of the plough headland and cut through the orange-brown subsoil just into the top of the gravel. Probably about half its width has been cut away by the outer ditch of the henge (IV). Alexander described the levels filling the cursus ditch, from bottom to top, as yellow-brown gravel; brown clay and gravel; oil-black clay and brown clay. The latter fills both the upper part of the cursus as well as the henge ditch. The triangle of very dark soil underlying the orange-brown subsoil at the north edge of the ditch was interpreted by Alexander as a collapse of topsoil into the ditch.

A similar relationship could be seen between the cursus and the ring-ditch enclosing the mound. In the area of the intersection the quarry operators had already removed the topsoil to the gravel surface before the start of excavations. At this level the ring-ditch could be clearly seen to be intersecting the cursus ditch (Pl.XXII).

The ditch was excavated within the area of pit-circle IIIa and for a distance of *c.*5m SE of it. In this area it was just over 2m wide and at least 30cm deep, with shallow sloping sides and a flat bottom. The section (Fig.169 at Site Grid 020 064) showed dirty gravel lying on the bottom with dark brown soil overlying it, both of which probably result from processes of natural in-filling. Above this most of the ditch was filled with a brown loam speckled with bright orange soil (most probably oxidisation mottling — C.French, pers. comm.), which appeared indistinguishable from the zone of undisturbed soil between the surface of the gravel and the bottom of the former cultivated soil. It was 8-10cm thick and was all that remained of the natural orange-brown subsoil in this area.

The cursus ditch was also totally excavated within the inner ring-ditch (IV) almost to the hedgeline at the eastern edge of the site. It was cut by the ring-ditch and buried beneath the turf mound. Beneath the protective covering of the latter it survived undisturbed and, presumably, much as originally constructed. It was 1.8m wide and just under 30cm deep. The two sections across it (Fig.171-2) indicate that the ditch was already quite well filled when the mound was built. This was best shown by the very black sandy soils against its sides, which contrasted strongly with the overlying dark or reddish brown loam of the decayed turf of the mound. They seemed to be soils heavily mineralized by manganese deposits which have also blackened the gravel bottom of the ditch and even cemented the sand into a hard discontinuous pan (Fig.171-2) 2.5cm thick. Elsewhere the filling seemed to be less heavily mineralized by iron deposits, as was shown by the orange speckling of the dark brown soil filling the southern half of the ditch.

The soil cover of the gravel before the mound was built seemed to have been at least 10-15cm and the ditch was cut through this and about the same depth into the gravel surface. The spoil dug from the ditch would therefore have consisted of a mix of soil and gravel — an important point to bear in mind in the search for an associated bank. No conclusive evidence of such a bank was found anywhere on the old land surface beside the ditch. Only in one area, on the north side of the ditch, was the stratification suggestive of a low bank (Fig.171). Other areas of stony orange-brown soil were found beneath the mound but these seemed to be only local variations in the old ground surface. The soil horizon overlying the gravel, however did not have the uniform characteristics when sealed below the turf mound, as elsewhere on the Welland gravels. The old ground surface and features cut into it were often very difficult to identify.

Although no bank was identified a number of post-holes were associated with the ditch. Just west of Pit 1 of pit-circle IIIa and immediately beyond it, five post-holes were found along the south lip of the ditch (Fig.170). They were set back *c.*30cm from it and were 15-25cm in diameter and *c.*10cm deep. The westernmost appeared to cut into the fill of Pit 12.

The only other feature which might possibly be contemporary with the cursus was a large pit near its centre just to the north of Feature 1 (Fig.168, Site Grid 009 086). Surprisingly it does not show on any air photograph. As no other features of interest show in that area no attention was given to it before quarrying operations started so that the pit was only discovered after most of its filling had been removed by mechanical excavator. Enough survived *in situ,* however, to show that it had originally been *c.*4-5m in diameter and at least 76cm deep; it post-dated Feature 1. Much, or perhaps all, of the fill was grey/black silt and peat-like material, indicating that the pit held water and the filling had always been waterlogged. The pit may have been dug as a waterhole, pond or well.

The peaty filling included twigs, small pieces of wood, leaves and hazel-nut shells. A sample was taken for pollen analysis from near the bottom of the pit but unfortunately Dr J.R.Pilcher of the Botany Department, The Queen's University, Belfast reported that it contained insufficient pollen for an analysis to be made,

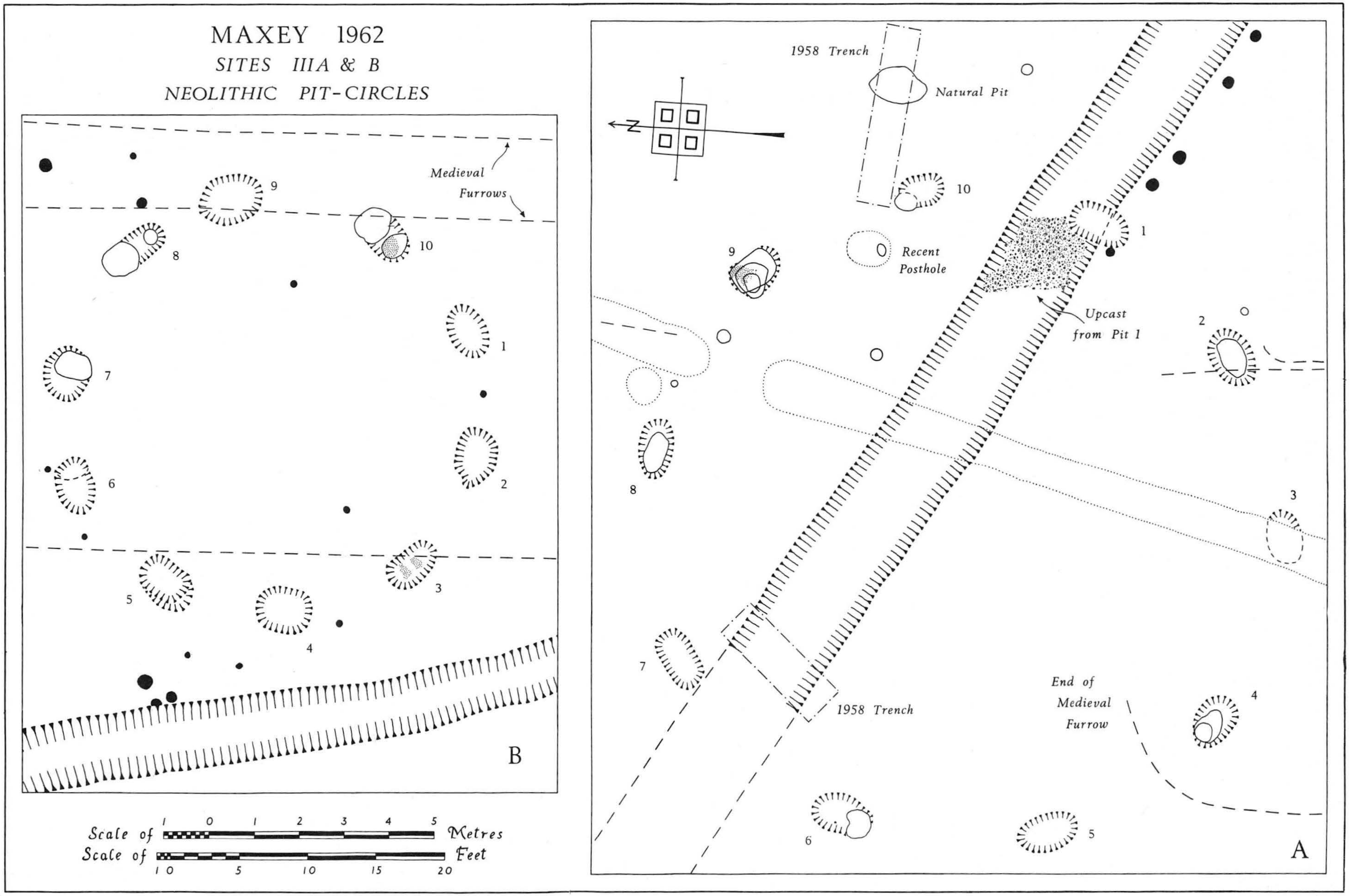


Fig.170 Maxey, Bardyke Field: plan of pit-circles III A (right) and III B (left). Note orientation. Scale *c.* 1:100.

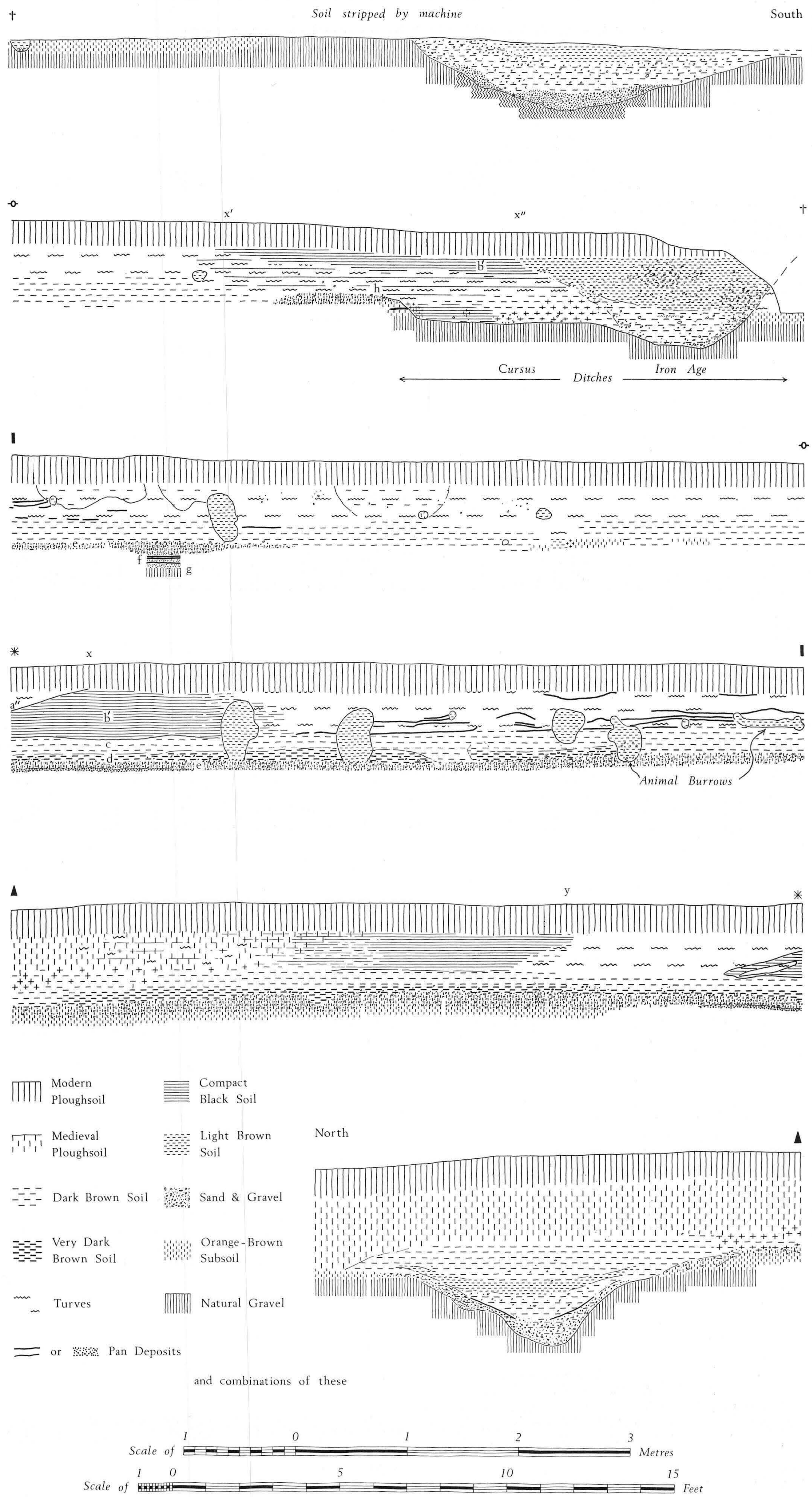


Fig.171 Maxey, Bardyke Field: sections through the central mound and ditch (continued in Fig. 172). Scale 1:40.

although a wide range of weed species' pollen was identified, suggesting open farmland. Samples of the wood were sent to the Royal Botanic Garden, Kew, and alder, ash, oak and *Prunus* sp. were identified (see Appendix VI).

Finds from the pit filling were few: a Neolithic polished stone axe of Group VI rock (identification by Professor F.W.Shotton) and nine sherds from a vertical rim bowl in poorly fired black, shelly fabric might also be Neolithic. There was also a large piece of unworked carboniferous sandstone — possibly Triassic millstone grit (identification by Dr W.A.Cummins, University of Nottingham).

The pit-circles (Fig.170,A and B;173,174; Tables 42 and 43).

Both circles are visible on air photographs though the larger, northern one (A) shows less clearly due to the overlying medieval headland. Each circle is composed of ten oval pits all much the same size. Those of circle B (Fig.170) are more closely spaced (on average 1.55m apart) than in the large circle (average 3.1m) and lie on a circumference of radius 4.65m and 7.1m respectively. The dimensions of the individual pits, particulars of the finds they contained and other significant details are set out in Tables 42 and 43.

					BONE			
Pit No.	*Length*	*Width*	*Depth*	*Pot-Sherds*	*Unburnt*	*Burnt*	*Charcoal*	*Recut*
1	135	84	40	—	Teeth & frag. of Skull	—	Trace	?
2	135	84	48	3	—	—	Trace	✓
3				Cut by Iron Age ditch				
4	120	86	30	1	—	—	Trace	?
5	135	78	17	—	Tooth	—	✓	—
6	137	86	30	—	—	—	✓	✓
7	142	78	20	—	—	—	✓	—
8	128	85	48	1	Tooth	—	✓	✓
9	118	86	35	—	Frag. Skull, Meta-podial long bone & Tooth	—	Much	✓
10	120	75	30		—	—	—	✓

External radius of circle 7.48m
Internal radius of circle 6.70m

Table 42: Features of pit-circle A

Little or no orange-brown subsoil survived over the gravel in the area of the circles. It must be assumed therefore that the pits have lost the top 15-20cm and perhaps even more on the east and west sides of Circle B, where medieval ploughing has cut into the gravel. Some of the pits had an even profile and a uniform fill of light brown soil mixed with gravel (e.g. Fig.174, 1 and 9) but this was unusual. It seemed probable that they had been refilled soon after digging for there was no sign of weathering of the sides. Other pits seemed to have had a similar filling initially but had subsequently been re-cut and/or enlarged (e.g. Fig.173,8 and 9; Fig.174,3,5 and 10). This bipartite, or two phase, character of many of the pits was usually obvious from the unevenness of their profiles (e.g.Figs.173,1; 174,2,6 and 8), from irregularities in their outline on plan (Fig.170, A9 and 10; B8) or from stratification of their fillings (Figs.173,8; 174,3). Secondary fill often consisted of a high proportion of gravel-free dark brown soil, usually towards the top. In about half the pits of circle A this soil filled a depression the shape of a halved pear. In other pits it filled post-like shapes (e.g. Fig.174, 3 [double] and 10 [single]) but it did not often reach to the bottom of the pits, which are not deep enough to have held substantial posts and the wrong shape to have held single posts. Pit 3 of Circle B (Fig.174) might seem to have contained the stumps of charred posts but the preferred interpretation is that two small scoops have been dug into the filling of the original pit and fires lit, or ashes from the hearth placed, in them. Only Pits B2, 3 and 10 and A9 contained any quantity of charcoal but a similar explanation must account for the evident re-cutting of many of the pits.

					BONE			
Pit No.	*Length*	*Width*	*Depth*	*Pot-Sherds*	*Unburnt*	*Burnt*	*Charcoal*	*Recut*
1	135	86	28	—	—	—	Trace	—
2	130	91	36	—	—	small	✓ mam-mals	✓
3	128	89	36	—	—	—	✓	✓
4	120	99	40	—	3 teeth, skull & mandible frags.	—	Trace	?
5	120	91	41	—	3 teeth & frag mandible	—	—	✓
6	125	84	50	1	2 teeth	—	Trace	—
7	130	101	35	—	—	—	Trace	?
8	150	75	20	1	—	—	Trace	✓
9	145	110	28	—	—	—	Trace	—
10	140	91	32	1	—	✓	✓	✓

External radius of circle 5.15m
Internal radius of circle 4.26m

Table 43: Features of pit-circle B

Finds were not common in any of the pits. The high proportion of teeth found is perhaps only because they survive better than the rest of the skeleton in acid soil conditions, although the fragments of skull and leg bones make one think of a 'heads and hoofs' explanation! Samples of the charcoals found were sent to Professor G.W.Dimbleby for identification. He reported (see Appendix VI) that oak, maple, willow, hawthorn, blackthorn and alder were represented. From Pit 7 of Circle A came two grains of hulled barley *(Hordeum* sp.). Samples of oak charcoal from a pit in each circle were sent to the radiocarbon dating Laboratory at Gakushuin University, Tokyo, Japan for analysis. The results were (July 1965):

GaK-657 Circle A Pit 9 1730 ± 90bp
GaK-658 Circle B Pit 3 1640 ± 90bp

The results are inconsistent with the archaeological evidence. Contamination from the overlying medieval plough furrow might account for the later than expected result from B3 but it is less easy to explain that from A9.

Fewer than ten sherds of hand-made pottery were found in the pits. All were similar, featureless body sherds of slightly corky black fabric with brown surfaces but a rim came from Pit 4 of Circle A (Fig.177,4). It

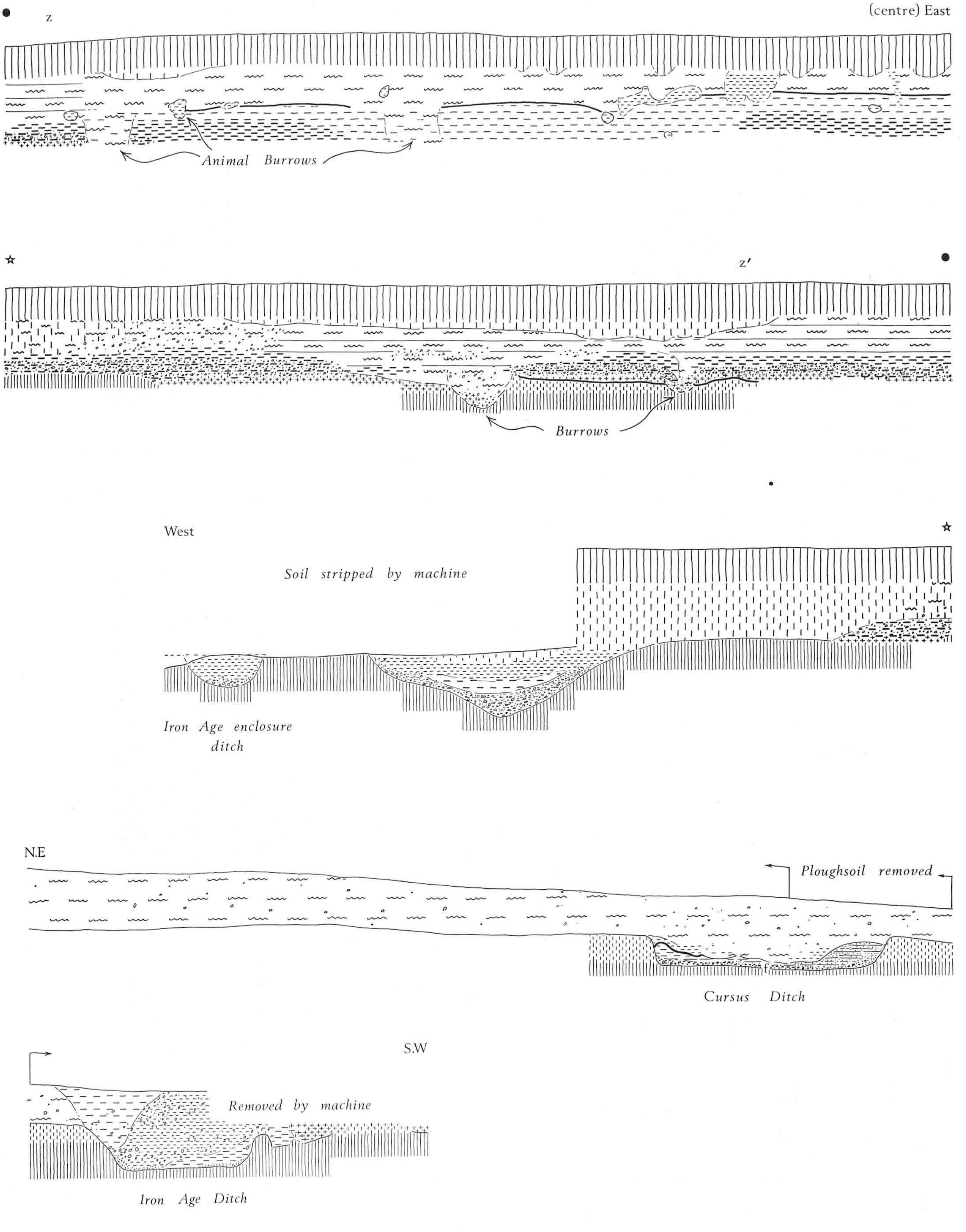


Fig.172 Maxey, Bardyke Field: sections through the central mound and ditch (continued from Fig.171). Scale 1:40.

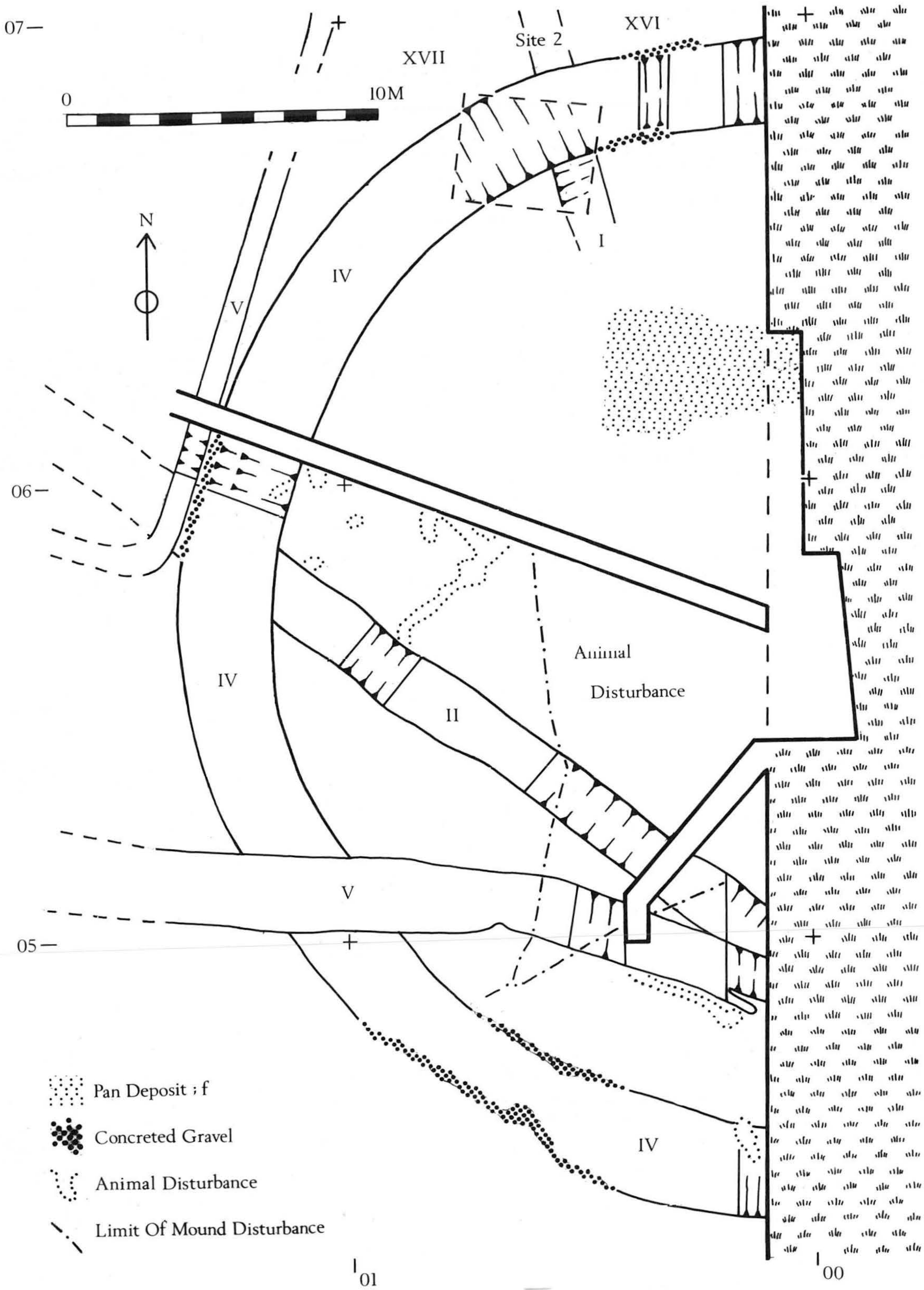


Fig.173 Maxey, Bardyke Field: plan of henge central area (*cf.* Fig.49). Scale 1:200.

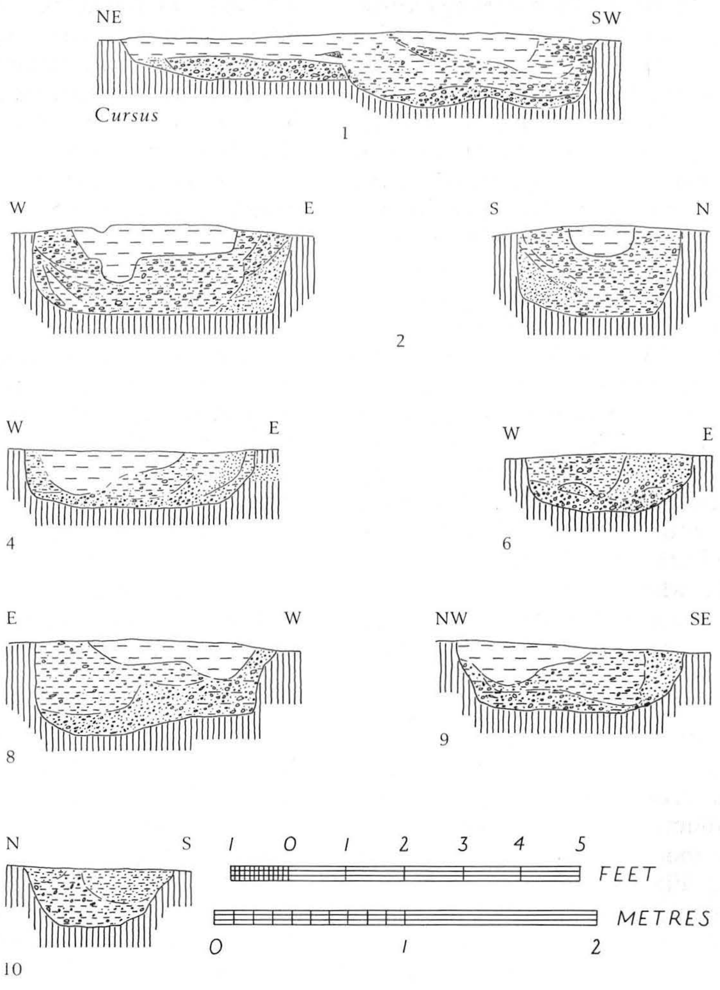


Fig.174 Maxey, Bardyke Field: sections through features of pit-circle III A (for location see Fig.170). Scale *c.* 1:40.

seems most likely to come from a straight-sided bowl of Mildenhall type.

A similar date for the circles is also indicated by the relationship between Pit 1 of Circle A and the south ditch of the cursus. At a level with the surface of the gravel, the fill of the latter and the northern part of the pit, was a clean brown soil with occasional patches of orange-brown or black soil. As this soil was removed gravel patches soon appeared to the NW of the pit. As excavation proceeded an undulating surface of gravel mixed with soil appeared just below the top fill of the ditch. It fanned out in a north-westerly direction from the pit and could be traced also to the east of the pit where its surface was flatter, it became thinner and eventually faded out. On removal it was found to lie on gravel mixed with sandy brown silt, with dark brown or grey sandy silt overlying it in places. These deposits were the normal primary silting of the cursus ditch already discussed, and Pit 1 certainly cut through both. The gravel mixed with soil overlying them was interpreted as the upcast from Pit 1. It had a volume approximately equal to that of the pit. It seemed to have been distributed on the ditch floor in a rather haphazard manner which would suggest that a bank around the inside of the circle was never part of the original plan. The pit itself may have been open for a short time — the dirty gravel on the bottom representing weathering from its sides — and was probably filled in with soil rather than the soil and gravel dug out of it quite soon afterwards.

A number of post-holes were found in the area of the two circles. Those along the south side of the cursus ditch, east of Circle A, have already been mentioned. Inside the circle was a recent post-hole dug into a pit and the others were most likely associated with the rectangular Iron Age enclosure, the ditch of which cuts across the cursus ditch and has also removed most of Pit 3 of the circle. Those in the area of Circle B do not form any convincing pattern although a group just inside the outer ditch of the henge (IV) may be nearly contemporary with the circle, since one of them is cut by the latter.

The henge (Figs.168,IV;169,171,172,175)

The henge monument consists of three elements; an outer penannular ditch with a central ring-ditch enclosing a mound of topsoil.

The outer ditch was of shallow U-profile, up to 1.5m wide and 51 cm deep. It enclosed an eliptical area measuring *c.*123×115m, the longer axis being E to W with an entrance gap in the east side. At the points excavated the ditch gave the appearance of being an even curve but air photographs show that certain parts of it, particularly in the NE sector were dug in a series of straight lengths as if to make a polygonal enclosure.

In the western half of the monument two stretches, one of just over 16m, on the north side, and the other of *c.*9m, on the west side (Fig.168, Grid squares 02/10 and 04/07 respectively), were cleared to the gravel surface and planned. Another stretch of over 36m immediately south of the latter (Grid squares 04/06,04/05,04/04) was planned and excavated. In addition Dr Alexander excavated 5.5m between grid squares 02/10 and 04/07 (Site 3, trenches, XIV and XV) and also the intersection with the south ditch of the cursus (Site 3, trenches XIII and VII). His section of this important feature is reproduced in Fig.169 (top). The section was taken along a line approximately NNW to SSE and so cuts the henge outer ditch obliquely, making it appear wider. It seems to show the henge ditch cutting a cursus ditch that was almost completely filled up. This should be compared with Figs. 171 and 172 which shows the relationship between the same cursus ditch and the mound within the inner ring- ditch. The similar amount of filling of the former, at the time when the mound was constructed, would suggest that all three elements of the henge are contemporary, or nearly so.

Excavation of the outer ditch showed it to be filled by a fairly uniform light brown soil interspersed with varying amounts of medium gravel. There seemed to be a tendency for this to be more concentrated towards the outer (western) side (e.g. Fig.169, middle — a section at an oblique angle across the ditch at Site Grid 033/037) and this was interpreted as being due to slippage from an external bank constructed from upcast from the ditch. An external bank is more likely if pit-circle IIIb is also taken into account. If more or less contemporary with pit-circle IIIa it was constructed quite soon after the cursus. The henge, it has been shown, seems to have been constructed quite some time after the cursus. Its outer ditch is no more than 1m from pit-circle IIIb (Pit 4, see Fig.170), in such close proximity as to make it very likely that, for the builders of the henge, the circle was still visible on the ground and of enough significance for it to be included within the outer ditch. There is scarcely room for a bank between it and the pit-circle.

It would seem likely from the general lack of gravel in the fill that the ditch filled up largely by natural processes. It was almost entirely devoid of finds, a single flint flake and a few small fragments of bone being the only items worth mentioning.

The excavation of the mound proved to be, not only laborious, but also very complex. The excavators' chief difficulty was the understanding of the significance of the soils of differing levels, colours and textures. This was the first upstanding monument to be excavated in the Welland valley and the study of archaeological soils was not then well advanced. Little more could be done than to record the features revealed as fully as possible, using colour as well as conventional symbols and verbal descriptions, in the field record. This was essentially a detailed record alone: the problems of interpretation remained. Their resolution was attempted, but the result was not wholly convincing. For this reason, although the earlier and the more recent excavations have been written-up without collaboration, it was necessary to draw upon the recent soil studies (Chapter 2, part V) to aid our interpretation. The extent to which the observations of the one complemented those of the other was very gratifying to us both.

The inner ring-ditch was *c.*39m in external diameter, just over 3m wide and 50-75cm deep, enclosing a mound of turf and topsoil about 27.5m in diameter.

Alexander's excavations in this area (his Site 2) were restricted to two trenches. One (Trench XVII) located the intersection of the ring-ditch with the ditch-like, ice-wedge feature (I) and the other (Trench XVI) cut across the ring-ditch between Trench XVII and the hedge-line to the east (Fig.175).

Sometime after Alexander had completed his excavations the quarry operator had scooped up a lorry load of mound material with the dragline excavator for use as garden soil. This damage was entirely confined to parts of the SW quadrant although the overlying ploughsoil was removed over a rather wider area. The worst affected areas were those lying between the ring-ditch and the medieval plough furrow running southwards from the mound, and between the ring-ditch and the south side of the Iron Age boundary ditch (see Fig.175). Over much of these areas the dragline excavator had removed soil down to the subsoil or gravel surface. The first task in excavating what was believed to be a burial mound was, therefore, to remove the modern ploughsoil from its surface and to tidy up those areas from which the mound had already been removed. Plate XXVII shows the SW quadrant after this had been completed. These preliminaries were useful in that they gave a limited preview of the stratigraphy of the mound and its underlying soils. For these reasons, and because of the interesting ditch/mound relationships anticipated, the SW quadrant seemed to be the obvious area to begin excavation. For the understanding of the mound structure the north side, which was excavated last, in fact turned out to be the crucial area.

The SW quadrant was found to have been greatly disturbed by animals, mostly badgers and rabbits, whose burrows were in places mistaken for man-made features. Residences with a south facing prospect were apparently preferred and the north side of the mound was comparatively less densely occupied (this was also noticed to the east — Pryor, pers. comm.). The badger setts formed a series of interconnecting tunnels which, close to the gravel surface where drainage was good, often maintained a fairly constant level and so appeared like small ditches or beam slots. Otherwise their levels were erratic so that only segments of tunnels would appear in plan at a given level (Fig.175). In section some of the larger tunnels were oval, extending from, or near, the gravel surface up through subsoil and former cultivated soil into the body of the mound itself. Presumably they had originally been dug at a low level but had moved upwards into the mound as the floor levels built up due largely to passing animals dislodging soil from the walls and roof. The bones of small mammals were found in many of these burrows.

The stratification of the mound was very much better defined on the north side than elsewhere. It was most easily understood at points x and y on the N to S section (Fig.171). At point x, immediately below the ploughsoil, a dark red/brown turf (a)[2] was clearly seen to be overlying a dense black soil (b)[1] which had a maximum thickness of 46cm. This lay on a dark brown soil (c-15cm thick) and below that was a very dark brown

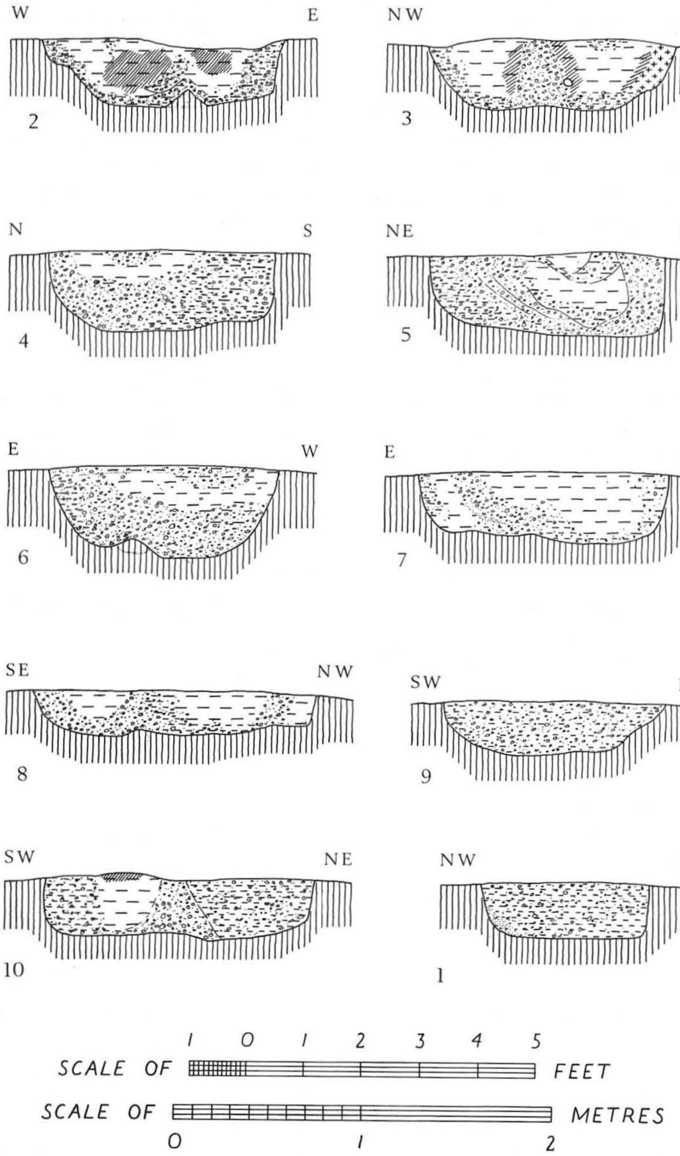


Fig.175 Maxey, Bardyke Field: sections through features of pit-circle III B (for location see Fig.170). Scale 1:40.

soil (d-3.80cm), then dirty orange subsoil combined with coarse gravel (e-6.35cm) over a compacted gravel of small grade (f-2.5cm). Until this point in the excavation it had been assumed that the very dark brown horizon (d) was a turf line marking the old ground surface. However, the relationship of the dense black soil (b) to the dark brown soil (c) made it seem more likely that the surface of the latter, which was marked intermittently by a pan deposit, was the old ground surface. This conclusion is endorsed by the results of Francis Pryor's soil analyses. The very dark brown soil (d), according to the soil analyses, marks the base of the former cultivated soil where the more compact surface of the undisturbed natural (subsoil-e) formed a barrier to further downward movement of minerals. This stratification (c to f) beneath the mound (reddish turf a^1) is not difficult to follow in the N to S section, from the inner edge of the ditch in the north, to the centre of the mound. Here a test hole was dug to reveal the base of the subsoil (e) overlying natural gravel (g), the horizon between them being marked by pan levels (f). South of the centre of the mound the stratification becomes much less well defined, although the line of the old land surface could be followed intermittently almost to the north lip of the cursus ditch. Here between points x^1 and x^2 on the N to S section an almost horizontal level of black/grey dense soil, no more than 18cm thick, is in the right position, relative to the centre, to be a continuation of that on the north side (b^1). In the radial E to W section, the inner face of the dense black soil occurs at the expected position (z) but there is no clearly defined outer face at point z^1. Indeed a black soil is more or less continuous, with varying amounts of gravel, as far as the western edge of the mound.

The correct interpretation of the N to S section between points x^1 and x^2 is crucial for the understanding of both the mound and the underlying cursus ditch. Here the black soil (b^1) cannot have been deposited directly on the old land surface, as on the north side of the mound, because it has largely been truncated by the cursus ditch (II) and a level of dark brown soil (h) is interposed between the fill of the latter and the base of the grey/black soil (b^1). This can only be a redeposited soil. It might perhaps be material which had formed a bank along the inside of the cursus ditch which was levelled over the ditch just before the mound was built. This seems unlikely, however, for the probability is that there was no bank constructed beside the cursus ditch at the time when the pit circle (IIIa) was constructed and this must have been, to judge from the comparatively small amount of silt in the ditch (see above), quite sometime before the mound (IV) was built. The redeposited soil (h) must, then, be just a continuation of the red turf material, which makes up the main body of the mound, extended southwards in order to fill up the hollow of the half-filled cursus ditch. Certainly this would seem to be the situation in the NE to SW section, where the dense black soil was completely absent, perhaps because it had been deposited at a higher level and removed by ploughing. At the bottom of the cursus ditch in this section there is black gravel of small grade (f) and also a dense black sandy deposit filling the south side. The hard pan on the north side of the ditch has formed on, or a little below, the top of the ditch fill here.

What appears to be a low bank may be seen in the N to S section on the inner edge of the cursus ditch. It had no equivalent in the NE to SW section. It was, in fact, a natural feature.

The outer limit of this deposit marks the edge of the suggested Phase 1 of the mound. As noted already it was most clearly marked on the north side, rather less clear on the south side, not well-defined on the west side and totally absent or entirely removed on the SW. The interior of this primary mound was composed largely of a reddish coloured turf deposit and was laid on the old land surface which was, as already mentioned, generally marked by a hard pan. Individual turves could be identified in places in this mound.

The length of time that elapsed between the completion of Phase 1 of the mound and its being covered by Phase 2 is not clear but it need not have been a long interval. Once again the evidence seemed to be most clear on the north side of the mound. At point y on the N to S section the soil profile seems almost to duplicate that observed at point x. To the south of y was the dark brown turf deposit (a^2) which at point x overlies the black soil deposit (b^1). To north of y the dark brown turf deposit was itself overlaid by another deposit of black soil (b^2). These two deposits (a^2 and b^2) mark the extension of the mound on the north side. No equivalent deposits were to be found, unfortunately, on the south side of the mound as they had all been removed, either by the ditch (V) or by the quarry operators. The soil stratification underneath the mound extension was a continuation of that already described beneath the primary mound.

On the west side of the mound the situation was again rather more complicated. The outer slope of the primary mound which should be visible at about point z^1 did not show up clearly. Here, beneath the edge of the later medieval plough furrow, the soil stratigraphy was: a dark, purply-brown turf; a very dark brown soil; very dark brown to black soil with coarse gravel; dirty orange subsoil with a band of concreted black sand (manganese pan) separating it from a clean orange subsoil overlying natural gravel. The correlation of this stratigraphy with that observed in the northern part of the north section was not very clear. The dark purply-brown turf extended beneath the later medieval plough disturbance to its western edge and then, with an admixture of gravel, almost to the edge of the ditch surrounding the mound. It seemed, therefore, to be an amalgamation of the discrete $b^2 + a + b^1$ deposits observed on the north side. Unlike the north side, no pan marked the boundary between the mound material and the old land surface and cultivated soil beneath (c). In the west section its equivalent was presumably the very dark soil which was nowhere clearly distinguishable from the overlying mound material. It seems very likely indeed that from point z westwards, some of the ancient soil surface had been removed. Below this, the very dark brown to black soil with coarse gravel and the dirty orange subsoil must have been the equivalent of levels d and e on the north side with the compacted manganese gravel (f) being equivalent to the concreted (manganese) sand overlying clean orange subsoil and natural gravel. This stratification continued uninterrupted (except for two badger setts) from point z up to the edge of the mound about 2m from the inner lip of the ditch. On the north side the berm seems to have been slightly wider, *c.*2.74m as recorded in our excavation. Dr Alexander in his Trench XVII found 'a rather irregular mound of dark clayey loam about 30cm thick beginning 60-90cm from the inner edge of the ditch' but his excavations were probably too limited in extent to appreciate the complex stratigraphy of the mound. This, together with erosion and subsequent agricultural activity, made it very difficult to define the edge of the mound with any certainty.

One remarkable feature of the mound was that, except on the west side, it contained hardly any gravel at all. This is surprising because, unless it was removed from the site completely, the gravel and soil dug out to make the ditch must have been used in some way in its construction. A bank around the outside of the ditch does not seem a possibility for the ditch filling did not appear to indicate much weathering of gravel from that direction, as might have been expected from a bank, which would certainly have been substantial. Also, such a bank would probably have remained a feature of the landscape for sometime unless deliberately levelled back into the ditch. Yet the constant depth of the ditch of the rectangular enclosure (V) on all four sides and the close proximity of its east side to the ring-ditch (IV) must mean that there was no bank there when the former was constructed, in the later Iron Age.

Most of the mound, as shown in the sections, was constructed of turf and topsoil. It seems very likely that the material dug from the ditch was evenly distributed over its surface as a capping. If the final mound was of bowl barrow form with gently sloping sides and rounded top there would probably not have been much downward movement of the gravelly covering and certainly very little once the surface was well-consolidated with vegetation, which would not have taken more than a decade. Any such eroded material would have collected on the berm initially and only when that had filled would it spill down the sides of the ditch to its bottom. In fact, as the sections show, gravel did get into the bottom of the ditch as 'rapid' silt, but probably no more than might have derived from the sides of the ditch itself. Most the filling, however, was soil, presumably of wind and water borne origin. Only on the south side was gravel present in any quantity and was probably due to the much greater disturbance of this part of the mound, due to burrowing animals and, particularly, the digging of the boundary ditch (V) in the later Iron Age. The digging of the ditch was perhaps the first major desecration of the monument and opened the way for its gradual incorporation into the cultivated fields. This might have been followed by a deliberate levelling of the top of the mound and systematic cultivation would have continued the process, mixing what remained of its soil and gravel capping with the underlying turf, and dispersing it outwards from its centre. What is shown on the section as medieval ploughsoil is, therefore, in fact, a palimpsest of soils, the outer and upper most of which would have been cultivated in the later Middle Ages or even more recently, while the inner and lowest might have incorporated intact the base of the soil and gravel capping. Certainly the western edge of the mound in the E to W section showed a diverse make-up which consisted of soil, turf and gravel. The west limits of the mound material and the post-mound cultivated soil were not clearly definable, which is understandable if the cultivated soil itself consisted largely of a mixture of the various components of the mound.

The linear ditch (V) and the rectilinear enclosure (V) (Figs.168,V;169 and 176)

The linear ditch (the equivalent to the west of the recently excavated Phase 5.2 ditch, (F.533)) was investigated at two areas of the site — from a point just west of the outer ditch of the henge extending for about 30m eastwards and in the SW quarter of the henge inner ditch and mound. In the latter area it was planned and sections drawn in the course of the excavation of the mound but otherwise not extensively investigated. In the western area, however, more time was devoted to its examination since its multiperiod composition seemed clear from the tripartite ground plan and it was thought that this greater separation of the successive recuts of the ditch might make it easier to interpret its historical development. A fairly typical section across it at Site Grid 035/062 (Fig.168) where it was 4.9m wide overall is given in Figure 169b.

The small ditches on either side of the main ditch-line were, on average, *c.*60cm wide and cut not more than 30cm into the gravel surface. They may be earlier than the main ditch. Certainly, where the southern side-ditch joins the main ditch (at Site Grid 028/058), its fill is truncated by the latter (Fig.169, section c). The northern side-ditch appeared to be earlier than the ditch of the rectilinear enclosure when seen in section (Fig.176, top right) and it was later possible to confirm this by viewing the conjunction of the two ditches in plan, just to the east of this section, as the site was being stripped of topsoil in preparation for gravel quarrying. It is probable, therefore, that the northern side-ditch was already filled up before the occupation of the enclosure had come to an end, for no metalworking debris particularly associated with the latter was found in it, as in the main ditch (see below; also Appendix VI).

The fill of the side-ditches was generally a clean brown soil. This sometimes had a gravel mix which was concentrated particularly on the sides or bottom. Finds were not plentiful and consisted of small fragments of animal bone and of shell-gritted, handmade pottery.

An attempt was made to follow the courses of the various recuttings of the main ditch by excavating their fillings (or what remained of them) horizontally, with sections at regular intervals to help correlate and record them. However, particularly in the upper parts of the ditch, the fill of one recutting was not sufficiently differentiated from what survived of the fill of that preceding it for this to be practical. The sectional baulks served also to make the task more difficult by interrupting whatever horizontal continuity there was. This failure to separate out the various phases of the main ditch has meant that there is little to distinguish the finds stratigraphically. It seems, however, that the last filling of the ditch was accumulating in the 1st century AD and that it was already filled up by the mid-2nd century at the latest. There are no Nene valley colour-coated wares for example. The initial digging of the ditch, the pottery makes clear, must lie in the pre-Roman Iron Age.

Five representative cross-sections are illustrated (Figs.169,171,172, a-e). The first section (a) was taken at the western edge of the site, immediately beyond the outer ditch of the henge which, it was found, was already filled when the linear ditch was cut across it. Neither of the side-ditches has been included in this section as the quarry operators had already removed the ploughsoil and subsoil from the area and only the bottoms, where they cut into the gravel, survived. The width of the main ditch was *c.*2.34m and it had a maximum depth of 50cm. If the side-ditches are included then the overall width was *c.*4.9m. The notable features of the section are the W-shape of the ditch profile and that the north side appears to be the last to be recut. Within the fill of the ditch were slight indications of one or two later recuttings.

The second section (b) was taken in the area between the two pit-circles (Site Grid 035/062) before the overlying soil had been stripped off. The ditch here underlay the south side of the medieval plough headland and the gradual fall of the ground surface towards the south is apparent from the section. The overall width of the ditch was the same but the maximum depth of *c.*76cm was greater since the subsoil level survived. The W-shape of the ditch profile in the natural gravel was not apparent here but could be seen in the gravel fill of the ditch- bottom. The upper fill was undifferentiated brown soil with gravel but the profile of the gravel fill of the ditch sides and bottom suggested that the ditch may have been recut three or four times.

The third section (c) was taken where the ditch approached the rectilinear enclosure, just where it turned abruptly south for a distance of some 9.1m (Site Grid 027/059). The ditch was here over 3.35m wide (or 4.6m if the northern side-ditch is included) and had a maximum depth of 71cm. The profile was again of W-shape although the northern cut had a rounded bottom and the southern cut a deeper, flat bottom. Both sides showed evidence of recutting, particularly the south side, which may have been recut three or four times. The last major recutting seems to have been on the north side and a little Roman pottery was found in the filling of this cut. There was possibly, also a later, shallow, recut on the south side containing more Roman material, on the line of a previous cut which had removed part of the filling of the southern side-ditch.

It was from the area of the ditch adjacent to the rectilinear enclosure that most of the finds came. These included charcoal, animal bones, metalworking debris and shell-gritted, handmade pottery as well as, from the upper levels of the ditch, wheelmade pottery of early Roman date. From the top fill of the ditch, in the area of

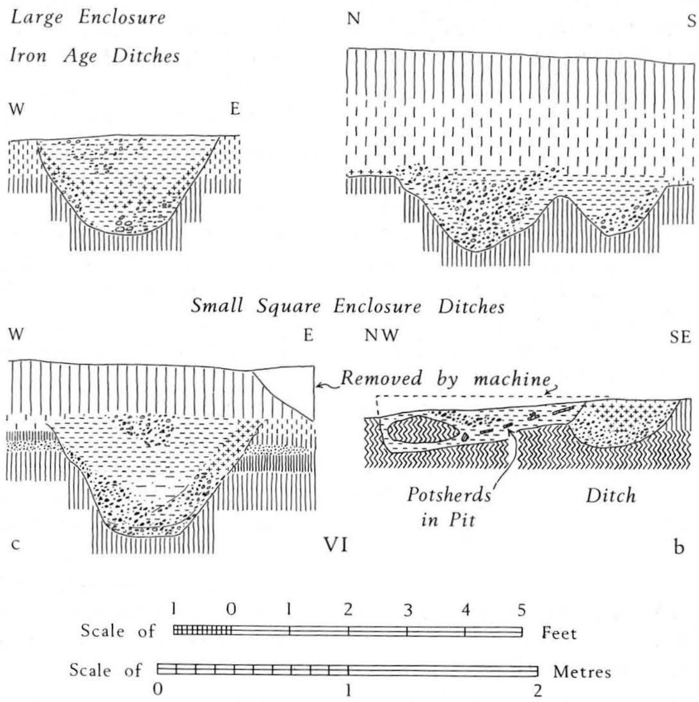


Fig.176 Maxey, Bardyke Field: sections through Iron Age enclosure ditches. Scale 1:40.

its southward turn, there came also a fragment of the topstone of a rotary quern in Jurassic (?) sandstone and a fibula of Hawkes' 'Colchester' Type III.

Two other sections of the ditch are illustrated, where it cut through the central mound of the henge (Figs.171,172). The westerly of these (Fig.172) was just on the edge of an area of the mound stripped of material by the quarry operators and only the bottom of the ditch has survived on the south side. However, enough remains to the north to show that the ditch had, as in the sections taken further to the west, a basal ridge of gravel giving a W-shaped profile. Both parts of the ditch on either side of this ridge were flat-bottomed and the overall width at the top must have been at least 3.35m. The more complete northern part of the ditch was recut on its north side.

In contrast to the sections already described the most easterly section (Fig.171) taken showed a ditch not more than 2.4m wide and 80cm deep and without any sign of a W-shaped profile; or of recutting. This might, however, be a false picture since it is possible that the quarry operators, in stripping, took away the south side of the ditch. Or, alternatively, it is possible that the character of the ditch here changed because it was cut into different material. The thickness of the mound was such that the deepest part of the ditch cut only 20cm into the surface of the gravel.

The rectilinear enclosure, defined by ditches, lay immediately north of the ditch-line just described, at the point where it turned sharply southwards. Its eastern ditch was set right up against the outer edge of the ditch around the central mound and was 20.4m long. The western ditch was 23.45m long and the distance from E to W was 22.4m. There was also a small annexe *c.*11m×6.1m attached to the NW corner of the enclosure. This was defined by a small L-shaped ditch of similar dimensions to the ditch of the main enclosure, which was of U-shaped profile and averaged 91cm wide and up to 51cm deep (Fig.176). The entrance, set eccentrically in the west side, was 14.8m from the SW corner and, as first constructed, was *c.*1.5m wide but was later widened to *c.*2.7m. A large post-hole just inside the entrance on the north side, probably held a gate-post. Just outside the entrance on the same side was a circular pit 80cm in diameter which may, at some time during the enclosure's occupation, have served the same function, although no trace of a post survived in it.

Within the enclosure only the SW quarter was investigated and there the interest was focussed primarily on the Neolithic features which preceded it. Apart from those already mentioned above no other features certainly contemporary with the enclosure were noted. Only a few isolated post-holes were found, the date and context of which were not clear.

Finds from the SW part of the enclosure ditch therefore provided the only indications of the activities that were carried on inside it. They included domestic occupation material such as animal bones, charcoal and handmade pottery, also fire-reddened stones and lumps of fired clay, perhaps parts of loomweights. Other fragments of fired clay were, however, parts of the lining of an iron smelting furnace which had been permeated by molten slag and fragments of crucibles or small bowl furnaces connected with copper smelting or bronze remelting (See Appendix VI). These finds seem to point to the existence of a workshop in the enclosure, used by a smith familiar with both ferrous and non-ferrous metallurgical techniques. The metalworking debris occurred at all levels of the fill of the enclosure ditch. It also occurred in the later filling of the linear ditch to the south, in contexts which contained early Roman material and also in contexts which did not. Since no Roman material was found associated with the enclosure it seems likely that the metalworking was being carried on in the pre-Roman Iron Age and that the occurrence of metalworking debris in later contexts in the linear ditch was due to redeposition.

It is unfortunate that it was not possible to excavate the interior more extensively to identify the foci and character of the domestic occupation and metalworking activities. The finding of metalworking debris in the linear ditch indicates the contemporaneity between it and the enclosure. The linear ditch, however, seems to have been established before the enclosure. Since it does not make any obvious sense as a defensive work or specifically for drainage its primary function must have been to define a boundary.

The linear ditch and enclosure therefore belong to a common class of ancient monument, noted more often on air photographs (e.g. R.C.H.M. 1960, pl.II, Baston, Lincs.) than investigated in archaeological excavations—the boundary ditch with rectilinear enclosure(s) attached on one or both sides. Though this enclosure was occupied for perhaps only a brief period within the pre-Roman Iron Age the boundary ditch maintained a significance over a greater period of time. This is apparent from the evidence of its frequent recutting and will be apparent also from the later history of the site. The other feature of the ditch which may be important is its bipartite character, both in the narrow little ditches to north and south, which perhaps represent the first marking out of the boundary line and also in the W-shaped profile of the main ditch. It is suggested that this bipartite character of the boundary ditch is a reflection of the agreement of the landowners on either side of it in its initial layout and of their co-operation in maintaining it.

The square-ditched enclosures (Figs.168, VIa-e;176)
Dr Alexander, in his excavations in 1958, dug four trenches (his Site 1, trenches I,IV,V and IX) at the north end of the site along its eastern boundary, in an attempt to locate the north ditch of the cursus (II) and outer ditch of the henge (IV). These trenches, it is now apparent, were too far north to locate these features but they did define what Alexander took to be one end of a rectangular ditched enclosure, which did not appear on any air photograph. The east side of this enclosure has never been located but as there are similar features of square outline to east and west it seems likely that this was a square enclosure of larger size. Although over 7m of its ditches were cleared by Alexander the only finds were two small fragments of bone.

The north end of the site is on gravels whose surface in many places has become concreted by natural processes. This area was rather unproductive of cropmarks perhaps because of this impediment to free drainage. Although feint outlines of small square enclosures may be distinguished on air photographs now that their presence is known, at the time no detailed close-ups were available and it was not considered that this part of the site demanded a priority rating for excavation as high as the area within the outer ditch of the henge (IV). So three enclosures measuring *c.*6m square over the ditches (VIa-c) at the extreme NW of the site were not revealed until the quarry operators had stripped the soil cover off the gravel. This also revealed again the site of Alexander's excavations (VId), the south ditches of a droveway, which shows up on air photographs and part of a system of large enclosures defined by shallow ditches laid out approximately at right angles to it.

The ditches of the square enclosures were of regular outline but irregular depth because of the difficult digging conditions imposed by the concreted gravel. Two ditch sections are illustrated. That of enclosure (c), taken beside the lorry track near its west corner (Site Grid 015/129) where the soil cover survived and the gravel was not concreted, shows a rather steep-sided ditch with a flat bottom 1.07m wide at the top and 61cm deep. The second section, taken across the ditch at the NW corner of enclosure (b) where it is cut by a later pit (Site Grid 017/124), shows a ditch less than 15cm deep and only a little over 61cm wide, for here the gravel surface is solidly concreted. The dimensions of the ditch of the enclosure excavated by Alexander (d) were up to 1.5m wide and 75cm deep and the profile was very similar to that illustrated of enclosure (c).

The areas within the square enclosures or their immediate surroundings revealed no man-made features or finds. The stripping of the soil cover had almost everywhere been complete down to the surface of the gravel. It may have been significant, however, that the natural gravels had the dark, black pea-sized grade and the natural pockets of sand and the dense black concretion of manganese that was only seen elsewhere on the site below the central mound. The upper fill of the ditches also was a dark brown to 'purplish black' (Alexander's description) loam, generally without gravel, which is reminiscent of the upper fill of the inner ditch of the henge and of the material making up the central mound. The possible significance of this was not apparent at the time since the centre of the henge had not yet been excavated. The lower fillings of the enclosure's ditches were generally concentrated gravel, in areas where the natural gravel was not concreted, or a mixture of small gravel and sand where it was, both fillings being presumably natural silting. Although all the ditch fillings were completely excavated the only finds were two flint flakes, small fragments of bone, a snail shell and a minute fragment of pottery.

The best evidence of date, in fact, came from the features which were cut into the square enclosures' ditches. Enclosure (b) had its upper fill truncated by a pit (at Site Grid 017/124) and enclosures (a), (c) and (d) had their upper fillings cut into by a ditch. Each of these features contained material of mid-1st century AD date. Perhaps of most significance is that, although the ditches of the small square enclosures must have been (even if allowance is made for loss of topsoil) largely filled up when the ditch (Fig.168,VII) was dug, it seems to be respecting their boundaries. The most likely explanation of these square enclosures is that they are small barrows of Yorkshire 'Arras' type (Stead 1979). Low mounds would have marked their position even after their ditches had silted up and burials would have been deposited either in very shallow graves in the topsoil or even on the old ground surface, as are the earliest of the Yorkshire examples (see also May 1970).

The droveway and the large enclosures
(Fig.168, VII)
At the extreme north of the site a double ditch was found aligned E to W which marks the south side of a droveway showing as a cropmark on air photographs. It was 2.6m wide overall and 42cm deep. To the south of this was an

enclosure measuring *c.*24.4m across and immediately, to the south of that, another enclosure 32.6m across. They were defined by shallow ditches 60-75cm wide and 25cm deep. The western boundary of the north enclosure followed the line of the eastern ditches of the square enclosures VI(a-c). Its alignment was nearly at right angles to the ditch of the droveway with which it may have been contemporary, but it was unfortunately not possible to investigate their junction which lay beneath a lorry track. The southern ditch of the enclosure was aligned almost exactly E to W and passed across the north side of the largest of the square enclosures (VId).

The west boundary of the southern enclosure was intermittent. There was scarcely any trace of a boundary ditch from the corner of the north enclosure for a distance of *c.*18.5m, presumably because of the severe concretion of the gravel in this area. The ditch defining the southern boundary joins the western ditch at right angles (at Site Grid 016/098). Beyond this SW angle other ditch-lines aligned E to W seem to indicate an extension of these enclosures to south and west.

Two or three small pits were found within or close to these enclosures. That at Site Grid 017/124 cutting the NW corner of square enclosure VIb has already been mentioned. A small elongated pit measuring 1.22×0.46m was found 6.1m south of the droveway ditches at Site Grid 001/130. What may have been another pit of similar size 1.83×0.61m was found close to the SE corner of square enclosure VIb at Site Grid 014/117. It may however have been an isolated section of the western ditch of the large enclosure.

These pits and ditches all contained finds of similar type and date. Most prolific were sherds of large storage jars similar to those illustrated in Figure 178. Animal bones and charcoal were also common. These large storage jars are difficult to date at all closely. However, the foot of an Aucissa-type fibula, from the pit cutting the square enclosure VIb, should date within a few decades following the Roman conquest and sherds of fine wheel- made vessels would seem to be of much the same date.

It is suggested that the ditched enclosures, together perhaps with hedgerows or fences, defined small fields.

III. The Finds

by Jeffrey May

Introduction

Artefacts recovered during the excavation suggest activity at the site in the late Neolithic period, the Iron Age and the early Roman period. A few items could belong to the Early Bronze Age (pottery), the Late Bronze Age (bronze rings), and the medieval period. The most useful are here illustrated and discussed; some, however, have been unfortunately mislaid, and note of them is taken from the finds notebooks and distinguished by the initials (WGS). All objects are marked MAX 62, followed, usually, by site grid square and feature number. In view of the problem mentioned above, all details of each find's provenance have been given; this information is signified by the term *Archive.* The surviving artefacts are deposited in Peterborough Museum.

The report is arranged chronologically, by context. Due to the small size of the collection it was not considered necessary to further sub-divide it by source material (flint, pottery, bone etc.).

Neolithic and Bronze Age

Catalogue

Pit midway between cursus ditches (Grid 009/086):

Fig.177,No.1 Polished stone axehead, length 134mm; Group VI. *Archive:* F.46/P28

No.2 Rim (and eight other sherds, WGS) from hand-made vessel in black fabric with liberal shell filler (up to 5mm). Red-buff eroded inner surface; red-buff outer surface and black outer skin with shell filler visible. Rim top rounded with trace of possible lip. Neolithic? *Archive:* F.46/P28

Pit circle IIIA:

Not illustrated:

No.3 Three sherds of pottery (WGS). From pit 2.

Fig.177,No.4 Rim of hand-made vessel in crumbly black ware with brown pitted surfaces from dissolution of filler. Rim top flat with int. lip. Neolithic. The form is present at Hurst Fen (Clark *et al.* 1960, P22 and closely similar to examples from Etton causewayed enclosure nearby (Pryor and Kinnes 1982). From Pit 4. *Archive:* GIV/P15/A

Not illustrated:

No.5 Body sherd in coarse hand-made ware, 6-9mm thick. Black int., red-brown ext.; pitted from dissolution of filler. Neolithic. From Pit 8. *Archive:* HIII/P19.

Pit circle IIIB:

Not illustrated:

No.6 Small body sherd of crumbly hand-made pottery, 8-9mm thick. Black int., red-brown ext.; pitted from dissolution of filler (*cf.*No.5, above). Neolithic. From Pit 5. *Archive:* FIV/P6/A

No.7 Small body sherd of hard, fine, black hand-made pottery, 6mm thick. Neolithic. From Pit 7. *Archive:* FIV/P8

No.8 Small body sherd of handmade pottery, 6mm thick. Black core, red-brown surfaces. Neolithic. From Pit 9 *Archive:* HIII/P20

Henge monument and central mound:

Not illustrated:

No.9 Small flint flake from outer ditch (WGS).

Fig.177,No.10 Sherd from base of hand-made vessel. Black int., apparently finger-pinched. Neolithic or earlier Bronze Age? From top of inner ditch of henge (Site Grid 008/066) *Archive:* GI/D5

Note: The central mound contained a mixture of artefacts, including scraps of prehistoric and romano-British pottery, five flint flakes (WGS), and also:

Fig.177,No.11 One of four almost identical copper alloy rings, found together apparently within the mound in its NW sector (Site Grid 003/062). Although the rings are of similar size and character, they are of irregular thickness, due either to casting in irregularly shaped moulds, or to wear. Similar rings are well-known in the later years of the Late Bronze Age, for example at Heathery Burn cave, Co. Durham (Britton 1968, 33-4), and, 56 miles from Maxey, in the hoard from Marston St. Lawrence, Northants. (Hawkes and Smith 1955,8).

Neolithic or earlier Bronze Age artefacts, unstratified or from later features:

Fig.177,No.12 Flake of grey-brown unpatinated flint from cultivated soil over Iron Age boundary ditch (Site Grid 022/058). Traces of secondary working.

No.13 Projectile point in orange brown unpatinated flint possibly of 'oblique' transverse form (Clark 1934) but *cf.*Fengate (Pryor 1978, fig.43, no.1), there identified as a point possibly from a fish or eel spear or arrow. Found on gravel surface at Site Grid 034/064 and so probably not in original position.

Not illustrated:

No.14 Waste flake of unpatinated flint, with cortex. From Iron Age ditch. *Archive:* Ditch 2, layer F.

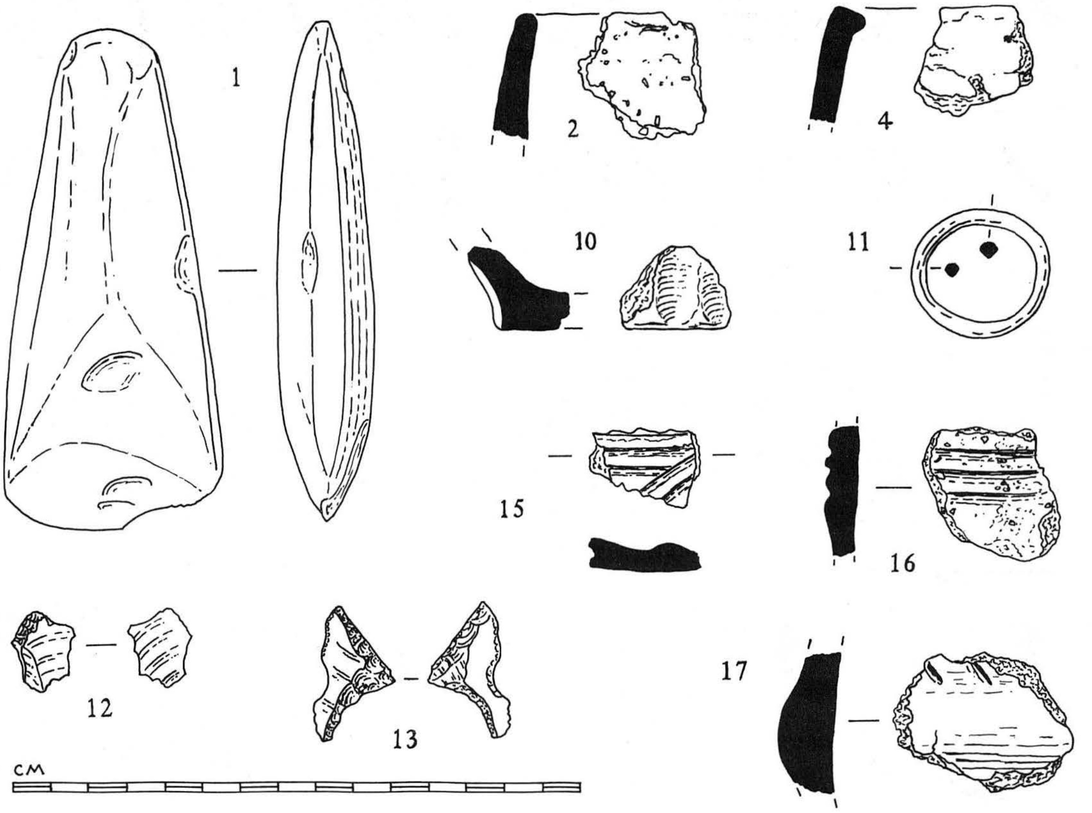


Fig.177 Maxey, Bardyke Field: Neolithic and Bronze Age finds. Scale 1:2.

Fig.177,No.15 Small body sherd of Grooved Ware from NW sector of henge. Dark brown fabric with red-brown ext.; slightly pitted from dissolution of filler.

No.16 One of two sherds of Grooved Ware, from the same vessel. Black with liberal shell filler up to 3mm. From large Iron Age enclosure ditch. Site Grid 02/06. *Archive:* GIII/D4

No.17 Sherd from large cordoned hand-made vessel. Int., black, ext. pale orange-buff. Row of eliptical impressions above cordon. From disturbed subsoil under centre of mound (Site Grid 000/055). Perhaps from large jar or urn of the earlier Bronze Age. *Archive:* MI/US

Discussion

No material demonstrably of Early Neolithic date came from the excavation. The pottery and stone implements could all belong to later Neolithic activity, and are consistent with evidence from elsewhere for the dating of cursus and henge monuments.

Comparisons can be made between the pottery from the Maxey pit circles and that from the well-documented site at Hurst Fen forty two miles to the south-east, but it is interesting that the two distinctive rims, Nos. 2 and 4, are among the rare forms at the Suffolk site. On present evidence from Maxey, the comparison with Hurst Fen is not impressive. Nor does the wide date range for Hurst Fen, from the late 4th to the early 2nd millennium bc (Wainwright 1972, 70-5) much help the dating of Maxey. The thickened rimsherd (Fig.177,No.4) is, however, closely comparable with material from the Etton causewayed enclosure (Pryor and Kinnes 1982) and a Middle Neolithic date is probably indicated. Although undoubtedly related, the pottery from Hurst Fen and Etton cannot be closely compared; both represent regional styles of the same general tradition (F.M.M.P pers. comm.).

Maxey differs from Hurst Fen in yielding a few sherds possibly of Grooved Ware, Nos. 15-17, and a sherd perhaps from an early Bronze Age urn, No.17, suggesting that some activity could have occurred in the area at a later date.

At present, we can do little more than suggest a third or early second millennium BC range for the sequence of activities which included the building of the cursus, the henge monument, the central mound and the two pit-circles.

Iron Age and early Roman

Catalogue

The linear ditch (Fig.168,V):

Quantities of material were picked up from the surface of the ditch (*Archive:* ditch 2), after the topsoil had been removed mechanically. These included thirty-eight sherds of hand-made pottery, twelve with scored decoration, three sherds of Romano-British pottery, and a fragment of sheet bronze (WGS). Various other levels in the ditch produced eighteen, or more, sherds of hand-made pottery, two of Romano-British and pieces of slag (WGS). From the upper filling came twenty sherds of shell-filled hand-made pottery, nine with scoring (WGS). Among the material still available for study is the following:

Fig.178,No.18 Rim from hand-made jar in black ware with sparse flint filler up to 3mm. *Archive:* FIII/D2/top

No.19 Sherd from base of hand-made jar with brown surfaces and black core; slightly pinched-out and about 135mm diameter. *Archive:* FIII/D2/upper fill

No.20 Rim from hand-made jar in black ware with red-brown core, and stone and shell filler up to 6mm. Rim top slightly flattened. *Archive:* FIII/D2/upper fill

No.21 Body sherd from large hand-made jar in black ware with red-brown ext. and sparse shell filler. Rough, lightly scored lattice decoration. *Archive:* FIII/D2/upper fill

No.22 Rim from hand-made jar in black ware with brown surfaces and liberal shell filler up to 6mm. *Archive:* GV/D2/B

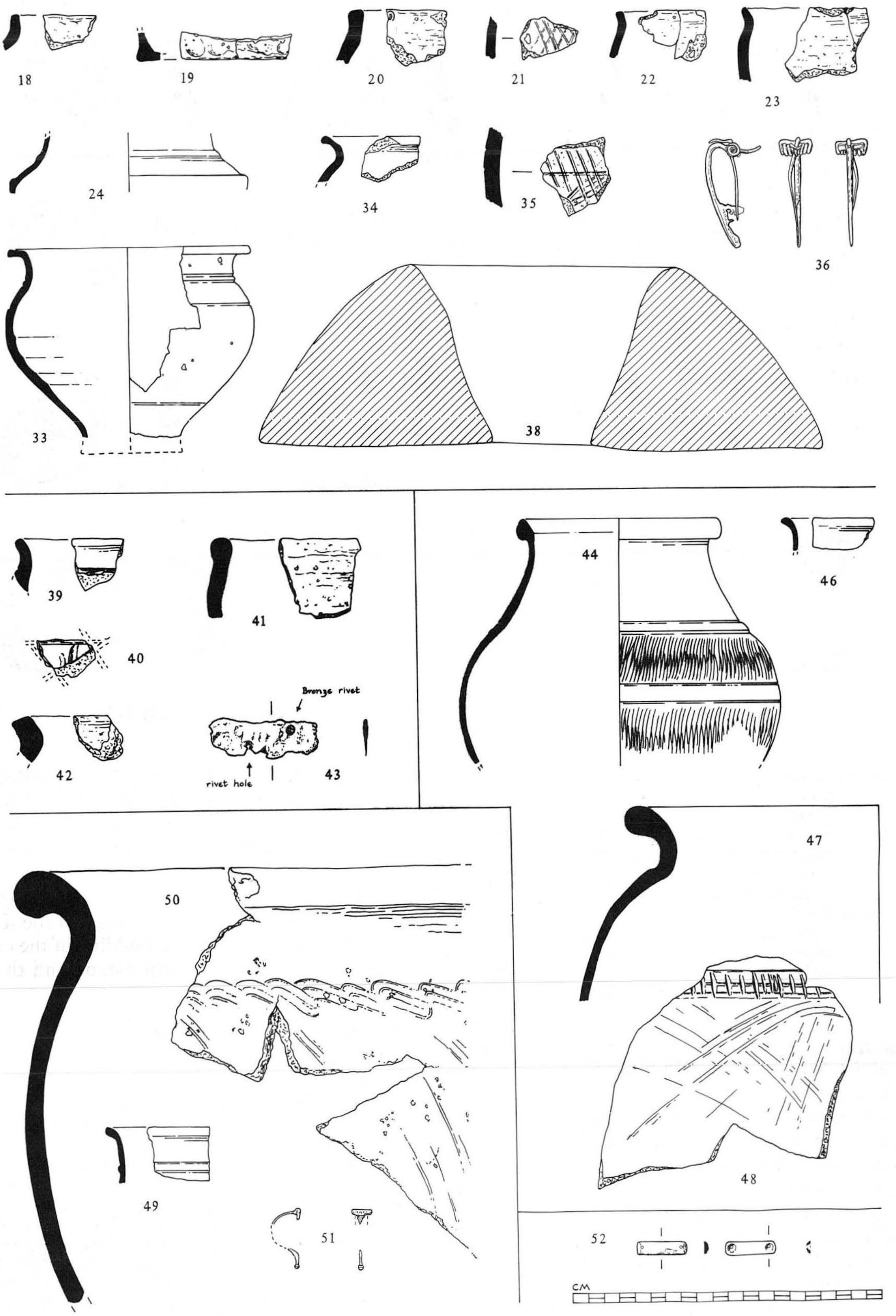


Fig.178 Maxey, Bardyke Field: Iron Age, Roman and post-Roman finds. Scale 1:4.

No.23 Rim from hand-made jar in black ware with shell filler up to 5mm. Rim out-turned, with smoothed groove below. *Archive:* GV/D2/B

No.24 Shoulder of fine wheel-turned cordoned bowl in thin, hard, pale red ware with buff core. *Archive:* GIV/D2/C

Not illustrated:

No.25 Body sherd from hand-made jar with red-brown surfaces and black core; sparse shell filler up to 5mm. Light lattice scoring (*cf.*No.21, above). *Archive:* FIII/D2/E

No.26 Sixteen very small sherds from one or more vessels, in grey-brown or red-brown ware with shell filler. Five sherds have scored decoration; one sherd is from the top of a rim apparently upright and flattened. *Archive:* FIII/D2/F

No.27 Body sherd from large hand-made jar, wall thickness 6mm. Fabric: dark grey core, brick-red surfaces, with shell filler up to 3mm. Light vertical scoring or possibly combing. *Archive:* FIII/D2/F

No.28 Body sherd from large hand-made jar, 10mm thick; brown-grey ware with shell filler up to 5mm, and light vertical scoring on exterior surface. *Archive:* FIII/D2/F

No.29 Body sherd from large hand-made jar 8mm thick; dull red-brown exterior surface, black core; sparse shell filler up to 3mm. *Archive:* FIII/D2/F

No.30 Sherd from just below the rim of a hand-made jar in black ware with shell filler up to 2mm; deep vertical slashing. *Archive:* FIII/D2/F

No.31 Body sherd from hand-made jar in black/red-brown ware with fine shell filler up to 1mm. *Archive:* FIII/D2/F

No.32 Two body sherds from hand-made jars in brown-black ware with fine shell filler up to 2mm, and scoring. *Archive:* FIII/D2/F

Fig.178,No.33 Large number of sherds from about half of a bowl in hard thin wheel-turned ware, with buff core and dark grey surfaces; occasional lumps of flint filler up to 5mm. *Archive:* FIII/D2/F

No.34 Rim from jar in probably wheel-turned ware, black in core, brick-red/brown surfaces with fine sparse shell filler up to 1mm across. *Archive:* M1/D2 fill

No.35 Body sherd from large hand-made jar in black ware with red-brown external surface; liberal shell filler up to 2mm; lattice scoring. *Archive:* GV/D2/US

No.36 Bronze brooch of La Tène III Colchester type. Catchplate now badly eroded, but some trace of three circular piercings when found. The spring contained a few fibres. The type is generally early to mid-1st century AD, as at Old Winctringham, Lincs. (Stead 1976, 196), where as late as Neronian-early Flavian. *Archive:* FIII/D2/F

Not illustrated

No.37 Three fragments of pebbles, apparently burnt (WGS). *Archive:* FIII/D2/F

Fig.178,No.38 Fragment from the upper stone of a rotary quern, from the top of the ditch (WGS). Dr W.A.Cummins noted that the stone is possibly Jurassic sandstone, but not from Northamptonshire, Lincolnshire or Yorkshire.

The rectilinear enclosure (Fig.168,V; *Archive:* ditch 4)

Fig.178,No.39 Two sherds from rim of hand-made jar in black ware with brown surfaces and black exterior skin. Horizontal groove below rim; outer surface missing below. *Archive:* HII/D4/top.

No.40 Body sherd from same or similar vessel with rough scoring. *Archive:* HII/D4/top

No.41 Rim sherd from large hand-made jar in dark grey ware with light red-brown interior and dark grey exterior surfaces; profuse shell filler up to 6mm. *Archive:* GIII/D4

No.42 Rim sherd from large hand-made jar in dark grey ware with brown exterior surface and rim top; shell filler including massive lumps up to 16mm; rim top flattened. *Archive:* GIII/D4

No.43 Fragment of iron blade with bronze rivet and another hole. Possibly from the tang of a straight-bladed pruning knife or tanged pruning hook (Rees 1979, 463-5), found elsewhere in both Iron Age and Roman contexts, although not with bronze rivets.

The droveway, enclosure ditch and nearby features (Fig.168, VII):

1. The enclosure ditch (VII):

Fig.178,No.44 Numerous sherds from butt beaker in pale grey ware with orange-brown int. and buff ext. with black patches. Decoration by close incised zig-zag. (Site Grid 012/126) From west ditch of the enclosure where it cuts VIa. *Archive:* MII/D7

Not illustrated:

No.45 Three small sherds of grey ware beaker. *Archive:* L1/D7

Fig.178,No.46 Rim sherd from bowl in pale grey ware with pale orange-buff surfaces. *Archive:* MII/D7

No.47 Rim and shoulder from large coarse storage jar in brick-red ware with grey core; shell filler in core up to 5mm, but dissolved on surfaces to give badly pitted effect (Area of Site Grid 005/120). *Archive:* LI/D7

No.48 Nine sherds from large coarse storage jar; grey core with brown or red-brown surfaces; shell filler up to 6mm. Decoration on shoulder of three horizontal grooves and vertical hatching (Area of Site Grid 005/120). *Archive:* LI/D7

2. Pit cutting enclosure VIb at Grid 017/124 (Archive: pit 26):

Fig.178,No.49 Rim sherd from cordoned bowl in a ware almost identical to No.24 above, and could almost be from the same vessel. *Archive:* MII/P26

No.50 A substantial part of a large storage jar in brick-red ware with shell filler up to 5mm. *Archive:* MII/P26

No.51 Two fragments from a badly decayed bronze Aucissa brooch. *cf.* Old Winteringham (Stead 1976, 198, 8-9), there Neronian-early Flavian.

Discussion

The middle and later phases of the Bronze Age seem to be unrepresented at the site, except for the four bronze rings, No.11, and the type of pottery tentatively identified as Late Bronze Age only 200m to the south (May 1981) is absent here. Finds from the linear ditch, the enclosures and pits, demonstrate activity during the Iron Age up to the mid-1st century AD.

It is not possible yet to date precisely the hand-made pottery from these features. Scoring suggests comparison with the Ancaster-Breedon scored ware tradition of the east midlands. At Ancaster (May 1976, 133-41, 175-6) this type of pottery may have belonged to the 4th-2nd centuries BC, ending before the development of a sequence of late La Tène styles from around 100 BC. Elsewhere, it is by no means certain that scored ware did not continue later than 100 BC (perhaps to inspire the more regular scoring on early Romano-British storage jars), yet good evidence for this is difficult to obtain. The apparent association at Maxey between hand-made pottery, including scored ware, the wheel-turned late La Tène vessel No.24, the Colchester brooch, No.36, and the early Romano-British bowl No.33, might argue for the continuation of scored ware to the end of the Iron Age or beyond. It seems wiser, however, in view of the difficulties of identifying phases of re-cutting of this ditch and the likelihood of rubbish survival, to regard this whole assemblage as an accumulation over a long period of time.

By contrast, the material from the large Iron Age enclosure ditch (Fig.168,V), albeit small in quantity, consists entirely of hand-made Iron Age ware (in this respect it agrees well with F.533, the main Phase 5.2 ditch of the recent excavation). The iron blade (No.43) might thus belong to the still very small amount of pre-Late La Tène ironwork from the region.

More firmly of mid-1st century AD date is the material from enclosure VII (*Archive:* ditch 7) and the pit found near it at Grid 017/124. Aucissa brooches are most commonly found on sites of the Roman Conquest period.

Post-Roman

Fig.178,No.52 Small bronze strip of plano-convex cross-section, with V-perforations drilled from the flat side at each end. From Medieval plough headland. Medieval or later? *Archive:* HIII/Y1

4 Excavations Between Barnack and Bainton, 1981

Introduction

by Francis Pryor

The excavations described in this chapter took place in advance of pipeline construction. Security considerations preclude the publication of the precise alignment, but the general area threatened by the construction work is shown on the map (Fig.179). The distance between the present site and Maxey is shown in the general map of the region (Fig.2, Nos.3 and 2). Initial field survey was begun in November 1980, but the main survey and excavation was undertaken from January to May, 1981, by members of the Welland Valley Project.

This report first considers the pre-excavation survey, then the excavations followed by the finds (parts I-III); the following two sections on geophysical/geochemical survey and soil studies incorporate research into both topsoil and subsoil features (parts IV and V); the soil discussion also includes results of an investigation of colluvium at a site on the western (Pilsgate) side of Barnack village. The chapter concludes with a discussion of results (part VI).

Site location and grid (Figs.179,181)

The site is located on arable land immediately south of a small tributary to the Welland, at a height of *c.*16.5m OD, in the parish of Barnack, midway between that village and the village of Bainton, to the east. The subsoil consists of freely-draining First Terrace gravels and slopes gently from south-east to north-west.

The centre of the site is at TF 0825 0665. The site grid follows the Maxey system: references use the Ordnance Survey grid, minus the initial letters and the first digits easting and northing (for an example see the Introduction to Chapter 2).

The site lies on either side of the Peterborough-Leicester (ex-L.M.S.) railway line, that to the north (the North Field) being larger than that to the south (the South Field); the length of the area available for study, including railway line, was 585m. We were fortunate to be able to work outside the area directly threatened by pipeline construction, thanks to the kindness of the farmer, Mr Aldwincle of Barnack; this enlarged area was essential to the interpretation of the field survey (Fig.179).

Recent history and previous work

The recent history of the site has a direct bearing on the distribution of finds and features in both topsoil and subsoil. The north part of the South Field (Fig.182, between c and d) is occupied by a wide plough headland and a thick accumulation of B horizon soil. The truncated furrows of the ploughed-out ridge-and-furrow system pass beneath the headland (see comments by Hall, Chaper 1), perhaps suggesting two phases of medieval land-use.

The North Field was disturbed by railway construction activities, in the immediate vicinity of the line (see Taylor, part I). Further north, the site was traversed by another plough headland, but narrower than that in the South Field (Fig.183, lower left). This headland sealed a prehistoric and Roman soil (see parts II and V). North of the headland was an Enclosure hedge, the soils of which were studied by French (part V). Finally, north of the hedgeline the land dips towards the stream which forms the north boundary to the site. This land was covered by accumulations of alluvium.

The gravel lands between Barnack and Bainton have long been known to aerial archaeologists as a rich source of cropmarks (e.g. Phillips 1935), which were first systematically plotted by the Royal Commission (R.C.H.M 1960, fig.8), whose numbers are used here (Fig.179, lower right). Previous excavations in the area were concentrated around the Roman villa site, immediately west of the present excavations (Simpson 1966).

Aims and Methods

The principal intention of the present project was to investigate the extent to which subsoil features had been damaged by recent agricultural activity and, where possible, to date the principal linear features. Discussions with the pipeline authorities led to the placing of the pipeline in an area where linear ditches occurred, but where individually identifiable monuments (such as ring- ditches) were absent. The final route selected also suited our research design, as it included at least two medieval plough headlands, which experience at Maxey had shown, often concealed portions of earlier landscapes. The alluvium, too, was hoped to provide buried or waterlogged archaeological material (which unfortunately it failed to do). The precise positioning of the pipeline route required an equally precise map of cropmarks, as errors of more than *c.* ± 20m were unacceptable. It was therefore decided to prepare a computer-rectified map of cropmarks. This work was carried out in collaboration with Rog Palmer, then of Cambridge University, and the results and procedures adopted have been fully described elsewhere (Pryor and Palmer 1980). The map is reproduced here (Fig.179).

The aims of the project were closely comparable with Maxey, and the excavation procedures (sampling, sieving etc.) at the two sites were identical (see Chapter 2, Introduction).

I. Pre-Excavation Survey

by Maisie Taylor and Francis Pryor

Introduction

The Barnack/Bainton project was more of a salvage operation than the main Maxey excavation (Pryor and

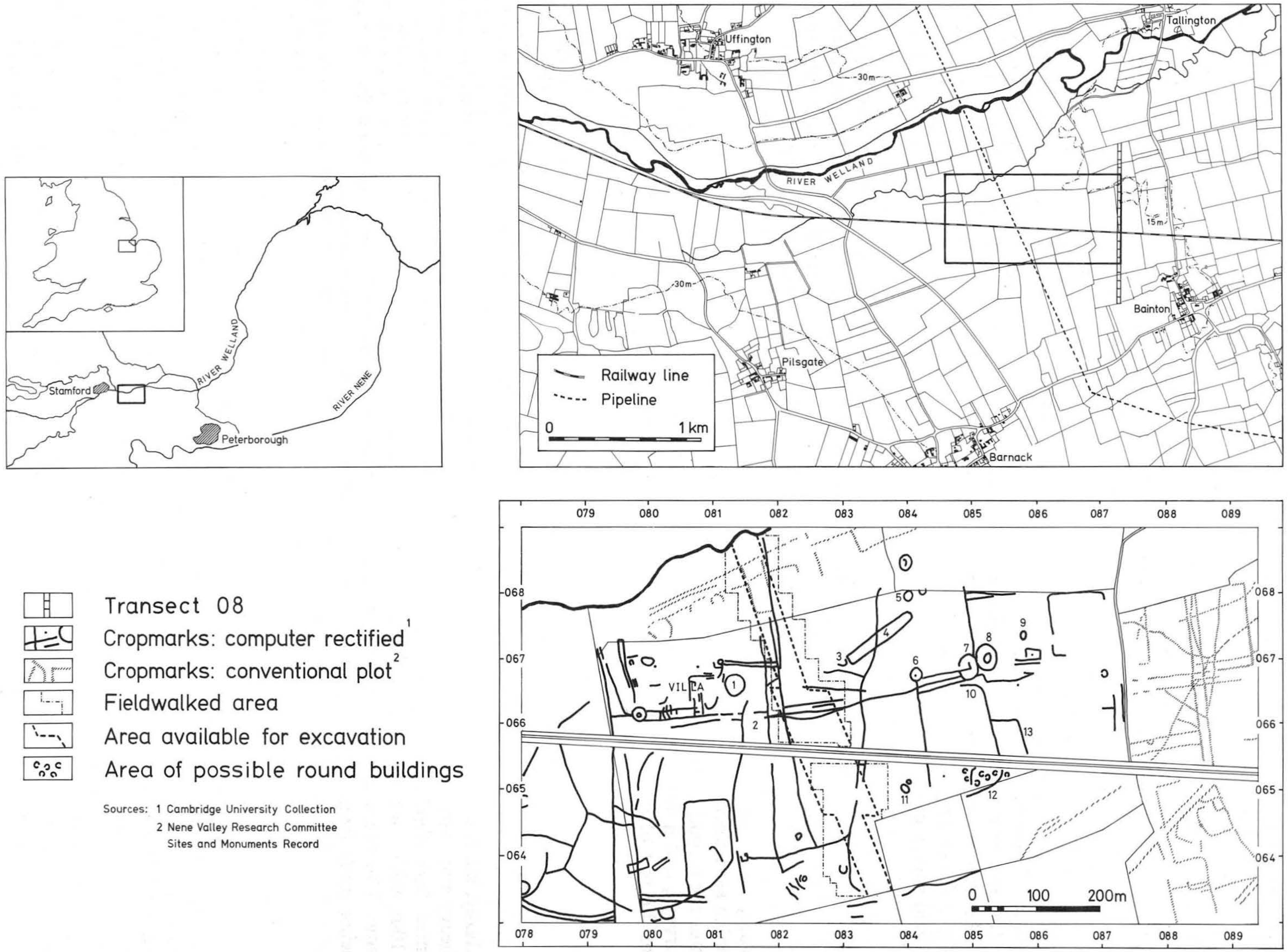


Fig.179 Barnack/Bainton: map showing location, the surrounding region (scale 1:23,500) and cropmarks (scale 1:5000). Numbers in cropmark plan follow R.C.H.M. (1960, fig.8). *(Based upon 1:50,000 (1980) Ordnance Survey map with permission of the controller of Her Majesty's Stationery Office, Crown Copyright reserved.)*

Palmer 1980). Neither the time nor the resources were available to carry out the variety of detailed survey procedures that were employed at Maxey, but we were particularly fortunate to be able to work with a most cooperative farmer, Mr Aldwincle, who gave us access to large areas of land outside that under immediate threat. The availability of this extra land allowed us to place the site in its context and thus helped to compensate for the rapidity with which the work had to be carried out.

The availability of the extra land allowed David Gurney to carry out a phosphate and magnetic susceptibility survey of cropmarks to east and west of the pipeline transect. Those to the east included a faintly visible series of possible ring-gullies, of probable Iron Age or 'native' Roman round buildings, which have been shown schematically in Figure 179. Fieldwalking did not produce the expected scatter of pottery in this area, but both the phosphate and the magnetic surveys showed indications of settlement. The westerly survey was across the site of the known villa; unfortunately we were unable to carry out a detailed field survey of this site, as we lacked the manpower and resources to collect, identify and study so very large a scatter, which has also been seriously disturbed by limited archaeological activity in the past (Simpson 1966). Gurney's survey, however, was on a sufficiently large scale to overcome these problems and he has convincingly demonstrated both that the survey procedures work, and that the villa represents a substantial Roman settlement. Gurney (part IV, below) closely integrates the topsoil survey with the B horizon and subsoil surveys, and it was thought inadvisable to remove it from the rest of the report (as was done in Chapter 2).

Aims and Methods

Barnack/Bainton was fieldwalked between November and January mainly by the author and J.R.Bourne. The actual fieldwalking was carried out using portable frames, as at Maxey, but it was found that the 5m angle-iron was too heavy and cumbersome for two people to use in mid- winter. Accordingly we constructed two new frames of 5×10m, which were used side-by-side, as a single 10m frame. The new frames were non-magnetic throughout, being made from plastic pipes and nylon rope. Both frames were light enough to be lifted by one person.

The survey began with a rapid assessment of the whole area of cropmarks shown in Figure 179. This was done in the autumn, after ploughing, harrowing and drilling, but when the corn was still young. The purpose of this rapid survey was to note any obviously dense flint or pot scatters that might be tied in later to the detailed pipeline survey. Apart from the dense scatter over the villa site, the surface material, both pottery and flintwork seemed to be spread with relative homogeneity, although it is doubtful whether this very rapid survey could have detected the manured and non-manured 'background' spreads of Roman pottery that were revealed at Maxey (Crowther, Chapter 2, part I). It was possible, however, to make a few positive observations. First, the whole area south of the alluvial spread beside the stream forming the boundary to the available land, was carpeted with a thin background scatter of (mainly) Bronze Age flints. The density of this spread is shown in the transect survey distribution (Fig.180, right). Second, the possible round buildings mentioned above were not associated with a surface scatter. Third, the scatter over the villa was very dense indeed, but showed rapid fall-off at its edges. Fourth, there was no obvious increase, or decrease of surface flint associated with the cursus, but two of the large ring-ditch cropmark sites (Fig.179, Nos.7 and 8) still retained a low, but distinct mound and this carried a localised flint scatter.

The rapid assessment proved the feasibility of undertaking a detailed surface survey ahead of the excavation, but it was felt that this intensively examined area must be placed in broader contexts. This was achieved by incorporating a nearby transect of the larger valley-wide survey (Taylor, Chapter 1) within the Barnack/Bainton project (Fig.179).

The transect selected was close to the excavated area and was broadly comparable, as it passed through similar slopes, soils and geology. It is worth pointing out, however, that the valley survey had been planned and was well under way many months before the pipeline threat arose. It would indeed have been possible to survey an entirely new transect hard by the pipeline site, but this would not have had the benefit of being incorporated within a far larger scheme. Being part of a greater whole, it is possible to draw wider conclusions, of more than site- specific relevance. The transect selected was only 650m to the east, and was almost parallel to the pipeline route. It was thus both aptly and conveniently located.

The Field-Walking Survey (Fig.180,181)

The transect nearest the pipeline site is TRO8 (Fig.9). This transect runs down and across the valley, from the grassland at Bainton Hall, to the railway line that bisects the pipeline site and continues north. South of the railway it crosses one or two cropmark linear ditches of fields of probable Iron Age or Roman date. North of the railway the cropmarks are more complex, but are still linear in arrangement, without clearly-defined settlements or other 'sites'. The transect covers more non-alluviated ground to the north, than does the pipeline, as the stream that forms the northern limit to the present site swings north, on its way to join the modern course of the Welland. Local people have informed us that this small stream was subject to regular and extensive winter flooding prior to the major engineering works that followed the disastrous floods of 1953. Its extensive alluvial spreads provide the archaeological evidence for this repeated and regular flooding. Finally the land between the small stream and the Welland is today watermeadow, and under permanent pasture.

The survey methods employed on transect and site-specific surveys are not identical (for practical reasons, as it would create problems with farmers if frames were used on growing crops), but they are intended to be comparable. The site-specific surveys are generally undertaken on land where irreparable damage to the archaeology is about to take place. In these circumstances every effort must be made to provide a fully comprehensive record. Transect survey land, on the other hand, is not thus threatened and practical problems, such as weight, prevent the collection, for example, of post-medieval material (for a description of survey methods see Chapter 1). In short, the transect survey is intended to provide general, and not specific, comparative information, as we shall see below.

Moving backwards in time, the surface surveys of the pipeline site and the transect only revealed the thinnest scatter of post-medieval and medieval pottery, in sharp contrast with Maxey. Roman pottery was too thinly spread across the transect to merit illustration here, but the thin scatter of abraded sherds on the surface of the pipeline survey area, perhaps suggests manuring, but not on a particularly intensive scale (Fig.181), when compared, for example, with Maxey. The thin scatter is in the vicinity of the villa, as one might expect, but its north edge is probably buried beneath headland deposits.

The distribution of flints in the two survey areas shows many features in common (Fig.180). The northern end of each area does not show a sharp cut-off when the alluvium is encountered. This may be caused by a number of factors, but it is a consistently observed phenomenon: there is often a band of about 10-20m in which material 'peters out', before disappearing absolutely, until an 'island' or non-

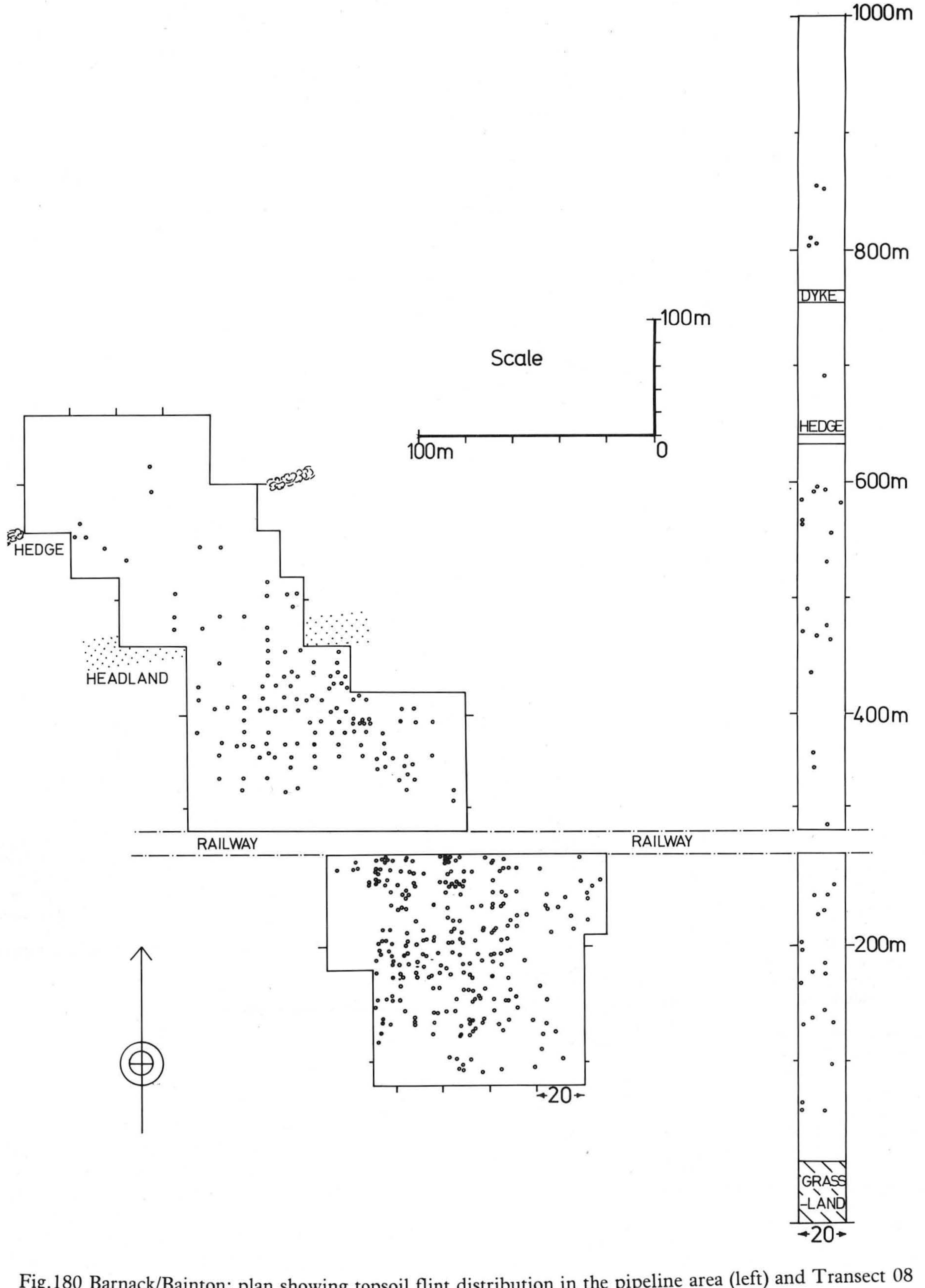


Fig.180 Barnack/Bainton: plan showing topsoil flint distribution in the pipeline area (left) and Transect 08 (right). Vertical (north to south) scale 1:200.

alluviated land is again encountered. Modern dykesides often carry wide lateral spreads of subsoil which has been excavated and subsequently bulldozed flat, over the surrounding land. These operations lead to pronounced distributional 'voids'. The extent to which wide, low lynchets can accumulate on the uphill side of hedgelines on relatively flat land has not been clearly appreciated until recently, but 'voids' are often found in such circumstances (Fig.180; see also French, part V, below).

The distribution of flints on the pipeline survey area is most dense over the South Field, in an area that did not produce a single flint-rich subsoil feature, when excavated. Admittedly the northern part of the South Field was covered by a plough headland, but when stripped of its covering topsoil this buried soil was largely devoid of flints. We must conclude, therefore, that the surface scatter in this part of the site did not originate from ploughed-out subsoil features.

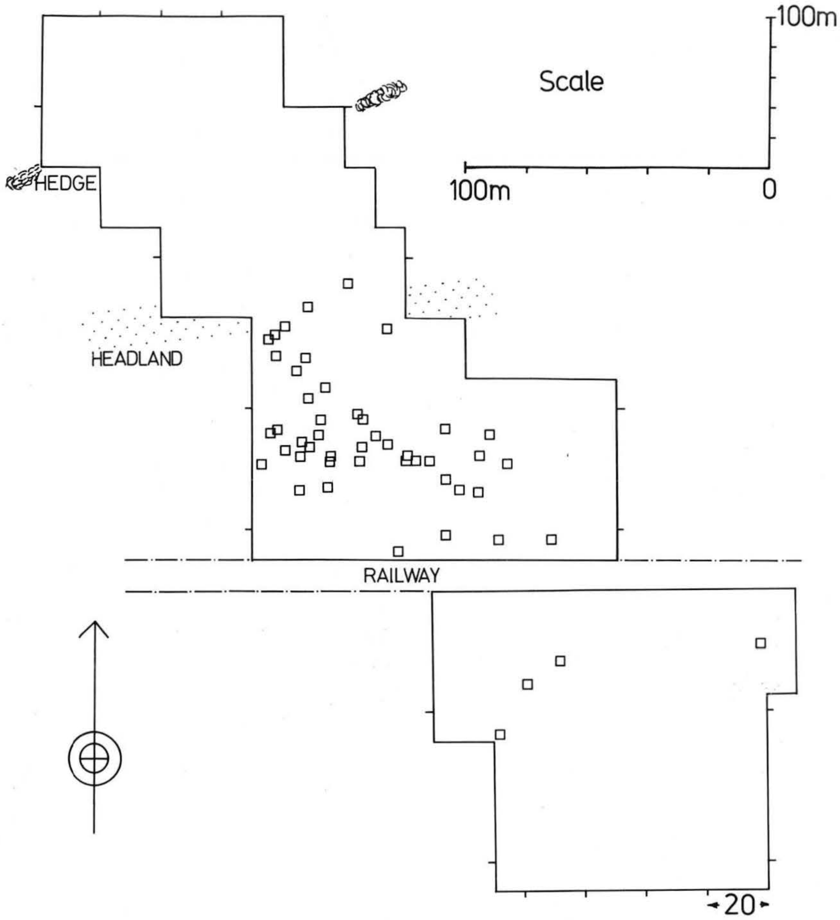


Fig.181 Barnack/Bainton: plan showing topsoil distribution of Roman pottery in the pipeline area. Vertical (north to south) scale 1:200.

The distribution in the North Field is less dense than the South Field, but it does appear to show a diffuse, but nonetheless defined, scatter just north of the railway. To the north this scatter 'peters out' towards the floodplain, where it stops altogether; to the south it stops more abruptly. The centre of the distribution is marked by two parallel ditches in the subsoil (Fig.183, Features 28 and 29), which, taken at first glance, might be seen as the central droveway around which a settlement was located. In reality, however, the picture is very different indeed. The two parallel ditches are of Late Iron Age or early Roman date, and produced very little flintwork, and the southern 'limit' to the scatter is simply caused by disturbance associated with the construction of the railway. Thus the apparently discrete flint scatter may be seen as the continuation of the larger scatter, already located in the South Field. Whether this scatter represents a 'site' (in the absence of contemporary subsoil features), is a matter for speculation.

The plough headland in the North Field revealed pottery and flint in some quantity when the topsoil was removed. Most of this material, however, had not found its way into the topsoil, and its location on the northern periphery of the larger scatter discussed above must indicate that it was not the primary source of that material, although doubtless it contributed to it.

Analysis of the surface flints shows (Pryor, part III, below) that most are of probable Bronze Age date and the close proximity of the diffuse surface scatter and the preserved site below the headland is therefore probably coincidental.

Finally, we have already noted that the initial 'assessment' survey of the land around the pipeline area showed no major, localised concentrations of surface material, indicative of a substantial settlement, other than the villa. We have seen at Maxey and at the present site that surface material does not necessarily 'reflect' the pattern of subsoil features. However, when the two do coincide, care must be taken to ensure that the one accurately 'reflects' the other. The 'assessment' survey east of the pipeline showed that a mound, or mounds, still survived in the region of ring-ditches 7 and 8 (Fig.180). It was apparent that this mound was being bitten into by the plough, and in the process seemed to be producing a number of flints. The flints were not collected, as we did not have the time to undertake a proper gridded survey, and had no wish to damage the site for future research. Casual inspection of this material left it in no doubt that it was not Neolithic in date. We cannot be sure without excavation, but the ring-ditches in question are large and in one case (no.7) at least superficially hengiform (R.C.H.M 1960, fig.8). In short, the surface flints at this site may, like Maxey Phase 3, result from secondary use of the monument.

II. The Excavations

by Francis Pryor and Charles French

Introduction

The excavations at Barnack/Bainton had to be carried out within the 'easement' available to the pipeline; practical considerations also dictated where spoilheaps could be located. The earthmoving was carried out in two separate operations, following the field survey discussed in part I. The first operation involved the removal of ploughsoil over the whole area available for study (Fig.179), apart from the expanded areas on either side of the railway line. It was expected that the removal of the ploughsoil would expose a B/C horizon, as at Maxey; in practice, however, this did not happen: in the North Field the B soil horizon was well preserved and was approximately as thick again as the overlying A horizon (see French, part V below). This quantity of soil could not be heaped-up within the area available to us, and it was decided only to clear approximately half of the exposed B soil, except in areas of special interest. The B horizon was thinner in the southern part of the North Field and it proved possible to remove most of it. This accounts for the apparent 'protrusion' of features (e.g. F.28, 29, 40 etc.) through it. In the South Field the B horizon was also thinner towards the south, and could be removed entirely, but nearer the railway line it became markedly thicker and it was decided not to attempt to remove it. Instead we decided to confine our attentions to the plough headland in the North Field.

It should be emphasised that all the features described below (except the modern F.12) were sealed beneath the B horizon, as originally exposed and field-walked. We will describe the two excavated areas, separately.

The South Field (Fig.182; Table 44).
The southern part of the South Field was devoid of archaeological features, except for two medieval furrows (Fig.182, dashed lines), the westerly of which cut through an E to W series of (recut) ditches, F.13,15,25 and 26. These ditches produced a few weathered bodysherds of probable Late Iron Age or early Romano-British type. The surface of the B soil horizon produced very few flints and this decided us against further investigation; with hindsight, however, this may have been ill-advised.

The North Field (Figs.183,199,201; Table 44; Pls.XXXIII,XXXIV)
The North Field revealed more subsoil features than the South, but finds proved equally illusive. Despite good conditions for preservation, very few animal bones were recovered, which, taken with the rarity of artefacts, must indicate that the excavated area did not pass through, or near to, any site of substantial settlement (apart, that is, from the soil preserved beneath the headland). Working northwards, the paired E to W ditches, Features 28 and 29 were probably of later Iron Age or early Roman date, on the grounds (a) of the scraps of pottery found within them and (b) because they were both cut by the proven-later Roman N to S ditch, F.31. The latter was a wide (*c.*3.00m), but shallow (Table 44; Fig.201, middle and bottom) feature that curved to the west at its northern end; it might, therefore, be seen to have formed the eastern side of a field or enclosure. Midway along its excavated course it cut the deeper, and more substantial N to S linear ditch F.33. This feature (Fig.201, top) was analysed for molluscs (French, part V, below) which showed it to have held water in its lower levels. Aquatic species apart, molluscs from primary levels showed a preponderance of shade-loving types indicating perhaps the presence of a nearby hedge or scrubby vegetation; alternatively shade could have been provided by the

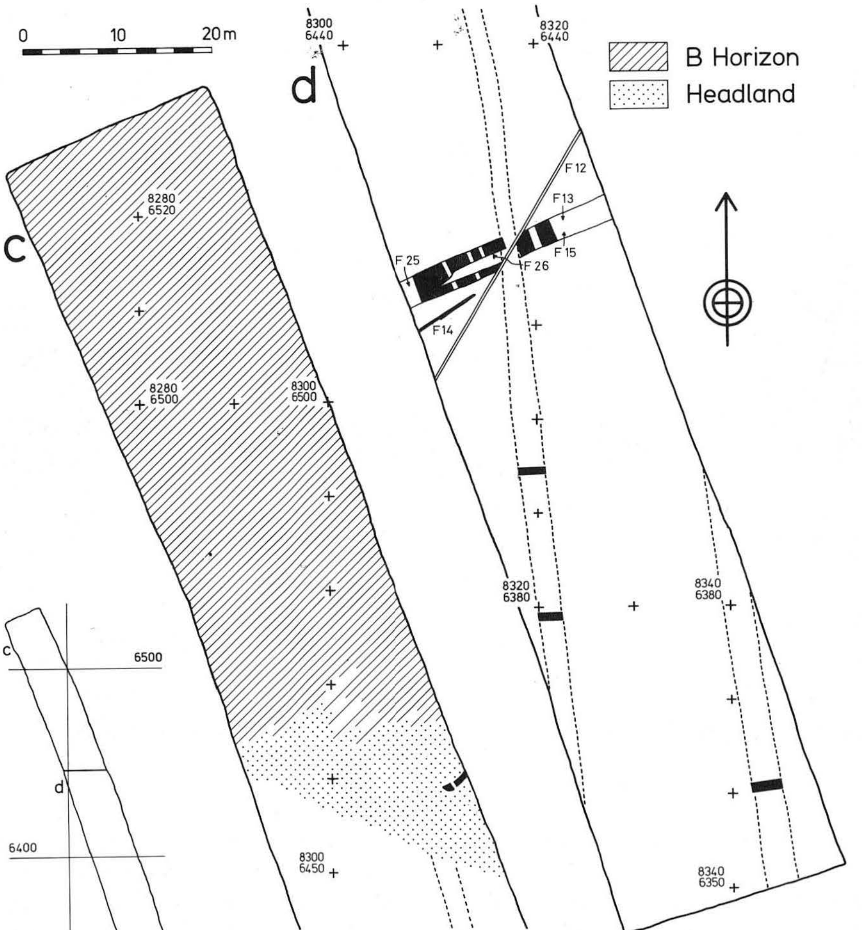


Fig.182 Barnack/Bainton: plan of excavated features in the South Field. Scale 1:400.

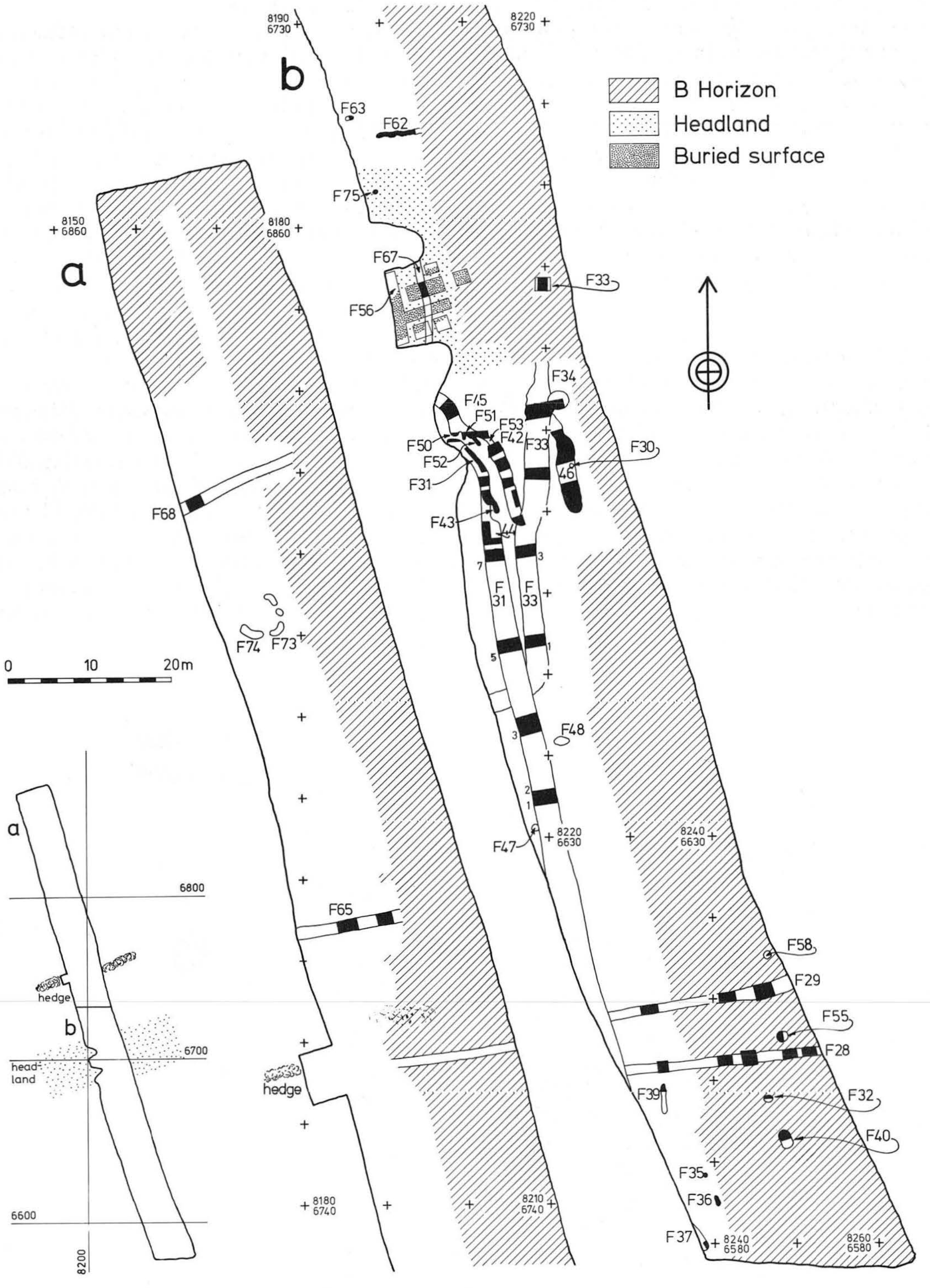


Fig. 183 Barnack/Bainton: plan of excavated features in the North Field (the small numbers refer to sections). Scale 1:400.

ditch environment itself. Pottery from the lowest layers was relatively soft and shell-gritted, with indications of scoring. Weathered Roman material was found in its secondary and tertiary filling, which would suggest that it was still visible as an earthwork by this period. A later Middle Iron Age date seems appropriate for the initial use of this feature.

The northern end of F.31 swung west, out of the excavated area at a point where numerous smaller ditches and gullies suggested at least a degree of activity in Roman times. The area was marked by the presence of limestone blocks in the B soil horizon and in feature fills beneath, where tile fragments were also found. Given the near-absence of domestic debris we must suppose that this dumped rubble was used as hard-core, either at a yard entranceway or around farm buildings, which have left no other trace.

Immediately north of this localised scene of

F.No.	*Type*	*Grid*	*Depth* (m)	*Matrix*	*Date/Notes*
South Field (Fig.182):					
F.12	slot	8320/6446	?	—	Modern water-main.
F.13	ditch	8311/6420	0.30+	Silt loam+scattered gravel	L.I.A./R-B?
F.14	gully	8308/6410	0.06	Sandy loam+scattered gravel	? contemp. with F.13, F.15 etc.
F.15	ditch	8320/6419	0.15+	Sandy loam+scattered gravel	L.I.A./R-B?
F.25	ditch	8320/6420	0.40+	Sandy loam+scattered gravel (+lenses)	L.I.A. and early R-B sherds
F.26	ditch	8311/6418	0.20	Sandy loam+scattered gravel	L.I.A./R-B
North Field (Fig.183):					
F.28	ditch	8240/6602	0.50+	Sandy loam+scattered gravel	I.A./R-B?
F.29	ditch	8240/6610	0.50+	Sandy loam+scattered gravel	I.A./R-B?
F.30	pit	8223/6676	0.08	Sandy loam in even gravel mix	Beaker (back-filled)
F.31	ditch	8218/6640	0.40	Silt loam/loam/sandy loam; gravel mix	R-B tile and NVCC
F.32	pit	8247/6597	0.40	Sandy loam+scattered gravel	?
F.33	ditch	8218/6665	1.00+	Silt loam/loam/sandy loam+even gravel	?M.I.A. to R-B; cut by F.31
F.34	well?	8221/6683	0.83	Layer 1: silt loam; 2: sandy loam+gravel	R-B
F.35	pit	8238/6588	0.28	Sandy loam in even gravel mix	? Neolithic (bodysherds)
F.42	ditch	8215/6675	0.30+	Sandy loam+scattered gravel	? R-B (contiguous+F.45,51,53)
F.43	ditch	8214/6670	0.20	Sandy loam+scattered gravel	? R-B (see F.42)
F.44	ditch	8214/6667	0.18	Sandy loam+scattered gravel	? R-B (? recut of F.31)
F.45	ditch	8208/6682	0.55	Sandy loam+sand lenses; scattered gravel	? R-B
F.46	ditch	8222/6675	0.18	Sandy loam, in even gravel mix	? L.I.A./early R-B
F.48	pit	8222/6642	0.22	Sandy loam+scattered gravel	?
F.50	pit	8209/6679	0.38	Silty clay loam+scattered gravel	? (could possibly be small ditch butt)
F.51	gully	8210/6679	0.25	Sandy loam+scattered gravel	?R-B (see F.42)
F.52	ditch	8212/6679	0.35	Sandy loam+scattered gravel	R-B (tile fragments)
F.53	ditch	8213/6679	0.35	Sandy clay loam+gravel lenses	? R-B (see F.42; recut of F.52?)
F.54	gully	8213/6677	0.10+	Sandy loam	? R-B (parallel to F.42)
F.55	O.L.S.*	8205/6695	5-10cm thick	Sandy clay loam to sandy loam+gravel	Mainly prehistoric; soil surface below headland
F.56	soil	8205/6695	20cm thick	Sandy clay loam to sandy loam+gravel	Neo./B.A.; buried Bt horizon.
F.57	soil	8205/6695	30+cm thick	Sandy clay loam to sandy loam+gravel	Medieval plough headland
F.62	ditch	8204/6717	0.28	Sandy loam, in even gravel mix	?
F.63	pit	8197/6718	0.10	Sandy loam, in even gravel mix	? Natural
F.66	ditch	8206/6695	0.38	Sandy clay loam+scattered gravel	?
F67	ditch	8206/6695	0.50+	Sandy loam, in even gravel mix	R-B (tile, slag); cuts F.56
F.68	ditch	8172/6828	0.36	Sandy clay loam+scattered gravel	Modern drain (cut through alluvium)
F.73, F.74 (not dug) tree root-holes beneath alluvium.					
F.75	pit	8199/6708	0.10	Sandy loam+charcoal	? R-B or earlier (below headland)

*O.L.S.=Old Land Surface

Table 44: List of excavated features, Barnack/Bainton

Romano- British activity we found the partially ploughed-out remains of a medieval headland. This thick accumulation of soil (Table 44, F.57; Fig.199, lower, Pl.XXXIII) seems to have accumulated above an earlier, possibly Roman dump or bank, which in turn sealed the prehistoric soil. This intermediate deposit was doubtless associated in some way with the activity immediately to the south. Indeed, the headland may have been aligned on the pre-existing earthwork. These two factors may help to account for the excellent preservation of the prehistoric soil (Table 44, F.55 and 56;). The complex history of these palaeosols is discussed in full by French in part V, below.

The soils buried beneath the headland produced flints, together with sherds of Peterborough ware. These sherds were weathered, but the heavy rim-form of one (Fig.184, No.22) and the traces of whipped-cord 'maggots' on two others (Nos.19 and 21) are distinctive and diagnostic. These finds indicate settlement in the immediate vicinity of the headland. Beaker sherds were found crammed into a very small (diameter 0.30m; depth 0.08m) pit on the lip of the later ditch F.46. This small pit appears to be isolated, although it is quite possible that others were removed by the extensive Romano-British activity in the area. It is difficult to explain its function, but it is possible that the closely stacked pot sherds could have been used as post-packing, which subsequently collapsed inwards, to lie on the post-hole bottom, when the post itself decayed. It is, however, particularly interesting to note that *no* Beaker material was found in the buried soil, just a few metres to the north.

The land between the plough headland and the modern (Enclosure) hedgeline was largely devoid of archaeological features, although the Iron Age ditch, F.33 was revealed in a trial pit through the B horizon soil. The modern hedge left no trace whatsoever in the gravel subsoil (Fig.199, top), despite the fact that it was substantial enough to be removed mechanically. The soils of its ditch and bank were examined by Dr French (part V), for comparative purposes. North of the headland the alluvium spread begins (Pl.XXXIV), but no proven archaeological features were recovered beneath it. The plan (Fig.183) does, however, show the outline of four distinctively banana-shaped pits, arranged in a rough semicircle, which are a clear example of tree-collapse, as discussed by Kooi (1974).

III. The Finds

The Prehistoric Pottery

by Francis Pryor

Introductory note

The terminology employed below is defined in the Introduction to the catalogue of prehistoric pottery

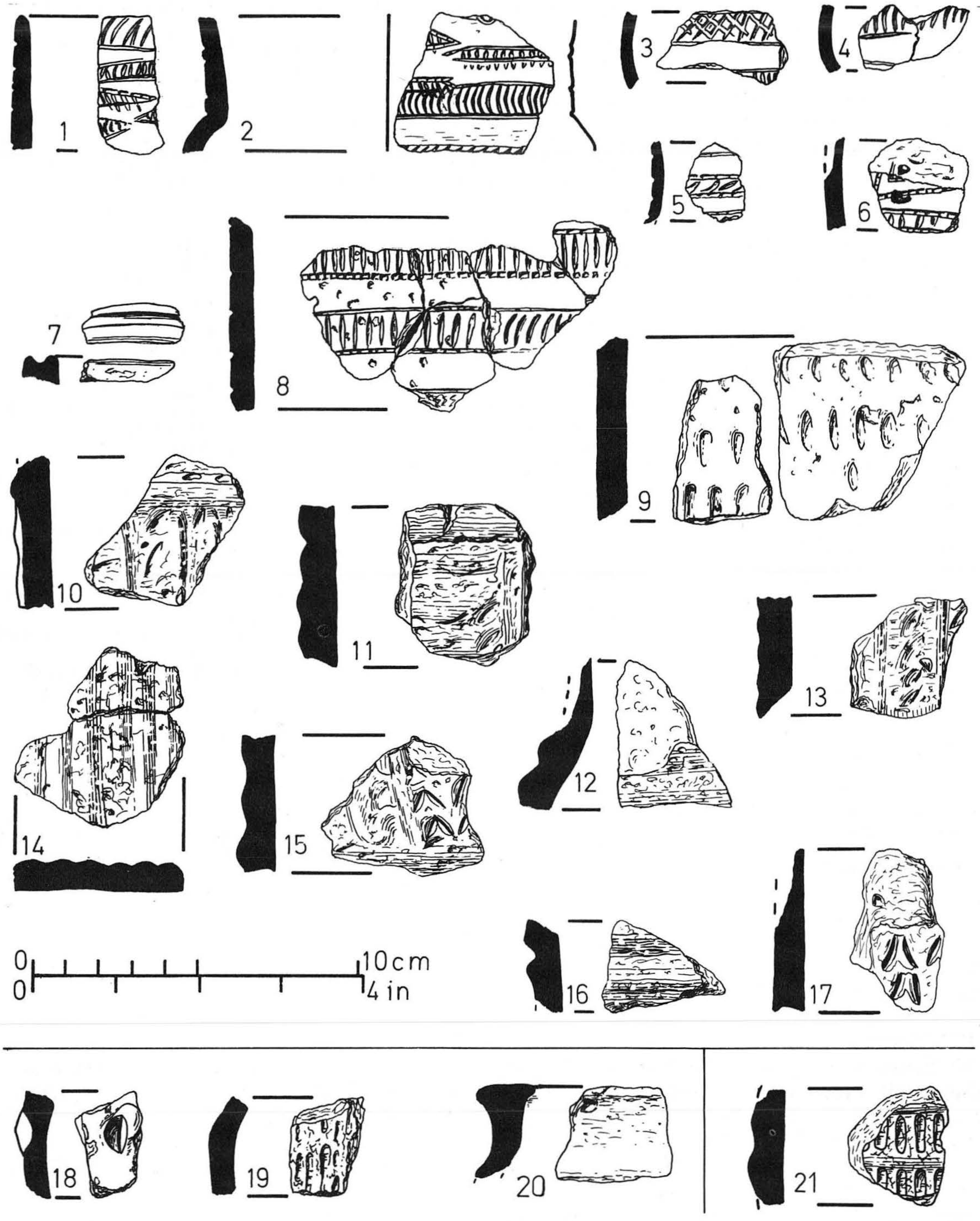


Fig.184 Barnack/Bainton: prehistoric pottery. Scale 1:2.

from Maxey (Chapter 2, part III). Munsell colour verbal descriptions may be found in Appendix II. To avoid confusion with pottery from Maxey, the finds number at the end of each entry is prefixed with the site code used in the field (T81).
Note: FN = fingernail; FT = fingertip.

Catalogue of illustrated sherds

F.30

Fig.184, No.1 Rim of medium-sized Beaker vessel with vertical neck and simple, rounded rim. Decoration in narrow bands of filled and reserved horizontal zones and lozenges. Top zone is applied FN, all others are comb-impressed. Fabric includes fine sand, rounded grits and crushed shell; medium hard, dark core. Int. and ext. 10YR 5/2. T81.31

No.2 Neck and shoulder of Beaker vessel. Diameter *c.*120mm. Decoration above shoulder: zone of FN below zones of comb-impressed lozenges separated by reserved areas; below: reserved zone at shoulder top above lightly slashed band. Fabric as No.1, but slightly harder (not the same vessel). Int. and ext. 7.5YR 5/4, dark core. T81.32

Nos.3-6 Bodysherds from Beaker vessel with comb-impressed (Nos.3,5 and 6) and FN decoration (No.4). Fabric similar to No.2, but thinner. Int. and ext. v. variable, *c.*7.5YR 4/4; dark core. T81.33-6

No.7 Rim-top (?) fragment with deep, open U-shaped groove. Fabric soft with dissolved (? shell). Int., ext. and core black. T81.41

No.8 Bodysherds of coarse Beaker pottery decorated with comb-impressed horizontal 'ladders'; ladder 'rungs' are FN-impressed. Fabric very soft, weathered, shell-gritted. Int., ext. and core 7.5YR 5/6. T81.42-9

No.9 Bodysherds of coarse, rusticated Beaker pottery with rows of stabbed FT. Fabric slightly harder than Nos.10-17, with shell grits and irregular vacuoles (? vegetable). Pale ext. finish; otherwise int. and ext. 7.5YR 5/2; core dark. T81.301-302

Nos.10-17 Bodysherds of coarse, rusticated Beaker vessel(s), decorated with horizontal and vertical cordons (Nos.10-16) and vertical pinched FT. Evidence for coil manufacture (note lower break of No.13). Fabric very soft, shell-gritted. Int. and core black; ext. *c.*7.5YR 5/4. T81.11-18

F.56

Fig.184,No.18 Bodysherd of coarse vessel with single pinch-mark (FT). Weathered. Fabric soft/hard. Ext., 7.5YR 4/4; int. and core black. T81.71

No.19 Bodysherd of coarse vessel with very weathered whipped-cord 'maggot' impressions, probably arranged in rows, separated by irregular reserved zones. Colour as No.18, fabric similar, but slightly softer, more weathered. T81.86

No.20 Rimsherd of Peterborough (probably Mortlake) bowl, with T-shaped rim (traces of ? decoration on top?) and near-cavetto neck; shoulder angle just visible. Int. surface lost, ext. and top v. weathered. Dissolved-out shell and (?) vegetable and some small sand. Soft. Ext. and int. paler than black core. T81.83-85

F.55

Fig.184,No.21 Bodysherd of coarse vessel with weathered whipped-cord 'maggot' impressions, probably in rows, as No.19. Fabric very soft, weathered, shell-gritted. Int. and core black; ext. 2.5YR 4/4. T81.60

Discussion

The pre-Iron Age pottery comes from two contexts: the small pit, F.30 and features associated with the old land surface beneath the plough headland of the North Field (Features 55 and 56). The small pit was on the edge of the linear feature, F.46, but a relationship was not observable. The pit had clearly been back-filled with pottery and charcoal, burnt matrix etc. The Beaker material falls into two groups; the finer wares (Nos.1-6) are in a medium hard, well-finished fabric, but they lack the very smooth, burnished finish of the very finest Beaker pottery. In Clarke's (1970) terminology this material is 'household ware'. The coarser pottery (Nos.8-17) is fired soft and is heavily charged with crushed shell. Both classes of pottery find numerous local parallels from similar contexts, including Fengate (Pryor 1974a, fig.10; Pryor 1980a, 234-45) and the recently re- assessed Chippenham Barrow 5 (Gibson 1980, with refs.). The latter site provides particularly close parallels for the coarser vessels, especially the treatment of cordons. The finer, 'household ware' does not show the tendency to metope decoration seen in the Wyman Abbott material from Fengate (Gibson in Pryor 1980a). A date within Lanting and van der Waals' Steps 6 or 7 would accord with the evidence best (Lanting and van der Waals 1972).

The second group of pottery comes from features or soils below the plough headland. This group is noticeably more weathered than that from the back-filled pit, F.30, but it is also different in form and fabric, being softer than the coarse Beaker material and poorly-fired (with very dark core). The presence of whipped-cord 'maggots' (Nos.19 and 21) and the diagnostic profile of the Mortlake bowl (No.20) leave little doubt that this is a Late Neolithic, Peterborough assemblage. It is of interest that, despite the presence of the Beaker pit immediately to the south, no identifiable Beaker material was found in the soil beneath the plough headland.

The unusual rimsherd fragment with grooved top (No.7) finds a close parallel from the Fen-edge Beaker assemblage at Methwold, Norfolk (Gibson 1982, 452, no.21).

Apart from the two groups discussed above, plain body sherds of Iron Age pottery were found in some of the linear ditches south of the headland area. A possible plain rim sherd was found in F.25. None of this material has been illustrated.

The Romano-British Pottery

by David Gurney

Despite the fact that the excavated areas lay very close to the site of a Roman villa, remarkably few diagnostically Roman finds were present in the excavated features. The actual area of the villa (Fig.179) just west of the North Field is defined by a discrete scatter of Romano-British pottery, tile and limestone rubble, and this area was also found to have a clear enhancement of phosphate in the ploughsoil.

Roman finds consisted of two sherds of pottery from excavated features, three tile fragments (from F.31, sections 13-14; F.52, sections 1-2 and F.67, sections 1-2) and two pieces of possible Roman slag (F.67, sections 3-4).

The two Romano-British sherds are as follows (not illustrated):

F.31

No.1 Bodysherd of small colour-coated jar or bowl. The fabric is white or very pale brown with (probably) a light red colour-coat (extremely weathered).
Sections 5-6, layer 1; depth 0.20m below stripped surface. N to S ditch. T81.50

F.56

No.2 Bodysherd of large colour-coated vessel, possibly a flagon, jug or jar, with a white to very pale brown fabric and a light red colour-coat (5YR 6/4). Possibly 3rd century. Trench 1. Old land surface beneath medieval plough headland, at base of B soil horizon, 0.05m below the stripped surface.

The flint

by Francis Pryor and Maisie Taylor

Introduction

The arrangement of this section follows Chapter 2. The initial Catalogue is followed by a discussion of the two principal contexts: the ploughsoil surface and the B horizon/feature finds. The discussion concludes with an assessment of the collection as a whole.

Catalogue of illustrated flints

Ploughsoil finds

Fig.185,No.1 Oblique arrowhead of Clark (1934) Class H. Bifacial retouch. Weight 1g. Grid 8280/6390. T81.713

No.2 Transverse arrowhead of Clark Class D. Damaged. Weight 2g. Grid 8319/6380. T81.132

No.3 Barbed-and-tanged arrowhead, broken along one edge and retouched to convert it to a barbed form. Weight 1g. Grid 8320/6530. T81.200

No.4 Bifacially retouched flake with spokeshave retouch, or utilisation. Weight 4g. Grid 8330/6470. T81.332

No.5 Broken blade, patinated and given burin retouch at a later period. Weight 3g. Grid 8260/6630 T81.1752

No.6 Small chopper (?). Bifacially retouched gravel pebble; possibly hafted (?). Weight 32g. Grid 8300/6520. T81.26

No.7 Piercer, single point, bifacially retouched and utilised (damaged?). Weight 6g. Grid 8240/6650. T81.1426

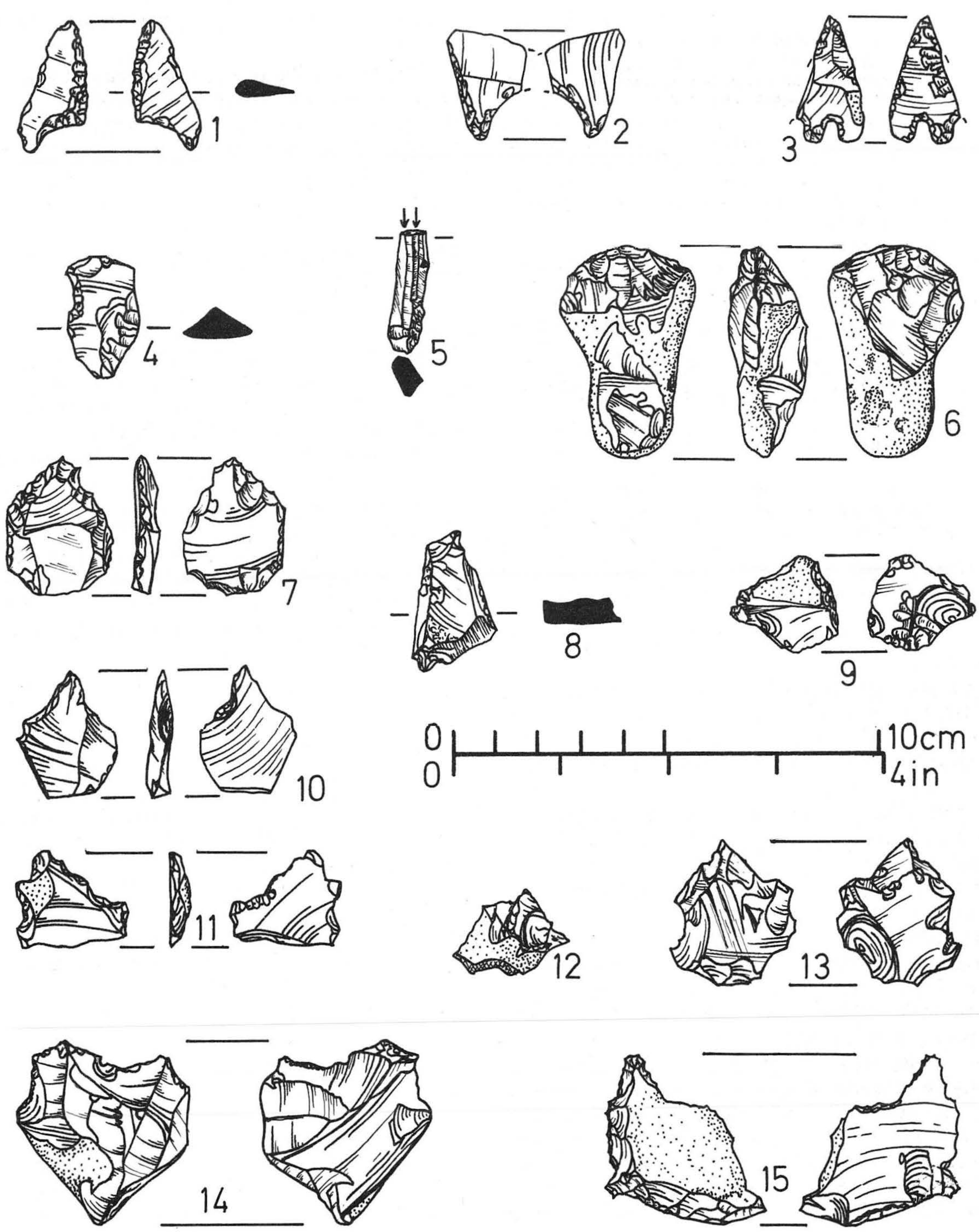


Fig.185 Barnack/Bainton: selected flints from the ploughsoil. Scale 2:3.

No.8 Piercer with two points (proximal and distal ends); utilised at points and along edges (damage?). Weight 4g. Grid 8220/6580. T81.1029

No.9 Piercer, single point, bifacial retouch and blunting retouch (or more probably plough-damage) along two edges. Weight 3g. Grid 8190/6780. T81.1894

No.10 Piercer, with steep blunting retouch on either side of single, utilised point. Weight 3g. Grid 8250/6670. T81.1482

No.11 Denticulated tool (at least five points). Unifacial retouch. Weight 3g. Grid 8270/6500. T81.459

No.12 Denticulated tool (four points). Damaged or utilised. Weight 6g. Grid 8300/6510. T81.15

No.13 Denticulated tool (at least five points). Heavily worn or abraded. Weight 13g. Grid 8330/6470. T81.328

No.14 Denticulated tool on core fragment. Edges heavily utilised (?damaged). Weight 23g. Grid 8300/6400. T81.67

No.15 Denticulated tool (at least four points). Blunting retouch (? damage); sides utilised and irregular scraper retouch along two sides (more probably the result of plough-damage). Weight 15g. Grid 8290/6430. T81.560

Fig.186, No.1 Double-ended scraper with irregular retouch on fragment of irregular workshop waste. Weight 24g. Grid 8720/6430. T81.664

No.2 Short-end scraper with flat edge retouch (45-50°); heavy, stepped, utilisation scars. Weight 9g. Grid 8270/6520. T81.483

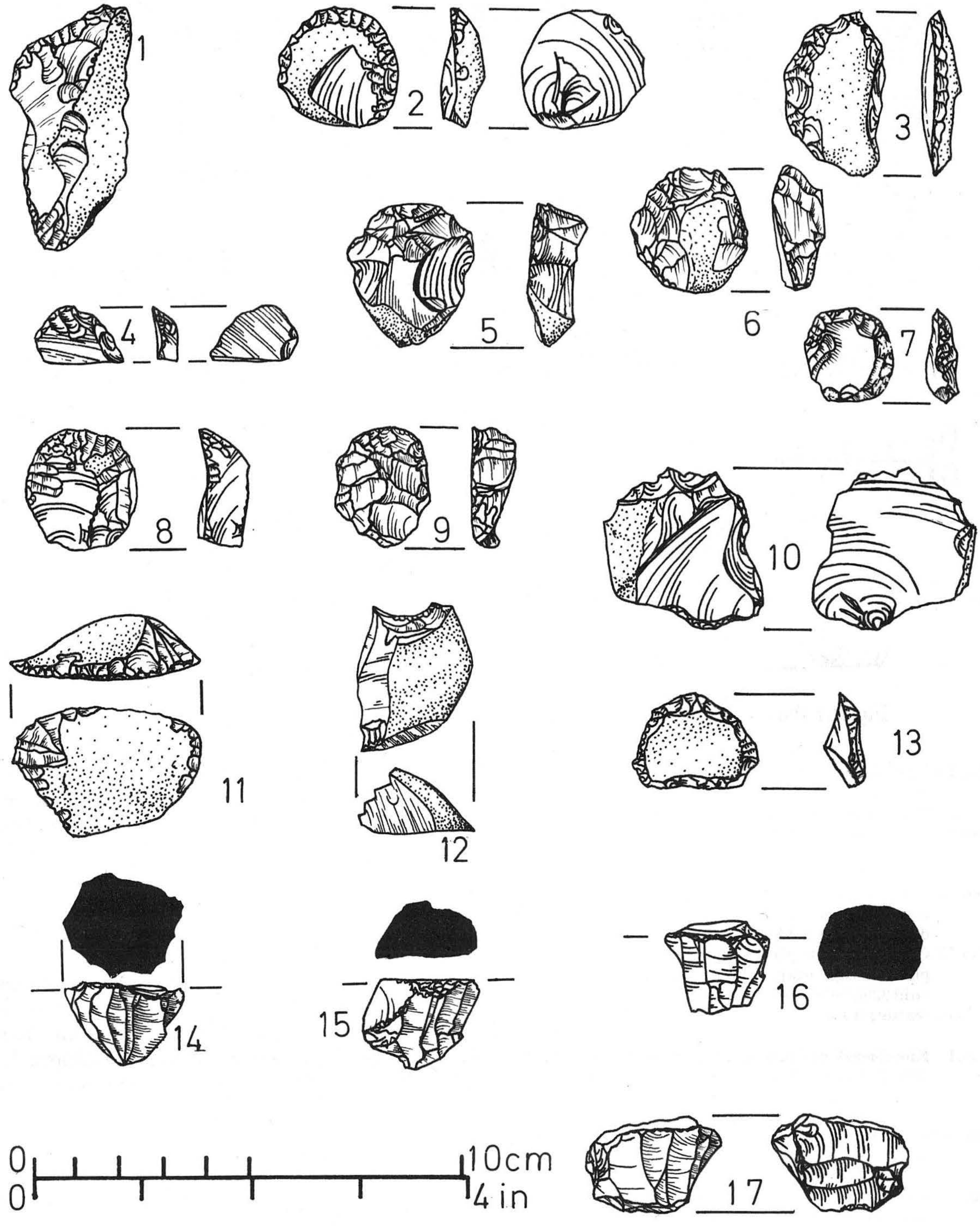


Fig.186 Barnack/Bainton: selected flints from the ploughsoil. Scale 2:3.

No.3 Irregular, short-end scraper with heavily worn point and unifacial retouch. All edges utilised (? damaged). Weight 8g. Grid 8230/6570. T81.1036

No.4 Short-end scraper remnant on broken flake. Heavily utilised (? damaged). Weight 2g. Grid 8240/6630. T81.1410

No.5 Short-end scraper on damaged flake (core platform rejuvenation?). Steep (90°) retouch and heavy, stepped utilisation/damage scars. Weight 14g. Grid 8280/6630. T81.1831

No.6 Short-end scraper on core platform rejuvenation flake. Retouch angle variable; heavy utilisation/damage. Weight 11g. Grid 8290/6570. T81.1114

No.7 Short-end scraper on flake. Flat edge retouch (45°). Utilised/damaged. Weight 5g. Grid 8270/6600. T81.1821.

No.8 Short-end scraper on flake. Retouch angle 60°. Utilised. Weight 7g. Grid 8310/6410. T81.146

No.9 Short-end scraper on (?) core platform rejuvenation flake. Retouch angle irregular (*c.*60°). Heavily utilised or damaged. Weight 8g. Grid 8270/6510. T81.474

No.10 Double-ended scraper with worn denticulate points and unifacial utilisation scars. Weight 14g. Grid 8280/6520. T81.453

No.11 Short-end scraper on broken flake. Heavily utilised with vertical retouch. Weight 19g. Grid 8270/6550. T81.661

No.12 Hollow scraper on fragment of irregular workshop waste. Utilised/damaged. Weight 17g. Grid 8160/6770. T81.2202

No.13 Disc-scraper on flake. Retouch angle irregular; utilised all way round. Weight 6g. Grid 8300/6460. T81.45

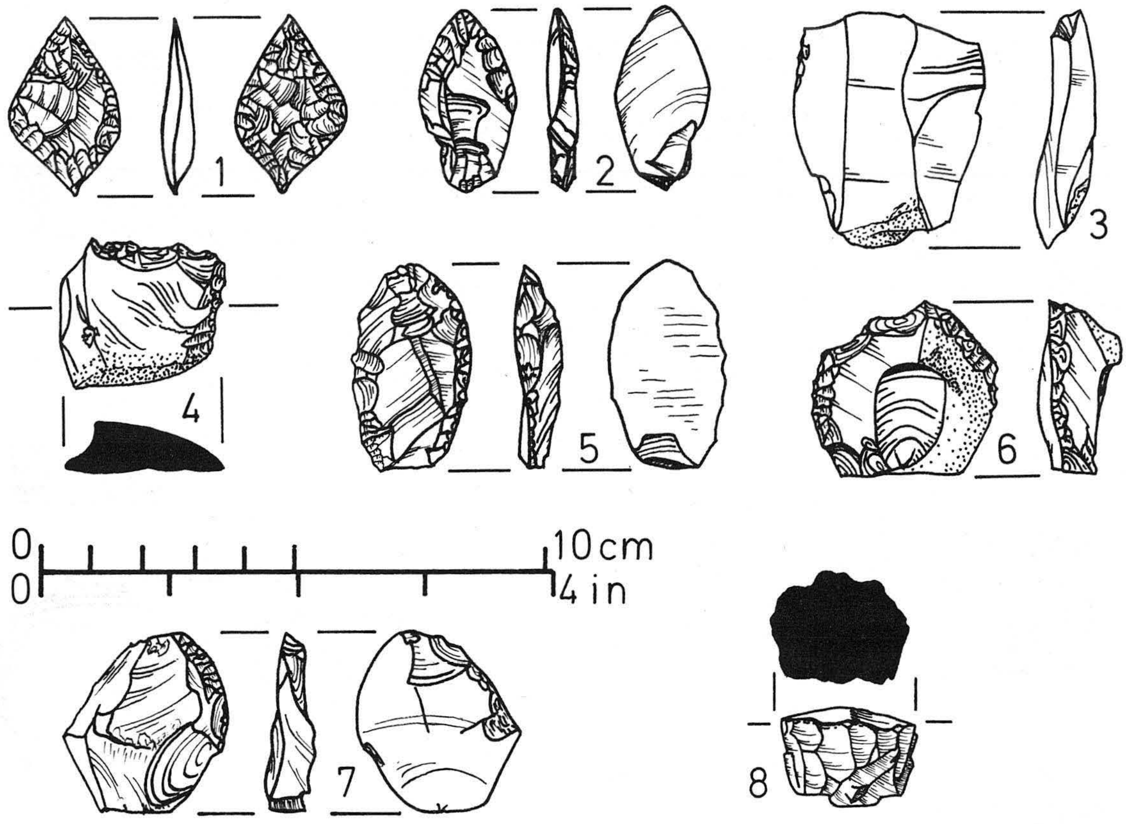


Fig.187 Barnack/Bainton: selected flints from the B horizon and features. Scale 2:3.

No.14 Core, single platform with flakes removed part of the way round. Prepared points of striking platform heavily worn. Weight 11g. Grid 8280/6630. T81.1830

No.15 Core, single platform, with flakes removed part of way round. Utilised and heavily rolled/damaged. Weight 9g. Grid 8270/6550. T81.662

No.16 Core, single platform, with flakes removed part of way round. Striking platform edge heavily worn, utilised or damaged. Weight 13g. Grid 8290/6450. T81.535

No.17 Core, with two platforms at right angles. Striking platform edge worn and (?) retouched. Weight 17g. Grid 8280/6420. T81.669

B horizon and feature finds

F.156:

Fig.187,No.1 Kite-shaped leaf arrowhead of Green's (1980) type 3Ak. Delicate bifacial, invasive retouch. Weight 4g. Layer 1. T81.81

F.55:

Fig.187,No.2 Retouched flake. Unifacial retouched, utilised edges and dorsal point worn. Weight 4g. Layer 5. T81.66

No.3 Flake or blade, heavily patinated except at break on distal end. Weight 19g. T81.67

F.31:

Fig.187,No.4 Denticulated tool on broken flake (? 4 points). Heavy unifacial retouch; all points but one worn. Weight 12g. Sections 13-14, layer 1. T81.108

F.56:

Fig.187,No.5 Long-end scraper on flake, retouch angle 70°. Utilised on all sides. Weight 9g. Layer 1. T81.82

F.35:

Fig.187,No.6 Short-side scraper, retouch angle *c.*60° (but variable). Subsequent removal of 2 large dorsal flakes to give 3 denticulate points. All 3 points worn. Weight 21g. Layer 1. T81.258

No.7 Short-end scraper on flake (angle of retouch 60°). Ventral face of working edge worn smooth; sides damaged. Weight 13g. Layer 1. T81.259

F.65:

Fig.187,No.8 Core, single platform, flakes removed all way round. Patinated and fire-cracked. Utilised or abraded. Weight 15g. Sections 1-2, layer 1. T81.109

Discussion

The classificatory systems and terminology used here are defined in the discussion of flints from Maxey (Chaper 2, part III). The present collection will first be considered by context, then as a whole.

Topsoil (A horizon) flints (Figs.185,186 and 188; Tables 45,46)

The general distribution of flints over the topsoil is shown in Fig.180. The distribution of flints from the nearby transect is discussed in part I and flints from the transect survey as a whole are analysed in Chapter 1. The topsoil flint collection comprises the following types:

Implements (69% of total)

Utilised flakes	124	(44.6%)
Retouched flakes	97	(34.9%)
Short-end scrapers	11	(3.9%)
Double-ended scrapers (long)	1	(0.4%)
Double-ended scrapers (short)	2	(0.7%)
Disc-scrapers	1	(0.4%)
Scrapers on broken flakes	1	(0.4%)
Hollow scrapers	3	(1.1%)
Piercers	6	(2.1%)
Serrated flakes	1	(0.4%)
Awls	1	(0.4%)
Denticulated tools	19	(6.8%)
Barbed-and-tanged arrowheads	2	(0.7%)
Transverse arrowhead, Type D	1	(0.4%)
Transverse arrowhead, Type H	1	(0.4%)
Implements, uncertain use	2	(0.7%)
Implements, modified twice	5	(1.7%)
	Total: 278	

By-products (31% of total)

Waste flakes 49 (39.2%)
Irregular workshop waste 45 (36.0%)
Cores, single platform, flakes removed all way round 1 (0.8%)
Cores, single platform, flakes removed part way round 9 (0.2%)
Cores, 2 parallel platforms 3 (2.4%)
Cores, 2 platforms, one at oblique angle 1 (0.8%)
Cores, 2 platforms at right angles 4 (3.2%)
Cores, 3 or more platforms 2 (1.6%)
Cores, keeled. 1 (0.8%)
Cores, damaged 5 (4.0%)
Pebble cores 5 (4.0%)
Total: 125

The collection of flakes shows a preponderance of short, squat forms (Fig.118), highly reminiscent of Bronze Age contexts at Fengate (Fig.110). The material shows a bias in favour of utilised forms which may almost certainly be attributed to plough-damage. The fact that some flakes show no damage at all, is, however, of interest, given the fact that subsoil features containing flint were almost absent in the excavated area. In other words, recent disturbance of flint-rich subsoil features cannot account for the presence of undamaged flint flakes in the topsoil. It is also of interest to note that the approximate proportions of utilised to waste flakes in the topsoil (70:30%) is broadly comparable (60:40%) with that from the subsoil. One might, perhaps, expect plough-damage to affect the figures more radically.

Typologically the collection includes two later Neolithic types (Fig.185, Nos.1 and 2, the oblique and transverse arrowheads); the modified barbed-and-tanged arrowhead (Fig.185, No.3) would normally be expected to derive from Beaker contexts in its unmodified form. These items aside, the collection resembles that from Newark Road Fengate (Pryor 1980a, figs.64-9), although some of the scrapers (Fig.185, Nos.2,4,7 and 8) could also be at home in Beaker contexts. No doubt the Late Neolithic and Beaker material probably owes its existence to the remnants of the settlement site(s) that were recovered below the plough headland in the North Field.

Flints from the B horizon and features (Figs.187,188; Tables 45,46)
The B soil horizon produced the following flints:

Implements (63.6% of total)

Utilised flakes 18 (64.3%)
Retouched flakes 9 (32.1%)
Denticulated tools 1 (3.6%)
Total: 28

By-products (36.4% of total)

Waste flakes 8 (50.0%)
Irregular workshop waste 6 (38.0%)
Core, 2 platforms, parallel 1 (6.0%)
Pebble cores 1 (6.0%)
Total: 16

Features cut into the gravel subsoil produced the following flints:

Implements (53.2% of total)

Utilised flakes 19 (57.6%)
Retouched flakes 8 (24.3%)
Scrapers, long-end 1 (3.0%)

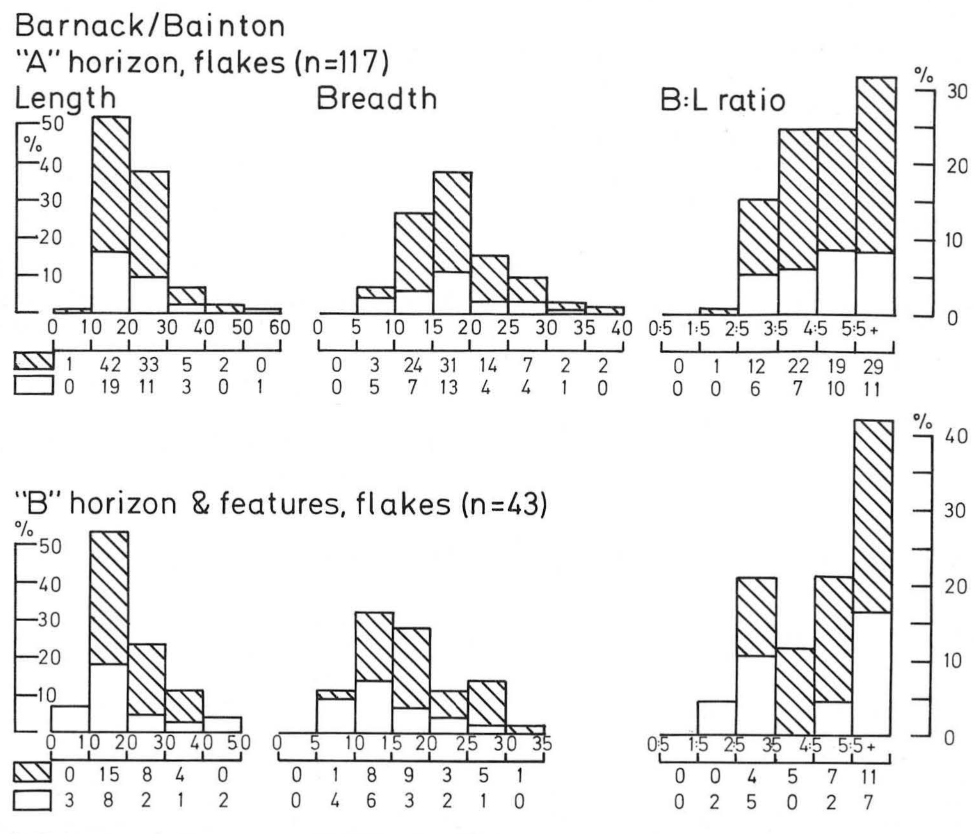


Fig.188 Barnack/Bainton: histograms showing dimensions of flint flakes from ploughsoil (top) and B horizon and features (bottom).

Flakes, utilised and waste (n = 78), with visible platforms, internal (ventral) angles (to nearest 5°):

	<80°	*80-85°*	*85-90°*	*90-95°*	*95-100°*	*100-105°*	*105-110°*	*110-115°*	*115-120°*	*120-125°*	*125-130°*	*130-135°*	>
A horizon	4	2	2	1	9	10	12	7	5	4	1	1	1
B. horizon	1	—	—	—	2	—	1	—	1	2	1	1	—
Features	1	1	—	—	—	1	3	1	1	3	1	—	—

Table 45: Barnack/Bainton flint metrical data, Part 1.

Scrapers, short-side 1 (3.0%)
Piercers 1 (3.0%)
Denticulated tools 1 (3.0%)
Leaf arrowhead 1 (3.0%)
Implements modified twice 1 (3.0%)
Total: 33

By-products (46.8% of total)
Waste flakes 22 (75.9%)
Irregular workshop waste 5 (17.2%)
Cores, single platform, flakes removed all way round 1 (3.4%)
Cores, 2 platforms, parallel 1 (3.4%)
Total: 29

This collection includes a number of early forms, including the broken blade with the parallel double arris on the dorsal surface (Fig.187, No.3). It is interesting to note that this piece has been broken at a later period in antiquity and then utilised at the break. The break and utilisation scars are not patinated, whereas the remainder of the piece has a fine grey, patina. The single platform core remnant (Fig.187, No.8) would also not be out of place in earlier Neolithic contexts. The leaf arrowhead (Fig.187, No.1) is of Green's small kite-shaped form 3Ak (1980, fig.28). Whilst the majority of leaf arrowheads may be considered as being of earlier Neolithic date, similar kite-shaped forms also occur in later contexts in association with, for instance, Peterborough Ware or Beaker ceramics, as at Spencer's Way, Driffield, Yorks. and Ayton East Field barrow, Yorks., respectively (Green 1980, 97). Peterborough sherds were also recovered here from the same feature (F.56).

1. Mean values, unbroken waste flakes:

	Length (mm)	*Breadth* (mm)	*Thickness* (mm)	*Weight* (g)
Topsoil (n = 34)				
Total	663	568	187	93
Mean	19.50	16.70	5.50	2.73
B horizon (n = 6)				
Total	66	87	29	7
Mean	11.00	14.50	4.83	1.16
Features (n = 10)				
Total	231	139	37	21
Mean	23.10	13.90	3.70	2.10

2. Mean values, unbroken utilised flakes:

	Length (mm)	*Breadth* (mm)	*Thickness* (mm)	*Weight* (g)
Topsoil (n = 83)				
Total	1683	1466	496	232
Mean	20.27	17.66	5.97	2.79
B horizon (n = 15)				
Total	271	217	70	24
Mean	18.06	14.46	4.66	1.60
Features (n = 12)				
Total	280	281	80	48
Mean	23.33	23.41	6.66	4.00

Table 46: Barnack/Bainton flint metrical data, Part 2

The flint industry, general considerations

Taken as a whole, the flint industry from Barnack/Bainton seems to comprise two elements. The earlier element is better seen in the B horizon and excavated group and probably contains a substantial Neolithic element. Although the numbers involved are very small, the bimodal tendency of the breadth to length ratio histogram (Fig.188) might indicate a small blade component in the non-topsoil group. The surface material does not show this tendency, but this could in part be attributable to plough-damage (blades must be more susceptible than shorter, squatter flakes). The surface material includes a few typologically early forms, which were largely absent at Maxey, and it is quite possible that these ultimately derive from the settlement(s) that were partially preserved beneath the plough headland on the North Field. Otherwise, the surface material includes a number of forms, especially, the denticulates and piercers, that find ready parallels with Bronze Age Fengate (Pryor 1980a, figs.64-69) and Maxey (Figs.107-109). Even if the few flakes from the buried contexts are included, the general pattern of the breadth to length ratio of flakes from Barnack/Bainton is closely similar to that from Fengate or Maxey (Fig.110).

IV. Geophysical and Geochemical Analyses

by David Gurney

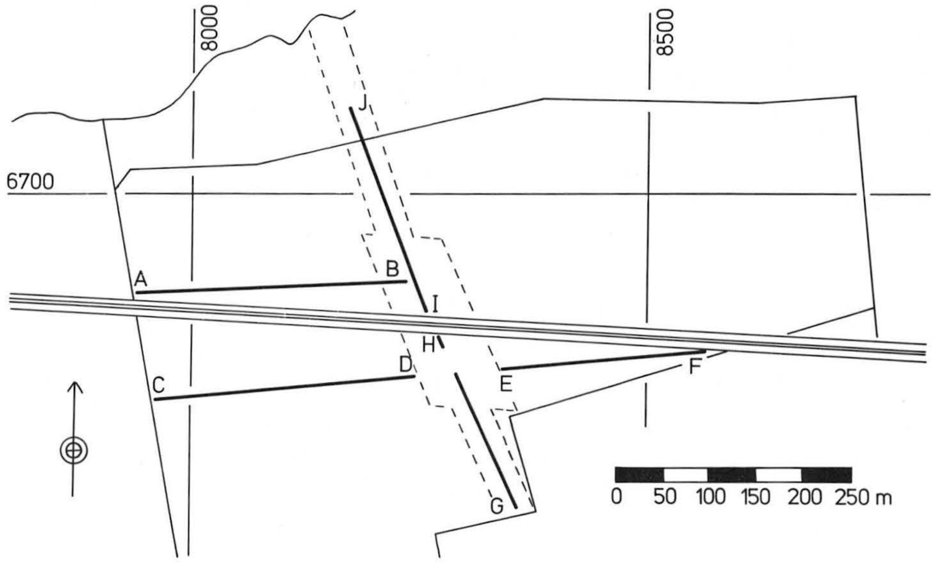
Introduction

Soil samples for phosphate and magnetic susceptibility analysis were taken from three general locations which will be considered in turn below. The first series of samples was taken from the ploughsoil, as part of the overall surface survey of the site, discussed in part I, above. The second series was taken from the stripped (C and B/C horizons) surface, at the point where features were first visible. The third series was from excavated features. Methods of field sampling, sample preparation and analysis are described by Paul Craddock in Appendix III.

The Ploughsoil Survey (Figs.189-192)

Introduction (Fig.189)

Samples for phosphate and magnetic susceptibility analysis were taken along three transects. The location of these transects, referred to as the Pipeline Transect (Fig.189, G-H, I-J), the South Field Transect (Fig.189, C-D, E-F) and the North Field Transect (Fig.189, A-B), was determined by the need to place the excavation in a wider context. The Pipeline Transect runs approximately along the line of the pipe itself, and in the centre of the area that was eventually to be excavated. The same sample locations were used for the stripped surface samples (see below). The South Field Transect



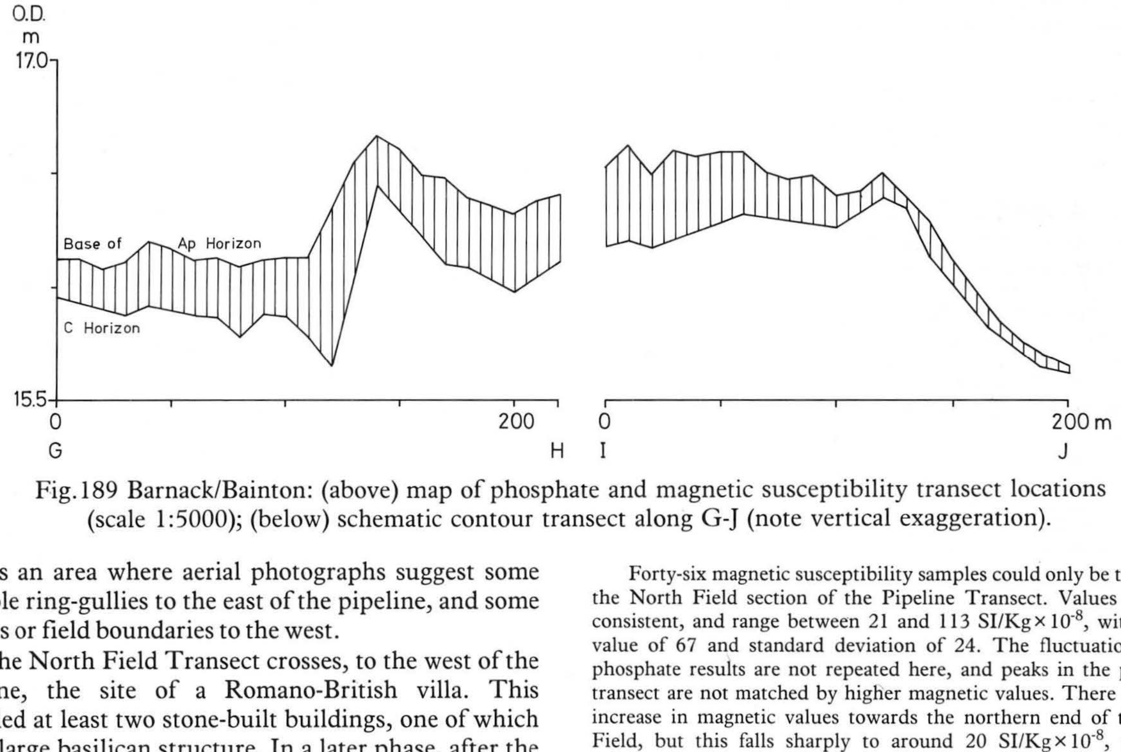


Fig.189 Barnack/Bainton: (above) map of phosphate and magnetic susceptibility transect locations (scale 1:5000); (below) schematic contour transect along G-J (note vertical exaggeration).

crosses an area where aerial photographs suggest some possible ring-gullies to the east of the pipeline, and some ditches or field boundaries to the west.

The North Field Transect crosses, to the west of the pipeline, the site of a Romano-British villa. This included at least two stone-built buildings, one of which was a large basilican structure. In a later phase, after the demolition of this building, a series of small enclosures was laid out across the site. Gravel pits, possible corn-drying hearths and debris from iron smelting have also been noted on the site (WVRC 1963-4; Simpson 1966; St.Joseph 1973).

The ploughsoil consists of a sandy clay loam with scattered gravel pebbles and the pH range is between 7.5 and 8.7.

The Pipeline Transect (Fig.189,G-H,I-J;Fig.190)

Seventy-nine phosphate values on the Pipeline Transect range from 53 to 170mg P/100g, with a mean value of 91 and standard deviation of 21. Where higher values occur in the ploughsoil, these tend to coincide with higher values from the subsoil samples, and not with underlying features (see below and Fig.193). The relationship between the ploughsoil results and the subsoil and feature results will be considered in the following two sections.

In general, phosphate values are slightly higher in the North Field length of the Pipeline Transect, but there are no areas of consistently higher values which might relate to either prehistoric or Romano-British settlement.

Forty-six magnetic susceptibility samples could only be taken from the North Field section of the Pipeline Transect. Values are fairly consistent, and range between 21 and 113 SI/Kg$\times 10^{-8}$, with a mean value of 67 and standard deviation of 24. The fluctuations of the phosphate results are not repeated here, and peaks in the phosphate transect are not matched by higher magnetic values. There is a slight increase in magnetic values towards the northern end of the North Field, but this falls sharply to around 20 SI/Kg$\times 10^{-8}$, when the alluvium is encountered.

The South Field Transect (Fig.189, C-D, E-F ;Fig.191)

Ninety-seven phosphate values vary between 33 and 160mg P/100g, with a mean value of 81 and standard deviation of 22. Apart from one or two isolated peaks, values to the east of the pipeline are highest at the eastern end of the transect, in a triangular corner of the (modern) field, where aerial photographs suggest the presence of possible house ring-gullies. This area of the field was walked informally, as part of the initial site prospection (in view of the aerial photographic information), but nothing was recovered (M.Taylor, pers. comm.). Values to the west of the pipeline are slightly higher than those to the east, but there are no areas of major enhancement, and values fluctuate around 100mg.

Ninety-seven magnetic samples might possibly be seen to reflect the results of the phosphate samples. Values vary between 29 and 80, with a mean of 52 and standard deviation of 12. Two slightly higher peaks at the eastern end of the transect may reflect the possible presence of the house ring-gullies mentioned above.

The North Field Transect (Fig.189,A-B;Fig.192)

Fifty-seven samples were taken across the North Field, to the west of the pipeline. This transect crosses the area of the Romano-British villa.

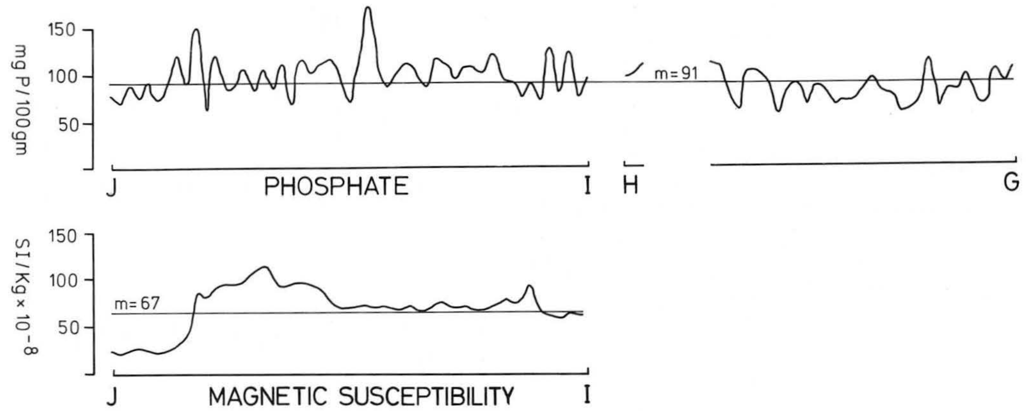


Fig.190 Barnack/Bainton: results of phosphate (above) and magnetic susceptibility (below) analyses (for location of transect lines see Fig.189).

Phosphate values vary from 56 to 170mg P/100g, with a mean of 107 and standard deviation of 26. The highest values occur directly over the area of the villa. This is paralleled by the fifty-seven magnetic results, which range from 52 to 121 SI/Kg $\times 10^{-8}$, with a mean of 77 and standard deviation of 17; again, the highest results occur in the area of the villa.

There is therefore an increase in both phosphate and magnetic values of this known Roman site, corresponding with a discrete ploughsoil scatter of pottery, tile and limestone rubble.

The subsoil survey (Fig.193)

Ninety samples for phosphate analysis were taken from the subsoil along the Pipeline Transect (Fig.189, G-H, I-J). These have a range of 19 to 386mg P/100g, with a mean value of 79 and standard deviation of 62. Sample values from the North Field subsoil are very close to the results from the ploughsoil, although some peaks are sharply accentuated. The degree of coincidence between the peaks on the ploughsoil and subsoil transects is shown in Figure 193. Coincidence on the South Field is also good, but subsoil values are generally lower than on the North Field.

Subsoil samples were taken from the undisturbed surface, away from exposed features, in order to avoid direct contamination from possible secondary sources. Significant leaching of phosphates down the soil profile does not usually occur, and once deposited, phosphates are generally fixed at the point of application (Eidt 1977, 1328). The results from the subsoil could therefore reflect either human or animal occupation, or variation in the natural phosphate levels in the subsoil. If the latter is the case, the peaks in the ploughsoil phosphate analyses would result from the effects of ploughing-up subsoil. This would not be significantly laterally displaced, and unless archaeologically-derived phosphates were of a very high level, would not be masked by settlement. The alternative implication is that the higher values in the ploughsoil transect do derive from occupation, and that the interface of the ploughsoil and the subsoil reflects the phosphate content of the ploughsoil by leaching. Given the pattern of enhancement in the North Field ploughsoil transect (Fig.192), and the higher phosphate values in both the ploughsoil and subsoil along the Pipeline Transect in the North Field, where there is considerably more proven archaeological activity than in the South Field, it seems reasonable to suggest that the higher values in the North Field do derive from settlement, and the ploughsoil phosphate enhancements have been relocated by leaching at the interface between the lower ploughsoil and the B/C horizon.

The feature survey

Selected features in the South Field (Figs.182;184)

The phosphate results from features in the South Field have been divided into five groups.

Group 1 *(Non-linear features north of F.13-15, 25-26)*
These features (*archive*: F/1-11) were sampled to confirm their natural status. The range of values is from 17 to 64mg P/100g, with a mean value of 32. Many of these features may be natural, and the phosphate values support this and suggest little evidence of occupation in the area.

Group 2 *(F.12, the modern water main)*
This feature was sampled at six loci, and samples gave results covering a range of 62 to 190mg P/100g, and a mean value of 117mg.

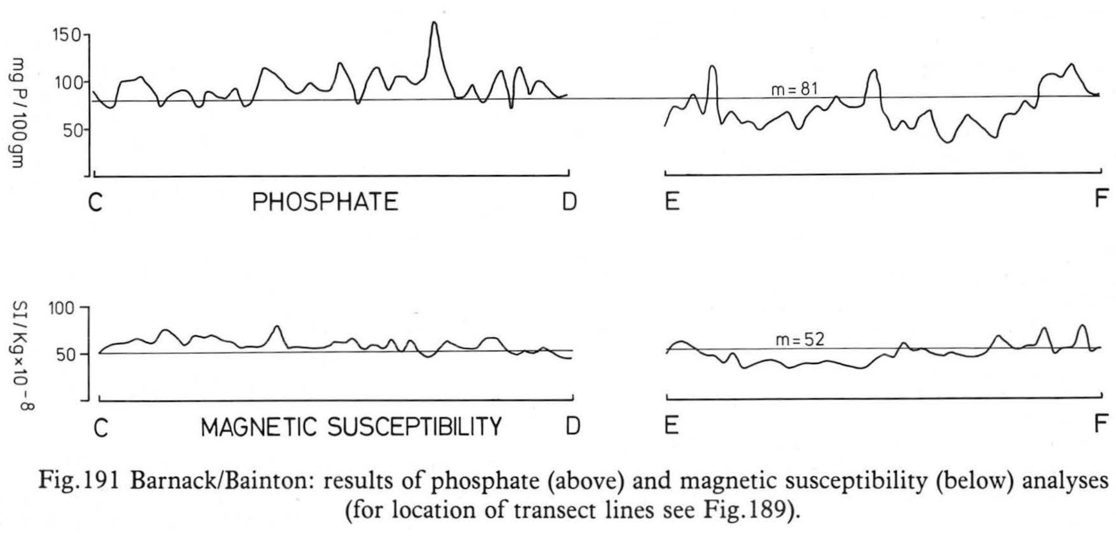


Fig.191 Barnack/Bainton: results of phosphate (above) and magnetic susceptibility (below) analyses (for location of transect lines see Fig.189).

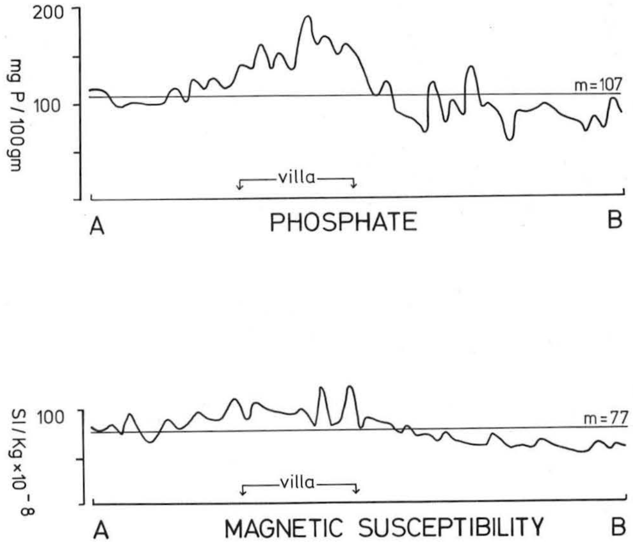


Fig.192 Barnack/Bainton: results of phosphate (above) and magnetic susceptibility (below) analyses (for location of transect lines see Fig.189).

Group 3 *(main East to West ditch, F.13-15, 25-26)* (Fig.194)
Twenty-three samples were taken from these features, with a range from 16 to 105mg P/100g, giving a mean of 36 and standard deviation 21. Values here, while higher than those from other features in the South Field, do not suggest any particular enhancement, such as might result from intensive or long-lived occupation. The features are of probable Late Iron Age to early Roman date and are probably field boundary ditches.

Group 4 *(non-linear features south of F.13-15, 25-26)*
As with Group 1, these features (*archive*: F.16-22) were sampled to confirm their natural status. Two isolated features (F.16 and 17) gave values of 26 and 115mg P/100g, respectively, while a roughly circular arrangement of features (F.18-22), gave values of 42 to 100mg, with a mean of 75. All these features are probably natural.

Group 5 *(medieval furrows)*
These features (F.23 and 24) were sampled at 15 locations along their lengths and gave results ranging from 11 to 23mg P/100g, with a mean of 18. Again, this is not an unduly enhanced result.

Selected features in the North Field (Figs.195-197)

Eighty-four phosphate samples were taken from linear and non-linear features. The results range in value from 37 to 358mg P/100g, with a mean value of 116 and standard deviation of 50. The results are illustrated diagrammatically (Fig.195).

Values from most features are generally low, less than 116mg, with a cluster of higher values associated with a complex of small gullies near the corner of the main north to south ditch F.31. This appears to be part of an enclosure or field of Roman date, associated with the villa which lies just to the west. The density of pottery finds in these Roman features is surprisingly low considering the size and proximity of the villa and this, combined with the phosphate evidence, would suggest that the enhancement here possibly derives from the traffic of livestock through an entrance into the enclosure, rather than from occupation debris from the villa itself. The suggestion that the limestone rubble could have been laid down as hardcore to reinforce a much-used farm gateway seems entirely reasonable (see part II). The phosphate results do not show enhancement towards the north, in the area of the plough headland and its buried Beaker/Late Neolithic settlement. Perhaps the main occupation area associated with this settlement debris lay outside the area excavated.

The features sampled in the North Field were more substantial than those further south, and it proved possible to take column samples; five of these were taken and two were also sampled for magnetic susceptibility. The results are shown in Figures 196 and 197, and the location of the sections is shown in Figure 195.

Each of the three sampled features will be discussed individually:

F.31, section 1 (Fig.196, top)
The five samples for phosphate analysis in this column range from 115-150mg P/100g, with a mean of 129 and standard deviation of 19. The values here agree with the general level of phosphate elsewhere in the ditch, and suggest little occupation. The results are consistent with the use of this feature as an enclosure or field boundary ditch.

F.34, section 1 (Fig.196, bottom)
The nine samples in this column range from 125 to 240mg P/100g, with a mean of 161 and standard deviation of 37. The highest values occur at the junction of layers 1 and 2 (with one higher value in layer 2), suggesting that phosphate-rich material was accumulating in, or was deposited in, this feature shortly after it was dug, but that this did not consist of either human occupation debris or phosphate-rich material from livestock in substantial quantities.

F.33, sections 1,3 and 5 (Fig.197)
Section 1
Five samples, range 115 to 150mg P/100g, mean 129, standard deviation 19. Six magnetic susceptibility samples, range 24-69 SI/Kg$\times 10^{-8}$, mean 49, standard deviation 18.
Section 3
Twelve samples, range 35 to 125mg P/100g, mean 65, standard deviation 23. Six magnetic susceptibility samples, range 14-68 SI/Kg$\times 10^{-8}$, mean 44, standard deviation 24.

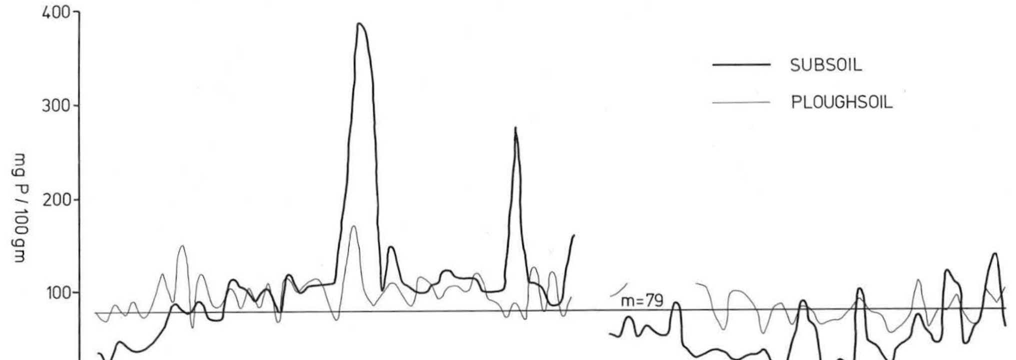


Fig.193 Barnack/Bainton: comparison of phosphate analysis results from the ploughsoil and subsoil along the main pipeline transects (for location see Fig.189).

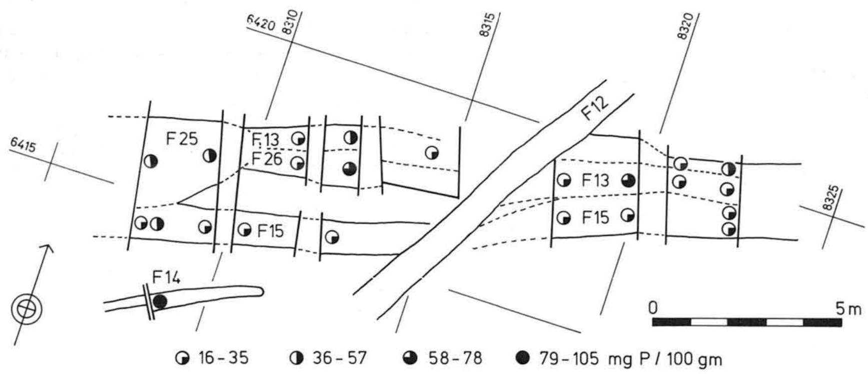


Fig.194 Barnack/Bainton: phosphate results from linear features in the South Field (for locations see Fig.182). Scale 1:400.

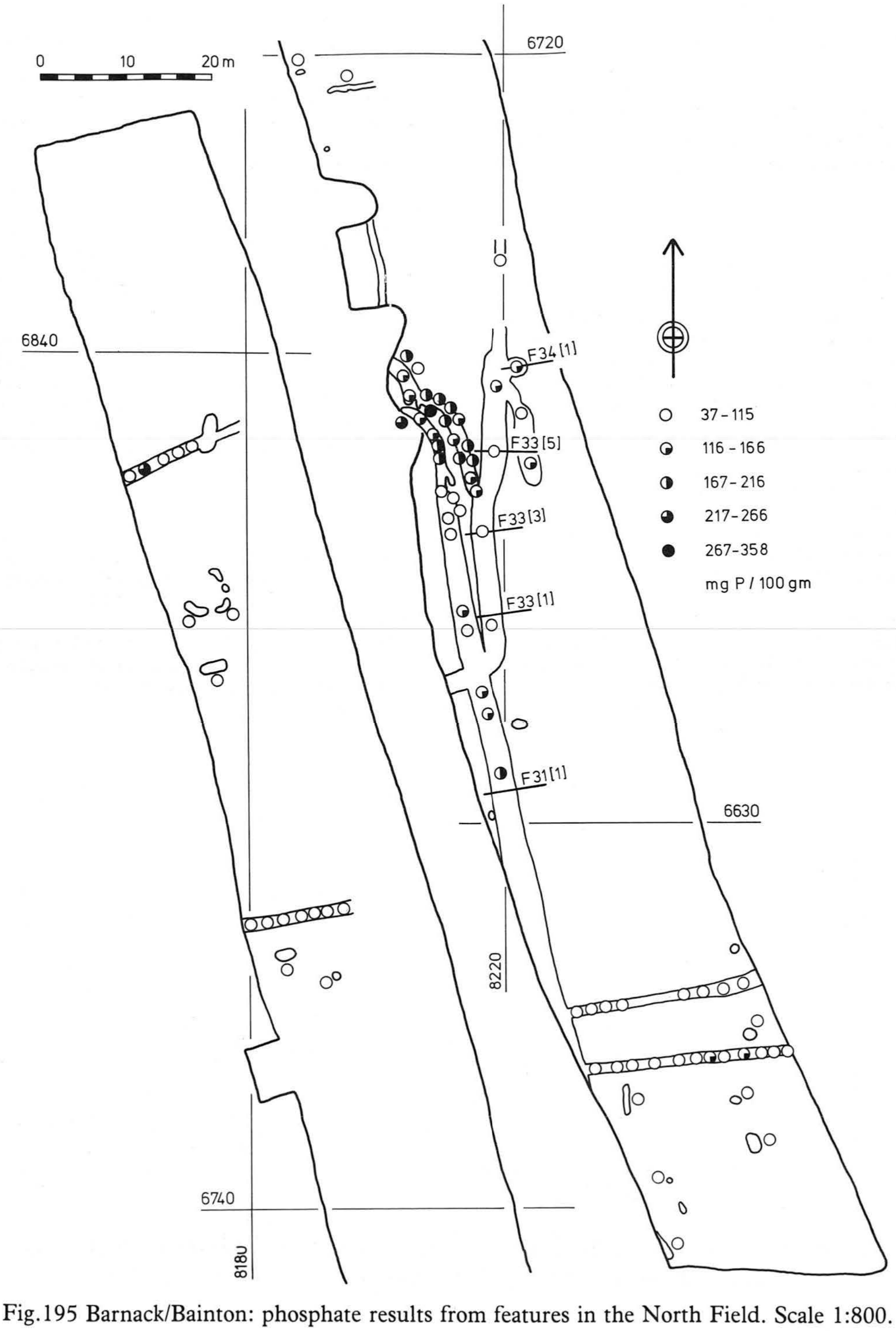


Fig.195 Barnack/Bainton: phosphate results from features in the North Field. Scale 1:800.

Section 5

Ten phosphate samples only, range 82 to 140mg P/100g, mean 101, standard deviation 21.

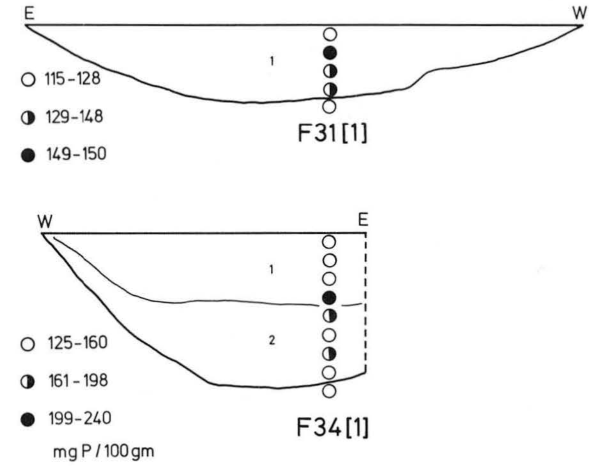


Fig.196 Barnack/Bainton: phosphate results from linear features in the North Field (for location see Fig.195). Scale 1:20.

These three sample columns are taken from three sections of the main north to south drainage ditch F.33, which is cut by F.31, of Roman date, and which appears to be part of a field or enclosure system associated with the Roman villa to the west. Feature 33 may be part of a later Middle Iron Age enclosure or field (see part II, above). Phosphate values are generally low, and all samples have a mean value of 90mg. It is not possible, however, to make strict comparisons between different sections, as the processes of in-filling have operated differently in each section: from a simple three-layer in-filling in section 3, to the more complex lensing and bedding of sections 1 and 5, where sampling columns could not include all layers. In the southernmost section (1), higher values occur at the top and bottom of the column, and a similar pattern is observed in section 3. In section 5, adjacent to the linear ditch F.31, higher values recur in layers 1, 3 and 6, down the profile. In sections 1 and 3, magnetic susceptibility values are higher in the uppermost ditch fills, but are not so high as to suggest the presence of material enhanced by occupation.

The sampled columns generally support the evidence of the other feature samples, and suggest that there is little evidence for enhancement of either phosphate or magnetic susceptibility, such as would be produced by an adjacent settlement or by the deposition of quantities of occupation debris. The evidence from the main ditches is consistent throughout with their use as outlying ditches of fields or enclosures some distance from any intensive occupation or settlement.

V. Soil/Sediment and Molluscan Analyses at Barnack/Bainton and Barnack/Pilsgate

by Charles French

Introduction

This report is in four parts. The first concerns investigations of colluvial deposits to the west of Barnack village, at the foot of the valley slope. The second is an analysis of soils and sediments of ancient and modern features of the pipeline site at Barnack/Bainton. The third is a joint report of heavy mineral analyses at Barnack/Bainton and Maxey and the fourth is a discussion of molluscs from the Iron Age ditch, F.33 at Barnack/Bainton.

The site at Barnack/Bainton is located on First Terrace gravels, in an area rich in cropmarks (see Introduction; Fig.179). The site revealed an unexpected Late Neolithic/Early Bronze Age buried surface beneath a medieval plough headland in the North Field (Fig.183). In contrast to the proliferation of prehistoric and Roman

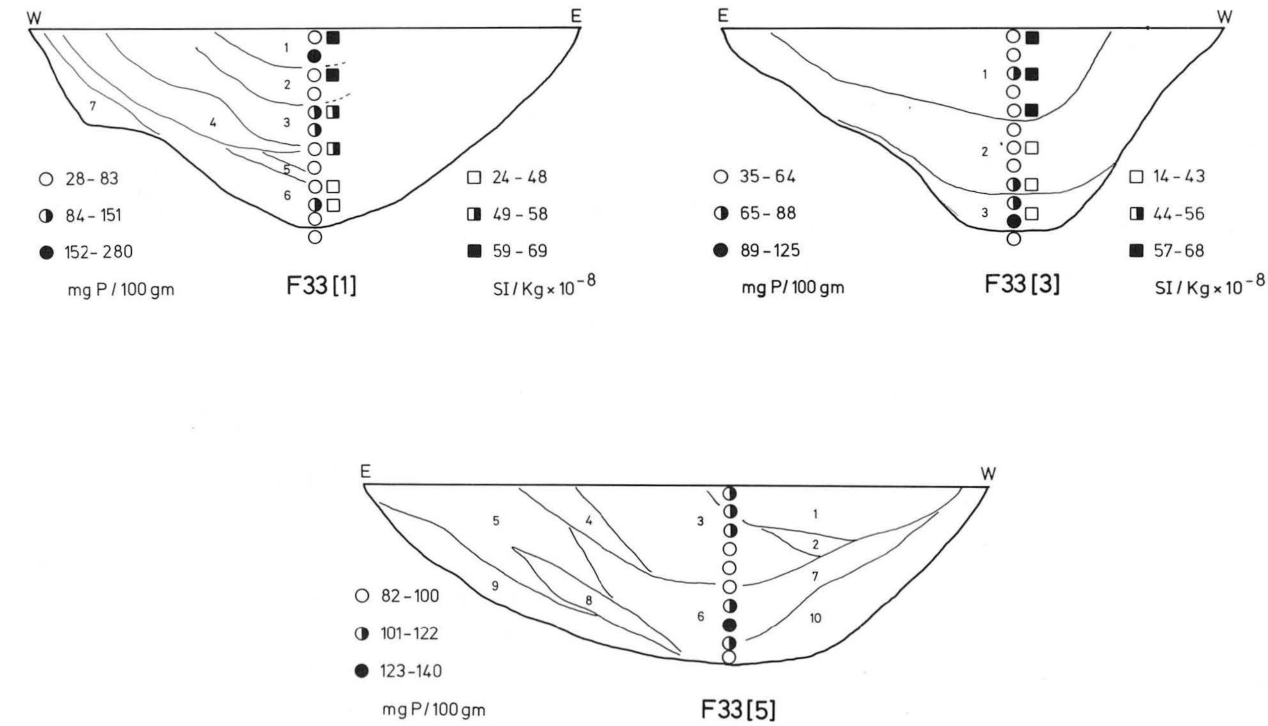


Fig.197 Barnack/Bainton: phosphate results from linear features in the North Field (for location see Fig.195). Scale 1.20.

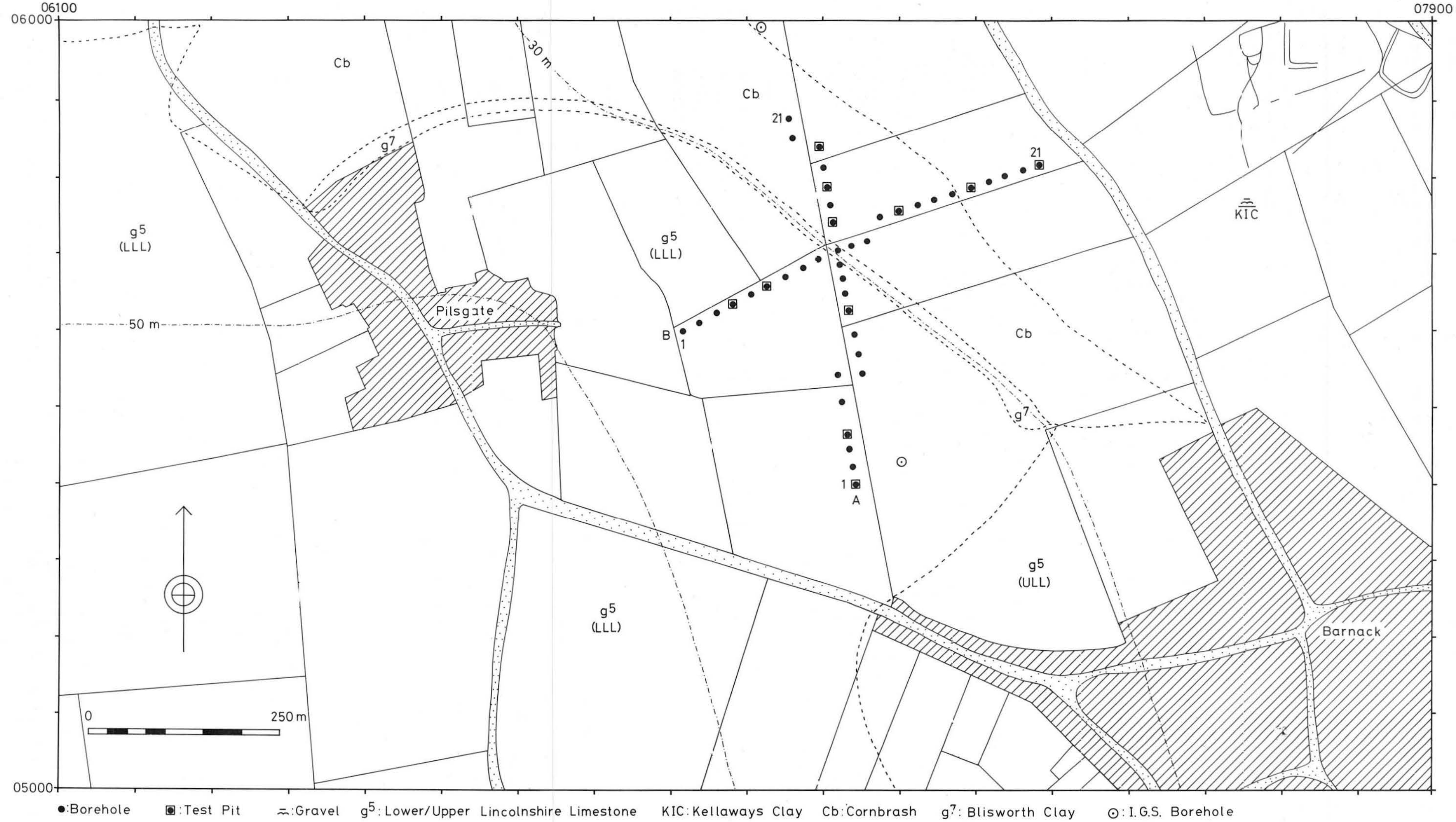


Fig.198 Barnack/Pilsgate: map showing location of auger survey area and local geology. Scale 1:7500.

sites on the river valley terraces, no sites were known on the relatively steep, southern slopes of the valley, nor on the adjacent upland. In an attempt to tackle these problems, an augering survey was undertaken to examine the Barnack/Pilsgate area for any potential masking or erosive effects on the archaeological record.

Soil erosion and colluviation at Barnack/Pilsgate (Fig.198;Table 47)

Two transects consisting of a total of forty-two individual boreholes were made in the vicinity of Barnack and Pilsgate villages (TF 1710 0550) (Fig.198). Both the south to north (A) and west to east (B) transects proceeded across the lower Lincolnshire limestone upland above the 30m contour, downslope across the 30m contour and onto a thin band of Cornbrash, and onto the gravel subsoil of the valley below the 20m contour. All the land is now open and used as arable land. Corn crops are grown on the flatter upland and lower slope areas; root crops are found on the intervening steeper slopes. Boreholes were made at approximately 25m intervals, and test pits were excavated by hand at nine loci (Table 47).

The slope profile ranges from gently sloping (7°) concave on the lower slopes to strongly sloping (*c.*15-25°) constant middle/upper slopes to gently sloping (7°) convex uppermost slopes. All areas of the slope would be subject to slope erosion processes but particularly the middle/upper slopes (Morgan 1979). Field indicators of erosion (after Morgan 1979,39) at the present time included a thin surface crust, grass muddied by wash and turned downslope, splash pedestals, small rills and small splays of coarser material upslope and finer material downslope all on a largely bare soil surface (during the winter months).

The soil profiles exhibit little variation (Table 47). The Ah/A_1horizon consists of a sandy loam (10YR 3/3) with limestone fragments which varied in depth from *c.*20cm to *c.*55cm. In the uppermost corners of individual fields it is often the only horizon present. This suggests that there is a combination of soil creep downslope and erosion caused especially by ploughs turning. The A horizon generally increased in depth (*c.*20cm-55cm) towards the lowermost corners of the upper fields (1 and 2), whereas it remained relatively uniform in thickness (*c.*25cm-30cm) in the fields (4 and 5) on the valley bottom. Also, positive lynchets have accumulated against field boundaries between fields 1 and 2, 1 and 3, and 2 and 3/4. They are *c.*30cm higher than the adjacent surface of the upper field and *c.*50-80cm higher than the adjacent surface of the lower field.

The B horizon generally consists of a sandy loam (10YR 5/4-6/4) with varying amounts of limestone fragments. It becomes stone-free as its depth increases. Downslope the B horizon thickens (*c.*30-110cm) and becomes differentiated into an upper oxidised layer (B_1) (7.5YR 4/4) and a lower, more sandy layer (B_2) (2.5YR 6/4) which is subject to intermittent conditions of reduction on the upper slopes, permanent reduced conditions where it overlies the Cornbrash on the lower middle slopes and no gleying where it overlies the gravel in the valley bottom. This A/B soil profile is described as a brown calcareous earth (Burton 1981, 28).

Oxidation conditions may indicate the depth to which aeration of the soil is caused by ploughing, that is up to a depth of *c.*1m. The conditions of reduction are probably caused by springs emanating from the limestone on the upper and middle slopes, and the consequent sub-surface water flow downslope. In particular, the reduced B_2 horizon of the lower slopes is characteristic of a calcaro-cambic gley soil (Burton 1981,119).

Consequently, these field tests indicate that there is a sufficient depth of soil (*c.*100-150+cm) below the 20m contour to mask archaeological material on the lower slopes of the Welland valley to the north of Barnack and Pilsgate villages. Artefacts are unlikely to be brought to the surface by plough action, and hence areas of land would be apparently blank to the detection of archaeology by field survey.

It is impossible to say how far the deep B horizon on the lower slopes is indicative of past and present colluvial processes alone, and how much is directly related to natural soil-forming processes. Only future micromorphological analyses and the measurement of present-day soil erosion and aggradation would satisfactorily solve this problem.

If the amount of soil accumulation due to colluvial processes varies between *c.*50cm and 100cm over a maximum of about 2000 years, this gives a very crude estimate of *c.*0.25-0.5mm of soil accumulation per year. For the formation of lynchets of *c.*30-80cm in height above the surrounding land surface in perhaps the last 500 years, the rate of soil accumulation increases to *c.* 1.1-1.6mm per year. By way of comparison, the typical figure for surface soil creep in humid temperate areas is *c.*1-2mm per year (Small and Clark 1982,27-44). On the upper and middle slopes of the valley there is definite soil erosion downslope and the formation of lynchets on the lower edges of the fields. Processes such as overland flow, splash creep, deforestation and ploughing are probably responsible (Dalrymple *et al.* 1968, 60-70). These processes will continue unless hindered by the growth of dense vegetative cover (Kwaad and Mücher 1979, 173-192; Imeson *et al.* 1980, 31-42).

On the uppermost edges of the slopes, the limestone subsoil is being broken up and brought to the surface. Consequently, any archaeology present both in the ploughsoil and the subsoil would be subject to severe damage.

Unfortunately, there is no direct evidence as to when the processes of clearance, cultivation and colluviation began. But a strong possibility

S-N Transect:		
1)	0-30	: Ah-Sandy loam with limestone fragments. 10YR3/3.
	30-60	: B_1-Loamy sand with fine limestone fragments. 10YR5/4.
	60-65	: B/C-Weathered limestone.
	65+	: C-Limestone subsoil.
4)	0-40	: Ah-Sandy loam with limestone fragments. 10YR3/3.
	40-75	: B_1-Loamy sand with fine limestone fragments. 10YR5/4.
	75-95	: B_2-Loamy sand. 10YR5/2.
	95-100	: B/C-Weathered limestone.
	100+	: C-Limestone subsoil.
10)	0-50	: Ah-Sandy loam with limestone fragments. 10YR3/3.
	50-75	: B_1-Loamy sand with reduction mottling and weathered limestone. 10YR5/2.
	75+	: C-Limestone subsoil.
15)	0-20	: Ah-Sandy loam with limestone fragments. 10YR3/3.
	20-30	: B_1-Sandy loam with oxidation mottling. 7.5YR4/4.
	30-75	: B_2-Loamy sand with reduction mottling and weathered limestone fragments. 10YR5/2.
	75+	: C-Cornbrash (1.0-2.5m) overlain by a thin layer of gravel.
17)	0-30	: Ah-Sandy loam with limestone fragments. 10YR3/3.
	30-150	: B_1-Silt/sandy loam with weathered limestone fragments and oxidation mottling. 7.5YR4/4.
	150+	: C-Cornbrash overlain by a thin layer of gravel.
19)	0-45	: Ah-Sandy loam with limestone fragments. 10YR3/3.
	45-150	: B_1-Sandy loam with reduction mottling. 2.5YR6/4.
	150+	: C-Cornbrash overlain by a thin layer of gravel.
W-E Transect:		
4)	0-55	: Ah-Sandy loam with limestone fragments. 10YR3/3.
	55-95	: B_1-Sandy loam with oxidation mottling. 7.5YR4/4.
	95+	: C-Limestone subsoil.
6)	0-50	: Ah-Sandy loam with limestone fragments. 10YR3/3.
	50-100	: B_1-Sandy loam with reduction mottling. 2.5YR6/4/10YR4/4.
	100-110	: B_2-Loamy sand with reduction mottling. 2.5YR6/4.
	110+	: C-Limestone subsoil.
13)	0-25	: Ah-Sandy loam with limestone fragments. 10YR3/3.
	25-95	: B_1-Sandy loam with oxidation mottling. 7.5YR4/4.
	95+	: C-Cornbrash (1.0-2.5m) overlain by a thin layer of gravel.
17)	0-25	: Ah-Sandy loam with a few limestone fragments and gravel pebbles. 10YR3/3.
	25-80	: B_1-Sandy loam with slight oxidation mottling. 10YR4/3/7.5YR4/4.
	80-120	: B_2-Sandy loam. 10YR4/4.
	120+	: C-Gravel.
21)	0-30	: Ah-Sandy loam with some limestone fragments and gravel pebbles. 10YR3/3.
	30-60:	: B_1-Sandy loam with slight oxidation mottling. 10YR4/4/7.5YR4/4.
	60-90	: B_2-Sandy loam. 10YR4/4.
	90+cm.	: C-Gravel.

Table 47: The soil descriptions of the test pits at Barnack/Pilsgate.

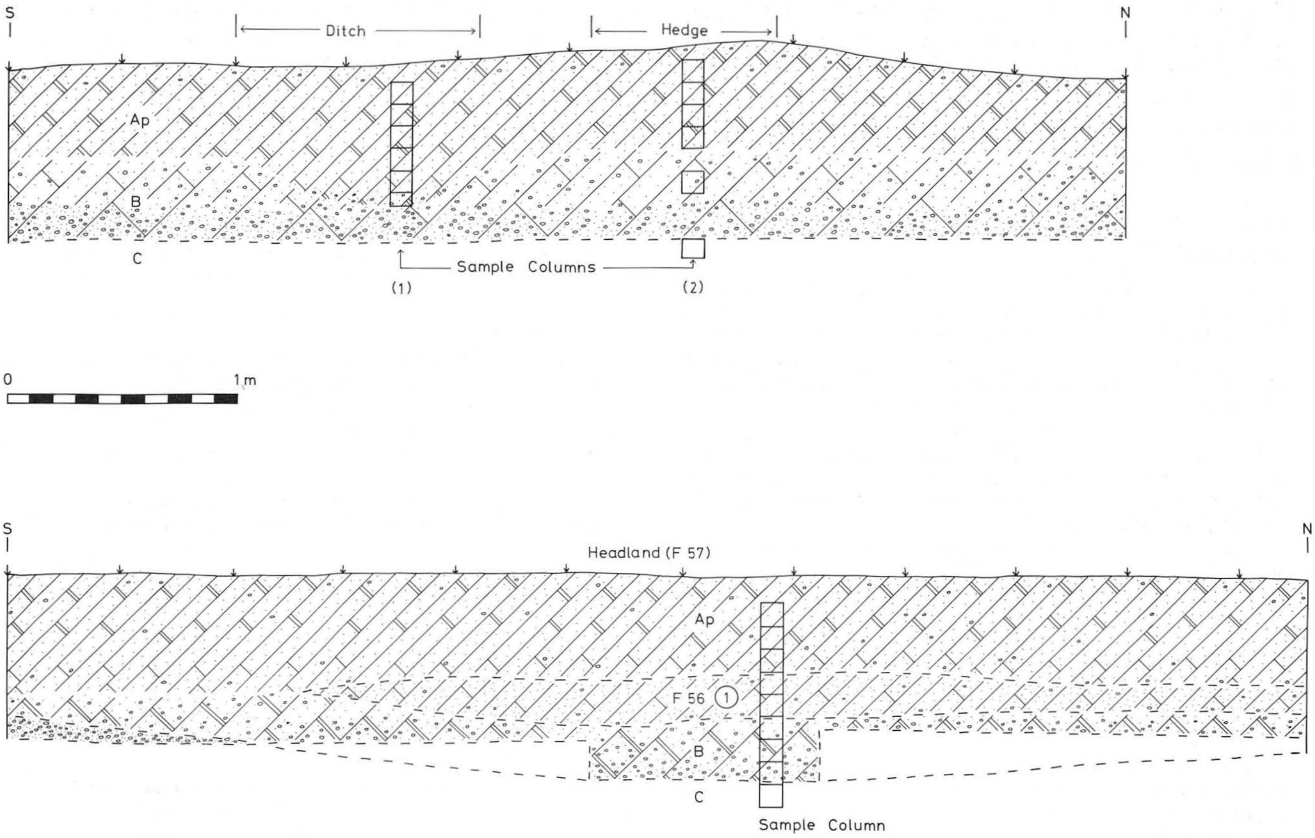


Fig.199 Barnack/Bainton North Field: sections through the modern hedge-bank and ditch (above), the headland, F.57 and buried prehistoric soil, F.56. Locations of soil samples indicated by open squares. Scale 1:30.

is the Middle/Late Iron Age and Roman periods. During these periods settlements in the area became established on a variety of subsoils, often in upland situations. This phenomenon is particularly marked in the upper Nene valley (French 1983a). Also there is evidence of extensive new clearance and cultivation in the form of the deposition of alluvium beginning in the later 1st millennium BC at the nearby site of Etton (French forthcoming). Colluviation has undoubtedly continued as a result of medieval and modern ploughing. The problem has probably been particularly exacerbated by the advent of modern machinery which is able to operate on steep slopes.

Only future work on an extensive scale would be able to estimate how widespread are the processes of colluviation and soil erosion on the slopes of the lower Welland valley, but the distorting effects of these processes are probably more pronounced and extensive as slope angles increase in the western part of the study area.

Soil/Sediment analyses at Barnack/Bainton (Figs.199-201)

Four features were sampled: the modern hedge bank and its associated ditch, which is on the same alignment as an earlier headland (F.57), which in turn overlies a Late Neolithic/Early Bronze Age buried surface (F.56), and the main linear feature on the site, a north to south Middle Iron Age ditch (F.33). The analyses performed are described in Appendix I. Ditch F.33 was analysed for molluscs at two loci (see below).

The modern field boundary

Samples were taken from the bank material and underlying B horizon beneath the hedge line, as well as from the ploughsoil and associated ditch (Fig.199) (Table M28). The bank material and ploughsoil (Ap) (c.0-40cm) consist of a sandy clay loam to sandy loam (10 YR 4/3) with a medium blocky ped structure and scattered gravel pebbles (Fig.200). The B horizon (c.40-90cm) (10 YR 4/4) and ditch fill are composed of a similar matrix (Fig.200).

The dominant sand fraction is well sorted, slightly skewed and leptokurtic (Table M29). The silt fraction of the bank and ditch, Ap and B horizons is subordinate, poorly sorted, mainly slightly positively skewed and exhibit platykurtic to mesokurtic kurtosis (Table M30). These measures appear to be characteristic of the natural soil developed on the river terrace sands and gravels.

The medieval headland and Late Neolithic/Early Bronze Age buried horizon

Immediately to the south and on approximately the same alignment as the modern hedge line is an earlier, medieval plough headland (F.57) (Fig.199). It has a similar composition and exhibits similar statistical measures to the ploughsoil (Tables M31-33) (Fig.200). The headland has increased the depth of the ploughsoil by a minimum of 5 to 15cm, which would have probably been greater until it was spread over a wider area by modern ploughing.

This headland has insured the preservation of a c.20cm thick Late Neolithic/Early Bronze Age occupation horizon/buried soil (F.56) (Fig.199). This horizon contained flint flakes, blades and arrowheads, a fragment of a Mortlake rim and Beaker pottery nearby, thus dating this horizon to around 2500-2000BC. The buried horizon consists of a sandy loam (10 YR 3/2) with scattered gravel pebbles (Table M31) (Fig.200). Its statistical measures exhibit little variation from the ploughsoil (Tables M32,M33) (Fig.200).

The micromorphological analysis

Thin sections for fabric and mineral analysis were made of three samples from the present-day ploughsoil, the medieval headland (F.57) (*c.*50-70cm) and the underlying Late Neolithic/Early Bronze Age buried horizon (F.56) (*c.*70-90cm) (Fig.199).

The micromorphological description of the present-day ploughsoil (Ap) is as follows (Table 48):

*c.*30cm thick; heterogeneous; blocky ped structure; very porous (vughy) (*c.*26.5%), both compound packing voids and channels but mainly metavughs; *c.*29% skeleton grains, medium to coarse, rounded and angular, well sorted, quartz grains with some feldspar and mica grains; few angular flint pebbles; opaque minerals common; abundant fine flecks of charcoal and organic matter intimately bound with the soil fabric; few cutans (*c.*3%), mainly normal void argillans, few embedded grain argillans and embedded argillans; dusty, dirty, either with flecked or moderate continuous orientation, ferri-argillans; few diffuse sesquioxidic nodules, but generally sesquioxidic throughout; silasepic, with relatively high proportions of silt and clay; porphyroskelic/agglomeroplasmic.

This soil is subject to agricultural use and earthworm activity, hence its high porosity, large numbers of inclusions and translocated material. It may also be subject to slight gleying, possibly as a result of seasonally standing water.

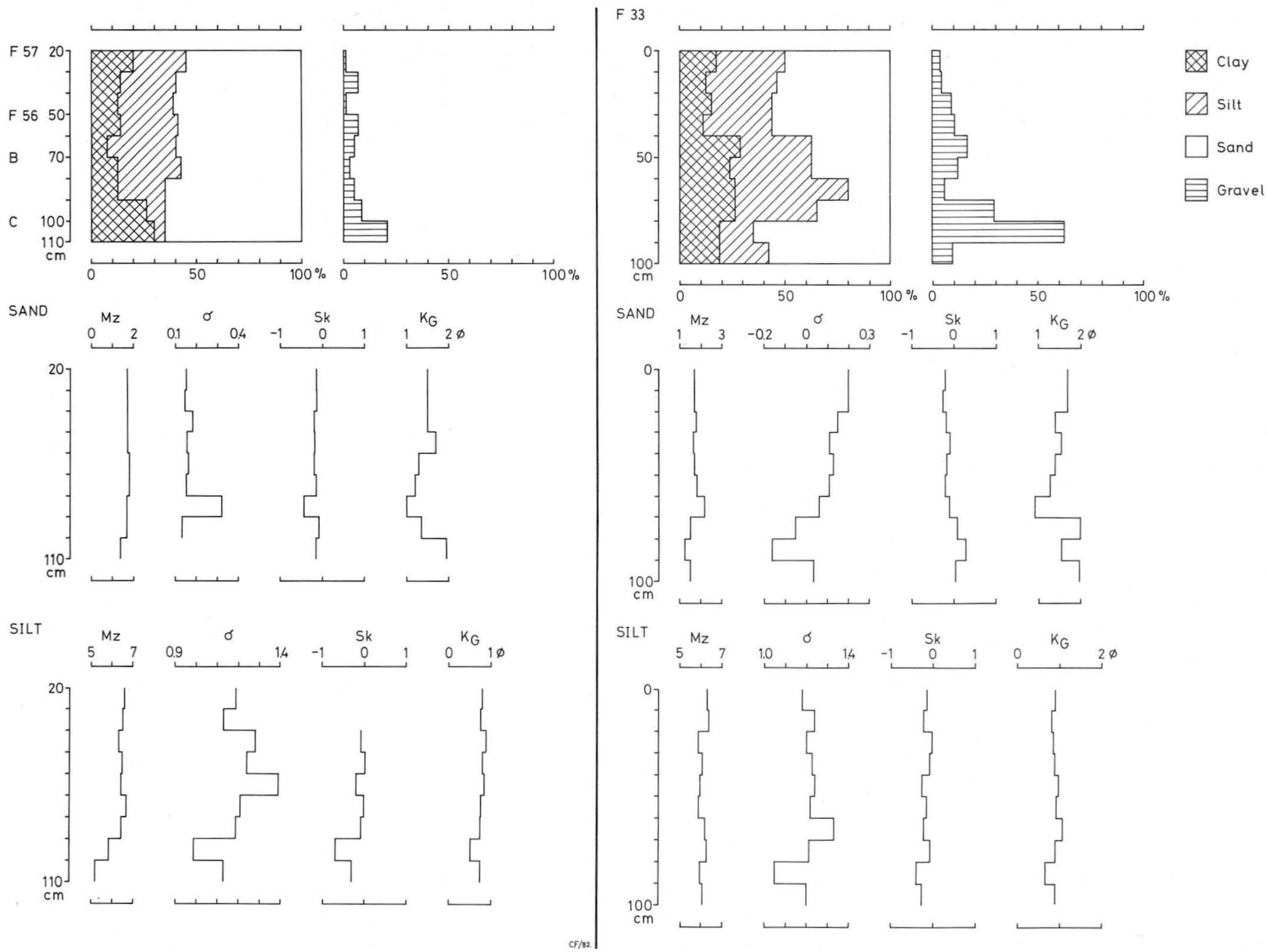


Fig.200 Barnack/Bainton North Field: sediments analyses. Composition (percentages by weight) and four statistical measures (Mz: mean size; σ: standard deviation; Sk: skewness; K_G: kurtosis) for the sand and silt fractions of the headland, F.57 and the buried prehistoric soil, F.56 (left); and for the Iron Age to Roman ditch, F.33 (right).

The micromorphological description of the lower headland material (F.57) (*c.*50-60cm) is as follows (Table 48):

*c.*30cm thick; heterogeneous; apedal; quite porous (*c.*15%), mainly compound packing voids and metavughs; *c.*24% skeleton grains, medium to coarse, mainly rounded, some angular, well sorted, quartz grains with a few feldspar grains; few rounded opaque minerals; occasional flecks of charcoal and little organic matter intimately mixed with the soil fabric; many cutans (*c.*33%), mainly of the normal voids and plasma fabric, mostly dirty, dusty, some flecked and significant amounts with a strong continuous orientation, ferri-argillans and agricutans; some nodules (*c.*6.5%), both sesquioxidic throughout and manganiferous, with pellety iron hydroxides; silasepic, mainly silt with some clay; porphyroskelic.

This material is acting as a Bt horizon to the overlying headland material and ploughsoil. The abundance of coatings within the soil materials suggests that it has been subject to leaching, gleying and the illuviation of clay minerals, iron and aluminium oxides and hydroxides. The strong continuous orientation and the layered appearance of the cutans suggest that this material may have been subjected to several phases of intense illuviation.

Three phases can be identified. The infills of the dirty matri-argillans (agricutans) with abundant fine charcoal indicate cultivation phases with much burning. The moderately well oriented, limpid ferri-argillans possibly indicate a short stable phase, perhaps with some scrub or woodland establishment. Bullock (pers.comm.) believes that these features are unlikely to have formed since medieval times and perhaps this layer is older. It may be the base of the post-Early Bronze Age to medieval soil, and the first two phases are indicative of land use at some time during this period. It is also possible that the lower headland material is representative of earlier bank material on a similar alignment which has since become indistinguishable from the overlying medieval headland as a result of ploughing. The third phase is represented by the infills of dirty matri-argillans (agricutans) with common fine charcoal, which indicate modern cultivation.

The micromorphological description of the underlying buried soil (*c.*70-80cm) is as follows (Table 48):

*c.*20cm thick; heterogeneous; apedal; porous (*c.*23%), with intrapedal voids, channels and metavughs; *c.*27% skeleton grains, fine to medium, mainly rounded, quartz grains with a few feldspar and opaque mineral grains; areas with abundant fine flecks of charcoal intimately bound with the soil fabric and in the voids; little organic matter intimately mixed with the soil fabric; abundant cutans (*c.*13%), embedded grain argillans, normal void argillans and embedded argillans, mainly dusty agricutans and ferri-argillans; earlier coatings (infills) have much charcoal associated with the plasma; later coatings are charcoal-free; few nodules (*c.*1.3%), sesquioxidic and manganiferous, but sesquioxidic throughout; silasepic, consisting mainly of silt with some clay; porphyroskelic.

This buried soil, although formerly an A horizon, has some characteristics of a Bt fabric. The abundant coatings of most of the soil fabric suggests that it has been and is subject to leaching, illuviation and gleying processes. The presence of two fabrics, one with silt/clay aggregates and fine flecks of charcoal within the major plasma area and one containing less charcoal, suggests that the soil was physically mixed, probably by cultivation. This also gave rise to dusty agricutans. The latest illuviation is evidenced by poorly oriented coatings free of charcoal.

Horizon *Depth (cm)*	*Headland (Ap)* *20-30*	*Headland (B)* *50-60*	*Buried Soil* *70-80*
Voids, Channels	26.6	15.2	23.3
Minerals: Quartz	27.3	23.3	25.3
Feldspar	2.0	0.65	2.0
Mica	0.65	—	—
Heavy Minerals	—	—	—
Plasma Fabric	35.0	20.6	32.6
Charcoal	2.6	—	0.65
Organic Matter	1.3	—	1.3
Coatings	3.3	33.3	13.3
Nodules	1.3	6.6	1.3
Faecal Pellets	—	—	—

(Point counts of 150)

Table 48: The micromorphological characteristics of the headland and buried soil at Barnack/Bainton (expressed as percentages).

The buried soil differs from both the headland Ap and B horizons. The buried soil contains two fabrics: a) predominant matrix plasma of dirty infill and coatings with much charcoal juxtaposed with b) areas with little charcoal in the fabric. The amounts of charcoal in the former fabric are higher than in the Ap or B horizons above. The presence of limpid, moderately well oriented argillans in the B horizon when they do not occur in the buried soil testifies to a degree of sealing from above. As the latest phase of illuviation in the buried soil is charcoal- free, this cannot relate to the modern Ap. Consequently, the buried soil has an agricultural phase followed by a stable phase. The latter was possibly post-depositional (R.Macphail, pers.comm.). As the Late Neolithic/Early Bronze Age pottery found on and within the buried soil is unabraded, this suggests that the phase of cultivation occurred prior to its use as an 'occupation surface'. But by the Middle Iron Age, this area was sufficiently wet for the adjacent ditch to contain freshwater slum molluscan species (see below), and the low-lying floodplain situation of the site would have made it prone to be under seasonally standing water. Thus it is possible that the area was unlikely to have been used as arable land and the soil had entered its stable phase by this period.

The Middle Iron Age ditch

The main north to south Middle Iron Age ditch (F.33) is *c.* 1m deep and 2.5m in width (Fig.201). It is composed of loam to sandy loam (0-40cm) (10YR 3/3), various loams (40-80cm) (10YR 4/4) and sandy loam (80-110cm) (10YR 4/4) intermixed with sand/gravel lenses on the east side of the ditch (Table M34) (Fig.200).

The sand fraction is dominated by very well sorted medium sand, and is only slightly skewed and is very leptokurtic (Table M35). These statistical measures suggest that the sand fraction has undergone previous sorting and mixing as well as during its deposition in the ditch. This may be seen as resulting from a mixture of influences such as standing water in the ditch (see Chapter 2) and the natural collapse of the upper edges of the ditch due to natural erosion processes.

There is always the possibility that the high gravel content in the lower 20cm of the ditch in section 3 and the gravel lenses in the secondary fill of ditch section 1 may indicate the presence of a bank on the east side of the ditch. The gravel in the ditch fill probably results from bank and ditch edge slip, although the possibility of deliberate back-filling cannot be ruled out. It is just possible that fresh gravel was thrown into the ditch to make, in effect, a 'new, clean' ditch bottom, rather than going to the trouble of 'mucking-out' an already waterlogged ditch.

The silt fraction of the ditch is generally poorly sorted, dominated by medium silt, and exhibits slightly negative skewness and mesokurtic kurtosis (Table M36). These statistical measures suggest that little sorting and mixing of the fraction occurred in the ditch.

The variation in the secondary fill from loam (70-80cm) to silt loam (60-70cm) to clay loam (40-60cm) may be seen as a direct function of the settling out of suspension of the finer soil grades as the ditch dried out. At the Late Iron Age enclosure at Werrington the action of alternating periods of slow-moving, standing and stagnant water in the ditch similarly determined which sediment size grades settled out of suspension (French 1980b; forthcoming).

Heavy mineral analysis of Late Neolithic/Early Bronze Age horizons at Maxey and Barnack/Bainton

One buried soil profile at each site was investigated. At Maxey, a B horizon sealed by the later Neolithic mortuary structure mound was analysed and compared with the overlying mound material (F.541), present-day ploughsoil (Ap) and the suboil (B/C). At Barnack/Bainton, a Late Neolithic/Early Bronze Age B horizon (F.56) sealed beneath a medieval plough headland (F.57) was examined, as were the headland material and underlying subsoil (B/C) for comparison. Micromorphological analysis (see above and Chapter 2) has indicated that both buried soils exhibited a Bt fabric which had been truncated in antiquity. As both soils have remained relatively undisturbed since burial they were thought to be suitable for the evaluation of weathering by heavy mineral analysis.

The bromoform separation method was used (Appendix I). Identification of the heavy minerals was performed under the supervision of Dr J.A.Catt and R.M.Bateman of the Soils and Plant Nutrition Department, Rothamsted. R.M.Bateman kindly identified *c.*50% more grains from each sample to check that the observed weathering trends were real, and arranged in the most probable stability series.

Line counts of over 1000 opaque and non-opaque mineral grains were made for each sample. Tables 49 and 50 give the results of these

Horizon Depth (cm)	Ap 5-15	Mound 45-55	Buried Soil 55-65	B/C 65+
Light Fraction:				
Alkali Feldspar	—	—	—	—
Glauconite	4	2	2	—
Calcite	2	5	4	42
Chlorite	3	8	10	5
Heavy Fraction:				
Brown Tourmaline	22	35	14	33
Blue Tourmaline	—	1	1	1
Green Tourmaline	2	2	—	1
Zircon	18	27	9	19
Brown Rutile	1	4	—	4
Yellow Rutile	—	3	—	1
Red Rutile	—	—	—	—
Anatase	—	—	—	—
Staurolite	28	19	9	14
Andalusite	—	—	—	—
Colourless Garnet	56	40	17	27
Pink Garnet	28	32	15	37
Epidote	23	11	8	10
Biotite	—	—	—	—
Augite	12	11	9	19
Green Hornblende	12	15	4	1
Brown Hornblende	1	3	—	—
Hypersthene	—	—	—	—
Olivine	1	—	—	1
Kyanite	—	—	1	—
Tremolite/Actinolite	—	—	—	1
Microcline	5	2	2	7
Apatite	15	20	9	8
Collophane	6	2	8	10
Magnetite	48	74	71	44
Haematite	78	47	52	46
Leucoxene	40	23	26	50
Limonite	1200	995	985	1100
Totals:	1354	1127	1137	1354

Table 49: The minerals from the oval barrow and buried soil at Maxey.

grain counts, and Table 51 lists the non-opaque minerals in order of increasing vulnerability to chemical weathering by grain counts and relative percentages. The weathering index (Wrh) for heavy minerals (zircon + tourmaline + rutile: apatite + pyroxenes + amphiboles) was also calculated to indicate the homogeneity of the unaltered soil materials (Table 51).

There are numerous orders of mineral stability (see Brewer 1976, 88-99). Pettijohn's (1941) stability series for primary minerals is inapplicable for subaerial weathering, and Jackson and Sherman's (1953) stability series contains minerals that can be primary or secondary. Bateman's stability series, therefore, resembles only in part these two tables.

There are nine main factors affecting the heavy mineral composition of the samples from both sites, which are discussed together:

1. As the heavy fractions were mainly composed of opaque minerals (76-97%), the counts of non-opaque minerals (3-24%) were less than the desirable 1000 for reliable estimation of proportions. Consequently, the differences noted below may partly reflect imperfect estimation of percentages of rarer minerals.

2. It is necessary to choose the size fraction that is slightly smaller than the modal size, as this will probably contain the greatest abundance and variety of diagnostic minerals (Brewer 1976, 45-54). For this reason the fine sand fraction (250-63μm) of these samples was chosen, as the medium sand fraction (500-250μm) was generally the modal size fraction. But most of the grains analysed were at the coarser end of the selected particle size range. In samples containing finer grains, these may be subordinate by weight but numerically superior, and thus distort the results. For example, both zircon and rutile tend to occur as small grains, so a small influx of fine grains greatly increases their relative proportions. This appears to have occurred in the Maxey mound material and in the headland material at Barnack/Bainton.

3. Samples situated above and below the buried soils were anlysed and plotted to suggest whether the differences in amounts of various minerals are due to weathering or differences in the parent material. Smooth curves indicate uniform parent materials and progressive weathering, whereas abrupt breaks in the curve indicate differences in composition or mode of deposition of the parent material (Brewer 1976, 104-112). In general the figures for both sites exhibit only gradual variations in mineral frequencies, suggesting uniform parent materials, although at Barnack/Bainton there may be slight differences in the composition or mode of deposition of the parent material.

Both profiles exhibit some evidence for post-depositional chemical weathering. As the samples contain calcite, collophane and apatite, these soils are not very acidic (Bateman, pers. comm.). Present-day pH values vary from 6.8 to 8.2 at Maxey (Table M9) and 6.9 to 7.9 at Barnack/Bainton (table M37), generally increasing with depth. In the buried soil at Maxey, calcite and olivine decrease in comparison to the ploughsoil and subsoil (Table 49). In the buried soil at Barnack/Bainton, collophane and augite decrease upwards through the profile, and olivine and hypersthene are less abundant than in the headland material and subsoil (Table 50). In particular the loss of apatite in the headland material at Barnack/Bainton suggests the earliest stage of acid weathering. Together with the micromorphological evidence for leaching, illuviation and gleying of both profiles (see above and Chapter 2), this suggests slight soil development on both sites, which appears to have occurred since the Late Neolithic/Early Bronze Age.

Horizon Depth (cm)	Ap 30-40	Buried Soil 70-80	B/C 100+
Light Fraction:			
Alkali Feldspar	—	1	2
Glauconite	—	1	2
Calcite	—	11	9
Chlorite	2	5	3
Heavy Fraction:			
Brown Tourmaline	118	58	8
Blue Tourmaline	4	4	3
Green Tourmaline	5	8	1
Zircon	75	22	4
Brown Rutile	11	7	5
Yellow Rutile	4	—	—
Red Rutile	—	—	—
Anatase	1	—	—
Staurolite	35	16	7
Andalusite	1	—	—
Colourless Garnet	74	26	7
Pink Garnet	83	33	3
Epidote	15	10	4
Biotite	2	—	—
Augite	30	7	9
Green Hornblende	17	9	3
Brown Hornblende	2	2	—
Hypersthene	2	1	2
Olivine	1	—	1
Kyanite	—	1	2
Tremolite/Actinolite	—	—	—
Microcline	—	—	12
Apatite	8	12	3
Collophane	3	1	1
Magnetite	54	21	17
Haematite	240	353	103
Leucoxene	30	40	15
Limonite	1245	1185	1755
Totals:	1572	1614	1913

Table 50: The minerals from the headland and buried soil at Barnack/Bainton.

4. A quantative estimate of weathering of the heavy minerals (Wrh) may be determined using a ratio of the more stable minerals (zircon, tourmaline, rutile) to the more vulnerable minerals (apatite, hypersthene, augite, hornblende, tremolite/actinolite). The ratio will increase in horizons where weathering has reduced the amount of vulnerable minerals. At Maxey the mound materials and subsoil are slightly more weathered that the rest of the profile and the profile is relatively homogeneous, whereas the headland material and buried soil at Barnack/Bainton have much higher weathering indexes. This may be a result of disturbance by later agriculture at both sites and possibly the deposition of materials carried in freshwater flood waters at Barnack/Bainton, both in antiquity and after the construction of the headland, as this profile is situated in the Welland valley floodplain.

5. Various factors of the micro-environment may affect weathering. In particular, the micromorphological analyses suggest that leaching, illuviation and gleying have played major roles. Those processes are

	Brown Tourmaline	Blue Tourmaline	Green Tourmaline	Zircon	Brown Rutile	Yellow Rutile	Red Rutile	Anatase	Staurolite	Andalusite	Colourless Garnet	Pink Garnet	Epidote	Chlorite	Biotite	Augite	Green Hornblende	Brown Hornblende	Tremolite/Actinolite	Apatite	Collophane	Totals/Wrh
B/B:																						*Totals*
Ap	118	4	5	75	11	4	—	1	35	1	74	83	15	2	2	30	17	2	—	8	3	493
Soil	58	4	8	22	7	—	—	—	16	—	26	33	10	5	—	7	9	2	—	12	1	220
B/C	8	3	1	4	5	—	—	—	7	—	7	3	4	3	—	9	3	—	—	3	1	61
Maxey:																						
Ap	22	—	2	18	1	—	—	—	28	—	56	28	23	3	—	12	12	1	—	15	6	247
Mound	35	1	2	27	4	3	—	—	19	—	40	32	11	8	—	11	15	3	—	20	2	234
Soil	14	1	—	9	—	—	—	—	9	—	17	15	8	10	—	9	4	—	—	9	8	110
B/C	33	1	1	19	4	1	—	—	14	—	27	37	10	5	—	19	1	—	1	8	10	191
B/B:																						*Wrh*
Ap	23.9	0.8	1.0	15.2	2.2	0.8	—	0.2	7.1	0.2	15.0	16.8	3.05	0.4	0.4	6.1	3.45	0.4	—	1.6	0.6	3.67
Soil	26.4	1.8	3.6	10.0	3.2	—	—	—	7.3	—	11.8	15.0	4.5	2.3	—	3.2	4.1	0.9	—	5.5	0.4	3.19
B/C	13.1	4.9	1.6	6.5	8.2	—	—	—	11.5	—	11.5	4.9	6.5	4.9	—	14.75	4.9	—	—	4.9	1.6	1.23
Maxey:																						
Ap	8.9	—	0.8	7.3	0.4	—	—	—	11.3	—	22.7	11.3	9.3	1.2	—	4.8	4.8	0.4	—	6.1	2.4	1.075
Mound	14.9	0.4	0.8	7.7	1.7	1.3	—	—	8.1	—	17.1	13.7	4.7	3.4	—	4.7	6.4	1.3	—	8.5	0.8	1.85
Soil	12.7	0.9	—	8.2	—	—	—	—	8.2	—	15.4	13.6	7.3	9.1	—	8.2	3.6	—	—	8.2	7.3	1.09
B/C	17.3	0.5	0.5	9.9	2.1	0.5	—	—	7.3	—	14.1	19.4	5.2	2.6	—	9.9	0.5	—	0.5	4.2	5.2	1.96

Table 51: The absolute numbers and relative percentages of the minerals arranged in a stability series from the oval barrow profile at Maxey and the headland/buried soil profile at Barnack/Bainton.

indicated by illuviation cutans, numerous sesquioxidic nodules and manganiferous coatings (see above and Chapter 2). Leaching tends to remove the products of weathering such as the first released hydrous oxides or lattice groups, while impeded drainage holds them in the soil. Free drainage tends to result in the formation of simpler secondary minerals; impeded drainage tends to form layer lattice silicates (Brewer 1976, 88-112).

All the soils analysed are relatively porous and free draining, although the Barnack/Bainton soils are less well drained than the Maxey soils because of their higher clay content (Tables M28, M31). In such conditions, soluviation and cheluviation may act simultaneously but independently to control the relative rate of removal of the soil's constituents (Swindale and Jackson 1956). *Soluviation* involves the solution of minerals and the eluviation of decomposition products dependent only on moving water. Aluminium and ferric iron tend to accumulate as they are less soluble than other constituents of minerals such as sodium and potassium. *Cheluviation* involves the eluviation of weathering products in the presence of chelating agents such as polyphenols which are derived from the decomposition of organic substances (Limbrey 1975, 45). As a consequence, iron and aluminium are removed more rapidly than silica. Both of these processes may be partly responsible for the abundance of illuviation coatings in both profiles. In particular, the abundance of the opaque, secondary mineral limonite may result from these processes, as well as from oxidation and weathering. Limonite may also be inherited from older deposits and need not have formed *in situ* (Kerr 1977, 240).

6. Calcite and chlorite are probably best discarded from the heavy fraction data as they have specific gravities similar to the separating liquid bromoform. Calcite is very common in the subsoil sample at Maxey, and therefore distorts the relative proportions of denser heavy minerals.

7. Collophane, which is usually considered to be an amorphous form of apatite, is listed separately as a mineraloid. It is the dominant mineral of fossil bone, in which it has been formed by phosphatic enrichment (Kerr 1977, 269-269). Collophane (7.3%) and apatite (8.2%) are most abundant in the truncated buried soil beneath the mortuary structure at Maxey. Their presence may indicate funerary activities within the mortuary structure prior to the construction of the overlying mound which covers a single burial.

8. Although it has been suggested that the ploughsoil at Maxey might contain loess (see Chapter 2), it has little similarity with the heavy mineral fractions of loessic soils examined by Catt (1977, 221-229; and in Bell 1981) and Weir *et al.* (1971, 131-149). But the lower A horizon sealed beneath the adjacent barrow probably does have a significant loessic component (see Chapter 2).

9. After considering all these factors, there appear to be no significant original differences between the samples. This indicates that both the buried and present-day soils have developed on the same parent material. They have both subsequently been slightly weathered.

The lack of evidence for severe weathering suggests that the base status of the soil/water regime has remained relatively constant though there is evidence for slight decalcification since the Late Neolithic period. This may be associated with the relatively severe leaching and gleying indicated by the micromorphological analyses. Additional possible causes are deforestation and periods of intensified land-use possibly associated with insufficient manuring. It is impossible to determine exactly when the slight decalcification occurred, but there are several possiblities. There is evidence of extensive clearance and cultivation of the surrounding upland in the form of alluvial deposition downstream to the east at Etton during the latter half of the 1st millennium BC (French forthcoming). More probable periods are the Late Iron Age and later Roman period when the valley floodplain witnessed a further intensification in land-use represented by numerous enclosed field systems and dispersed farmstead settlements and the establishment of villa farms, respectively (Pryor and Palmer 1980, 5-8; Simpson 1966, 15-25). A final period of more intensive land- use occurred during the Saxon/early medieval periods (D.N.Hall pers. comm.).

The molluscs from the Iron Age ditch at Barnack/Bainton (Figs.183,201-203)

Samples were taken from the main north to south Middle Iron Age ditch (F.33) in two sections, 1 and 3 (Figs.183,201). The methods used are discussed in Appendix I. The results are presented in tabular form by species (Tables 52, 53), by histogram (Fig.202) and by ecological group (Table 54), and as rank-order graphs (Fig.203). The ditch was *c.*1.5m deep and *c.*3m in width. It appears to have been infilled by natural processes. The only anomaly in this process is the layer of gravel at *c.*80-90cm in section 3 which may represent deliberate back- filling or an episode of severe erosion of the upper edges of the ditch and/or material from a possible bank. There are several gravel lenses in the secondary fill of section 1.

Rank-order curves were plotted and the diversity indexes calculated for both sections (Fig.203). Section 1 exhibited three zones. The primary fill (*c.*90-110cm) was characterised by smooth to intermediate curves, high H^1, H values and a small difference between H^1 and H. This is suggestive of a relatively diverse and maturing environment with a wide variety of terrestrial and marsh habitats. There may be some degree of allochthony as the ditch begins to fill up. The freshwater species, mainly slum species, probably represent an autochthonous element.

The secondary fill exhibited a smooth curve and high H^1, H values with very small differences between H^1 and H. These values indicate a mixed autochthonous/allochthonous assemblage. The dominant terrestrial species are representative of a wide range of habitats, and the greater variety of freshwater snails suggest an increased allochthonous element to the assemblage.

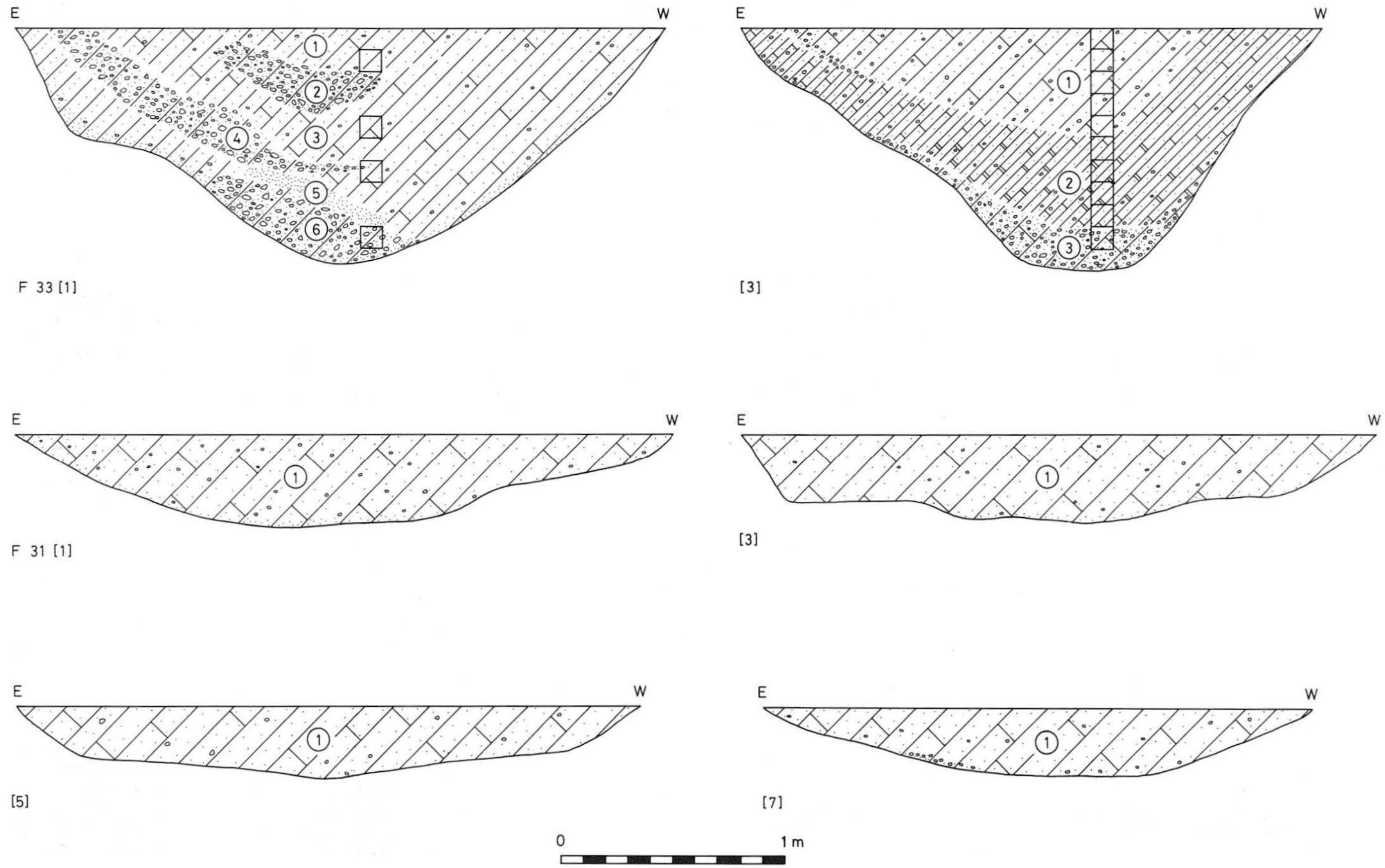


Fig.201 Barnack/Bainton North Field: sections through the Iron Age to Roman ditch F.33 (top) and the Roman ditch F.31 (below). Location of section lines shown on Fig.183; position of soil samples indicated by open squares. Scale 1:30.

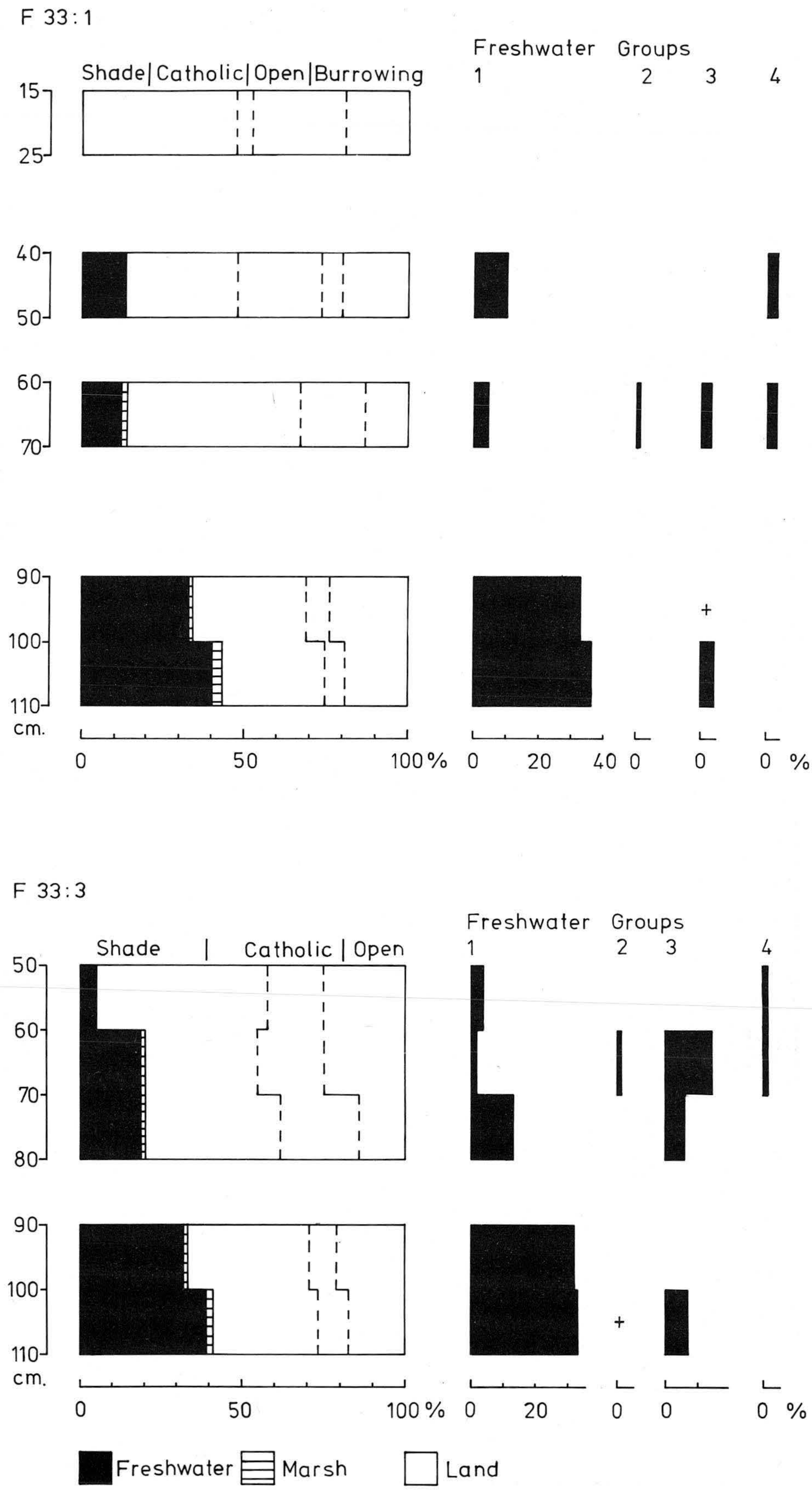


Fig.202 Barnack/Bainton North Field: the main ecological groups of molluscs (expressed as percentages) in samples from ditch F.33, with section 1 above, and section 3, below.

In the tertiary fill, numbers and species decline drastically, the curves become intermediate and the H^1, H values are medium but with a small difference between them. These characteristics suggest an autochthonous assemblage, but are indicative of a simpler environment. Either the assemblage is becoming impoverished or the shells have not been preserved because they are out of reach of the calcareous groundwater. This phenomenon is reflected more severely in section 3 with the total absence of shells above *c.* 50cm.

Dry weight 2.0kg *Depth (cm)*	*15-25*	*40-50*	*60-70*	*90-100*	*100-110*
Valvata piscinalis (Müller)	—	—	3	—	—
Bithynia tentaculata (Linnaeus)	—	1	1	1	—
B. leachii (Sheppard)	—	—	1	—	—
Aplexa hypnorum (Linnaeus)	—	—	4	3	15
Lymnaea truncatula (Müller)	—	3	2	70	88
Anisus leucostoma (Millet)	—	—	3	41	49
Carychium minimum Müller	—	—	2	1	2
C. tridentatum (Risso)	2	1	9	22	45
Cochlicopa lubrica (Müller)	—	—	2	6	5
Cochlicopa spp.	—	2	8	7	8
Columella edentula (Draparnaud)	—	—	—	—	7
Vertigo pygmaea (Draparnaud)	—	—	1	7	2
Pupilla muscorum (Linnaeus)	—	—	—	3	2
Vallonia costata (Müller)	6	2	9	62	59
V. pulchella (Müller)	—	—	—	—	8
V. excentrica Sterki	—	—	—	2	—
Vallonia spp.	—	—	4	9	5
Acanthinula aculeata (Müller)	1	1	7	12	4
Ena obscura (Müller)	—	—	—	2	—
Punctum pygmaeum (Draparnaud)	1	1	4	19	26
Vitrina pellucida (Müller)	—	—	—	2	3
Vitrea contracta (Müller)	1	—	5	5	5
Nesovitrea hammonis (Ström)	—	—	6	3	—
Oxychilus cellarius (Müller)	1	4	7	11	8
O. alliarius (Miller)	—	—	1	—	1
Oxychilus spp.	2	—	8	1	1
Zonitoides nitidus (Müller)	—	—	—	2	2
Euconulus fulvus (Müller)	—	—	—	1	3
Cecilioides acicula (Müller)	4	6	1	2	—
Clausilia bidentata (Ström)	2	3	13	42	20
Trichia hispida (Linnaeus)	—	4	4	2	1
Cepaea nemoralis (Linnaeus)	—	—	—	—	1
C. hortensis (Müller)	—	—	3	3	3
Cepaea spp.	1	2	5	7	4
Pisidium subtruncatum Malm	—	—	1	—	—

Table 52: The molluscs from ditch F.33 section 1 at Barnack/Bainton.

The rank-order curves and the high diversity indices for section 3 indicate mixed autochthonous/allochthonous assemblages. This is most marked in the primary fill (*c.* 90-110cm) and the secondary fill (*c.* 70-80cm) where the greater variety and abundance of freshwater and terrestrial molluscs suggest a mixture of environmenntal influences and different habitats. The assemblages in the upper secondary fill (*c.* 50-70cm) are probably more autochthonous and indicative of a simpler environment. The erosion or back-fill zone at *c.* 80-90cm is virtually devoid of molluscs.

The assemblages from both ditch sections are discussed together. Terrestrial molluscan species predominate throughout (56-95%), with the freshwater species (5-40%) increasing in abundance towards the base of the ditch (Tables 52-54) (Fig. 202).

The three most common freshwater species present are the slum species *Lymnaea truncatula* (1-23%) and *Anisus leucostoma* (2-13%), and the ditch-living species *Aplexa hypnorum* (3-15%) (Tables 48, 49). All three species tolerate poor conditions of standing, vegetation- choked water subject to drying out (Boycott 1936, 116-187; Beedham 1972, 80-95). Consequently, those freshwater species normally found in moving water are virtually absent except for the occasional *Bithynia*. If sheep were grazed in the vicinity of the ditch they may have been affected by the sheep liver fluke, *Fasciola hepatica*, which has *L. truncatula* as its specific intermediate host (Beedham 1972, 86).

The terrestrial molluscan assemblage is apparently dominated by shade-loving species (30-53%) (Table 54). The most common species is *Carychium tridentatum* which is characteristic of leaf litter or tall ungrazed grassland (Evans 1972, 136). Aside from this species and *Clausilia bidentata*, the remaining species, principally *Oxychilus*, *Vitrea contracta* and members of the *Punctum* group (after Evans 1972, 195) occur in relatively low numbers (Tables 52, 53). *C. bidentata*, although essentially a rupestral species which lives on rocks, tree-trunks and walls, may be found in dead leaves, scrub or hedgerows (Evans 1972,

Dry weight: 2.0kg *Depth (cm)*	*50-60*	*60-70*	*70-80*	*80-90*	*90-100*	*100-110*
Valvata piscinalis (Müller)	1	1	—	—	—	—
Aplexa hypnorum (Linnaeus)	—	—	12	—	—	39
Lymnaea truncatula (Müller)	—	1	13	—	39	111
L. peregra (Müller)	—	—	—	—	—	1
Anisus leucostoma (Millet)	3	3	14	1	22	72
Carychium minimum Müller	—	1	1	—	1	5
C. tridentatum (Risso)	14	7	15	1	19	89
Succinea putris (Linnaeus)	—	—	—	1	—	—
Succinea/Oxyloma spp.	—	—	1	—	—	1
Cochlicopa lubrica (Müller)	2	5	9	—	3	20
Cochlicopa spp.	2	7	17	1	3	15
Columella edentula (Draparnaud)	—	—	—	—	1	5
Vertigo substriata (Jeffreys)	—	—	—	—	—	1
V. pygmaea (Draparnaud)	—	—	3	—	1	7
V. angustior Jeffreys	—	—	—	—	—	2
Pupilla muscorum (Linnaeus)	—	1	—	—	—	3
Vallonia costata (Müller)	17	14	22	4	32	56
V. pulchella (Müller)	1	2	1	1	6	9
V. excentrica Sterki	1	1	2	—	—	5
Vallonia spp.	2	2	2	—	3	11
Acanthinula aculeata (Müller)	4	1	6	2	4	1
Ena obscura (Müller)	—	—	1	—	3	6
Punctum pygmaeum (Draparnaud)	1	—	8	—	8	29
Vitrina pellucida (Müller)	—	1	3	—	—	4
Vitrea contracta (Westerlund)	1	1	7	1	2	13
Nesovitrea hammonis (Ström)	4	2	4	—	4	6
Aegopinella pura (Alder)	1	2	7	—	—	2
Oxychilus cellarius (Müller)	8	6	5	—	1	5
O. alliarius (Miller)	1	1	2	—	—	1
Oxychilus spp.	—	—	11	—	—	2
Zonitoides nitidus (Müller)	—	—	—	—	1	—
Deroceras sp.	—	—	—	—	—	1
Euconulus fulvus (Müller)	—	1	1	—	2	5
Clausilia bidentata (Ström)	8	9	16	2	20	22
Trichia hispida (Linnaeus)	6	1	16	1	3	2
Helicigona lapicida (Linnaeus)	1	—	—	—	—	—
Cepaea nemoralis (Linnaeus)	—	—	1	—	—	2
C. hortensis (Müller)	—	2	1	—	2	—
Cepaea spp.	3	2	6	3	6	12
Pisidium milium Held	—	1	—	—	—	—

Table 53: The molluscs from ditch F.33 section 3 at Barnack/Bainton.

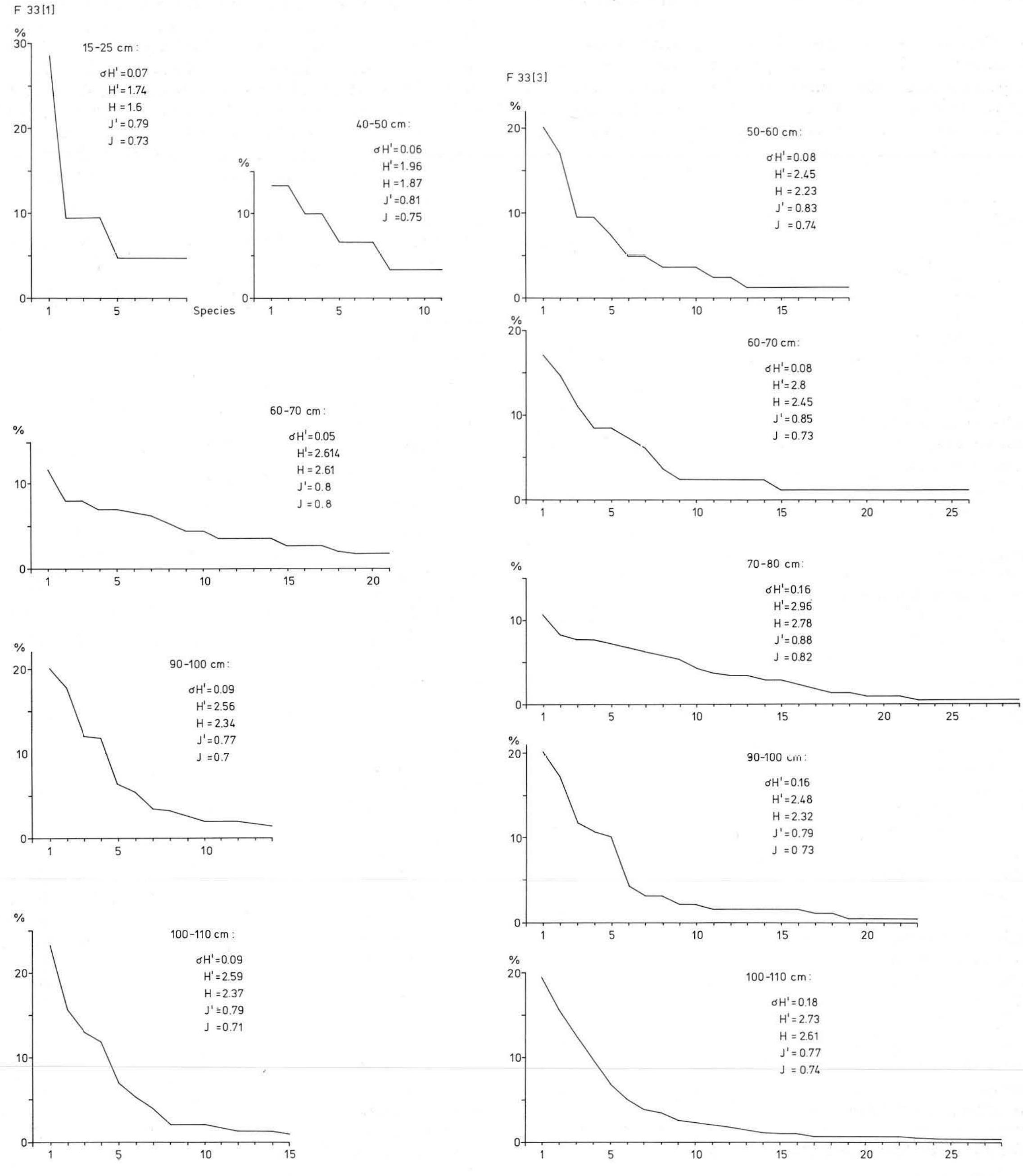


Fig.203 Barnack/Bainton North Field: rank-order curves and diversity indices of the molluscan assemblages in ditch F.33, section 1 (left) and section 3 (right). The symbols used are explained in Appendix I.

166). There are several other rupestral species present, such as *Acanthinula aculeata* and *Helicigona lapicida*. *Oxychilus cellarius* and *V.contracta* tolerate a wide range of habitats, and may also be found on collapsed wall debris. Large pieces of limestone did occur in the tertiary ditch fill. Several other species may be found in hedgerows, in particular *C.bidentata, Ena obscura, Punctum pygmaeum* and *Nesovitrea hammonis*.

Although none of the shade-loving species present require woodland surroundings, many are characteristic woodland species. In particular, *Columella edentula* and *A.aculeata* were rarer species more closely confined to woodland in Paul's (1978b, 295-300) study of ancient and modern woodland in Cambridgeshire. *C.edentula* may only survive where high humidity levels are maintained by a permanent canopy of vegetation. On the other hand, the ditch environment may have provided a suitable alternative environment. Other species such as *C.tridentatum, C.bidentata, P.pygmaeum, E.fulvus, Vitrina pellucida* and *Aegopinella pura* were found to be characteristic of ancient woodland in East Anglia, although they may occur in a variety of other habitats and environments elsewhere in Britain (Paul 1978b, 295-300).

Nevertheless, there may be a woodland element to the mollusca assemblages in both ditch profiles. This may be partly created by localised shading of the ditch, perhaps by an adjacent hedge, or by the ditch environment itself. There may also be a woodland or scrub element to the environment in the vicinity.

The catholic and open-country groups combined are of secondary importance to the shade loving group (Tables 52-54). *Cochlicopa* is the most abundant catholic species, and most of these are probably *C.lubrica*. It prefers damp and sheltered habitats (Quick 1954, 204-213), and Paul (1978b, 295-300), found it was almost ubiquitous in every ancient wood examined. But on the other hand the catholic species such as *Trichia hispida* tolerate a variety of habitats, just as would many of the so-called shade-loving species.

Open country-species tend to increase in relative abundance as the ditch dried out and became infilled. This may indicate that the ditch was partially providing a localised damp, shaded and vegetated environment during the accumulation of the primary and lower secondary fills. The principal open-country species present is *Vallonia costata* (6-28%) (Tables 52,53), probably because of its ability to tolerate damp habitats. Although it generally prefers dry grassland, it may be found in shaded and wet habitats (Ellis 1941; Evans 1972, 153-160). The other open-country species such as *Vertigo pymaea, Pupilla muscorum, Vallonia pulchella* and *V.excentrica* indicate the presence of some open ground in the vicinity. Nevertheless, the low diversity of open-country species and their relatively low abundance suggests that the ditch was too wet and sheltered, and the surrounding area was possibly too damp and well vegetated to provide suitable habitats. Thus there may be an unkempt meadow land aspect to the area.

Sample: F.33:1	*15-25*	*40-50*	*60-70*	*90-100*	*100-110*
Freshwater:	—	*13.35*	*11.8*	*33.0*	*40.3*
Slum	—	10.0	4.45	33.0	36.3
Catholic	—	—	0.9	—	—
Ditch	—	—	3.5	+	4.0
Moving water	—	3.35	3.0	—	—
Marsh:	—	—	*1.8*	*0.85*	*2.9*
Land:	*80.95*	*67.6*	*85.85*	*65.55*	*56.75*
Shade-loving	47.6	34.35	53.05	34.5	30.8
Intermediate	4.75	26.7	19.5	7.2	5.8
Open-country	28.65	6.6	13.3	23.85	20.15
(Burrowing)	(19.05)	(20.0)	(+)	(+)	(+)
Sample: F.33:3	*50-60*	*60-70*	*70-80*	*90-100*	*100-110*
Freshwater:	*5.0*	*19.0*	*19.0*	*32.0*	*39.2*
Slum	3.65	1.85	13.1	32.0	33.1
Catholic	—	1.2	—	—	0.2
Ditch	—	14.6	5.8	—	6.9
Moving water	1.2	1.2	—	—	—
Marsh:	—	*1.2*	*1.0*	*1.5*	*2.3*
Land:	*95.0*	*80.0*	*80.0*	*66.5*	*58.5*
Shade-loving	53.1	35.1	41.8	36.85	33.5
Intermediate	17.0	20.6	24.1	8.15	9.0
Open-country	24.9	24.3	14.6	21.5	16.0

Table 54: The percentages of molluscs by ecological group in ditch F.33 at Barnack/Bainton.

Only one species restricted to marshes occurs, *Zonitoides nitidus*; and one species characteristic of marsh but not confined to them, *Carychium minimum* (Tables 52, 53). But several other species within the freshwater slum, shade-loving and catholic groups may tolerate marshy habitats. Examples include *L.truncatula, C.tridentatum, C.lubrica, C.edentula* and *T.hispida*. When all these minor elements of the assemblages are considered together, they suggest that ground conditions were very damp.

Thus, this part of the Welland valley floodplain during the late 1st millennium BC was probably characterised by a diverse and mature environment of wet unkempt meadowland with a possible scrub or woodland element in the vicinity. The ditch initially held freshwater, at least temporarily, and probably provided numerous damp, shaded, sheltered and well vegetated micro-habitats as it infilled. There is the possibility of some localised shading of the ditch, perhaps with a hedge. The ditch probably served for drainage and as a boundary and barrier against livestock movement. This suggested environment emphasises the marginal aspect of the floodplain in the vicinity of Barnack/Bainton.

VI. Discussion

By Francis Pryor

The project arose as the response to specific threat posed by a pipeline. We were fortunately able, thanks to the kindness of the farmer and contractors, to adjust the precise route, so that it did not damage any specific, clearly-defined monument (Pryor and Palmer 1980). Instead we hoped to obtain information on the preservation and construction of the various linear features that characterise this part of the valley. In the event we were able to achieve these aims, plus others that we had not anticipated.

Turning first to the dating and construction of the linear features, the aerial photographs show a major north to south ditch traversing the South Field. We did not find this feature in our excavation and can only assume that it ran either below a furrow, undetected, or else incorporated a natural watercourse, or some other natural feature in that area. The only undoubted linear feature revealed in the South Field ran east to west and was of the later Iron Age or early Roman date.

The main north to south ditch of the North Field was of Roman date, but over part of its lengh it appeared to closely parallel an earlier, Iron Age, alignment. The parallel east to west ditches in the southern part of the field are of later Iron Age or early Roman date. It seems reasonable to suppose that the Roman features are associated in some way with the villa to the west (Fig.179; Simpson 1966).

The site was remarkable for the few finds it produced. The animal bone collection was too small to merit study (although conditions for preservation were good) and artefacts were extremely scarce, even in Roman features. The rarity of Roman finds from features is mirrored in the topsoil, where the scatter of mainly small, weathered and abraded sherds is very thin (Fig.181). Roman features were mainly concentrated just south of the central part of the North Field where the dumping of hard-core and high phosphate levels (Gurney, part IV; Fig.195) suggest the traffic of livestock, perhaps around a shed, field or yard entranceway. Taken as a whole, however, the slightness of the Roman evidence is unusual in view of the villa nearby which produced a substantial phosphate and magnetic enhancement (Fig.192), in addition to a dense surface scatter of sherds, tile etc.

Another, perhaps less probable, settlement area is shown faintly on aerial photographs of the extreme eastern corner of the South Field, where possible house ring-gullies occupy perhaps an acre of so, hard by the railway line. Fieldwalking did not produce material in this area, but phosphate and magnetic survey did show positive results. If it does exist, then this settlement might be associated with the east to west ditches just discussed.

Fieldwalking in the pipeline area (Taylor, part I) and along a nearby transect of the valley survey revealed a continuous 'background' spread of typologically Bronze Age flints (Pryor, part III). The spread over the pipline area was more dense than that of the transect, but it did not coincide with a 'site', as defined by a series of earthfast, subsoil features, rich in debris. The density of flints (it was unusual to find more than five per 5m square) was low, when compared with *bona fide*, excavated, lowland occupation sites: Hurst Fen, for example, produced about forty per yd^2 (Clark *et al.* 1960, 214); a probable building at Etton produced similar densities. The pipeline surface survey, however, failed to reveal the existence of a buried fragment of a settlement site beneath the plough headland, just north of the area of Roman activity noted above.

This settlement, or settlements, seems to have been protected both by dumped material probably originating from the Roman features immediately to the south, and by the headland soils which accumulated above. A small pit or post-hole on the fringe of the Roman features, but just outside the headland, yielded quantities of domestic Beaker pottery of Lanting and van der Waals' (1972) Steps 6-7 (Fig.184, Nos.1-17). The buried soils beneath the headland produced diagnostic sherds of

Peterborough (Mortlake style) wares (Fig.184, Nos.18-21) and a few broadly contemporary flints (Fig.187). These features were located, on the northern fringe of the main surface scatter, and do not, suprisingly, seem to have affected that distribution. We can only speculate why the Late Neolithic/Beaker settlement(s) was located at this particular spot, but it is the closest point on the pipeline to the Barnack cursus (Fig.179, No.4), whose south-west terminus is *c.*40-50m due east.

The field survey at Barnack/Bainton has shown that a simple correlation between surface distributions and subsoil features cannot be made. The point is further illustrated by the case of the paired ring-ditch hengiform monuments south-east of the cursus (Fig.179, Nos.7 and 8). These sites appear to have incorporated a mound, or mounds, in their construction, as at Maxey; but also as at Maxey, the flints in the soil above the mound are not necessarily contemporary with the original use and construction of the monument. A very similar situation was observed during the recent excavation of a flint scatter overlying the Dorset Cursus at Down Farm, Dorset (Bradley *et al.* 1985). Here, flint material in the ploughsoil was clearly not associated with the original construction and use of either the Cursus itself, or a possible pit-circle contained within it, even though both the topsoil and excavated features produced ample material of demonstrably Late Neolithic date. At Maxey there was a gap between the original construction of the henge and the later, Phase 3 occupation, of perhaps a millennium. A similar hiatus would also be perfectly possible at Barnack/Bainton.

Finally attention must be drawn to Dr French's examination of 'hillwash', an aspect of colluviation that has not received much attention in the region until recently, most probably because the landscape is considered too flat for such things to take place. The field survey has shown that wide, flat lynchets can accumulate up-slope of hedge lines, even on relatively gentle slopes, and French's report examines these phenomena in more detail. We consider the broader implications of alluvium and colluvium in part 1 of Chapter 5.

5 Discussion
by Francis Pryor

Introduction

This chapter is intended to provide a broad overview of the archaeology and environment of the lower Welland valley in a regional and, where appropriate, in a wider setting. It should be emphasised, however, that this is not the final word on the subject; work is still actively underway in Greater Peterborough (Nene Valley Research Committee); at the Etton causewayed enclosure (Fenland Archaeological Associates); in the Fen and its margins due east of Peterborough (Fenland Archeaological Associates: South-West Fen-edge survey and Flag Fen excavations) and in the Fens of Lincolnshire and Cambridgeshre (The Fenland Survey). If it is not the final word, it does mark the conclusion of the first 'pioneering' phase, in which the scene is set for future research.

I. Environment and Land-Use in the Lower Welland Valley

(with Charles French)

The principal source of information on the archaeological environment of the Welland region is French's doctoral dissertation (1983a), which forms the basis for the following review. However, before we consider the manner in which the regional landscape evolved in antiquity, it is necessary to briefly consider how the environment itself affects processes of archaeological recovery and recognition. The two main agents of post-depositional 'distortion' in the study area are colluvium and alluvium. Both are inter-related in cause, if not effect. The archaeological implications of colluvium were studied in detail by Bell (1981); this work was largely confined to the chalklands of southern England, where slopes are generally steeper than in the Welland valley. The distribution of cropmarks in the lower Welland valley, however, showed unexpected voids in areas such as the Barnack/Pilsgate region (Fig.198, note the blank area between the 10m-20m contours) where intensive prehistoric settlement and land-use might otherwise be expected. These blank areas are located around the base of valley slopes and are irregular in plan, and therefore hard to identify on aerial photographs and cropmark plans (alluvial spreads are more regular in plan and usually have sharper, better defined edges). French's investigations of the Barnack/Pilsgate area are reported in full, above (Chapter 4, part V; for general discussion of colluvium see French 1983a, 39-41). Put briefly, there are accumulations of colluvium of 0.50-1.50m depth, spread laterally across an irregular band some 75-150m wide, enough to seriously mask cropmark development — below the 20m contour. The colluvium itself is very fine-grained, intractable and difficult to plough. There is evidence of soil movement on slopes varying from 10° to 25°, and soil accumulation on the lower slopes and upper edge of the valley bottom. On the upper and middle slopes of the valley there is soil erosion downslope, and the formation of lynchets on the lower edges of the fields. Processes such as overland flow, splash creep (an effect of rainfall), deforestation and cultivation are probably responsible (Dalrymple *et al.* 1968). The upland soils in this area are generally of thin rendsina type, on a relatively well-drained limestone subsoil, and are most susceptible to erosion once cleared of cover. A crude estimate of the rate of colluvial accumulation over the past 2000 years is very approximately from 0.25mm to 0.5mm *per annum*. The time required for the formation of lynchets of about 300-800mm in height above the surrounding land surface is perhaps 500 years; during that period the rate of soil accumulation increases to about 1.1mm to 1.6mm *per annum*. There can be little doubt that much archaeological material, especially light flint flakes and smaller, softer prehistoric pot sherds must have suffered as a result of these processes; this must explain the almost absolute predominance of Roman and post-Roman surface finds in this part of the valley (D.Hall, pers. comm.).

Alluvium is freshwater-derived, and in our case largely consists of silts and clays; it forms the second principal agent of distortion mentioned above (French 1983a, 41-44, with refs). linear spreads occur on the lower part of the valley floor between the areas around Maxey and Stamford; east of Maxey 'island' the linear spreads merge with the extensive areas of alluvium which cover the flat expanses of the Fen margins. Further east the alluvium butts against, or merges into, the deeper deposits of Fenland; these deposits generally consist of peat, peaty alluvium or marine/brackish silts and clays. They largely fall outside the scope of this report, but their post-depositional effects are similar to alluvium. Detailed soil mapping has allowed the extent of alluviation to be better understood, and areas once thought to be of unmasked gravel soil, are now seen to be partially, or sometimes totally obscured by alluvium. The site at Cat's Water, Fengate is an example of partial masking: here spreads of 3rd century and later alluvium obscured a large Iron Age settlement whose presence was only revealed by a borehole survey (Craddock *et al.* forthcoming); cropmarks, however, clearly revealed the ditches and yards of a later, Romano-British, farmstead that was placed on the same spot (C.C.Taylor 1969, pl.I, top right). An understanding of the subtlety of alluvial distortion has been accompanied by a better appreciation of its true extent: for example, the map relating geology to cropmark distribution in *A Matter of Time* (R.C.H.M. 1960, fig.4), shows a relatively slight spread of alluvium in the lower Welland when compared with that reproduced here (Fig.3, based on information kindly provided by the Soil Survey).

Recent work on the Neolithic ditched site at Etton Woodgate I, just west of the Etton causewayed enclosure, has shown a possible phase of colluviation in pre-Beaker times (see also Godwin and Vishnu-Mittre 1975), but the main alluvial deposits did not begin to be laid down until the later 1st millennium BC, when significant areas of valley side and upland were probably being cleared for cultivation (French 1983a, 248-9). A broadly similar picture is emerging in the Nene valley (French 1983a, 246-48; Pryor 1983a, chapter 8), and further afield (e.g. Lambrick 1978; Lambrick and Robinson 1979; Shotton 1978).

The large-scale clearance of valley slopes and suitable soils of the upland probably began to occur in Iron Age times. Prior to that the picture is somewhat less clear, but there are indications that the archaeologically visible clearances of the mid and later 1st millennium mark an extensification and perhaps an acceleration of processes that had begun earlier (e.g., Hall and Nickerson 1966; Hall and Hutchings 1972; Pryor 1983a, for more refs.). The origins of the process are harder to find: pollen analyses by R.Scaife (1983) of deposits at the base of the Etton causewayed enclosure ditch indicate at least a locally deforested, but wet, environment. Perhaps the nearby site at Etton Woodgate I (which on ceramic grounds is probably somewhat earlier than Etton) was associated in some way with this clearance. Similarly we have seen that the Maxey cursus, which is at best an insubstantial monument, or series of monuments, was most probably laid out across a largely treeless countryside. In short, the available evidence suggests that clearance of the forest cover of the valley floor was well under way in both Welland and Nene valleys by the close of the Neolithic period (Pryor 1983a, chapter 8). Indeed, pollen analysis by Dimbleby of a Late Bronze Age context at Tallington (Chapter 1) indicates a substantially open landscape. As clearance continued, so surface drainage was improved and cycles of erosion and deposition were begun or were intensified.

Further east, in the Fen proper, ground conditions were becoming wetter (most probably by the Middle Neolithic period) over the flat landscapes east of Thorney and Newborough (Pryor 1983c, map). Nearer Peterborough, organic muds and peats were accumulating in the basin south-east of Fengate around 1000BC, or in the centuries shortly thereafter. The formation of the marginal Fen deposits was a complex procedure involving a number of quite small micro-environments where associated effects, such as freshwater back-up, alluviation etc. would have differed from area to area. The human exploitation of this varied and changing landscape is the principal subject of the current Heritage Commission-sponsored South-West Fen-edge Project (Pryor 1983c; Crowther, French and Pryor, forthcoming). We shall discuss models for the exploitation of the lower Welland valley below.

II. Aspects of Archaeology in the Lower Welland Region

Prehistoric

Neolithic

The Neolithic features of the Welland valley must clearly form a central theme of this chapter, and much of the interpretation hinges on the result of the Maxey excavations reported in Chapters 2 and 3; particular attention is drawn to the final part (IX) of Chapter 2. This discussion of the Neolithic has been subdivided, for present purposes alone, into three parts: economy and land-use, funerary practices and, finally, ceremonial.

1. Economy and land-use Evidence for the beginnings of food-production in the region is very slight indeed. The very earliest Neolithic communities probably lived in man-made or natural clearings in the woodland. We may only speculate, but their economy may have included a larger livestock component than had been supposed previously. The young Fen would have provided numerous damp places where sparse tree cover would have made clearance more straightforward; whether cleared by man, or naturally open, these damp locations would provide suitable areas for grazing, hay cutting and of course the watering of livestock. Indeed, Torsten Madsen has suggested that damp clearings such as these probably played an important role in the early Neolithic, or sub-Neolithic, livestock economy of Denmark (Madsen and Jensen 1982, 83). Perhaps a similar explanation may hold true for bog-side sites in Northern Ireland such as Ballynagilly (ApSimon 1976). Although evidence is still not available it is tempting to suggest that the early Neolithic Fenland witnessed a broadly similar settlement pattern.

We must assume that the region might have seen a measure of retrenchment following initial, pioneering, Neolithic expansion; although it must again be admitted that the local evidence is very sparse (Whittle 1978). The region is characterised by a number of diverse micro-regions, each with different soil drainage characteristics, varying soil acidity or alkalinity, very divergent surface slope etc. In short, the Fen and Fen-edge environments are so heterogeneous that the case for Middle Neolithic retrenchment and forest regeneration must be proved from one area to another before a general pattern can be established.

By the mid-3rd millennium bc there are indications that settlement was dispersed and based on small, nuclear family units placed at intervals around the gradually forming Fen margins, and near 'islands' of various sizes in the slowly growing peatlands (for example Clark and Godwin 1962). The evidence, such as it is, suggests that the economy of these dispersed groups was based on mixed agriculture or horticulture amidst small clearings in the widespread woodland (Pryor 1974; for a further discussion, Pryor 1983a, chapter 8). Mindful of the Danish example cited above, we may suppose that livestock might have played an important role in these small settlements. The picture is essentially one of 'long fallow' farming, perhaps leading to the gradual clearance of primary and secondary woodland (Boserup 1965). Additional evidence for a dispersed pattern of settlement is provided by the local distribution of Group VI axes (Cummins 1979).

Thus far our reconstruction of Neolithic settlement in the region has been based on Clark and Godwin's important work in the southern Cambridgeshire Fens (1962; see also Godwin 1978) and on the Fengate Neolithic house (Pryor 1974, 6-14). It is now apparent that these sources only give a partial picture of Neolithic settlement patterns following the initial, pioneering phase. Recent research, however, has given hints at a more complex picture: two Group VI axe flakes were found in a pair of parallel ditches that traversed the

Fengate Vicarage Farm subsite from north-east to south-west (Pryor 1974, fig.12, F.14 and F.17). The layout and alignment of these diagonal ditches bore no relation to the better-known ditches of the main 2nd millennium bc system, and a later date may also be discounted. It may be said that two ditches do not a field system make, but they do hint at land-management methods of a more elaborate type than those of an isolated log cabin (Coles 1976).

In recent years it has become apparent that the Middle Neolithic settlement pattern was more diverse than had been previously suspected. Causewayed enclosure sites such as Southwick, Northants., some 17km 'inland' from the Fen-edge, south-west of Peterborough may well sit on the fringes of a Fen-orientated landscape. The site (Palmer 1976, fig 14) has produced decorated sherds of Mildenhall bowls from primary contexts in the causewayed ditch infilling (pottery shown to F.M.M.P. by J.Hadman). Broadly similar pottery was recovered from the ditches of the Great Wilbraham causewayed enclosure, located on the side of a peat-filled chalk valley at the Fen-edge, just east of Cambridge (I.A.Kinnes, pers. comm.). Wetter, more low-lying Fen-edge causewayed enclosures have recently been investigated at Haddenham, near Earith, Cambs. (Hodder 1981/82) and at Etton, immediately east of the current Maxey excavations, beside the cursus (Fig.15) (Pryor 1983d; Pryor and Kinnes 1982). This distribution may be supplemented by unexcavated cropmark sites (Wilson 1975; Palmer 1976) at Uffington and Barholm, Lincs. (St. Joseph 1970), and Tansor, Northants. Each site is defined by at least two interrupted ditches and that at Uffington is partly buried beneath later deposits.

Taken at face value, the distribution of causewayed enclosures in the Peterborough area is remarkable. No less than five sites are situated within a 15km radius of the city (Palmer 1976, fig.9, plus Etton). This concentration is the more extraordinary as all the sites necessarily occur west of Peterborough, on land not buried beneath Fen deposits. Given such incomplete data, caution must be shown when discussing site distributions, but one very general observation may be suggested. The sites are in two groups, around the rivers Welland and Nene. Those of the former (Etton, Barholm, Uffington) are spaced some 6km apart, while the Nene 'group' (Tansor and Southwick) are closer together (*c.*2.5km). Such a distribution is surely inconsistent with any 'territorial' explanation that involves a Central Place. This also holds good over much of East Anglia, where causewayed enclosures often occur close together; the remarkable overlapping multivallate enclosures of Fornham All Saints, Suffolk, near the south-east Fen-edge, illustrate this particularly well (St. Joseph 1964).

This is not the place to discuss the social role of the northern East Anglian causewayed enclosures, as research is still active at both Etton and Haddenham. However, there do seem to be quite major differences between causewayed enclosures in the chalklands of Wessex and those of the eastern lowlands, which are far less 'monumental', less 'territorial' and do not appear to have served a defensive role, in the military sense, as exemplified at sites such as Crickley Hill (Mercer 1981b, 187-198 for a general discussion). Material from the eastern sites, consists largely of occupation debris, such as broken pottery, flint implements and by-produucts (e.g. Hedges and Buckley 1978) and animal bone, where conditions favour survival (e.g. Etton and Haddenham). Some general implications of this regional contrast are discussed elsewhere (Pryor 1984).

2. Funerary practices The foregoing brief review of the evidence for settlement shows that where it is actively sought, it is often found. The problem, however, is that much of the survey and excavation is actively in progress and the information is still too slight to attempt a synthesis. Regrettably, the same applies to the burial evidence. As recently as seven years ago it was stated in a major review that most of East Anglia 'may have been outside the barrow tradition altogether' (Whittle 1977, 61). Given the large numbers of Bronze Age round-barrows in the area (Lawson *et al.* 1981), this suggestion seemed at the time somewhat improbable; although in fairness, it must be recalled that most of the recent discoveries had yet to be published. Long barrows are indeed rare in East Anglia (Lawson *et al.* 1981), but Ian Kinnes (1979) has recently drawn attention to the importance of round barrows in our region, as elsewhere. Two fine examples are known from the relatively few sites excavated around the Fen-edge: Swale's Tumulus (Briscoe 1957) and, in the middle Nene valley, Aldwincle (Jackson 1976). More importantly for our purposes, recent work by the Nene Valley Research Committee in Ferry Meadows, Orton Waterville, immediately west of Peterborough, has revealed evidence for complex mortuary arrangements of Neolithic date, in round barrow contexts, sealed beneath accumulations of later alluvium (O'Neill 1980/81). The second of the two Orton barrows has been discussed at some length in Chapter 2 part IX.

These recent developments give an impression of a diverse Neolithic barrow-burial tradition, but we still require a basic minimum of information before we can attempt any sort of regional synthesis. Perhaps it is also appropriate to recall here that East Anglia Neolithic groups might have employed another, less monumental, means of burial, as witnessed by the apparently unmarked Fengate grave-pit burial (Pryor 1976a; Pryor 1983a, chapter 4).

3. Ceremonial We have briefly discussed settlement and burial and must now turn to ceremonial, as this was one of the Welland Valley Project's main research objectives (Pryor 1980b); however, 'ceremonial' sites were rare in the lower Nene valley and could not be included in the Fengate project. Unfortunately, ceremony is an aspect of the East Anglian Neolithic which has not received much attention until very recently. Apart from causewayed enclosures, which may well have seen ceremonies of many types in and around them, the two main classes of Neolithic monuments that might be described as 'ceremonial' are cursuses and henges. We will discuss the former first (for a general review see Hedges and Buckley 1981).

Our area includes two cursuses, one very large (Maxey), one small (Barnack). None are known in the neighbouring Nene valley, but one, and just possibly two are known from aerial photographs some 40km to the south, on the lower Ouse gravels at Eynesbury and Buckden (Cambridgeshire SMR, TL 202 666 and TL 183 585). Apart from Maxey, none have been excavated. The Barnack cursus was examined as part of the Welland valley transect survey, and Maisie Taylor noted no increase in finds density in the topsoil above it; there are, however, indications of Late Neolithic (Mortlake Ware) settlement beneath a headland just 40m, or so, to the west of the monument's south-west terminal (Chapter 4 parts I and VI). Peterborough pottery has also been found in stratigraphic association with the Drayton cursus, Abingdon (Richard Bradley, pers. comm.).

The observations at Barnack confirmed what had been observed of the Maxey cursus, both on the excavation site (Fig.28) and where it was crossed by field survey transects (Taylor, Chapter 1); the scarcity of finds was also confirmed by excavation (Chapter 2, part II; Chapter 3). Although it was impossible to walk the whole length of the Maxey cursus, due to quarry pits and other practical problems, there were no indications that it acted as a focus for settlement, nor for the location of funerary monuments, either contemporary or later (e.g. Atkinson 1955). Despite this, it is an impressive monument in scale, being over 2km in length (each end disappears beneath spreads of alluvium). The smaller monument at Barnack is regularly laid out and shows no signs of extension or re-alignment; as such, it was probably constructed in a single episode. Maxey, however, is different. Its course immediately south of the Welland (R.C.H.M. 1960, fig.6) is marked by no less than four roughly parallel ditches, whereas its other (south) extremity almost certainly consists of one (the southern) ditch alone (Fig.15). Further, the northern ditch's known southern extent (now lost by gravel-digging) shows a slight inward inclination, perhaps suggestive of a terminal. The north ditch is seemingly discontinuous towards its southern end, and the south ditch has a probable gap near its centre, which has been filled (or was preceded by) a double-ditched, henge-like monument (Fig.15, No.80). This might imply a chronological incongruity, since the cursus was clearly cut by ditches of the large henge complex, discussed below.

We have seen (Chapters 2 and 3) that the large Maxey henge and central ring-ditch clearly cut the cursus which had completely filled-in, by natural means. This must provide a later Neolithic *terminus ante quem* for the monument. Further south, the cursus ditch west of the Etton causewayed enclosure was very different in profile (narrow and V-shaped) and produced small sherds of undoubted Beaker pottery from primary, or near primary contexts. The ditch was straight and could be followed, closely and continuously (during topsoil removal by the gravel company, and by our own excavation in 1982) for some 500m. There can, therefore, be no doubt as to its alignment or plan. A pre-1st millennium date is also suggested by its location beneath alluvium which does not dip into its upper layers. There is at Maxey, then, strong evidence to suggest that the cursus was in use for perhaps several centuries. We must now consider the archaeological nature of this 'use'.

Dr French's examination of the excavated ditch filling (Chapter 2, part V), helps to confirm our impression in the field that the cursus, at that point, was short-lived. The ditch was dug, stayed open briefly, and was then abandoned, without recutting. There was no evidence for a bank, either in the ditch in-filling or in the preserved soil beneath the henge complex central mound. The ditch must have looked striking when open: the gravel at Maxey is white and, when dry, reflects sunlight; it would have stood out as a strong white slash across the countryside, perhaps for a season, before being overgrown by vegetation. The misalignments of the ditches to the north, together with the slight bend immediately north of the henge complex, suggests that earlier ditches were either not visible, or were not used for surveying-in extensions. Similarly, the very different ditch profiles of central and southern reaches imply that the shape of the ditch itself did not have to be consistent. The southern ditch, moreover, contained more gravel than those at Maxey and the possibility of one or more banks in this area cannot be discounted.

The course of the Maxey cursus, diagonal across Maxey 'island', from one river to another, could not be more at variance with subsequent field patterns which, as usual, are aligned at right-angles to the rivers and their floodplains (Ellison and Harriss 1972). This positioning makes no 'functional' sense whatsoever, and if the cursus were a permanent, long-lived feature, its presence in such a prime location would be decidedly inconvenient; indeed one might expect more 'monumental' construction, in keeping with so important a location. Such a location is, however, less inexplicably disruptive if the monument is not seen as a single, long-lived, entity. Taken at face value, the archaeological evidence suggests that the cursus ditches were not necessarily dug and 'used' in parallel. They seem to have been dug in relatively short lengths (perhaps 500+m), broadly comparable in effort with the construction of the Barnack cursus, and others like it, nearby (Loveday and Petchey 1982). It is unfortunate, perhaps, that convention demands that we describe this monument as just that: a monument, a cursus, whereas in reality it consists of a chronologically extended series of quite separate, short- lived, sites, events or episodes, which share a common alignment. For purposes of record only, one might redefine the Maxey cursus, and maybe others like it (perhaps Fornham All Saints, Dorchester, Abingdon, Rudston etc.?) as episodic sites of significant alignment. The term cursus, however, will stay with us, but as we have seen, it is perhaps too all-encompassing; it is tempting to suggest that a future reclassification should not be based on layout and size typology alone; we must consider their use-life, too. Suggested categories for future assessment might include:

1. 'Monumental' or continuously used sites (cursuses, as originally understood, e.g. Dorset)
2. Short-lived, single period sites (small, e.g. Barnack or large e.g. Springfield?).
3. Long-lived episodic ditched alignment sites (e.g., Maxey; Fornham All Saints).

We must turn now to our second category of 'ceremonial' site, namely henges and hengiform monuments. Apart from Simpson's (1967) preliminary paper on the painted objects from Maxey, Grahame Clark's (1936) Arminghall, Norwich, report was the only East Anglian reference available when the last major review of henge monuments was undertaken (Wainwright 1969). Since then, we have seen the excavation of very few *bona fide* Neolithic henge or hengiform monuments in the region (Tye Field, Lawford, Essex, for example, is a complex monument, excavated under difficult circumstances and probably not a henge (discussed in Hedges 1980, 26)). Alison

Taylor sectioned the ditch of a probable Class II henge, on the sides of the Nene valley at Elton, mid-way between Oundle and Peterborough. The ditch diameter was about 100m and there was evidence for an external bank and a slight berm; like Maxey, the ditch was shallow (under 1m), but wide (5.5m), step-sided and flat-bottomed. This unusual profile may be a result of the sandy subsoil of the region. There were no diagnostic artefacts, other than a few gravel flints, mostly found on the surface, but mature oak charcoal from apparently near-primary contexts in the ditch gave a date of (HAR-3111) 2100 ± 110 bc (A.Taylor, forthcoming).

Returning to the Welland, there are so many ring-ditches on aerial photographs that it is extremely difficult to decide which are henges, and which are barrows. Clearly excavation is required to test some of the interpretations, but some of the larger ring-ditches in the Barnack area could be henges (for example Fig.179, nos.1, 3, 7, 8), indeed No. 7 has been interpreted as a Class II henge (R.C.H.M. 1960, fig.8, no.7), but re-examination of the aerial photographs does not show at least one of the entranceways so distinctly; there is also surface evidence for a mound (but this, of course, need not discount the site's role as a henge, as demonstrated at Maxey).

Maxey cropmarks provide candidates for a number of possible henge monuments, apart from the two discussed below (R.C.H.M. 1960 fig.6, nos.5, 28, 80, 85, 96, 108). The double-ditched monument (now destroyed by gravel extraction) listed by the Royal Commission (R.C.H.M. 1960, fig.6) as no.80, was either placed precisely across a gap in the south cursus ditch, or is earlier than the cursus, and respected by it. Of the two excavated hengiform sites, the smaller (Fig.15, no.69) might readily be mistaken on aerial photographs for intersecting Iron Age eaves-drip gullies, or stack-stands. This site has been fully published by Simpson (1981), and will therefore be described in brief.

The smaller hengiform monument, or monuments, was located about 550ft south of the larger one (described in this report). It, too, produced very few contemporary finds, and although morphologically quite dissimilar, the two sites share important points in common. First, shape: they are circular and broached by a single entranceway. Second, ditch fills suggest they had concentric, external banks and, third, domestic rubbish was very rare in primary contexts (bulked animal bone, probably from tertiary contexts, gave a date (UB-456) of 675 ± 275 bc). The filling of the various ring-ditches was gravel-rich and sufficiently similar in appearance for the excavator to suggest that they were probably all (broadly) contemporary. Apart from the well-known engraved and painted bone and antler objects (Simpson 1967; 1981, fig.6, pls.IX-XIII), the site also produced sherds of non-Peterborough Neolithic pottery, probably from secondary levels. It is hard to say whether or not the ditches had been back-filled, but the presence of much stone-free, 'light brown soil' (most probably a sandy loam), and the animal bones mentioned above, suggest that it was abandoned, to fill in by natural means. This no doubt accounts for the similarity of filling observed by the excavator. The sections show no obvious evidence for recutting.

The extremely small size of the ring-ditches (external diameters range from 9.20m to 6.40m) does not indicate any 'monumental' role, and the very different entranceway alignment of ring-ditches I and II surely suggests that they were dug as part of two separate events. Two similar small ring-ditches nearby (aligned east to west on ditch II), are also probably Neolithic.

Finally we must consider the large hengiform monument and its associated features (Fig.15, No.59): results of the recent excavations are considered in Chapter 2; the earlier excavations of Gavin Simpson are reported in Chapter 3. First we must compare results from the two projects, as the recent work was deliberately carried out in ignorance of the earlier. The first point to note is that both excavations are in broad agreement on essentials: for example, both agree that the henge ditches cut the cursus, and that the cursus was probably bankless. Both excavations showed the central henge mound to be of topsoil and two-phased, with a primary turf mound (Simpson was able to distinguish individual turves) and both showed the outer, henge, ditch to have a gravel lense towards the outside, suggestive of a bank. Simpson did not consider that the central ring-ditch was accompanied by an external bank, but was unable to find evidence for an internal one, largely, it seems, because of later disturbance. Dr Alexander's earlier excavations, however, had noted a dark clayey loam, turf-like deposit which the excavator considered might be the remains of a bank (the unpublished report is summarised in Chapter 1, part III). It must also be admitted that the internal bank accompanying the central ring-ditch was only recognised in the later excavations because remains of its clean gravel capping survived in four quite closely-spaced sections. Otherwise it was made of material similar to the enlarged (or secondary in Simpson's terminology) mound, and could only be seen, after very close inspection (and with the 'vantage of hindsight') in other sections. The later excavation was also fortunate to open sections through the inner ring-ditch which showed clear, clean gravel lenses around the inner edge. Another minor point where the two accounts differ concerns the in filling of the outer, henge ditch, which Simpson concludes was by natural means alone, while Dr French and the present author would favour initial, deliberate, back-filling, followed by slow accumulation through weathering.

The main interpretational problem posed by the earlier excavation concerns the date and the relationship of the two pit circles to the cursus and to the various features of the henge complex. These problems can be briefly outlined: the two pit circles lie largely outside the cursus and clearly do not respect it. All parallels elsewhere indicate that pit circles of this type are closely associated with henge monuments. Yet Pit I of the north circle (IIIA) appears to have been dug when the southern cursus ditch was still open and had accumulated two layers of 'primary silting'. It would appear, moreover, that all the gravel excavated in the pit's construction was placed in the cursus ditch, which was still open, and was not spread around; the upcast from Pit 7, which also nearly cuts the cursus was not treated in this way, however. The plan of the gravel spread (Fig.170) which is thought to derive from Pit I is unusual if that indeed was its source. Clearly we will never be able to test that idea, but recent excavations (where greater lengths of both ditches were excavated) suggest that the filling of the shallow cursus ditches was often very variable and that the gravel spread noted by Simpson need have no special significance. If the original explanation is accepted the implication is that the gap between the construction of the henge complex and the abandonment of the cursus was shorter than we now suppose. There can, however, be no doubt whatsoever that the cursus ditch was completely filled when it was cut by the ditches of the henge complex (C.French, pers. comm.). These minor problems apart, the close agreement between the two independently executed excavations is most encouraging.

The discussion of the recent excavations (Chapter 2, part IX) attempts to show that the various components of the 'henge complex' of features, the oval barrow (structure 16) in the henge entranceway, the outer, 'henge' ditch and external bank (structure 15) and the inner ring-ditch, its internal bank and two-phased central mound (structure 14), were later Neolithic in date, were strictly contemporary and, moreover showed a common sequence of development. This sequence (Fig.164) involved the removal of topsoil and turf in specific areas, followed by the erection of a timber structure (below the later oval barrow), the digging of the outer ditch and bank, and the inner ditch, bank and primary turf-built mound. The next period probably saw the construction of the two pit circles and the possible use of the oval timber structure to house bones or bodies. This episode was brought to a close by the burning of the timber structure, and the deliberate slighting of both central and outer henge ditch banks. The final period is marked by the erection of an oval barrow of topsoil over a single grave, and the throwing-up, perhaps using gang-labour, of the enlarged central henge mound; this enlarged mound was of topsoil and it covered the primary mound and the now smaller bank that ran concentrically within the inner ring-ditch.

Soil studies clearly suggest (Chapter 2, part V) that this sequence of events took place over a relatively short period of time, an argument that is supported by the near-complete absence of settlement debris in the area, and the evidence for gang-labour. The constructional changes that we were able to observe have a number of common themes, of which the recurrent opposition: construction versus destruction, is most notable. The initial stripping of turf and soil from areas that were later to house mounds could be seen as a type of preparatory destruction, prior to the first phase of construction. Although the massive oak-built oval structure could have remained upright for a long period, there are no signs of pedogenesis in the associated, truncated soil; this might be explained by a roof, but internal post-holes are lacking and the corner-less, rather irregular plan of the monument does not suggest that it was in fact roofed-over. The simplest suggestion is that it was in use for a short period. One might suppose that the whole sequence described above took place within a single generation. The site was then abandoned as a ceremonial centre. Although somewhat later, the large barrow at Tallington (Simpson 1976, site 16) also shows a sequence of constructions, ultimately involving an enlarged (phase III) mound, reminiscent of the central henge mound, in its final phase. Simpson notes (1976, 227) that 'The length of time that elapsed between the setting up of the stake circles and the enlargement of the primary mound would not seem to have been very long . . . The detailed examination of about thirty stakeholes provided clear evidence that most of the stakes had been buried in the enlarged mound'. It could even be suggested, on the basis of the available evidence, that the construction of the stake circles and the erection of the enlarged mound were part of the same event, for it is difficult to imagine so many unsupported posts surviving for long upright, in loose gravel soil without numerous replacements, repositioning and repairs, which were, apparently (and convincingly), absent (Simpson 1976, 227-8).

We have seen above that the Maxey area includes a number of ring-ditch sites that could well be henge monuments and we have also seen that the only other excavated example was a scene of probably short-lived ceremonial events that did not involve permanent or extended settlement nearby. Indeed, one is tempted to see the duration of these activities in days or hours, rather than years. The general slightness of the features does not suggest that they were built over a long period of time to provide impressive 'monumentality'. Instead, it seems that the events were of more significance than the monuments that provide their archaeological existence. Moreover, when we compare the Maxey cursus with the henge monuments we notice certain common themes: settlement debris is absent; features are slight; ditches are dug and abandoned, but never recut (the more surprising, given the loose nature of the Welland gravels). In short we see an apparent concern, on the part of the people that used both types of monument, for specific, short-lived, ceremonial events. As far as we know, the ceremonies that took place at cursuses did not generally involve symbolic destruction, but this may be counterbalanced by other, closely similar features, such as post and pit circles which are common to both types of site. (for henges see Chapter 2, part IX; for cursuses see Hedges and Buckley 1981, particularly Springfield itself).

A close examination of the two classes of monument at Maxey shows similarities preponderate over dissimilarities; differences, however, must still be sought, if only to explain the similar. The first, and perhaps, most obvious difference concerns shape and location. Most henge monuments appear to be dotted across the valley floor, at random. It is true that they are largely confined to the lower Welland region, and in that, regional, sense, show patterning; but within the confines of the lower Welland their location seems haphazard, and often, as at Maxey and Barnack, on prime, flood-free land. Their circular shape focusses attention towards the interior; the presence of external banks must surely emphasise this; in addition the Maxey henge has a central platform-like mound, emphatically separated from the rest of the monument by a gap-less ditch and internal bank. The central ring-ditch was altogether more substantial than the outer, and funerary activity was confined to a zone of land around this central area.

The location of the cursus alignment across the very centre of the Maxey island, from river to river, without regard to landscape is extraordinary, but its longevity as an alignment suggests that its location and orientation were significant, even if its component ditch-lengths were not permanent, maintained, features. We have seen that the layout of a henge draws attention towards its interior, but a cursus is quite different: attention is focused along its alignment, either inside or outside one or both of the ditches. In short, unlike henges, the focus of attention is specifically away from the centre, towards either terminal, or beyond.

Finally we must return to the relationship of the henge complex to the cursus. In chapter 2, part IX, we suggested that it was not straightforward. It is true that in the West Field the henge features do indeed cut the cursus, but elsewhere there is good reason to believe that the cursus alignment still held significance in Beaker times. This alignment was not fixed precisely, as we have seen by the off-centre arrangement of the northern cursus ditches, and by the slight bend (Fig.15). If the alignment really was still significant, then the position of the largest, most elaborate henge monument in the area, close to the centre of the cursus, must be more than coincidence. The fact that it was located slightly off the axis of the short length of cursus that runs across the West Field need occasion no surprise, but it is worth noting that the northern length of cursus is aligned quite precisely on the henge complex centre-point (Fig.15). Much attention has hitherto been paid to cursus terminals, but if the explanations offered here have any validity, it might also repay us to investigate the centre(s) of our better preserved monuments. Sites such as Fornham All Saints, Suffolk where, like Maxey, the ditches are 'kinked' at the centre, could be particularly rewarding (St. Joseph 1964; Hedges and Buckley 1981, fig.5, no.6).

Second millennium bc

Until relatively recently our knowledge of 2nd millennium bc (broadly speaking, Late Neolithic and Bronze Age) society in eastern England was confined to analyses of metal and metalworking, non-perishable grave goods, burials and barrow form. As recently as 1965, Professor Coles was forced to declare that 'settlements of the Early and Middle Bronze Age are scarcely known although scatters of sherds and flints, sometimes bronzes, have on occasion been found under barrows or elsewhere, especially along the Fen margins' (Coles 1965, 121). The Fengate project helped redress the imbalance, and other work has drawn attention to the possibilities of widespread land management in the Bronze Age (Pryor 1980a, chapter 5, with refs.). Put very succinctly, Fengate demonstrated that sizeable areas of the Fen-edge around Peterborough were parcelled into ditched fields or paddocks, from *c.*2200 bc. These ditched enclosures seem to have been abandoned, relatively rapidly, at *c.*1000 bc, or very shortly thereafter. This abandonment correlates with a deposit of freshwater-borne clay alluvium, suggesting the occurrence of seasonal flooding around the Fen margins of the lower Nene valley. Similar flooding is known from other locations in the Fen area (R.Evans, pers. comm.). It was suggested (Pryor 1980a) that these floods played an important role in the abandonment of the ditched enclosures, which the environmental evidence showed subsequently reverted to scrub cover (French in Pryor 1980a).

Whittle (1982,193) has recently suggested that the Fengate report describes 'the total collapse of the fenland grazing system'. If this impression was indeed given, it is most unfortunate, as the abandonment of the ditched enclosures has so far only been demonstrated beyond reasonable doubt at Fengate, and the abandonment of ditch maintenance does not indicate 'total collapse'. Doubtless Fen-edge meadows were still grazed, or were mown for fodder, in all but the wettest of summers.

Recent work has provided new information on the lower Nene area which has a direct bearing on the Welland. First, the formation of marginal Fen deposits is now better appreciated and 2nd millennium Fengate is thought to be less marginal than hitherto; flood-free grazing probably extended much further east than we had previously supposed. The discovery by David Hall of the partially buried barrow fields at Borough Fen (Fig.2) and Cat's Water, near Thorney, some five miles NE of Peterborough (Pryor 1983c, map) illustrate this well. These sites probably form components of the same buried landscape whose dry-land elements were investigated previously by Leeds (1911-12; 1914-15). Recently David Gurney (1980) has published evidence for ditched enclosures that most probably formed part of the Fengate system, about a mile and a half due east of Fengate, immediately next to (and far below!) the modern course of the river Nene. This landscape was probably subject to repeated, serious, flooding very approximately at 1000bc (Pryor 1983c), at which point the ditched enclosures, like those at Fengate, were probably abandoned.

Ditched enclosures of this date are no longer unusual in southern Britain. The ditched fields at Mucking, Thurrock, for example, are very convincing (Jones and Bond 1980, fig.1) and elements of an early ditched landscape are known from investigations of the Central Excavation Unit at Ardleigh, Essex (J.Hinchliffe, pers. comm.) and, further north, near the Fen-edge of the Vale of Pickering at West Heslerton (Powlesland 1982). It is interesting to note, however, that of the many possible lowland 2nd millennium landscapes which show evidence for ditched fields, the examples from the Fen region (mentioned in Pryor 1976b) still appear dubious. For example, the precise date of the Billingborough ditched fields is open to question (Chowne 1980), and the recent investigations in the Welland valley have produced no pre-Iron Age field ditches, despite a diligent search amongst probable candidates on air photographs. It is hard to imagine that the Fengate/Eye/Northey landscape immediately east of Peterborough is the only one with a ditched, parcelled, landscape; but further investigations, especially in the south Lincolnshire and Norfolk (Hockwold) Fen-edge should clarify the matter. In the meantime the contrast between the ditched landscape of Fengate and the apparently open landscape of the lower Welland valley requires comment.

There are no environmental reasons to suppose that the lower Welland Fen-edge was less suited to human occupation than that of the lower Nene. Moreover the region contains, as we have seen, numerous funerary and ceremonial monuments of undoubted Late Neolithic/ Bronze Age type. Where visible (i.e. not covered by peat or alluvium), these sites are located on light, freely-draining calcareous gravel soils of high quality. The modern soil is classed as Grade 2 (Burton 1981), because of its poor characteristics in time of drought, but it should be recalled that the ancient water table was probably not maintained at such an artificially low level, as peat wastage in the contiguous Fen had yet to take place. It should also be noted that the pre-Iron Age monuments are spread over these soils, and do not cluster around the edge, nor do they seem to extend appreciably up the valley sides onto less fertile land. In common with the ring-ditches of the Great Ouse valley, the Welland monuments are distributed across the most fertile land.

Woodward's (1978) important study of the Great Ouse valley showed ring-ditches were positioned away from settlement areas (as defined by spreads of flint). The Welland pattern is less straightforward to define, as modern disturbance has seriously damaged the most promising areas of study. Despite these drawbacks, and the problems posed by the greater complexity of the Welland cropmarks, it is clear that the pattern is substantially different. Maisie Taylor (Chapters 1 and 4) has shown that the Welland region is not characterised by localised, clearly-defined, concentrations of Bronze Age flint. Instead we find a 'background' spread of moderate density, which shows occasional, gradual intensifications, which may, or may not be 'sites' (as defined by subsoil features). The Barnack/Bainton topsoil flint distribution (Fig.180) illustrates the latter, while the 'background' scatter is shown by the flints from Maxey (Fig.28), or the transects (e.g. Fig.180, right; see also Taylor, Chapter 1). It is very doubtful indeed whether the areas of slightly higher flint distribution necessarily indicate 'settlements', as the excavations at Barnack/Bainton testify (Chapter 4).

It has been known for some time that it is difficult to locate Bronze Age occupation sites in the area. Discrete clusters of diagnostic flint types, like those convincingly demonstrated by Woodward (1978) are rare; and although they may not be absent altogether (e.g. the example at Lolham, discussed by Maisie Taylor in Chapter 1), they are by no means characteristic of the region as a whole.

The best distributional parallels for the 'background' spread of 2nd millennium flints are the homogeneous distributions of medieval and modern material in the Maxey topsoil (Figs.31, 32 and 38); Roman pottery in the south-east part of the East Field also shows this random, homogeneous patterning (Fig.30). There can be no doubt that the three recent examples are the result of manuring, and it is suggested that this may also explain the diffuse 'background' scatter of flints. It would be interesting to see whether this scatter continued beneath the flood plain alluvium, but its present distribution on the well-drained gravel soils of the valley floor and Fen-edge may be taken to indicate the actual extent of 2nd millennium settlement and land-use. If this is indeed the case, one might reasonably ask where the settlements are located.

A possible answer to this problem may lie in the nature of our data. Fengate revealed good archaeological evidence (ditches, house plans, butchered bone, phosphates etc.) for at least three small settlements which lay dispersed among the ditched enclosures. These undoubted occupation areas were remarkable in that they produced virtually no flint (or, indeed, pottery). The extraordinary 'cleanliness' of these small settlements might result from the careful saving of domestic debris, for eventual spreading on the fields, as has been suggested by Crowther for the Roman period at Maxey (Chapter 2, part I). Had Fengate been plough-damaged, the existence of these dispersed settlements would not have been revealed on the surface. The vast majority of typologically 'Bronze Age' flints from Fengate were found in linear ditches around the fields and paddocks. The fillings of these ditches in turn derived from slipped topsoil of the field surface. In other words, the ditches preserved a sample of the topsoil that once lay around the enclosure edges, albeit somewhat disturbed (Crowther, Chapter 2, part I; Fig.36). Had Fengate not been covered by alluvium (and a detailed surface survey had therefore been possible), then the resulting flint distribution would have reflected that of the underlying ditches, with slight concentrations near field entranceways, but otherwise an even, dispersed scatter. This is precisely what we find in the lower Welland valley gravel soils; moreover the flints themselves are virtually indistinguishable from those at Fengate.

The surface flints of the Welland valley may be taken as indicators of extensive land-use, in a manner reminiscent of Fengate, but using techniques of livestock and land management that did not require the large-scale digging of ditches. It might be suggested that the apparent absence of parcelling in the Welland valley reflects the fact that pressure on hay or grazing was less intense than in the Fengate region. Alternatively the land might have been divided-up using means that have left no archaeological trace, and the most obvious candidates are hedges. The 2nd millennium ditches at Fengate were probably accompanied by banks, which carried hedges (Pryor 1980a, pl.XV), and the very substantial Enclosure hedge at Barnack/Bainton left no trace whatsoever in the graval subsoil (French, Chapter 4). Whatever the explanation, there seems little doubt that the dispersed pattern of land-use and settlement seen in the Fengate region during the 2nd millenium bc continued north, to the Welland valley and its Fen. It would be particularly interesting to examine the land between these two areas to see how the one system merged with the other.

Before we leave the 2nd millenium, we must consider the associated flint industry (Chapter 2, part III). This industry differs from its Neolithic antecedants in some important respects. First, and most important, it is an industry that is not based on core preparation and the subsequent removal of blades or flakes. Instead it utilises small, rolled gravel pebbles. This source material, which is characterised by numerous internal planes of weakness, cannot readily be fashioned into cores, but when bashed, the pebbles break naturally into many-pointed denticulates and borers with strong scraping edges, which may sometimes be strengthened by the addition of scraper retouch (although this 'retouch', particularly that of hollow scrapers, is often hard to distinguish from the scars of heavy utilisation). In certain cases tiny pebbles have had cortical flakes removed to give the appearance of single-platform (Clark type A) cores. The flakes detached from these 'cores' are too small and cortical to have served any practical function, but the scalloped edge of the striking platform invariably shows evidence for wear between and at the tips of the points and ridges that separate individual flake scars; it would seem that the core technique was used to produce a small, but effective, denticulate implement.

First millennium bc

Any discussion of the 1st millennium bc must take account of the known increase in ground wetness, which charaterises its early and middle centuries. The subject has been discussed at length in the Fengate Fourth Report (Pryor 1983a, chapter 8), and little need be added here, except a brief summary of the main events and an account of some recent developments. If freshwater flooding was reaching as high as 2m OD at Fourth Drove, Fengate, most of the landscape further east would have been seriously inundated. At present, we do not know whether the flooding that took place at Fengate at the outset of the 1st millennium happened rapidly, or slowly, but there is little doubt that the relatively slight accumulations at Fourth Drove (Pryor 1980a, fig.86) are merely a peripheral, landward, exposure of a far larger phenomenon.

We know that Fen deposits were forming by the early 7th century bc, between the 'island' of Northey and the Fen-edge at Fengate. This wetland was the location of a substantial Late Bronze Age timber platform which probably served a defensive purpose (Pryor 1983d). The construction (and use?) of this site takes place in one of the few periods for which there is little archaeological evidence at Fengate; it was a time when the ditched enclosures had been abandoned and the large settlements of the full Iron Age had yet to be established.

The early years of the 1st millennium have left little archaeological trace: non-renewable flint tools were abandoned, to be replaced by recyclable metal tools. Pottery was still relatively lightly fired, shell-gritted, and had poor survival characteristics, as David Crowther has shown above (Chapter 2, part I). Archaeologically this Late Bronze/Early Iron Age settlement pattern is well-nigh 'invisible', as there is not even a thin 'background' scatter of flints to indicate the overall area of settlement and land-use. Artefacts are usually from isolated or loosely grouped pits, devoid of structural evidence (e.g. May in Simpson 1981, site J; Pryor 1974a, 15-22). Frequently, particularly in the lower Nene valley, the pits are large and well-like (Hawkes and Fell 1945; Pryor 1983a).

There is evidence that ditched enclosures or fields were being laid out in the Nene valley, generally on a small scale, by the Middle Iron Age (Pryor 1983a); in the Welland valley, where there is more undisturbed land available for study, large ditched field systems were in use in the later Iron Age (Simpson 1966; Pryor 1983a); in many cases (for example Maxey East Field), the later prehistoric system formed the basis for the Romano-British system. At Maxey there was also evidence for an appreciably earlier series of rectilinear, ditched enclosures, of Middle Iron Age date (Chapter 2, Phase 5.1). Land boundaries were also formed in this period by pit-alignments, which in certain cases can be seen to continue or accompany the alignment of a linear ditch (R.C.H.M. 1960, figs.6-8; Pryor 1983a, with refs.).

Land-use models are dicussed at length in the Fengate Fourth Report (Pryor 1983a, chapter 8), and by French (1983a, 256-60). Seasonally wet floodplain areas of the First Terrace were probably used for hay/grazing, during the drier months of summer, and their associated dispersed farmsteads were located on slightly drier First Terrace areas, as at Werrington (Mackreth and O'Neill 1980). Communities on drier 'islands' in the First Terrace, such as Maxey, probably placed less reliance on floodplain pastures (see the discussion of the Romano-British economy, Chapter 2, part IX). Other groups further up the valley were in a better position to exploit the freely-draining gravel soils of the Second Terrace and the limestone soils of the valley slopes. Unfortunately, we know little of land management on the uplands surrounding the valley, but the erosion discussed in part I above, surely indicates that land was being cleared and farmed. As a general rule, it is fair to say that livestock, particularly cattle, would be of increasing importance further east, towards the Fen; these sites, the Welland equivalents of Fengate, however, still await discovery beneath blanketing alluvium. However the recent recognition of a defended circular enclosure, rich in occupation debris of probable Middle Iron Age date in Borough Fen (Fig.2, no.6), indicates that open settlements were not the invariable rule in the lowest reaches of the Welland valley (Pryor 1983c, BoF 7).

The implements of the pebble-based flint industry have been studied from three sites in the region: Fengate (Pryor 1980a), Maxey (Chapter 2) and Barnack/Bainton (Chapter 4). It should be recalled that the industry was first recognised and defined from excavated assemblages at Newark Road, Fourth Drove, Storey's Bar Road and Cat's Water, Fengate (Pryor 1980a, 1983a). It cannot be written-off as merely the product of modern plough-damage alone, although surface material has undoubtedly suffered damage by this cause. All these assemblages show very similar histograms of flake breadth: length ratios; all show in addition a very high ratio of implements to by-products. The flakes are characterised by hinge fracture or side-strike and generally show a lack of technical control. It is suggested that this apparent lack of control merely reflects the fact that the production of flakes was accidental, as the industry existed to manufacture quite different implement types, far better suited to the source material which occurred in such abundance over the valley floor.

The production of irregular, 'bashed', implements makes economical use of source material, since by-products such as waste-flakes are less frequently produced. This accounts for the apparently high ratio of implements to by-products. Indeed many of the terms used above, in the detailed analyses of the various flints assemblages, are quite unsuitable, since they were intended for a core and blade-based Middle Neolithic industry (Clark in Clark *et al.* 1960). Terms such as 'irregular workshop waste' are used to describe bashed pebble tools — one of the main implement types produced. Many existing descriptive terms are inadequate, since they attribute just one function to implements that were quite clearly used for a number of tasks, although modern plough-damage makes close study of surface material difficult (Mallouf 1982). Some of the smaller examples of 'hollow scraper' retouch (e.g. Fig.185, Nos.10 and 11) may well be examples of Mallouf's 'simple (or complex) edge nick'.

The inventory of tool types seems to favour scraping, piercing or boring — the type of equipment that might be required for hide or leather-working. Cutting implements, such as plain, backed or serrated blades are notably absent. One is strongly tempted to suggest that the rarity of arrowheads, axes and cutting flint implements results from the widespread introduction of bronze weapons and edge-tools. Far from being lacking in control, the final stages of flintworking in the area reflect a specialised need which is satisfied with a minimum of effort, using readily available local materials.

This discussion of flint types shows that it is important to study the physical attributes (dimensions etc.) of the material in close association (a) with its spatial distribution and (b) with contextual distortion in mind; efforts must also be made to locate and study remnants of Neolithic or Bronze Age flint industries residual in later (Iron Age - Saxon) contexts, so that the rate of post-depositional change can be monitored over an extended period of time. Experimental archaeology can assess short term effects. Another distortion which will also vary significantly from one area to another is the extent to which these later flint industries made use of earlier material either as casual finds, or more probably, as part of a systematic scheme of procurement. Much of the material from the Welland valley shows clear signs of re-use in more than one period; in certain cases this re-use may in fact be plough-damage, but the smashed denticulate fragments of polished flint axe from the Maxey secondary mound deposits of Phase 3 are unlikely to have been modified in this fashion. The possibility that earlier sites were 'mined' for large pieces of flint raises significant problems of distortion which would, presumably, affect the overall implement/by-product ratio, not to mention the inventory of tool types. Earlier sites could be spotted by later communities, for example, by noting differences of vegetation which would indicate the presence of phosphate-rich soils just below the topsoil (e.g. Bakkevig 1980); other effects of disturbance on the subsequent vegetational succession may be prolonged (Dimbleby 1978, 137-155, with refs.).

Romano-British

(with D.A.Gurney)

Introduction

Any discussion of the Roman period in the Welland/Nene region must be provisional, as much important work is still under way, particularly in the Greater Peterborough area. We will therefore confine our attention to the Maxey settlement, having first placed the site in its regional setting.

Romano-British settlement in the lower Welland and Nene valleys (Fig.204)

The map reproduced here (Fig.204) is not intended to be comprehensive in coverage, but it does include hitherto unpublished information (kindly provided by David Hall) on Romano-British sites of the Fen-edge. The earliest elements in the Roman landscape were the Roman road of Ermine Street, which crosses the River Nene at Water Newton and is traditionally thought to be the line of penetration northwards by *Legio IX Hispana.* Military sites probably associated with this include a vexillation fortress at Longthorpe, occupied from *c.*AD 43 to *c.*AD 61/2 (Frere and St. Joseph 1974) and an auxiliary fort at Water Newton of late Claudian date. The vicus of the latter eventually developed into the town of *Durobrivae.* A third site where evidence for military activity has been found is Lynch Farm, Orton Waterville (immediately west of Peterborough by the Nene floodplain); aerial photographs and small-scale excavation suggest a marching camp or similar temporary work, of 1st century date (Wild 1974, 145).

King Street branches off Ermine Street some 4.5km west of the Longthorpe fortress, and heads north to Bourne and Lincoln, ultimately rejoining Ermine Street at Ancaster. This road crosses the Welland just over 1km west of Maxey, and was probably laid out soon after Ermine Street (Wild 1974, 142). King Street appears to have been a focus for Roman settlement in the Welland valley, and many small early Roman farmsteads, with droveways leading to King Street, are known (Simpson 1966). Two sites (Simpson 1966, sites 37 and 49) at Tallington, appear to have been occupied from *c.*AD 50/60 to *c.*AD 80/90, and are clearly settlements laid out to take advantage of the improved communications, although the nature of these sites also suggests a strong degree of continuity with pre-Roman settlements in the area. During the 1st century AD there is little evidence for any change in either the economy, or the general prosperity of these communities, as a result of the military presence in the Nene valley to the south.

The early Roman settlements around Maxey also appear to be part of this system of settlements focussed on King Street, and site 44 (Simpson 1966, 21), covering an area of *c.*20 acres around Maxey church, and only half a kilometer north-west of the recent excavations (East Field), is linked to a series of droveways and pit alignments which also appear to be of 1st century AD date.

The earliest phases of Roman settlement on the gravel knoll or 'island' at Maxey (Phases 7 and 8) may be seen as a series of farmsteads where apparently rapid expansion from the later Iron Age phases (5.2 and 6), might be a partial response to the improved communications brought about by the military presence nearby. However, if this is indeed the case, there is little evidence for sharply improved prosperity, or for the adoption of a 'Romanised' economy (Halstead, Chapter 2, part VII).

The question of the status of the site within Roman Britain as a whole finds interesting expression in the coins. This unusual small collection was discussed by Richard Reece (Chapter 2, part III) who concluded that they represent 'the sporadic loss of irrelevant objects'. That the Maxey farmstead did not house a coin-using community, is entirely consistent with the other evidence for the site's 'native' status.

During the second half of the 1st century, the Romano-British settlement at Maxey (Phase 7) comprised at least three structures (Fig.166), and a ditch system which probably had its origins in the later Iron Age. This settlement is on the south edge of the excavated area, and it may originally have extended further south, as part, perhaps, of a longer-lived, larger settlement. The associated ditches may be related to a rectangular ditched enclosure observed by Simpson (1981, Site L, 35 and fig.2), but not excavated. Two parallel north to south ditches (Site D) observed in the same excavations may be contemporary, and these may join up with the Phase 6/7 ditches of the West Field. A further, unpublished, excavation of a ditch to the north of Site D suggests that these ditches form part of a system of Late Iron Age or early Roman date (Simpson 1981, 35 and note 2). It is most probable that these ditches held the key to the relationship of Phases 6 and 7 of the recent excavations.

Returning to our broader theme, the development of the Roman town of *Durobrivae* from the Trajanic period onwards as an administrative and market centre, must have had a profound effect upon the local, rural economy. By the late 2nd century, the area of the town and its suburbs was in the region of 60ha, and defences were erected enclosing about 17ha. The prosperity of this urban centre was probably based on the prosperity of its hinterland (Wild 1974), which is occupied both by imposing villas and more modest farms. The nearest villa to Maxey is a winged corridor villa at Helpston, about 3.5km to the south. It appears to have been occupied from the early 2nd century to the 4th century (Challands 1975).

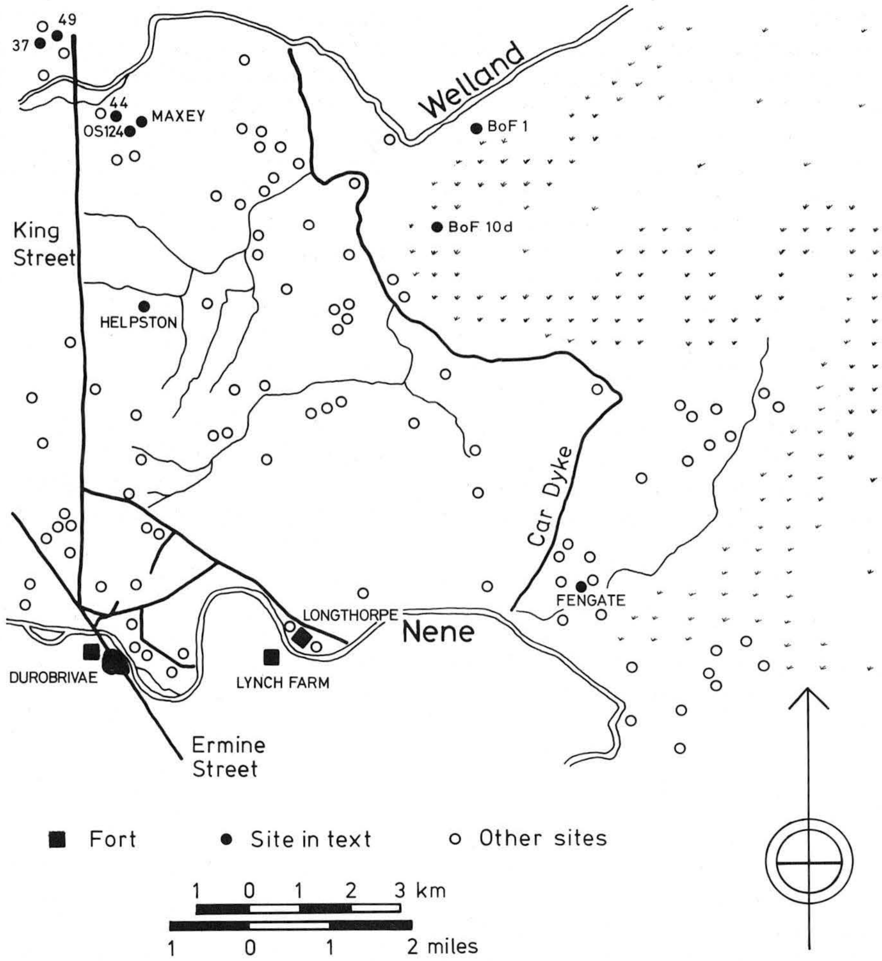


Fig.204 Simplified map showing archaeological sites of the Roman period in the Welland/Nene area. Based on *Durobrivae* 8 (1980) with additions. Nos.37, 44 and 49 refer to sites in W.G.Simpson (1966); OS 124 refers to W.G.Simpson (1981); sites in Borough Fen (BoF 1 and BoF 10d) courtesy of D.N.Hall. Scale 1:150,000.

The prosperity of the villas around *Durobrivae* itself was probably based on arable and pastoral farming. An additional source of income may have come from leasing rights to dig clay or cut fuel for the extensive pottery industry of the lower Nene valley (Hartley 1960; Howe *et al.* 1980).

One aspect of the later Iron Age and Romano-British economy in the area that has received recent attention is the prevalence of metalworking, both ferrous and non-ferrous, on relatively minor 'native' sites. One might, perhaps expect to find such activities further upstream in the region around Corby, where ironstone is plentiful (e.g. Wakerly; Jackson and Ambrose 1978), but the occurrence of tin and other metalworking at Cat's Water and other subsites at Fengate (Craddock in Pryor 1983a), and the presence of both ferrous and non-ferrous metal working in late Iron Age and early Roman features from two widely-separated contexts at Maxey (Craddock, Chapter 2; Cleere *et al.* Appendix VI), must suggest that small smithies were to be found on even the humblest of sites.

Further north, about 18km along Ermine Street, in the valley of the Gwash (a major tributary of the Welland), we find the Roman town of Great Casterton (Corder 1961). Like *Durobrivae*, Great Casterton probably had its origin in the *vicus* of a Claudio-Neronian military camp, in this case sited at the crossing of the Welland; like *Durobrivae* too, is a fortified town (defences were built in the early 3rd century); it is, however, far smaller, less successful, and without the prosperous sprawling suburbs that are so characteristic of *Durobrivae.* As both towns are approximately equidistant from Maxey, it seems probable that *Durobrivae*, would have been the market centre for barren ewes and other surplus produced on the farmstead.

The colonisation of the silt Fens during the reign of Hadrian must also have had a considerable effect upon patterns of rural settlement. The lure of new land and the possiblility of tax concessions may have attracted many river-valley or Fen-edge inhabitants to move away from their previous surroundings. The Car Dyke, which follows the 25ft contour some 3.5km east of Maxey, is now interpreted as an upland catchwater drain (A.Pryor 1978; Simmons 1979). This major engineering work must have had an important effect both upon local ground drainage and on the seasonal and absolute availability of land. Monuments of this sort are notoriously difficult to date, as they were frequently maintained open until medieval times, or later, but it was probably first cut in the early 2nd century (C.C.Taylor 1969, 40-43). There is some indication from recent survey in Borough Fen, due east of Maxey, that conditions there were slightly drier at this time (Fig. 204, settlements at BoF1 and BoF10d); even a slight improvement in drainage would have opened large areas of Fen-edge and margin to seasonal, if not permanent settlement.

The settlements at Maxey

During the late 1st and early 2nd centuries AD (Phase 8) the settlement at Maxey expanded in size and prosperity, and the focus of settlement shifted from the area of Phase 6/7 occupation towards the north-east (Fig.167). A small, integral, settlement comprising perhaps as many as six buildings was established, along with a series of enclosures and ditch systems, many of which incorporated earlier alignments. A small cemetery consisting of at least seven burials lay to the west of the main buildings. The area formerly occupied by buildings in Phase 7 became an area of rectangular enclosures which phosphate survey suggest (Gurney, Chapter 2, parts I and IV) were not used for the management or housing of livestock, while further west a possible rural temple or shrine was built (structure 12). A major entrance to the Phase 8 settlement appears to give onto the north-east, suggesting that further field systems may have been in use beyond the excavated area.

The Phase 8 settlement is clearly more extensive and prosperous than its later Iron Age and Conquest period antecedants: that notwithstanding, the pottery suggests a relatively low-status settlement (by the standards of the region), with few traded wares from outside the locality. The principal fabrics encountered are the grey wares of the lower Nene valley kilns, and large quantities of locally-made calcite- (fossil shell-) gritted fabrics. Some samian may have been in use, but the bulk is probably of Phase 9 date (Wild, Chapter 2, part III). Other finds include a coin (Challands, Chapter 2, part III) and seven brooches (Crummy, Chapter 2, part III).

The animal bone analysis is particularly interesting (Halstead, Chapter 2, part VII). It suggests that although pigs and horses were kept in small numbers, the mainstays of the Romano-British economy at Maxey were cattle and sheep, of which the latter formed by far the greater part. The mortality curves suggest that the sheep were largely kept for meat, and no doubt also for their important manure. There are indications that older, barren ewes were sent away from the site, most probably to higher-status market centres, such as *Durobrivae,* where they would have been sold for meat. The presence of some older cattle also suggests traction, most probably ploughing, and large numbers of loomweights indicate that wool was being spun and woven as a 'by-product', no doubt for local use. Similarly a cheese-press and colanders suggest that milk was being processed. The animal bone analysis does not suggest that local floodplain grazing was being exploited to any great extent; instead, the focus of interest lay on the higher lands of the gravel 'island'. This ties in well with the botanical evidence (Green, Chapter 2, part VIII) which suggests that the primary processing of crops (i.e. threshing and winnowing etc.) was probably taking place away from the settlement areas, perhaps on the slightly higher, less flood-prone land to the north, nearer the centre of the 'island'. The manured area immediately south-east of the main Phase 8 settlement might well have been used for garden plots, where peas, for example might have been grown. Although the botanical evidence is slight, there is evidence for apples and soft fruit, but these could have been gathered from the hedgerows and countryside around. On present evidence it would seem that the farmstead was placed between the lower-lying land which fringed the seasonally-flooded meadows of the floodplain, and the higher ground towards the modern village. This location would certainly be consistent with good farming practice.

During the 2nd century (i.e. Phase 8) the 'island' at Maxey must have been relatively dry and contemporary settlements have been found, as we have noted above, some 6.5km to the east, in what is now Borough Fen. These conditions would favour the style of mixed farming suggested here. During this period the farmstead at Maxey illustrates a type of land-use where the focus of attention was on the better drained soils of the higher terrace gravels (French 1983a). In this respect Maxey is clearly quite different from contemporary (Cat's Water) Fengate, where conditions were notably wetter; here cattle formed the mainstay of the economy and there are numerous indications for flooding and generally high water levels (French in Pryor 1983a). The recently discovered settlements in Borough Fen (Fig.204) are also probably of this type.

The thin scatter of Romano-British pottery over the south-east part of the East Field has been interpreted by Crowther (Chapter 2, part I) as the residue of manuring. The land to the north-west and west was generally free from this material, and does not seem to have been spread with manure containing domestic refuse. Crowther has also argued that there is evidence for middening within the settlement itself. No doubt the manured land alongside the settlement was used to grow vegetables, fodder etc.

The clear definition of the areas of manuring and non-manuring indicates either that the manuring in question was short-lived, or that patterns of land-use continued unchanged for some time. On the whole the latter seems more probable, simply because of the quantities and variety of pottery found; the homogeneity of the distribution also suggests more than a single episode of muck-spreading. Such continuity, or conservation of land managment practice has interesting implications: it might suggest, for example, that management of the farmstead was confined within one family, where procedures relating to the day-to-day running of the farm were handed down from one generation to another; such an interpretation does not conflict with the 'native', non-intensive style of animal husbandry, that the faunal bone analyses suggest (Halstead, Chapter 2, part VII).

The years of the late 3rd and early 4th centuries (Phase 9) see a resumption of settlement, following a break of perhaps a century, or rather less. This re-occupation of the site is probably part of a broader, rapid return to low-lying areas following several decades of freshwater flooding (Bromwich 1970). There is no evidence that the Maxey settlement was actually inundated (as happened at Fengate), but there can be little doubt that conditions in the region must have become very difficult. The new settlement again shows a shift to the north-east, toward higher ground. Many of the Phase 7 and 8 linear ditches were re-used, as they had not been filled-up with alluvium, and hedge-lines may well have survived largely intact (indeed there is a good possibility that the site could have been used for grazing throughout the period of apparent abandonment). No structures of this phase have been found, as the main focus seems to have shifted just outside the excavated area. Features of this phase in the East Field (Fig.167) do however contain large quantities of domestic and structural debris, including a fragment of a turned stone column (Fig.118), indicating, perhaps a more, prosperous 'Romanised' type of stone building; certainly the gilded plate brooch (Fig.111, No.6) does not refute this picture.

It is unfortunate that the main settlement of Phase 9 falls just outside the area available to us, but the move 'uphill' as time advances hints at the reason why late Roman and Saxon material is absent from the site.

Finally, it is perhaps appropriate for a non-Romanist (F.M.M.P.) to add some words of caution. The literature on the Roman period in the area tends to emphasise the region's prosperity and general richness, largely it would seem, on the basis of villa sites and pottery manufacture. This may indeed be true, but the overwhelming impression provided by numerous specialists' studies at Maxey is of a mere subsistence economy. Coin evidence, botanical remains and faunal bones suggest minimal contact with the rest of the region, let alone with the wider Roman world. Yet despite this the site is represented by a substantial archaeological presence: cropmarks are complex and numerous, pottery is abundant (if somewhat mundane) and there is even some evidence for a temple or shrine. The lesson to be learned from this is that first impressions may be misleading: terms such as 'prosperity' and 'richness' require to be substantiated by field evidence from a variety of independent sources. The fact that an area may be prosperous is of some interest, but the internal working of that region, with sites like Maxey somewhere near the bottom of the economic and social order, is of far greater interest. Despite many decades of research in the area it is salutory to reflect that we still lack suitable comparisons for what must be the most mundane and frequently encountered class of site. It is surely ironic that one can quote dozens of dated parallels for almost every class of artefact recovered, yet the site sits in an interpretational vacuum.

III. Field Survey in Lowland Regions: Potential and Implications

(with D.R.Crowther and M.Taylor)

Introduction

This section draws conclusions from the field surveys which have been a major feature of the recent project. They were of two types: site specific and transect. Site-specific surveys were carried out in two areas: Maxey (Chapter 2, part I) and Barnack/Bainton (Chapter 4, part I), both of which were later cleared, as part of a rescue excavation. In sampling terms, these surveys were haphazard (in that the threat determined the location) and judgemental (in that we selected which parts of a generally-threatened landscape to survey) (Cherry *et al.* 1978). We tried to overcome this bias by walking as large an area as possible at each site; indeed at Barnack/Bainton, thanks to the kindness of the farmer, Mr Aldwincle, we were able to work well outside the strip directly threatened with destruction.

The second type of survey, the transect survey, was intended mainly to investigate off-site artefact distributions and the extent to which surface material has been exposed or masked by post-depositional events (Pryor 1980b); it was not intended to find new 'sites' — although it might inadvertantly have succeeded in this. Both surveys were carried out by full-time members of the project under the general supervision of David Crowther (Maxey) and Maisie Taylor (Barnack/Bainton and transects). The techniques used are fully described in Chapters 1 and 2.

Mesolithic and earlier Neolithic

Flints of this period are not generally found in the diffuse 'background scatter' that characterises the Bronze Age, instead they are usually concentrated and localised (e.g. Hall and Wilson 1978; M.Taylor 1979). The earlier prehistoric periods tend to be obscured by alluvium, as low-lying sites were often selected for occupation (Louwe-Kooijmans 1976, 265-6); good examples of this are the major ditched sites at Etton and Etton Woodgate, the former of which was only discovered from the air in the exceptionally dry summer of 1976 (Pryor and Kinnes 1982), while the latter was discovered as part of a watching-brief of topsoil-stripping operations at the nearby gravel quarry. A Neolithic site on the skirt of a largely buried island at Crowtree Farm, immediately east of Newborough, in Borough Fen, was entirely buried beneath peaty alluvium in an area apparently devoid of archaeological sites (Crowther *et al.* forthcoming). Even barrows may be seriously affected by later deposits of alluvium; the Orton Meadows barrows, for example, were largely obscured (French 1983a, 168-184).

Later Neolithic and Bronze Age

This period is notable for the rarity of its settlement sites. In our area the settlement at Fengate (Late Neolithic: Storey's Bar Road; Bronze Age: Newark Road, Cat's Water and Fourth Drove) were all buried beneath thin accumulations of alluvium, and did not show up on the surface. There is evidence (discussed above) that settlement debris was removed from occupation areas, to be spread on the land with manure, thus giving rise to the thin 'background' spread of flints which is so characteristic of the period in our area. In places we find localised increased flint densities, but one example, when excavated (Barnack/Bainton, Chapter 4), did not reveal subsoil features beneath. Instead, subsoil features, rich in Late Neolithic and Beaker domestic debris, were found concealed beneath a low plough headland in an area where the topsoil was nearly devoid of flints. The pottery of this period in our area is poor and tends to break-down rapidly in the topsoil; the main surface indications are therefore provided by flints. Flint tool production, however, probably ceased after the Late Bronze Age (Pryor forthcoming), and surface survey is therefore bound to be heavily biassed towards the earlier part of the period. On the positive side, the widespread 'background' flint scatter is a useful guide to the extent, and edges of, alluvial spreads.

Iron Age

By this period flint tools were no longer made, but much of the pottery is still soft, and relatively poorly-fired; it is often tempered with crushed fossil shell, which rapidly dissolves-out when placed in contact with topsoil (humic) acids. In some cases this acid attack gives rise to the familiar 'corky' finish, in others it leads to the collapse and disintegration of the pottery fabric. At Maxey the survey clearly showed that occurrences of Romano-British shell-gritted sherds in the topsoil did not match concentrations in excavated, subsoil, features. Further, the substantial Iron Age presence (Phases 4-6) at Maxey was only indicated by six identifiable sherds from the topsoil. In effect it was not indicated at all. Similarly, the large and long-lived Iron Age site at Cat's Water Fengate was only revealed by phosphate survey, thanks to the presence of alluvium in and under the topsoil (Craddock in Pryor 1983a; Craddock *et al.*, forthcoming).

Roman and later

We have already noted that surface recovery of Roman material tends to be biassed away from calcite- (shell-) gritted fabrics in favour of harder, less acid-susceptible wares, such as Nene valley grey or colour-coated wares. Samian, too, seems to survive well in the soil, and its bright colour is easily spotted on the surface, especially when rain-washed.

These distortions aside, the detailed field survey at Maxey (Crowther, Chapter 2, part I) demonstrated that much of the Roman material in the ploughsoil had always been there, either as midden heaps, or as surface refuse. The extent of recent plough damage was hard to estimate, but plough-marks could be seen cutting into the B/C horizon in places. Some of the surface material too, was quite fresh and unbraded. There can be little doubt, however, that the majority of Roman material did not derive from ploughed-out subsoil features; this indeed is particularly true for the diffuse scatter across the south- east portion of the East Field, which most probably derives from Romano-British manure-spreading. Detailed surface survey of this sort, when combined with other types of survey, such as phosphate and magnetic susceptibility survey, together with geophysical prospecting techniques, can provide much new information, some of which could never be provided from subsoil features alone. If the transect survey can be said to concentrate on 'off-site' distributions (Foley 1981), detailed site-specific surveys concentrate on 'off-feature' activities.

Saxon pottery is generally much harder than Iron Age, and is usually sand-gritted (and hence more durable in the soil). Later, medieval and post-medieval wares are notably better fired than the earlier material and tend to be brighter in colour, and sometimes glazed. The presence of this material tends to distract the eye from the more drab prehistoric pottery.

As a general rule, the later the period, the less the distortion caused by alluvium: Roman sites, such as those in Borough Fen, discussed above, may still become buried, but by Saxon and medieval times, the edges of the Fens and river floodplains were much as they are today. Consequently, substantial settlements of these later periods are unlikey to remain hidden beneath blanketing superficial deposits.

Conclusions

The period-by-period review does not paint a straightforward picture. Working forwards in time, all the pre-Roman periods are seriously distorted by the blanketing effects of alluvium and colluvium. Earlier Neolithic and Mesolithic sites, being of limited distribution and often located near water are likely to be most seriously affected, however. One effect of the alluviation is to divide once whole landscapes into sinuous, linear, strips of cropmark- bearing soils (Fig.3); in other cases, for example Maxey, we find a type of 'distributional inversion' where the centre of an ancient landscape becomes buried, and vanishes, leaving the periphery, with its cropmarks exposed. The periphery — in the present case the 'island' of Maxey — is then seen as the centre, whereas in fact the centre of the Neolithic lower Welland landscape might well have been further east in Borough Fen, where barrows are now protruding through the eroding superficial deposits (Fig.2). We have also noted that, alluviation, particularly around the fringes of regularly flooded areas may be partial in its effects, burying some sites, but not others.

By the 2nd millennium, large areas of the valley floor had been cleared and the extent of settlement and land-use is indicated by a thin 'background' scatter of flints. This scatter provides the principal archaeological evidence for the period and its extent and presence must be noted.

By the end of the 2nd millennium flintworking had largely ceased, but pottery was still soft, often shell-gritted, and very friable. This no doubt accounts for the negligible surface evidence we have for it. Iron Age pottery is often harder, and was sometimes made in large quantities; nevertheless its absence does not indicate that settlement, too, was absent (surface evidence for Phases 4-6 at Maxey was negligible). The earlier, 'native' Romano-British settlement pattern may well be influenced by these factors, as shell-tempered pottery was still used in quantities, but by later Roman times, harder, Nene valley products had good topsoil survival characteristics. In general, with the possible exception of some Pagan Saxon wares, post-Roman pottery survives well and may provide a realistic picture of past settlement and/or rubbish disposal patterns.

Detailed field survey, when used as an adjunct to excavation, can provide important information that excavation alone can never provide. It is a technique, however, which is capable of producing misleading results if its findings are not taken in conjunction with excavation. In short, the two approaches, when combined together, offer more than the sum of their parts.

However informative it may be, especially when coupled with the results of excavation, the main weakness of a detailed, site-specific survey is its very specificity: it lacks context, but can only be accommodated within a regional scheme if the regional survey is carried out to comparable standards of recovery. This clearly presents major practical problems, unless some kind of sampling procedure is adopted. In the present case, a random, aligned sample — in the form of a transect survey — was taken. Our experience with this sampling strategy (see Chapter 1, part IV) has shown that it has more than research significance alone, as it has provided a valuable means, at Barnack/Bainton and Maxey, of placing detailed site-specific rescue surveys within wider, local and regional contexts. Viewed thus, surveys of this sort can be seen as 'Off-Sites and Monuments Records' (Foley 1981), and should perhaps be organised as such. Certainly Barnack/Bainton clearly demonstrated the wealth of information that can be acquired from a threatened 'off-site' landscape.

The principal lesson to arise from this discussion of field survey, is that post-depositional biasses are minimal in the latest periods and become progressively worse, as one moves back in time. Expressed in graphical terms, the curve of distortion is not smooth. With the exception of the Late Iron Age, all prehistoric periods are grossly affected by blanketing alluvium and colluvium. The

Early Iron Age and Late Bronze Age are almost 'invisible'. Second millennium settlement and land-use may only be appreciated in general terms: proven settlement sites of this period, for example, are extremely rare, and other 'sites' include often nebulous flint scatters, that still urgently require explanation. Finally, earlier earlier Neolithic and Mesolithic settlements are more reliably indicated by surface flint scatters, but their general distribution over the landscape may be drastically distorted by alluvium.

It is hard to avoid the conclusion that the more we study post-depositional effects, the more we learn that is new and unexpected. The complexity of the situation was particularly clearly shown by the transect survey: with nearly a quarter of the land written-off for survey it is hard to see how study of archaeological formation processes, even in so rural an area, will ever become 'practical and routine' (Schiffer 1983, 675). We must make efforts, however, to investigate the 'voids' on our current, hoplessly biassed, distribution maps. Ways of doing this are suggested in the conclusion of Chapter 1, but it should be noted that survey of areas that do not produce flint naturally, must be intensive and detailed. Rapid, extensive survey will only reinforce the current (probably misleading) impression that these areas were always avoided by ancient communities.

The conclusion that must be drawn is that the mapping of comprehensive pre-Roman settlement patterns in low-lying areas is impossible, using surface survey and/or aerial photography. Voids on such distribution plans are generally archaeologically meaningless, and tend to draw attention to areas where surface material is prolific; these are usually regions where plough-damage is most severe (for example the sandy soils of the south-eastern Fens (Fox 1923, map 1). On the evidence of surface survey alone, Fengate and Maxey would both be minor Romano-British farmsteads, the latter accompanied by a thin 'background' scatter of flint. The Fengate surface evidence is particularly interesting (C.C.Taylor 1969, fig 6) as it shows two concentrations of Roman pottery (mainly Nene Valley Grey Ware), one directly over the Cat's Water settlement (no.8), the other (no.9) over a ditched yard which we now know to be of 2nd millennium bc date; no doubt this pottery derived from smaller features which are not visible on the aerial photographs. In the case of both sites, the pre-Roman finds all come from gravel pits or controlled excavation.

Appendix I. Soil and Mollusc Samplings and Analytical Procedures

by Charles French

Sampling

Sampling in the field

A combination of sampling techniques was used according to each site's circumstances: lateral transects, sample columns and spot samples.

For the ploughsoil studies at Maxey, purposively placed transects were used, orientated at right angles to the ridge-and-furrow, with samples taken systematically at 50cm lateral intervals from both the A and B horizons. The sample transects had to be placed across the ridge-and-furrow to assess the amount of lateral soil movement due to ploughing. They also had to be placed across known cropmarks and archaeological features to test whether textural or other differences related to the cropmarks and/or underlying features could be detected in the ploughsoil and B horizon.

Most upstanding archaeological features, and in particular barrow mounds, were sampled along their major axes in lateral transects at 50cm intervals, as well as vertically according to their stratigraphy. The internal mounds within the henge and the oval barrow mound at Maxey were treated in this manner. Internal constructions may possibly be identified by this technique.

All linear features, principally field or drainage ditches, were sampled either in continuous sample columns at *c.*10cm or 20cm intervals and/or by spot samples placed according to the stratigraphy. Samples were always taken at several different loci along the linear features in order to investigate any variation. Only by examining lengths of features may hints of associated former banks in the form of bank slippage or deliberate back-filling be assessed.

Consequently, there has been a large degree of personal judgement with respect to the sampling strategy. The use of wet- and dry-sieving apparatus also meant that there was a constant check on the deposits in each feature. It is thus considered that little evidence has been missed or lost, especially with respect to molluscan recovery.

The taking of field records involved the use of the Welland Valley Project layer sheet (Fig.17). This basic record was augmented where necessary, by notes and photographs.

Augering

Where it was found desirable to investigate sites which were not conveniently cut by drainage dykes and where excavation was out of the question, a full programme of augering was instigated. A soil sampling auger with a combination of Jaratt and spiral flight auger heads and a custom-built soil sampler, comprised of a metre length of 1½in steel tubing cut longitudinally in half, based on the Dutch gouge sampler, were used. The augering programme was supplemented with soil test pits where possible.

At Barnack/Pilsgate, boreholes were made at *c.*25m intervals in two transects downslope over distances of *c.*400m and *c.*500m (Fig.198). In the North Level survey area, augering transects were made across two sites, BoF 3 and 7, at 2m, 5m, and 10m intervals.

Methods of soil/sediment analysis

General procedures

Descriptions in the field were based on the criteria for soil description used by Smith and Atkinson (1975); the relevant categories are summarised in Figure 55.

Sample pretreatment involved the air-drying of each sample for about one week. Then each sample was quartered, ground with a rubber pestle and mortar, and shaken through a 2mm mesh sieve to remove the gravel fraction. The gravel fraction was weighed and its percentage by weight of the total sample calculated. The sub-gravel fraction (less than 2mm) was further sampled for each of the sediment analysis procedures described below except for the thin sections.

Soil reaction (ph)

Measurements were taken using a pH meter (after Avery and Bascomb 1974; Bunting and Campbell 1976). A buffer solution of pH 7 was first prepared to standardise the meter. Dilutions of 10g of less than 2mm air-dried soil were used with 100ml of distilled water. A random number of dilutions was prepared with 0.5 N KCI (potassium chloride), which standardises the 'salt effect' and generally gives readings of one unit less than measurements in distilled water.

Particle size analysis

The hydrometer method of particle size analysis was used (after Shackley 1975; P.Taylor, pers. comm.). 40g samples were pretreated by boiling with hydrogen peroxide (H_2O_2), allowed to cool, dispersed with 'Calgon' (sodium hexametaphosphate), mixed, and then the suspension poured through a 0.062mm mesh sieve into a 1000ml graduated cylinder. The sand fraction so removed was oven-dried and then fractionated by dry-sieving. Six hydrometer readings of the settling suspension were taken from which the percentage in suspension was calculated as well as the particle diameter and phi (ϕ) value (Page 1955, 285-292).

The results of the particle size analysis and dry-sieving were combined to construct cumulative percentage and frequency graphs, and histograms representing the composition of each sample. The character of the soil or sediment is named by the use of the triangular textural diagramme (in Limbrey 1975, 261). The size grades of the United States Department of Agriculture (U.S.D.A. 1951) were used.

Statistical measures based on the particle size analysis were calculated for the mean (Mz), standard deviation (σ), skewness (Sk), and kurtosis (K_G). The formulae of Folk and Ward (1957) were used to calculate these measures separately for the sand and silt fractions because the phi (ϕ) values at 5% and 16% were generally unavailable due to the presence of unanalysed fines. The mean size reflects the average size of the sediment or grain size fraction, or the central tendency of the distribution curve. The inclusive graphic standard deviation is a measure of the spread of values around the mean, or the degree of sorting. The inclusive graphic skewness is a measure of the symmetry of the distribution curve and the mean, that is, whether the greater part of the material is coarser (Sk = 0 to -1) or finer (Sk = 0 to 1) than the mean. The kurtosis is a measure of the 'peakedness' of the distribution curve. A normal curve has $K_G = 1$. A flat, or platykurtic, distribution will be a bimodal distribution with two more or less equal and widely separated peaks. A peaked, or leptokurtic, distribution will contain one dominant size fraction with coarser or finer 'tails'. An even, or mesokurtic, distribution lies between the previous two types of curve (Folk and Ward 1957, 3-26; Spiegel 1961, 91).

The results are presented in tabular and/or histogram form. By these exercises one may discern the similarity between sediments, and possibly how deposits were formed and under what environmental conditions. Calculations were made on an Apple II micro-computer.

Alkali-soluble organic matter content

Soil organic matter is comprised of the whole non-mineral fraction of the soil. The alkali-soluble fraction of the organic matter in a soil is taken as being representative of the total organic matter present (Hesse 1971). The presence of humus in a soil may be detected by the production of a brown precipitate after boiling with sodium hydroxide (2N NaOH). A quantative estimate of the humus content was made using a colorimeter (Shackley 1975).

Heavy mineral analysis

Heavy minerals tend to be concentrated in the finer sand grades. The sand fraction from the particle size analysis was used. It was pretreated by gently boiling in a weak solution of 'Calgon' to remove the iron-staining from the grains. The sand fraction was then washed in distilled water and oven-dried, and the 250μm and 125μm fractions separated out by dry- sieving. A small amount of each fraction was then placed in bromoform ($CHBr_3$) in a fume cupboard. This effects a gravity separation of quartz and felspar from the heavier minerals which are collected on filter paper. The mineral grains were next dried and non-permanent mounts were made on a microscope slide in clove oil (Krumbein and Pettijohn 1938). Identification of the mineral grains is made using a polarizing microscope. Some idea of the nature of the parent rocks or sediments and the degree of weathering may be determined. The reference collection of the Soil Survey of England and Wales was used to aid in the identification of the heavy minerals. Additional counts were made by R.Bateman of the Soils and Plant Nutrition Department, Rothamsted.

The preparation of thin sections (Micromorphology)

The method of impregnation used in the laboratory employed a polyester resin with acetone (Bullock *et al.* 1981).

Air- or oven-dried blocks of soil are impregnated with crystic resin in a fume cupboard for four to six weeks. Slices are sawn from each block and are ground down on diamond plates or using silicon carbide powder, and are then polished using aluminium oxide powder.After cleaning with deodorised paraffin the slice is mounted face downwards on a microscope slide with a resin mixture. It is then cut to a thickness of 100-200μm, and is ground to a thickness of 40μm or less on a surface grinding machine. The final grinding and polishing to the 25-30μm thickness is done by hand using silicon carbide powder.

The thin section is then examined at various magnifications with various degrees of illumination. Thin sections are useful in the study of soil microstructure and in elucidating pedologic processes. Aggregates, concretions and weathered grains are best studied in thin section. Sand and silt grains can be identified mineralogically. Clay translocation and weathering processes may be studied, and clay illuviation may be identified (Bullock in Avery and Bascomb 1974, 70-81). Consequently, the study of soil micromorphology examines the possibilities generated by the previous soil analyses critically, and may elucidate some of the problems.

In this study, the micromorphological analysis was used mainly as a descriptive aid and to identify pedogenic processes (Dalrymple 1958). Point counts of *c.*150 were made of all slides as a general back-up to each description, although it is realised that this is only a 10% sample of the usually required number of point counts (*c.*1500).

Dr R.Macphail of the Ancient Monuments Laboratory checked all the micromorphological descriptions and P.Bullock of the Soil Survey gave second opinions. The facilities of the Human Environment Laboratory, Institute of Archaeology, London were used for the final preparation and examination of the thin section slides.

Methods of molluscan analysis

The principles and methods of molluscan analysis given by Evans (1972, 3-86) have been followed. Sample intervals of 10cm or 20cm were used, either as spot samples from individual layers or as continuous sample columns.

Interpretation is based on the work of Bishop and Hewitt (1976), Boycott (1934; 1936), Ellis (1941; 1951; 1969), Evans (1972), Paul (1978a and b), Sparks (1964) and Sparks and West (1959, 1970). The species are listed in their conventional ecological groups in Table 55 (after Evans 1972; Kerney 1976a and b; Kerney and Cameron 1979; Sparks and West 1970; Waldén 1976). New directions in the ecological interpretation of molluscan faunas are discussed elsewhere (Bell 1981; French 1983a).

Ecological Groups	*Species*
Freshwater: (1) Slum	*Lymnaea truncatula*
	Anisus leucostoma
(2) Catholic	*Lymnaea peregra*
	Pisidium milium
(3) Ditch	*Aplexa hypnorum*
(4) Moving-water	*Valvata piscinalis*
Marsh:	*Zonitoides nitidus*
	Carychium minimum
	Succinea putris
	Vertigo angustior
	Columella edentula
Land: Shade-loving	*Carychium tridentatum*
	Aegopinella pura
	Oxychilus cellarius
	Oxychilus alliarius
	Vitrea contracta
	Acanthinula aculeata
	Ena obscura
	Vertigo substriata
Punctum group	*Punctum pygmaeum*
	Euconulus fulvus
	Vitrina pellucida
	Nesovitrea hammonis
Catholic/Intermediate	*Trichia striolata*
	Trichia hispida
	Cochlicopa lubrica
	Cochlicopa lubricella
	Cepaea nemoralis
	Cepaea hortensis
	Deroceras
Land: Open-country	*Vertigo pygmaea*
	Vallonia costata
	Vallonia pulchella
	Vallonia excentrica
	Pupilla muscorum
Rupestral	*Clausilia bidentata*
	Helicigona lapicida
Burrowing	*Cecilioides acicula*

Table 55: The molluscan species (present in deposits at Maxey and Barnack/Bainton) arranged in their conventional ecological groups.

Aside from the conventional ecological methods of dealing with the numbers and species of molluscs represented, two numerical methods were also used to describe the faunas: rank-order or species-abundance curves and diversity indexes (Evans forthcoming; Pielou 1975; 1977).

In rank-order curves the numbers of each species (as a percentage of the total shells in each sample) are plotted in their order of abundance. Each curve illustrates the total number of species and the distribution among the various species. These curves may be considered alone, and with the depositional context and the ecological inferences made from the species assemblage. It is suggested that a regularly curved graph, often with a large number of species, is indicative of diverse and relatively mature habitats. L-shaped curves are indicative of less diverse and often younger environments, and there may be a mixture of *in situ* and derived species in this type of assemblage. Slightly stepped curves are intermediate between these two curves.

Diversity indexes involve the reduction of the information in the rank-order curve to a single figure. In particular, evenness (J^1)(3) measures the way in which the various individuals are apportioned among the various species. But as this figure does not take account of the number of species and shells in the assemblage, it is a measure applied to samples. Consequently, J^1 is compared with an equivalent index, J(4), which is applied to fully censused collections which considers the number of individuals. The difference between J and J^1 at any one level is a measure of the closeness of a sample to a fully censused collection.

A second set of diversity indexes, H^1(1)(the Shannon-Wiener index) and H(2)(the Brillouin index) incorporates the evenness with the number of species. The divergence of H from H^1 is an index of autochthony. When J and J^1 and H and H^1 are plotted against each other a useful measure of the degree autochthony or allochthony can be ascertained. The standard deviation (σ) of H^1 was also calculated.

1. $H^1 = -\Sigma(\text{pi} \log_e \text{pi})$ (Pielou 1975)

where p = proportion of the assemblage belonging to the i-th species

2. $H = \frac{1}{N}(\log_e \frac{N!}{\pi N_i!})$ (Pielou 1975)

where N = number of individuals in the assemblage
N! = number in the i-th species for i = 1, ...s
s = the number of species

3. $J^1 = \frac{H^1}{\log_e s}$ (Pielou 1977)

where s = the number of species in the assemblage.

4. $J = \frac{H}{\log_e s}$ (Pielou 1977)

where s = the number of species in the assemblage.

The Shannon-Weiner index originated as a measure of information content or uncertainty obtained from information theory (Krebs 1978). Other measures of diversity include species richness, heterogeneity, Fisher's α (Fisher *et al.* 1943, 42-58) and the log-normal distribution (Preston 1948, 254-283). For example, Kenward (1978, 25-38) has used rank-order plots and log-normal distributions with superimposed values of Fisher's α as a measure of species structure. This index is well suited to insect assemblages subject to many random variables. It is also suggested that the very abundant species (greater than 10%) may be used as evidence of breeding, and should be subtracted from the fauna before calculating other statistics. In several of my samples, only a few freshwater species occurred but in great abundance. Consequently I should probably have treated them in a similar manner, or calculated the diversity indexes separately for the freshwater and non-freshwater species of molluscs. Kenward (1982, 71-78) has also used close linkages in species-pair analysis of Coleoptera to suggest that this may be a result of the occurrence of insects in the same habitat.

Species diversity in living communities is governed by a complex interaction of factors which are not completely understood (Gould 1981, 295-317; Krebs 1978). These include the time available for speciation and dispersal; habitat size, range, number and structure; the stability of primary production; the intensity and frequency of disturbance of an environment; and competition and predation, which may be complementary factors. Thus these factors make the assignment of a number as an indication of species diversity a potentially difficult exercise.

Appendix II. List of Munsell Colours used in the Text

Hue,	Value and Chroma	Colour name
10YR	2/1	black
	2/2	very dark brown
	3/1	very dark grey
	3/2	very dark greyish brown
	3/3	dark brown
	3/4, 3/6, 4/4, 4/6	dark yellowish brown
	4/1	dark grey
	4/2	dark greyish brown
	4/3	brown-dark brown
	5/1	grey
	5/2	greyish brown
	5/3	brown
	5/4, 5/6, 5/8	yellowish brown
	6/1	grey-light grey
	6/2	light brownish grey
	6/3	pale brown
	6/4	light yellowish brown
	6/6, 6/8	brownish yellow
	7/1, 7/2	light grey
	7/3, 7/2	very pale brown
	7/6, 7/8	yellow
5YR	2.5/1	black
	3/1	very dark grey
	2.5/2, 3/2, 3/3, 3/4	dark reddish brown
	4/1	dark grey
	4/2	dark reddish grey
	4/3, 4/4, 5/3, 5/4	reddish brown
	4/6, 4/8, 5/6, 5/8	yellowish red
	5/1	grey
	5/2	reddish grey
	6/2	pinkish grey
	6/3, 6/4	light reddish brown
	7/3	pink
7.5YR	N5/	grey
	4/2, 4/4	dark brown-brown
	5/2, 5/4	brown
	5/6, 5/8	strong brown
	N6/	grey-light grey
	6/2	pinkish grey
	6/4	light brown
	6/6, 6/8	reddish yellow
2.5YR	4/2, 5/2	weak red
	4/4	reddish brown
	4/6, 4/8	red

Appendix III. Synopsis of Methods used in the Soil Phosphate and Magnetic Susceptibility Surveys

by Paul Craddock

Phosphate survey

This brief account is based on the method given by M.Hughes in Sieveking *et al.* (1973), revised in the light of eight years additional research and experience on other sites.

It must be stressed from the beginning that the method is designed to be quick, inexpensive and portable, suitable for locating areas of high phosphate on archaeological sites, rather than providing a full phosphate survey such as a soil chemist might require.

Sampling

Three tools are currently used:-

1. Trowel for sampling representative freshly exposed soils (ploughsoil and feature fills)

2. Hand auger for sampling buried soils up to a depth of 70cm

3. Hand coring device to sample deeply buried soils, sampling at 20cm intervals.

Approximately 10g are collected, omitting pebbles, roots and obvious contamination, in self-seal panelled polythene bags. The sampling interval usually varies between 1 and 10m. The practical limitations caused by the size of the area to be covered, as well as the specific problems to be answered, have to be carefully weighed. On a hectare site a 5m interval represents 400 sample points, a 1m grid 10,000. One would have to be very sure of the likely value of the additional information to justify the extra work. The soil samples are then air-dried for a few days, and sieved through a 1.4mm mesh. one gram of each sample is weighed out on a sturdy single pan sliding mass balance and put into 15ml capacity polypropylene 'snap' tubes (obtainable from Anachem). These link together into convenient chains which can be moved about with little fear of upsetting, breakage or of samples getting out of sequence. 5ml of 2N hydrochloric acid is then added to the samples prior to heating in a water bath. Boiling helps to agitate the sample, and releases almost all of the phosphate present. In the field, the coiled tubes fit into an ordinary 10inch saucepan heated on a camping stove. 0.2ml of each of the resulting solutions is pipetted and mixed with 10ml of the diluted molybdenum blue colour reagent (Murphy and Riley 1962). The reagent is unstable, and must be made up from stock solutions. These include 6N sulphuric acid, ammonium molybdate 40 per litre, potassium antimonyl tartrate 2.743 per litre, and solid ascorbic acid.

NB. Concentrated hydrochloric and sulphuric acid are too dangerous to have on site in quantity, and they should be previously diluted in a laboratory by trained personnel. Always dilute concentrated sulphuric acid slowly adding acid to water; it is extremely dangerous to add water to acid. Addionally, all antimony salts are poisonous. The diluted acids and stock solutions must be stored in labelled bottles kept in the appropriate plastic safety containers.

The diluted reagent is made up to 65ml sulphuric acid, 37.5ml ammonium molybdate, 12.5ml antimony solution, and 1.32g ascorbic acid, diluted to 1500ml. This solution should be used immediately. In the presence of phosphate, an intense blue complex is formed after a few minutes. It is also unstable, and should be measured quickly after it has developed.

This method, with its somewhat rough-and-ready sample collection and preparation is only semi-quantitative, but does allow several hundred samples a day to be processed to give an on-site 'same day' results service. The apparatus can fit into a suitcase, and is relatively inexpensive. The colorimeter can run off a battery. The major logistic problem is the large quantity of deionised water necessary.

The individual numerical results are not normally published. Usually the results are only semi-quantitative and the results of a big survey would be an undigestible sea of figures. A simple wide interval contour or shaded dot plan has been used for showing variation in plan for single level surveys (normally at the surface or at the undisturbed archaeological level).

Magnetic susceptibility survey

The sampling and analysis was carried out by David Gurney under the guidance of Dr A.J.Clark. Approximately 300g of soil is collected from each sample point; this is then air-dried and sieved through a 5.6mm mesh. A polythene bottle is filled with the sample (approximately 200g) and this measured within one of the coils of a Littlemore Type 780 differential inductance bridge. Several hundred samples can be analysed in a day.

Appendix IV. The Survival of Features below the 'Ballast Level' at Maxey Quarry

(Fig.205; Tables 56 and 57)
by David Crowther

A quarry company will normally remove overburden in one operation to expose gravel for extraction, dumping topsoil and subsoil separately if the concession area is to be reinstated. The exposed 'ballast' level contains clean gravel, so as not to clog the washing equipment. Rather than strip the concession to ballast at once, the gravel company originally agreed to remove only the A/B horizons, to the precise level at which earthfast features were defining. After archaeological excavation of the site, the remaining matrix (lower B and B/C horizons) was removed by the company in a second earthmoving operation. A series of levels taken across the ballast indicated that this latter operation had lowered the site surface by an estimated average of 530mm.

This usually is the level at which watching briefs or salvage excavations have to be conducted. At Maxey, features shallower than 530mm would have been completely removed, and it is probable that only those deeper than 630mm would have been recognised. Shallow, discontinuous remnants would be masked by loose gravel, or removed anyway by 'rafting' against the blade of the box-scraper.

Table 56 presents a list of excavated feature profiles deeper than 630mm. It includes values for the depth and width of each profile at the excavated level, and at the ballast level, 530mm below it. After the second stripping only F.161 and F.607 were clearly visible; if the area had been shovel-cleaned twenty-four of 400 or 6% excavated features would have survived for recognition (Table 57).

Feature	*Excavated Level*		*Ballast Level*	
	Width (mm)	*Depth (mm)*	*Width (mm)*	*Depth (mm)*
F.51: 1	150	99	92	46
F.108: 4	150	81	92	28
F.109: 5	107	66	17	13
F.125: 1	270	88	186	35
F.161: 1	320	67	120	14
4	320	65	120	12
9	300	75	90	12
10	290	71	180	18
14	330	70	45	17
19	350	80	250	27
F.166: 1	430	133	407	78
F.199: 3	260	68	100	15
5	230	70	74	17
7	291	70	142	17
8	310	77	167	24
9	210	75	69	22
F.219: 2	80	65	27	12
F.221: 1	122	79	71	26
F.250: 2	330	90	256	47
F.254: 1	300	105	210	52
F.341: 1	230	74	183	21
F.342: 1	260	70	85	17
F.473: 5	260	82	121	29
F.506: 1	400	68	60	15
5	272	92	173	39
19	270	85	155	32
21	228	82	140	29
23	278	72	100	19
25	132	68	26	15
F.511:10	192	69	24	16
F.521: 2	310	75	99	22
F.523:20	280	74	189	21
F.535: 1	300	68	48	15
F.542:10	125	69	64	16
F.554: 1	120	70	100	63
F.556: 1	200	75	169	50
F.559: 1	290	120	79	67
F.607: 1	525	103	375	50

Table 56: Features surviving at the ballast level at Maxey.

Feature Class	*Archaeological Level*	*Ballast Level*	*Survival Fraction (%)*
Pits and Wells	82	10	12
Ditches	108	12	11
Ring gullies	18	1	6
Gullies	56	1	2
Post-holes and Others	136	0	0

Table 57: The survival fraction for each class of feature at Maxey.

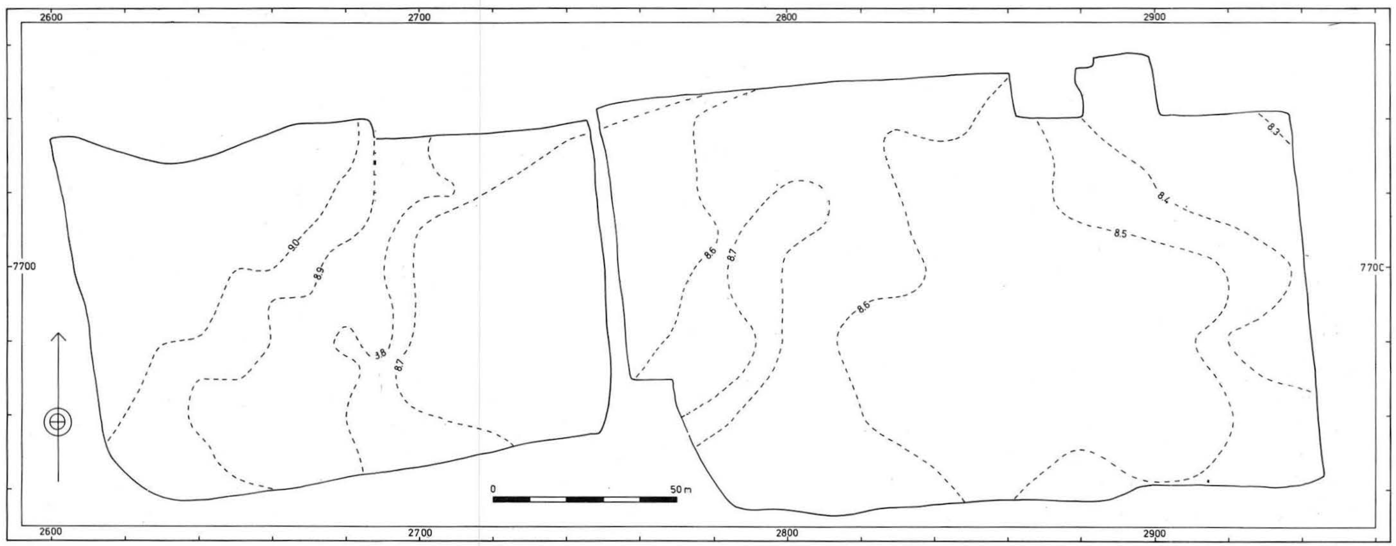


Fig.205 Maxey East and West Fields: surface contours of machine-stripped 'ballast level' (see Appendix IV). Scale 1:1500.

Appendix V. Maxey Excavations, 1979-81: List of Dated Features

Note In the case of linear features, Grid references are to areas where the feature is clearly visible. Feature numbers 1-49 (inclusive) were allotted to furrows of the ridge-and-furrow system and are not included here.

Feature No.	*Phase*	*Grid ref.*	*Description*
50	7	2835/7655	ring-gully
51	7	2832/7660	pit
60	1	2835/7664	cursus ditch
61	7	2838/7752	pit
101	7	2815/7679	ring-gully
102	8	2815/7682	gully
107	7	2818/7664	ditch
108	7,8	2794/7668	ditch
109	8	2818/7675	ditch
118	8	2810/7676	gully
119	8	2818/7665	ditch
121	7,8	2809/7663	ditch
122	8	2811/7675	pit
125	8	2811/7671	pit
126	8	2819/7668	pit
127	8	2773/7680	ditch
128	8	2806/7662	ditch
130	8	2804/7677	gully
131	8	2818/7672	pit
132	7	2818/7682	ring-gully
133	8	2811/7658	gully
134	8	2808/7675	gully
135	8	2803/7680	gully
136	8	2813/7667	ditch
137	8	2812/7767	gully
150	8	2855/7709	grave
151	8	2856/7713	grave
152	8	2855/7713	grave
153	8	2844/7706	ditch
154	9	2847/7714	ditch
155	9	2854/7722	gully
156	8	2863/7718	ditch
157	8	2854/7725	grave
158	8	2862/7706	ditch
159	8	2856/7713	post-hole
160	8	2856/7703	ditch
161	7-9	2850/7672	ditch
162	9	2897/7725	gully
163	9	2848/7707	gully
164	8	2842/7705	cremation
165	8	2843/7709	pit
166	12	2852/7729	pit
167	8	2855/7703	ditch
168	8	2857/7703	ditch
169	8	2843/7721	pit
170	8	2860/7720	ring-gully
171	8	2853/7722	pit
172	8	2842/7723	pit
173	8	2861/7713	ditch
175	8	2859/7719	pit
176	8	2843/7725	grave
177	9	2848/7705	gully
178	8	2829/7743	pit
179	9	2847/7719	gully
182	8	2856/7732	ring-gully
183	8	2854/7733	post-hole
184	8	2854/7733	pit
185	8	2856/7736	post-hole
186	8	2854/7739	post-hole
187	8	2852/7737	post-hole
188	8	2858/7737	post-hole
190	8	2862/7711	pit
191	8	2861/7736	pit
192	8	2857/7710	grave
194	8	2851/7732	post-hole
195	8	2865/7780	pit
196	8	2858/7737	post-hole
197	8	2861/7717	charcoal spread
198	8	2875/7703	ring-gully
199	7-9	2894/7738	ditch
200	8	2857/7714	pit
203	8	2878/7718	gully
204	7	2825/7734	gully
205	7	2928/7728	ditch
206	7	2925/7722	ditch
207	7	2926/7729	post-hole
208	7	2927/7726	ditch
209	7	2927/7723	ditch
210	7	2926/7729	post-hole
211	8	2865/7726	post-hole
212	8	2865/7726	pit
213	8	2864/7735	pit
214	8	2864/7725	post-hole
215	8	2862/7726	gully
216	8	2861/7727	pit
217	8	2862/7729	tree root- hole?
218	9	2872/7723	ditch
219	7	2926/7723	ditch
220	7	2928/7726	pit
221	9	2872/7721	pit
222	9	2879/7727	ditch
223	8	2865/7726	uncertain
224	8	2875/7732	ring-gully
225	8	2874/7729	post-hole
226	8	2873/7729	post-hole
227	9	2882/7734	pit
228	8	2862/7731	ring-gully
229	8	2858/7727	pit
230	8	2863/7713	pit
232	9	2869/7736	ditch
233	9	2873/7736	ditch
234	8	2871/7739	ditch
235	7	2930/7727	pit
236	7	2932/7725	pit
237	8	2877/7730	ditch
238	8	2877/7730	ditch
239	8	2879/7726	ditch
240	8	2875/7728	post-hole
241	8	2865/7725	gully
242	9	2880/7727	ditch
243	8	2881/7724	ring-gully
244	7	2916/7734	ditch
245	8	2875/7737	post-hole
246	8	2914/7720	ditch
247	8	2876/7736	ditch
248	8	2889/7739	ditch
249	8	2890/7739	ditch
250	7-9	2894/7738	pit
251	8	2886/7737	ditch
252	9	2923/7675	ditch
253	8	2897/7738	ditch
254	9	2880/7718	pit
255	8	2920/7711	ditch
257	6	2865/7677	pit
258	6	2869/7678	pit
259	8	2825/7687	ditch
260	8	2889/7730	ditch
281	7	2785/7644	gully
282	8	2787/7642	gully
283	8	2786/7642	ditch
284	7	2783/7648	pit?
285	7	2784/7652	pit
286	8	2780/7655	pit
287	8	2775/7659	pit
288	8	2774/7657	pit
289	7	2780/7655	gully
290	8	2777/7655	pit
291	8	2777/7664	ditch
292	8	2778/7664	pit
293	8	2777/7663	pit
296	8	2790/7661	gully
297	8	2791/7655	ditch
298	8	2794/7659	pit
299	8	2792/7647	post-hole
300	9	2791/7650	gully
303	8	2795/7640	pit
304	8	2798/7642	pit
305	8	2800/7652	gully

Feature No.	*Phase*	*Grid ref.*	*Description*
306	8	2795/7656	pit
307	8	2795/7655	pit
308	8	2798/7665	ring-gully
309	8	2801/7656	ditch
310	8	2801/7658	ditch
311	8	2803/7656	gully
314	8	2810/7641	ditch
315	8	2810/7758	gully
318	9	2811/7755	gully
322	8	2847/7644	gully
323	8	2847/7641	ditch
324	8	2846/7647	ditch
325	8	2850/7654	gully
326	8	2843/7650	ditch
329	9	2877/7717	ditch
330	8	2880/7715	ditch
331	8	2881/7715	ditch
332	8	2866/7655	ditch
340	8	2895/7648	gully
341	8	2899/7648	pit
342	8	2796/7637	pit
343	8	2796/7636	pit
344	7	2800/7636	pit
345	7	2800/7630	ring-gully
346	8	2815/7635	ditch
349	8	2845/7639	ditch
350	9	2901/7687	ditch
351	9	2902/7683	pit
352	9	3895/7684	pit
353	9	2898/7681	pit
354	5	2900/7680	pit
355	9	2895/7685	pit
356	8	2878/7715	post-hole
357	8	2904/7670	pit
358	9	2897/7675	gully
360	8	2875/7716	ditch
361	8	2872/7715	ditch
362	8	2872/7713	ditch
364	8	2874/7717	post-hole
365	5	2885/7677	pit
375	7	2865/7679	ditch
376	8	2865/7686	pit
381	9	2833/7680	ditch
387	8	2790/7670	pit
388	8	2788/7675	ditch
389	8	2861/7713	ditch
390	8	2780/7667	pit
396	9	2776/7646	ditch
417	9	2830/7726	ditch
418	8	2825/7748	ditch
421	9	2818/7738	gully
442	8	2876/7717	ditch
465	8	2836/7749	pit
468	8	2860/7693	pit
473	8,9	2893/7746	ditch
489	8,9	2800/7700	ditch
490	7	2799/7635	gully
491	8,9	2896/7745	pit
492	8	2885/7747	gully
493	8	2885/7747	ditch
494	8	2885/7749	gully
495	8	2888/7743	ditch
496	8	2884/7749	gully
497	8	2884/7749	gully
498	5	2666/7648	ring-gully
499	5	2664/7645	gully
500	6	2672/7644	gully
501	5	2668/7645	pit
502	5	2670/7650	gully
503	5	2668/7652	ditch
504	5	2668/7655	ring-gully
505	5	2669/7645	ring-gully
506	5	2675/7656	ditch
507	5	2670/7648	pit
509	5	2670/7650	gully
510	5	2670/7651	ditch
511	5	2645/7665	gully
512	12	2665/7661	ditch
513	5	2667/7648	pit
514	5	2669/7649	pit
515	5	2666/7666	ditch
516	5	2666/7653	gully
517	1	2607/7703	cursus ditch
518	5	2666/7674	ditch
519	5	2667/7682	ring-gully
520	5	2667/7680	pit
521	5	2680/7667	ditch
522	5	2660/7678	pit
523	2	2650/7677	henge ditch
525	5	2666/7680	ditch
526	5	2664/7680	ditch
527	6	2700/7653	ditch
528	5	2574/7646	ditch
532	5	2665/7702	ditch
533	5	2655/7704	ditch
534	5	2665/7645	pit
535	6	2742/7666	ditch
536	6	2704/7669	ditch
537	5	2677/7703	ditch
540	6	2716/7669	gully
541	2	2664/7720	mound
542	2	2650/7718	revetment trench
543	6	2705/7662	ring-gully
544	6	2708/7665	gully
545	6	2712/7660	ditch
546	6	2726/7673	gully
547	5	2657/7724	ditch
548	4	2656/7725	ditch
549	4	2668/7732	ditch
553	4	2655/7728	post-hole
554	4	2656/7731	barrow ditch
555	2	2664/7720	grave
556	4	2673/7733	barrow ditch
557	5	2665/7688	ditch
558	5	2665/7691	ditch
559	5	2744/7655	pit
562	5	2724/7658	ditch
566	5	2722/7661	ring-gully
569	9	*c.*2613/7719	grave
571	5	2633/7708	ditch
572	5	2642/7713	oven
574	5	2634/7711	post-hole
575	5	2634/7717	post-hole
576	5	2639/7715	post-hole
577	5	2639/7714	post-hole
578	5	2637/7713	post-hole
579	9	2610/7707	grave
581	2	2659/7734	henge ditch
584	5	2825/7728	ring-gully
585	4	2651/7725	post hole
591	6	2704/7662	post-hole
593	5	2618/7627	ditch
600	2	2610/7720	mound
603	12	2616/7664	ditch
605	5	2640/7662	well
606	5	2639/7656	ditch
607	2	2616/7726	henge ring-ditch
614	5	2634/7714	post-hole
615	5	2634/7719	post-hole
616	4	2659/2729	post-hole
617	4	2654/2729	post-hole
621	5	2637/7715	post-hole
622	5	2637/7715	post-hole
624	5	2638/7720	gully
625	5	2636/7724	post-hole
626	5	2640/7720	post-hole
627	5	2637/7720	post-hole
628	5	2638/7716	post-hole
629	5	2637/7716	post-hole
630	5	2637/7717	post-hole
631	5	2637/7718	post-hole
632	5	2639/7717	post-hole
633	5	2638/7719	gully

Appendix VI. Maxey Excavation 1962-63: Specialists' Reports

I. Charcoal identification
by Professor Emeritus G.W.Dimbleby

Introduction

This is simply a list of the wood species identified from the various features. No systematic attempt was made after excavation to quantify (e.g. by weight) the amount of charcoal recovered from each feature, or from different locations within each feature. The synoptic Tables (42 and 43), the plans (Fig.170) and the sections (Fig.173 and 174) across the various pits of the pit-circles (IIIA and B) do however give a general impression of the amount of charcoal present and its distribution.

The identifications

1. The pit-circles:

Circle IIIA (North):

Pit 1 — 1 piece unidentifiable.
Pit 5 — 1 piece blackthorn (*Prunus spinosa*).
Pit 6 — All willow (*Salix* sp.).
Pit 7/— Mostly maple (*Acer* sp.); one piece of alder (*Alnus glutinosa*).
Pit 8 — Oak (*Quercus* sp.); one piece of maple (*Acer* sp.).
Pit 9 — A large piece of oak (*Quercus* sp.); a small piece of maple (*Acer* sp.).

Circle IIIB (South):

Pits 2 and 3 — All oak (*Quercus* sp.).
Pits 4 and 6 — Unidentifiable.
Pit 7 — Two pieces of oak (*Quercus* sp.).
Pit 8 — All hawthorn (*Crataegus* sp.) types.

2. The outer ditch of the henge (Fig.168, IV):
Oak (*Quercus* sp.) and yew (*Taxus baccata*) were identified.
One piece was not identifiable.

3. The boundary ditch (Fig.168, V):
Alder (*Alnus glutinosa*); also a piece of blackthorn (*Prunus spinosa*) and a piece of hawthorn (*Crataegus* sp.) type.

4. The ditch of the rectilinear enclosure (Fig.168, V):
Mostly ash (*Fraxinus excelsior*). Three pieces of yew (*Taxus baccata*). One piece probably of hawthorn (*Crataegus* sp.) type. Two pieces of bark.

II. Wood identification

Waterlogged pit at Site Grid 009/086

This pit was located midway between the two cursus ditches and produced an axehead of Group VI type and Neolithic pottery (now lost). Sir George Taylor, of the Royal Botanic Gardens Kew, reports:

> From the tin of specimens sent for identification, sixteen pieces were selected at random. Their species were as follows: alder (*Alnus glutinosa*), eight pieces; ash (*Fraxinus excelsior*), three pieces; oak (*Quercus* sp.) and blackthorn (*Prunus* sp.), one piece each, and three unidentified.

III. Petrography of samples from the Iron Age boundary ditch and the ditch of the rectilinear enclosure (Fig.168, V)
by H.Cleere (then, The Iron and Steel Institute), D.C.Goldring and W.Davies (then, Research and Development Department, United Steel Companies Ltd)

	Boundary Ditch (V)		*Rectilinear Enclosure Ditch (V)*				
	1	*2*	*A*	*B*	*C*	*E*	*G*
SiO_2	65.0	>65.0	12.6	25.3	19.3	43.0	>65.0
Al_2O_3	10.1	9.8	1.5	2.5	6.8	21.0	7.8
TiO_2	1.3	1.1	0.2	0.6	0.8	1.6	1.0
MnO	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5
CaO	4.0	4.0	2.5	2.0	13.2	2.0	<1.0
MgO	0.8	1.0	<0.5	<0.5	1.0	1.0	<0.5
Cr_2O_3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Fe	6.6	6.6	55.0	49.8	18.0	8.4	2.2

Table 58: Partial chemical analyses of samples from Iron Age ditches, Maxey (1962-63)

Excavator's Site Reference	*Description*	*Petrography*
Boundary Ditch *Sample 1*	Dark grey porous slag, oxidised marginally. Slightly magnetic.	Abundant rounded grains of quartz show a great range in grain size (0.5-0.02mm) and are enclosed in a glassy porous matrix. The glass is pale brown or dark in colour and contains abundant dendrites of diopside (Ca, Mg SiO_3) and some cristobalite (SiO_2). Locally, there are more coarsely crystalline aggregates of diopside.
Boundary Ditch *Sample 2*	Similar to the above in appearance.	Very similar to the above. Grains of quartzite and felspar occur as well as quartz. The slag also contains particles of brownish clay up to 2mm across and areas of a different type of slag, composed of colourless glass containing fine dendrites of magnetite (Fe_3O_4) and wustite (FeO).
Rectilinear Enclosure Ditch *Sample A*	Dark slag containing metallic iron. Much oxidised. Strongly magnetic.	Irregularly shaped metallic iron bordered by "Scale", composed of magnetite (Fe_3O_4) and "rust", hydrated iron oxides. Lenses of slag are marginal to the iron and are composed of dendrites of wustite (FeO), laths of fayalite (Fe_2SiO_4) and glass. Some quartz is also present.
Rectilinear Enclosure Ditch *Sample B*	Dark bluish grey slag, oxidised marginally. Not magnetic.	The slag consists mainly of rounded crystals and dendrites of wustite (FeO) and rounded laths of fayalite (Fe_2SiO_4). There are occasional globules of metallic iron. Pockets consist of quartz in a fine clayey matrix or are of dark brownish glass containing dendrites of diopside and represent incorporated refractory material.
Rectilinear Enclosure Ditch *Sample C*	Bronze beads with adherent grey slag, oxidised brown.	The slag consists mainly of melilite. Magnetite (Fe_3O_4), monticellite (Mg Ca SiO_4) and quartz are also present.
Rectilinear Enclosure Ditch *Samples F & G*	Clay lining of furnace/crucible with dark grey slag adherent to and permeating the clay. Not magnetic. *G* has bronze beads on one side.	The "baked clay" consists of pale yellowish or colourless glass containing some crystallites of cristobalite and abundant grains of quartz. The permeating slag is a bluish green or reddish glass and contains dendrites of a spinal-type mineral, probably Al-rich.
Rectilinear Enclosure Ditch *Sample E*	Reddish brown baked clay cut by a network of fine cracks.	Very fine grained. Mostly clay (one constituent has been identified as montmorillonite) with haematite (Fe_2O_3) and quartz. The clay content and low iron content shows this is a refractory material rather than an ore.

Table 59: Petrography of samples from Iron Age ditches, Maxey (1962-63).

Introduction

The analyses discussed below were carried out in the laboratories of the Research and Development Department of the United Steel Companies (now part of BSC) by arrangement with the Iron and Steel Institute. The samples were analysed chemically by x-ray diffractometer (quantometer) and the results are given in Table 58. They were also examined petrologically and by x-ray powder photography and the results are given in Table 59. Two samples (1 and 2) were submitted from the boundary ditch and seven (A to G) from the rectilinear enclosure.

Analysis and discussion

The first two samples (A and B) from the ditch of the rectilinear enclosure are pieces of tapped slag with a high proportion of metallic iron or iron oxides and fayalite. They represent the partly reduced products of siliceous iron ores and are evidence of iron-making in the bloomery.

All the other samples from both ditches have a pumice-like appearance and high silica and alumina contents. They are pieces of refractory clay lining to the furnace which has been permeated by molten slag (the boundary ditch samples) or by slaggy material (the remaining enclosure ditch samples). In some instances the sandy clay refractory material has been merely baked (Enclosure Ditch, E) and in others it has been fused to glass (Enclosure Ditch, D). In two instances (Enclosure Ditches C & G) the material is associated with bronze. The most slaggy of this material (C) has a particularly high iron and lime content. It is impossible to be sure whether the slag arose from iron or copper smelting, since the compositions are closely similar, but the presence of bronze beads seems to confirm that these were fragments of crucibles or small bowl furnaces connected with copper smelting or bronze remelting, probably the latter.

These finds seem to point to the existence of a workshop used by a smith familiar with both ferrous and non-ferrous metallurgical techniques. Such combinations are not unknown but were probably more common in the Iron Age than in the Roman period when there was certainly greater specialisation.

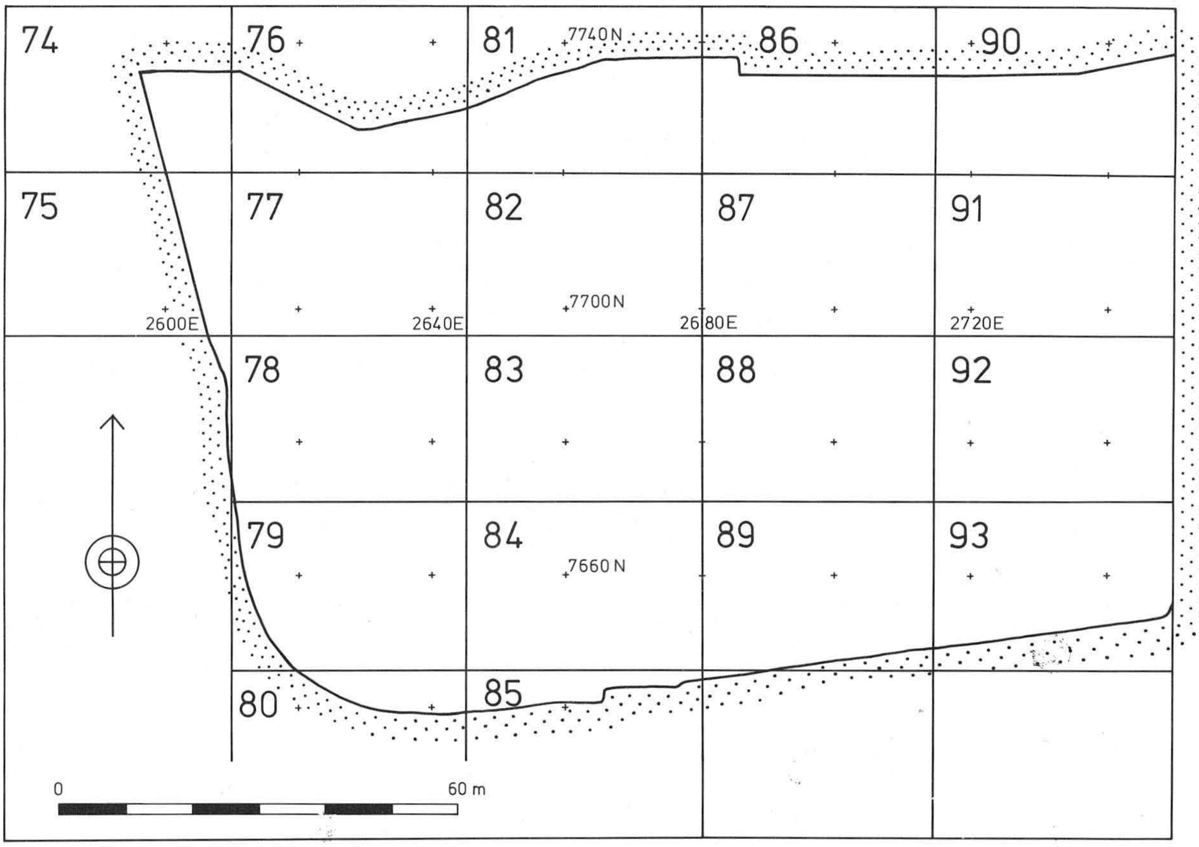


Fig.206 Maxey West Field: location of Site Atlas plans 1 to 20 (see Microfiche pages 74 to 93).

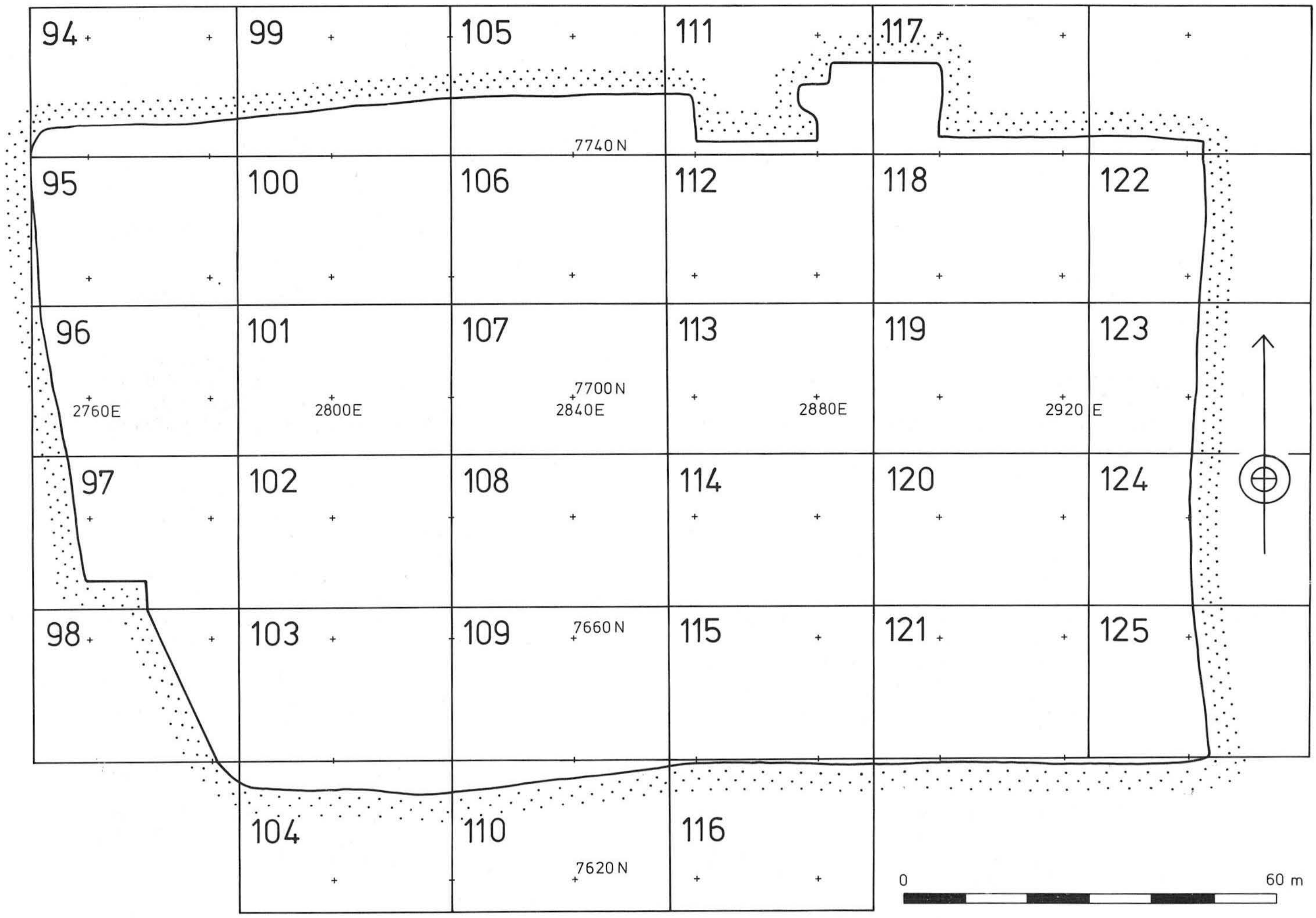


Fig.207 Maxey East Field: location of Site Atlas plans 21 to 53 (see Microfiche pages 94 to 125).

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Report No.22,	1984	Norfolk: Excavations in Thetford 1948-59 and 1973-80
Report No.23,	1985	Norfolk: Excavations at Brancaster 1974 and 1977
Report No.24,	1985	Suffolk: West Stow, The Anglo-Saxon village
Report No.25,	1985	Essex: Excavations by Mr H.P. Cooper on the Roman site at Hill Farm, Gestingthorpe, Essex
Report No.26,	1985	Norwich: Excavations in Norwich 1971-1978; Part II
Report No.27,	1985	Cambridgeshire: Archaeology and Environment in the lower Welland valley

Photo: J.K.St.Joseph
Plate I. Aerial photograph of cropmarks at Maxey, looking north-west along the cursus with the henge complex in the foreground.

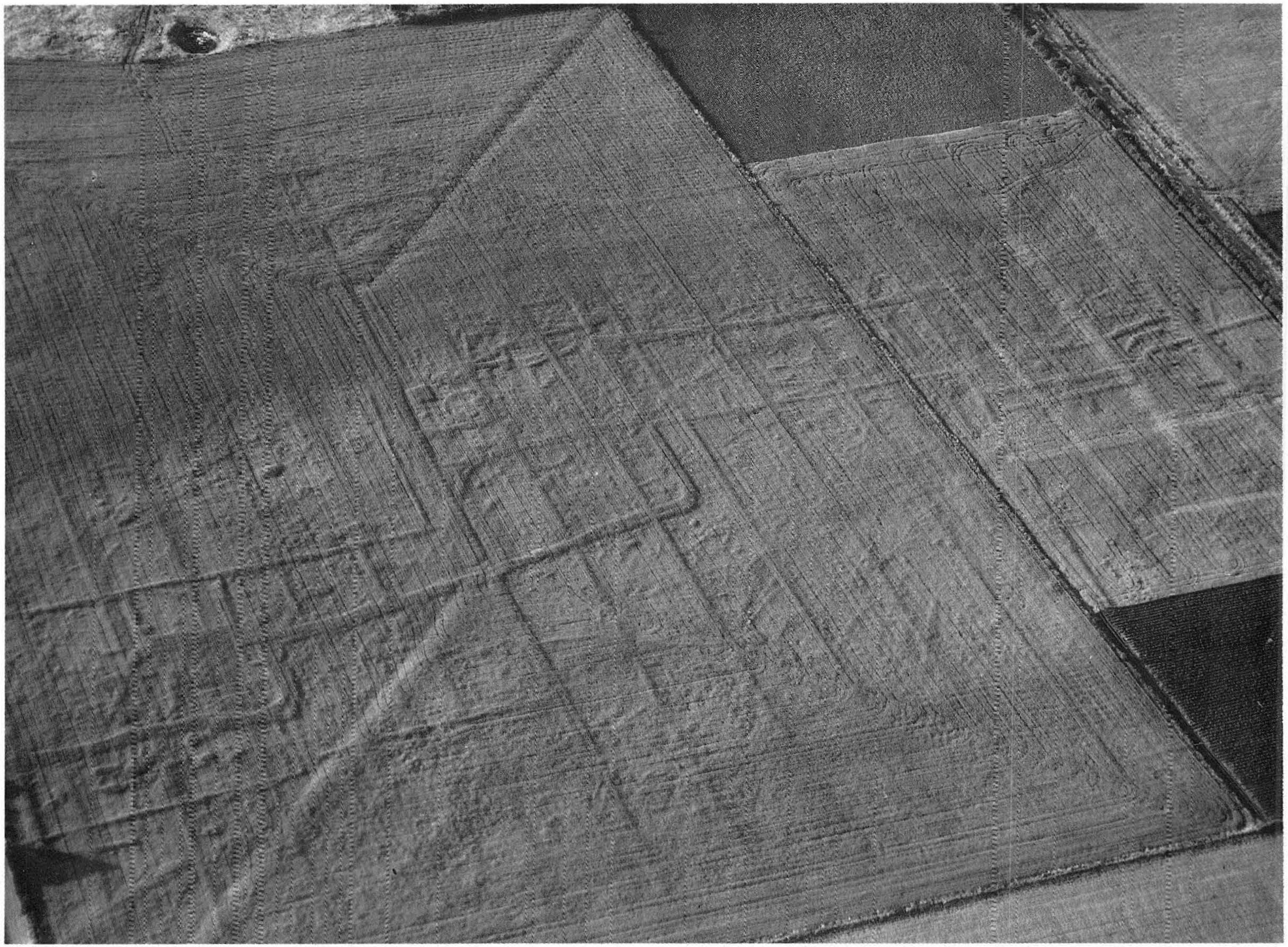

Photo: J.K.St.Joseph

Plate II. Cropmarks in the region of the East Field, Maxey, photographed in ripening corn (21/6/66). North is to the top of the picture.

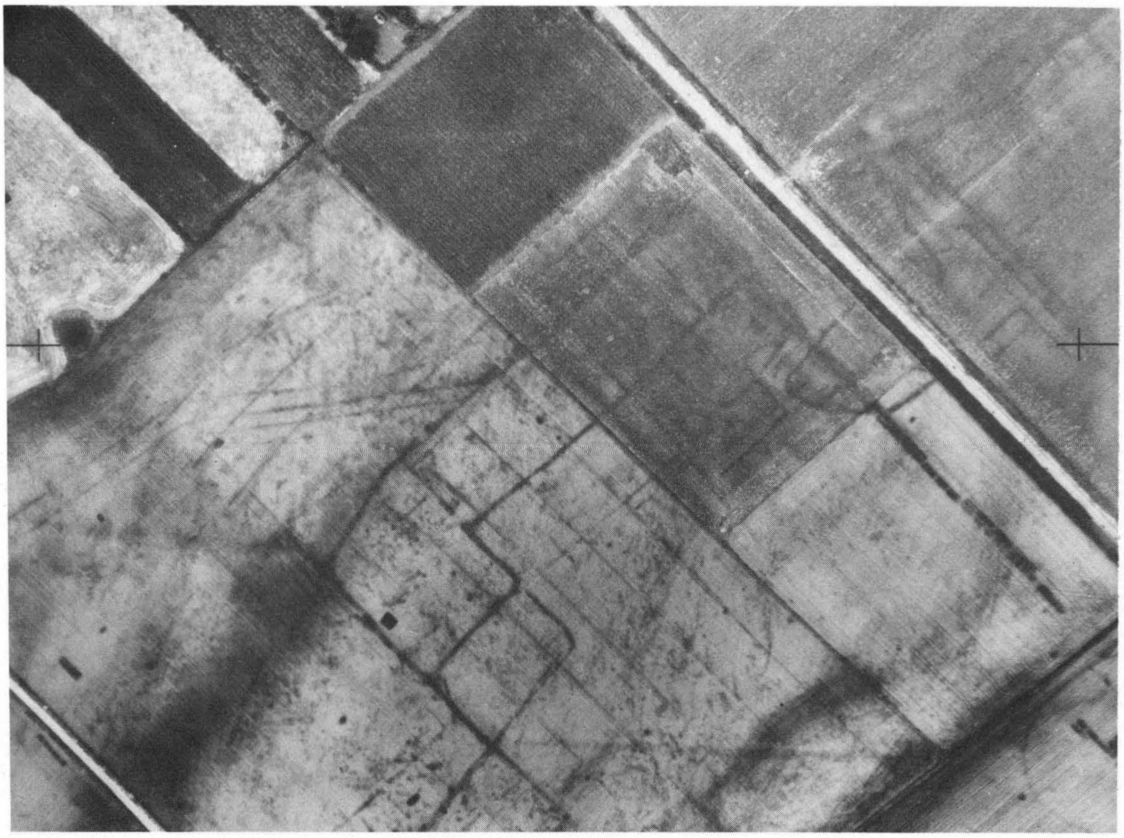

Photo: J.K.St.Joseph
Plate III. Vertical view of cropmarks in the region of the East Field, Maxey. The track is running from north-west (top) to south-east (bottom). *(Cambridge University Collection, copyright reserved.)*

Photo: S.G.Upex, Nene Valley Research Committee
Plate IV. Distant view of Maxey East Field excavations, looking south-east towards the Fens. This view shows the extent of the gravel pits in 1980. The 'acoustic bank' is shown, covered in rough vegetation, bottom left.

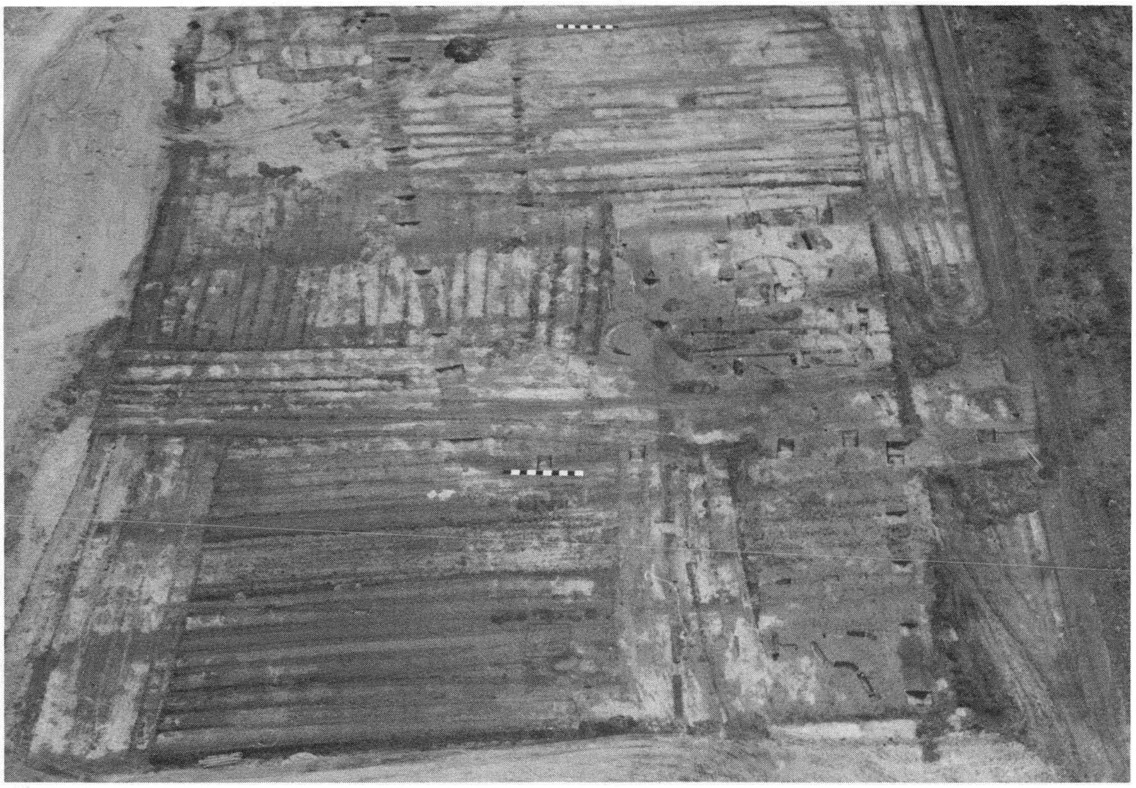

Photo: S.G.Upex
Plate V. Oblique aerial view of Maxey East Field excavations, looking west. The scraper-cleared areas are clearly visible. Scales (10m) in metre divisions.

Photo: S.G.Upex
Plate VI. Near vertical view of the main Phase 8 settlement area, Maxey East Field. The crescentic gully of F.198 (structure 5) is clearly visible. Scale (10m) in metre divisions.

Plate VII. Techniques: the Maxey East Field surface survey in progress (the second survey group is visible in the background).

Plate VIII. Techniques: the water sieve in use (4mm mesh insert).

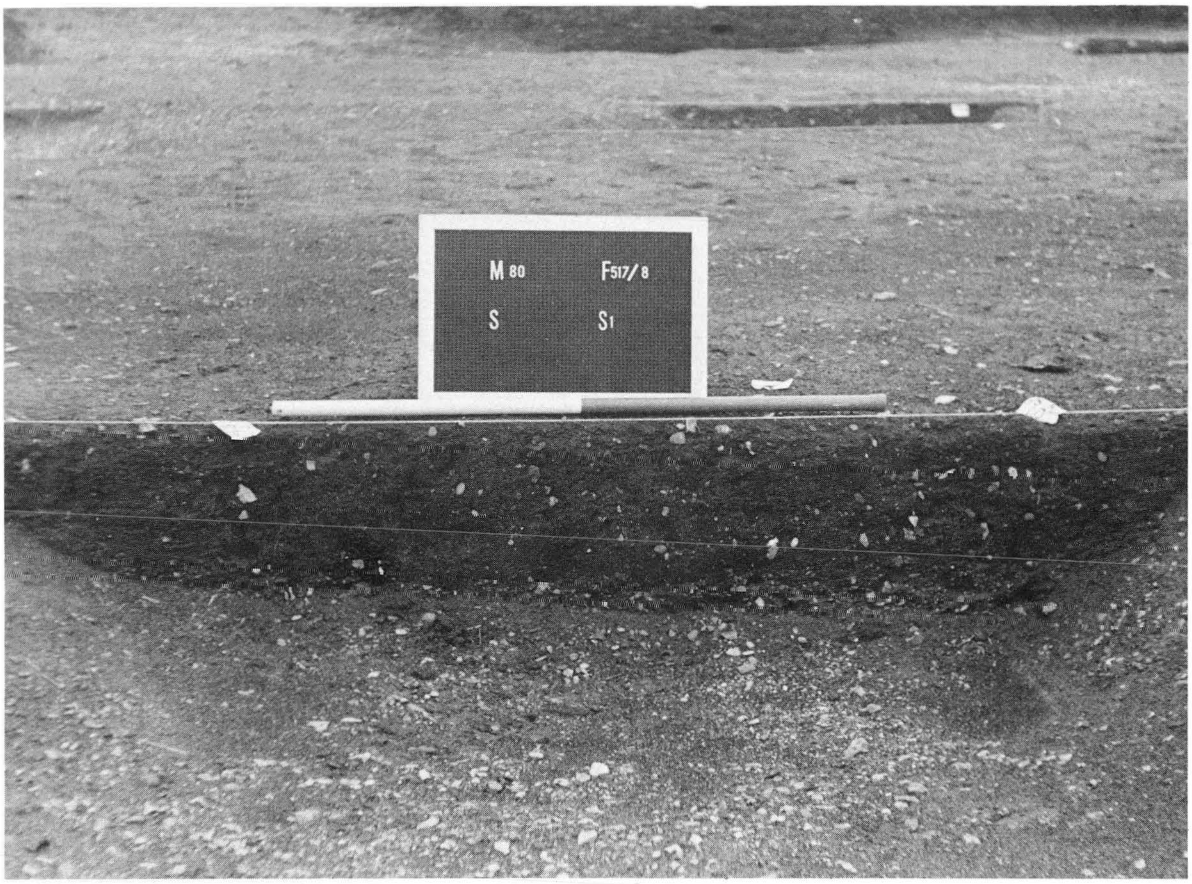

Plate IX. Maxey West Field: section through the south cursus ditch (metre scale in 0.5m divisions).

Plate X. Maxey West Field: the oval barrow, showing location of sieved metre squares.

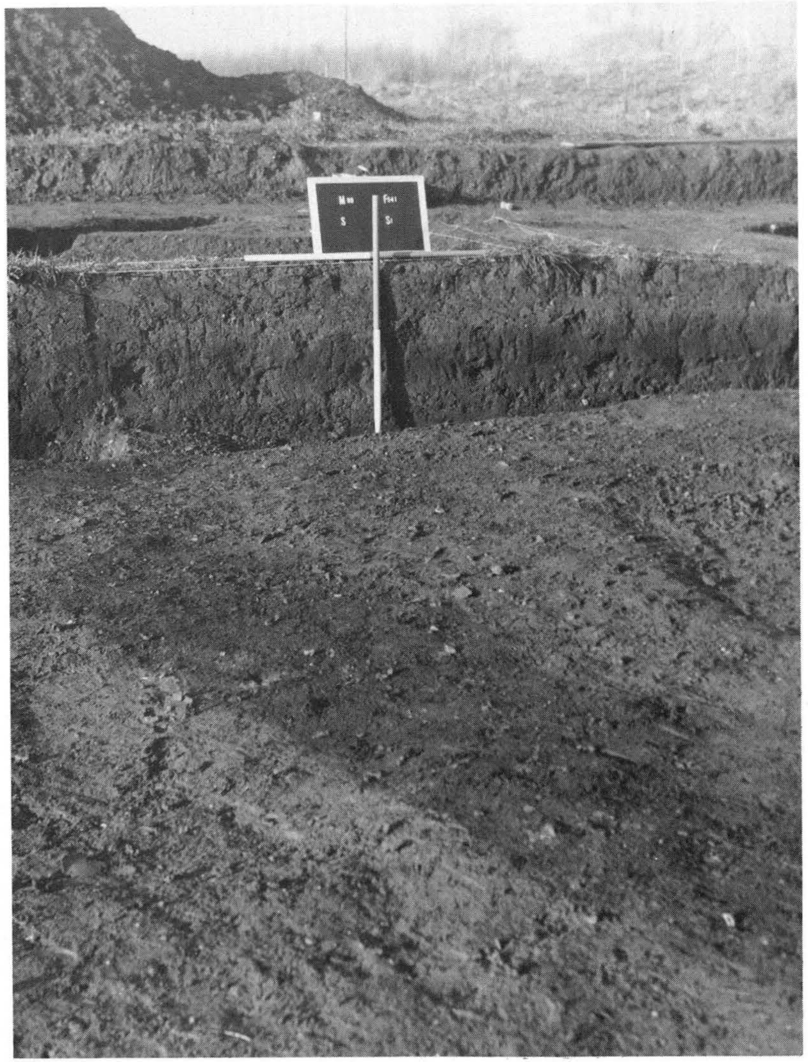

Plate XI. Maxey West Field: view of the oval barrow main baulk showing the barrow mound make-up (the darker band) between the headland soil (above) and the Bt soil horizon (below). 1m scales.

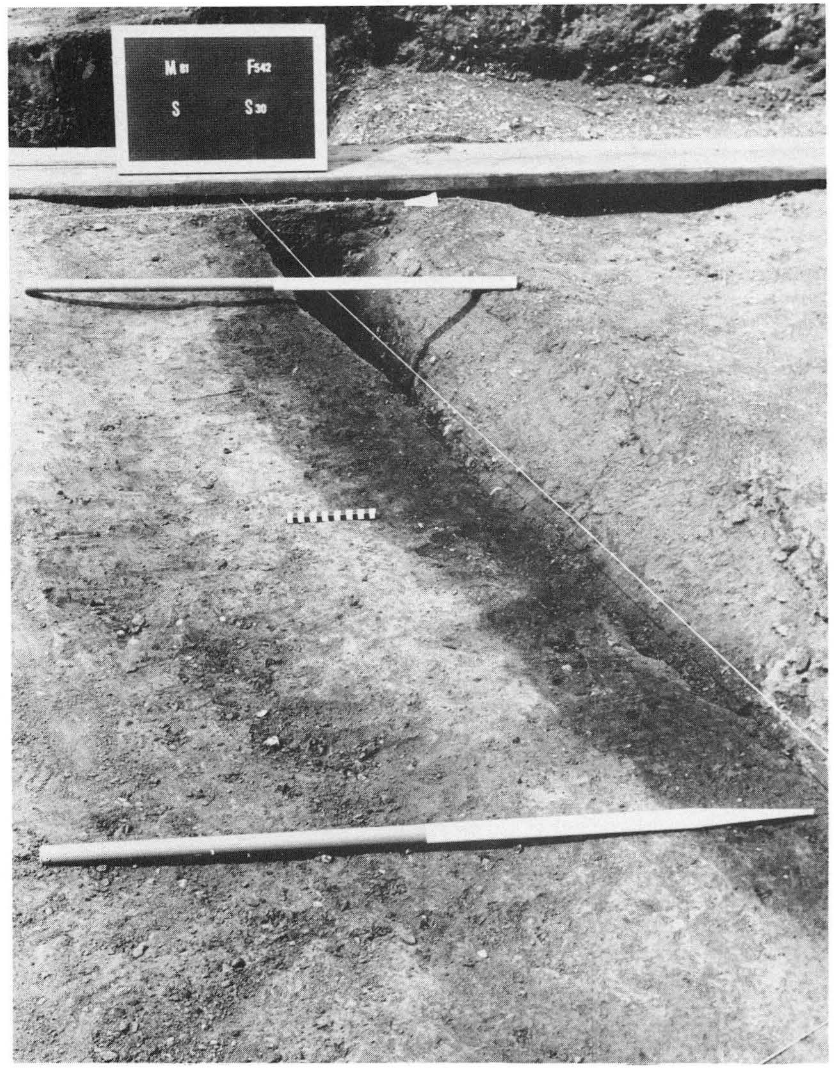

Plate XII. Maxey West Field: the oval barrow timber slot (F.542), partially excavated. Note the dark organic-rich soil of the post 'ghosts' (see Plate XIII). Large scales, 1m; small scale in centimetre divisions.

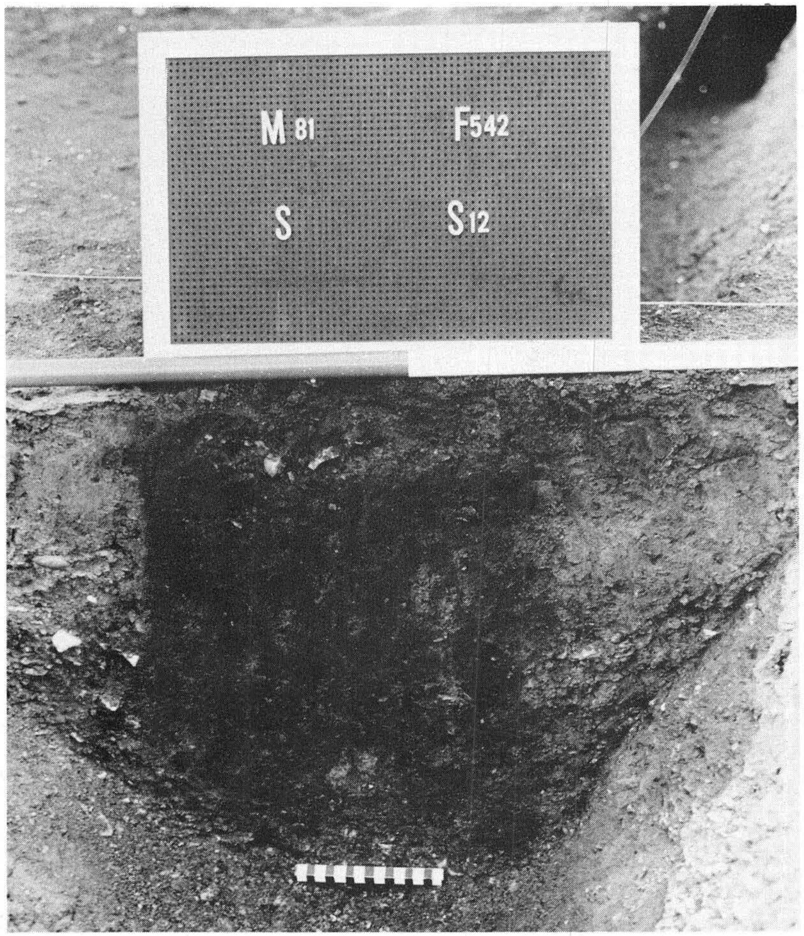

Plate XIII. Maxey West Field: the oval barrow timber slot showing 'ghost' of squared oak timber. Scale in cm.

Plate XIV. Maxey West Field: central burial (F.555) within the oval barrow (metre scale).

Plate XV. Maxey West Field: view north-east along the outer henge ditch (F.523). The figure with the staff stands at the entranceway butt-end.

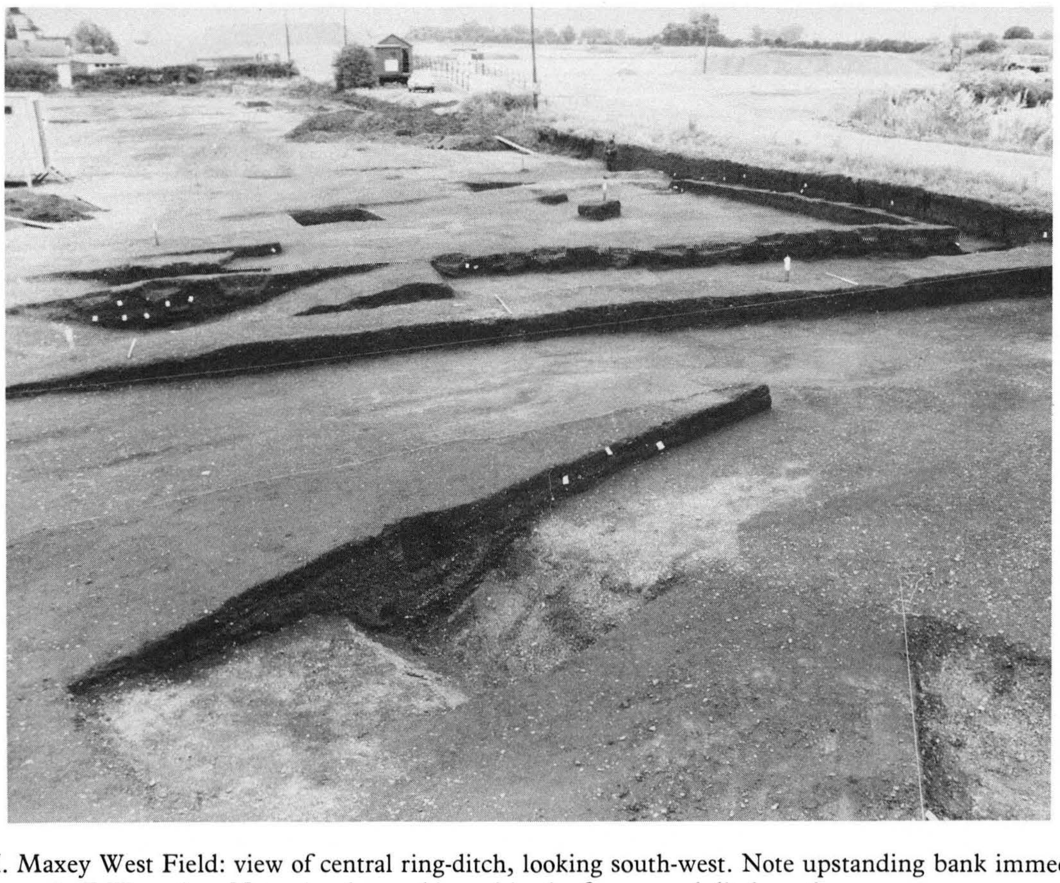

Plate XVI. Maxey West Field: view of central ring-ditch, looking south-west. Note upstanding bank immediately beyond the main E-W section. Note also dumped gravel in the foreground ditch section.

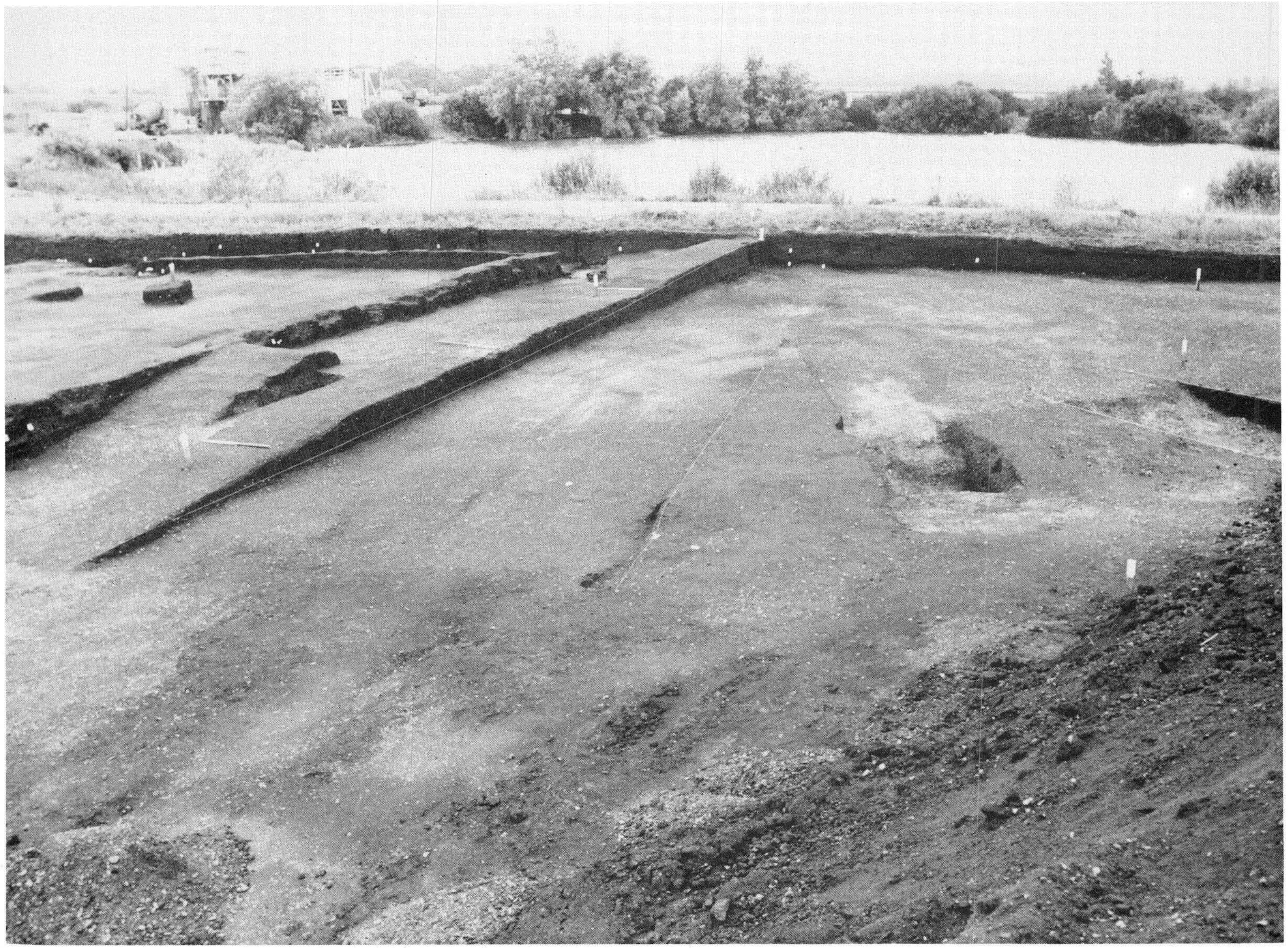

Plate XVII. Maxey West Field: view of central ring-ditch area, looking west. Note the internal bank to left of main E-W baulk.

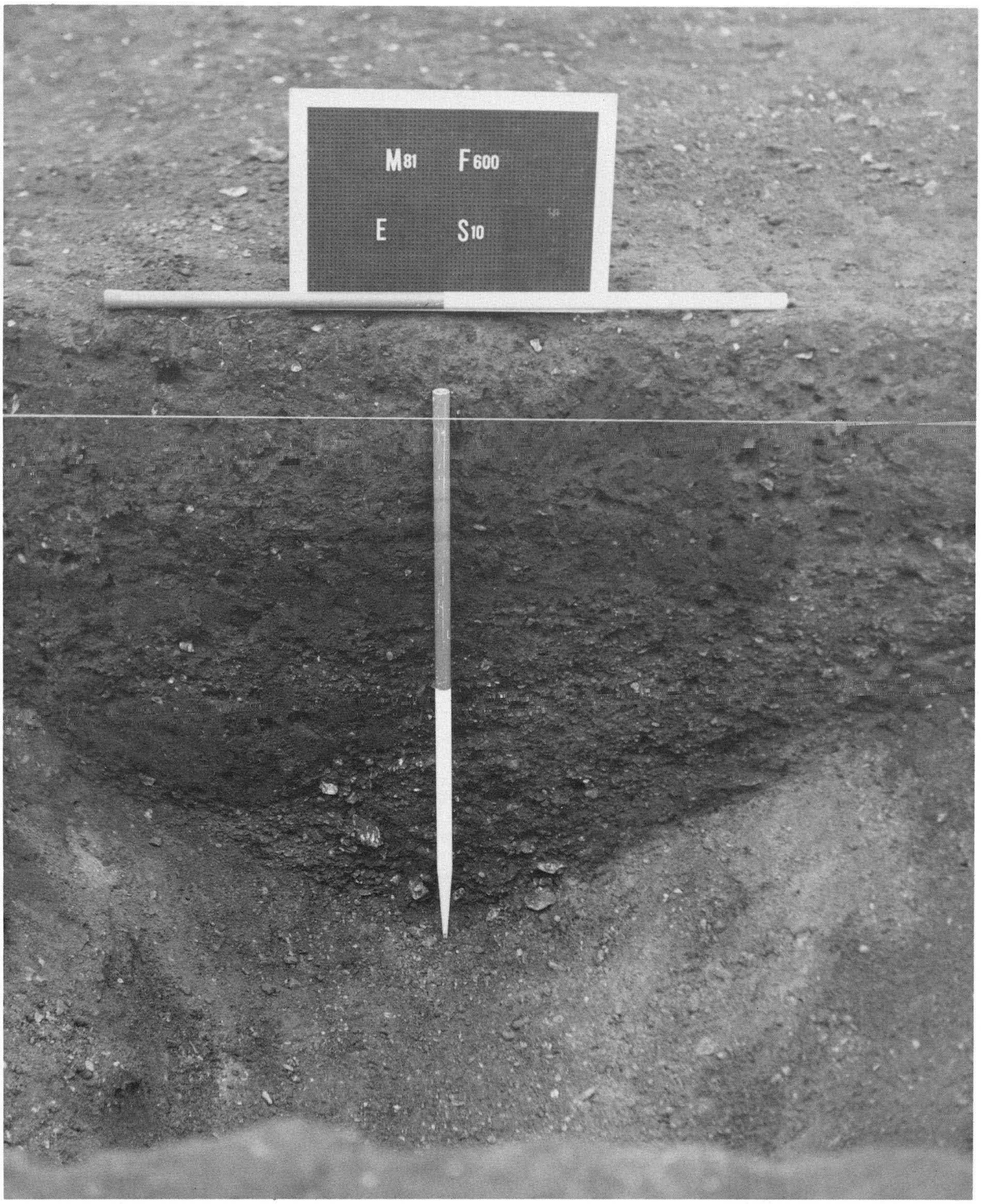

Plate XVIII. Maxey West Field: section through central ring-ditch showing gravel dump on inner face (right). 1m scales.

Plate XIX. Maxey West Field general view of features in the henge entranceway area, looking south-east. The oval barrow (upper right) and the small square-ditched probable barrow, structure 17 (foreground), are clearly visible.

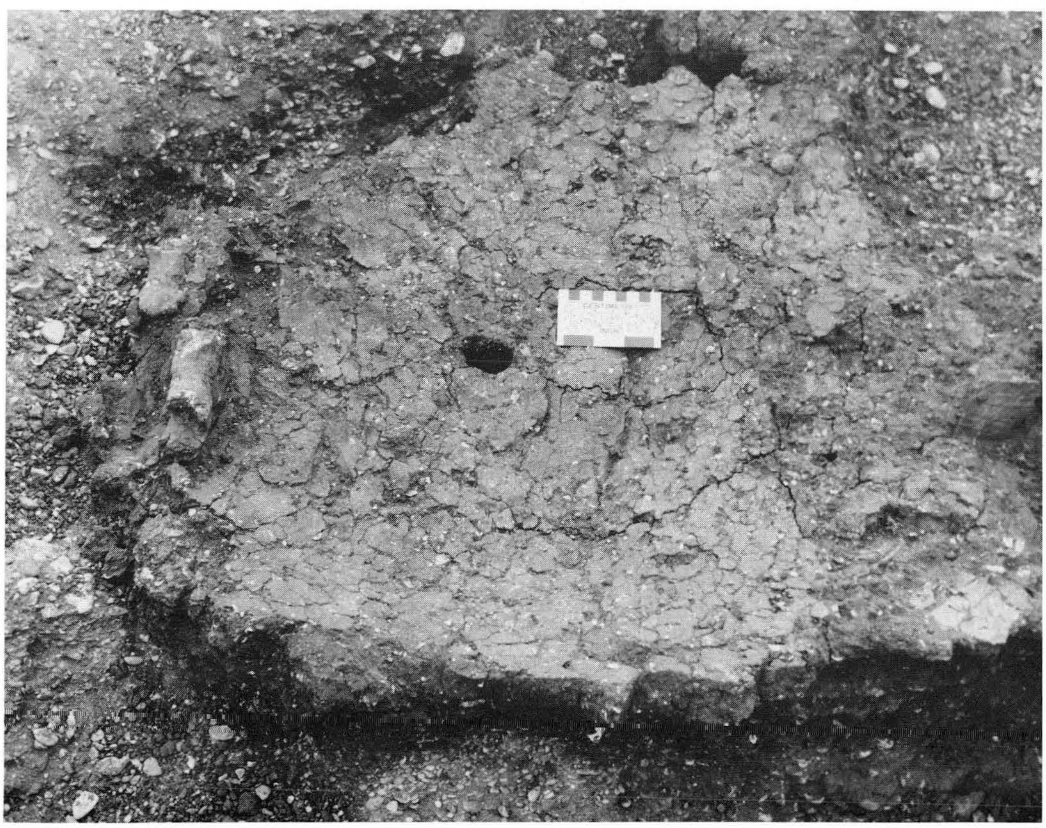

Plate XX. Maxey West Field: Phase 5.2 collapsed oven, structure 19, with flue to left (the hole near the scale is probably a root).

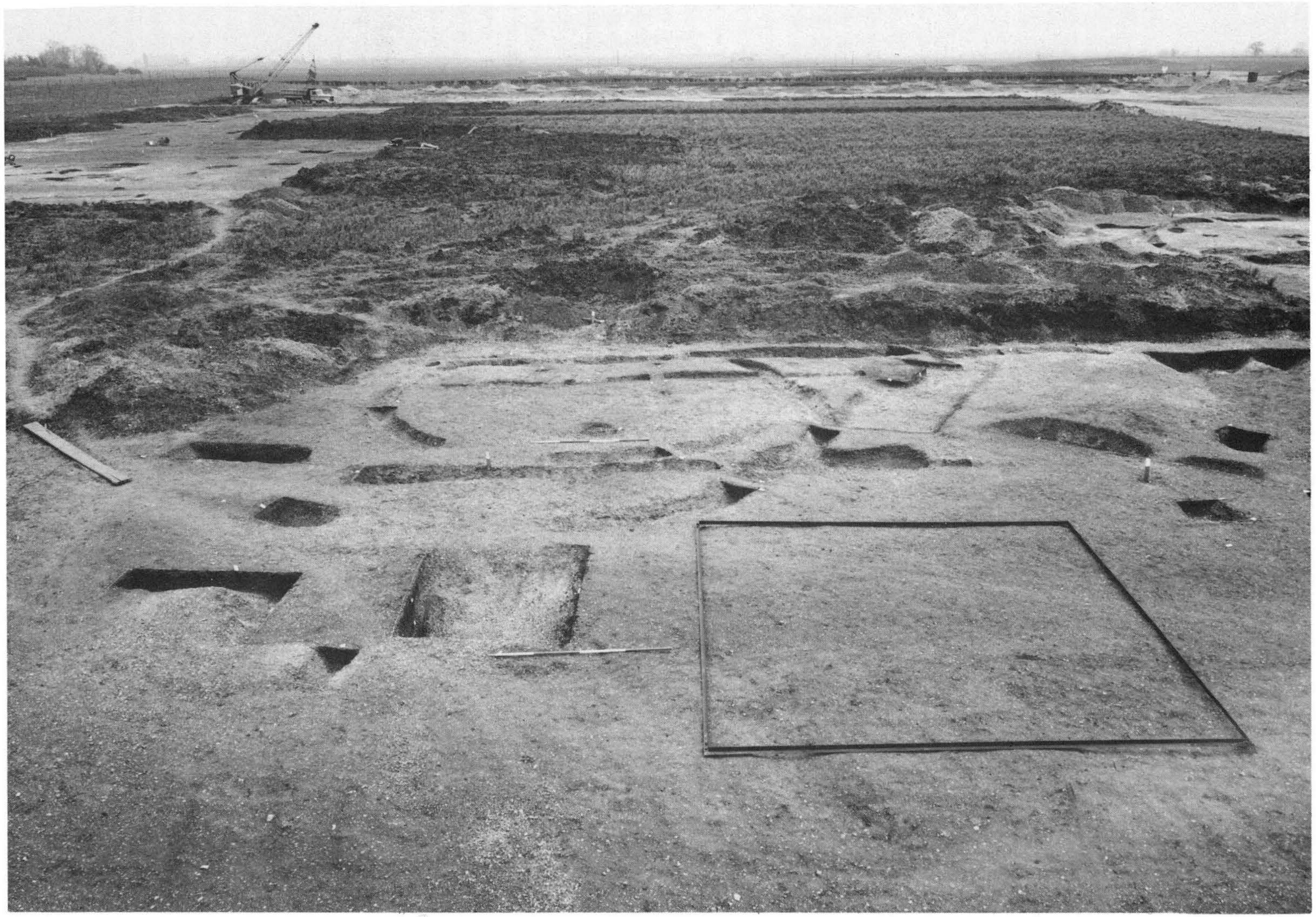

Photo: Gwil Owen, Cambridge University.
Plate XXI. Maxey East Field: view of the excavations, looking east, showing areas cleared by hydraulic excavator, prior to scraper stripping of the whole field (compare with Pl.V). The gullies in the foreground belong to structure 2 (phase 7). 2m scales; 5m-square frame.

Plate XXII. Maxey, Bardyke Field (1962-63): section through the south cursus ditch looking south-east, showing its relationship to the central mound. Scale in feet.

Plate XXIII. Maxey, Bardyke Field (1962-63): view to the south-east along the partly excavated south cursus ditch. Pit 1 of pit-circle A is completely excavated (right) and the original spoil from it lies on the bottom of the cursus ditch (foreground). Scale in feet.

Plate XXIV. Bardyke Field (1962-63): the small pit-circle (B) from the north-west showing its relationship to the outer ditch of the henge. Scale in feet.

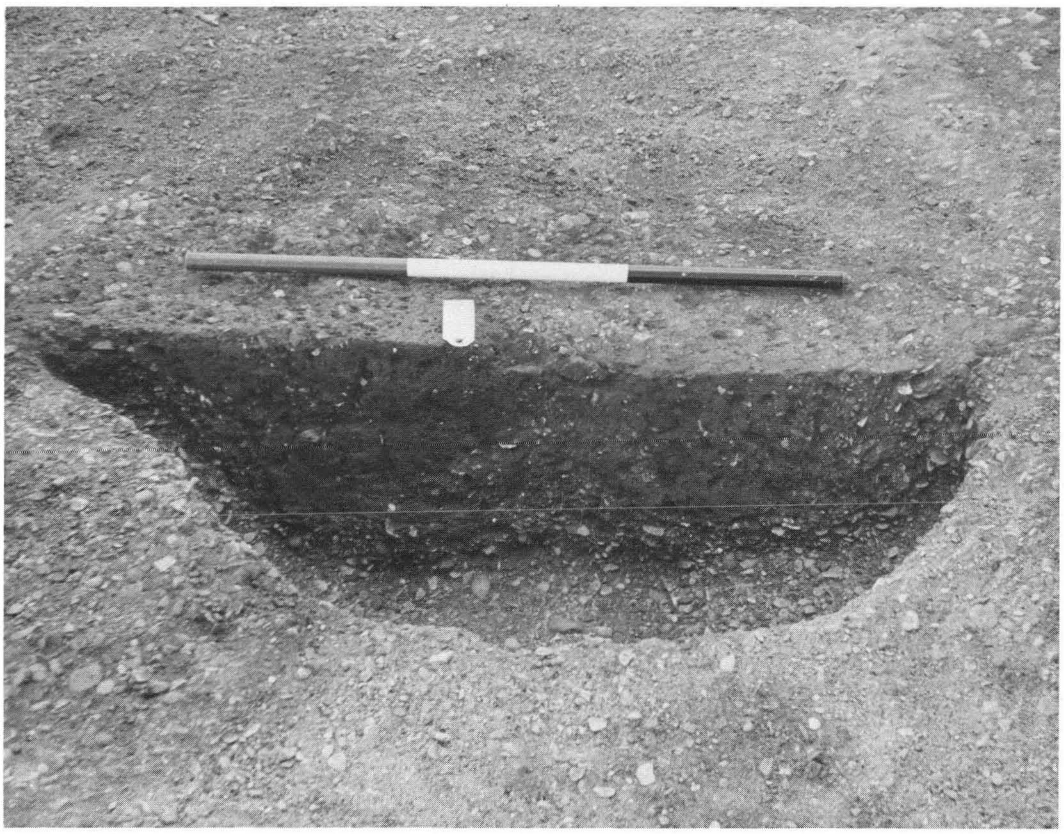

Plate XXV. Maxey, Bardyke Field (1962-63): view from the south of the section across Pit 2 of pit-circle B. Scale in feet.

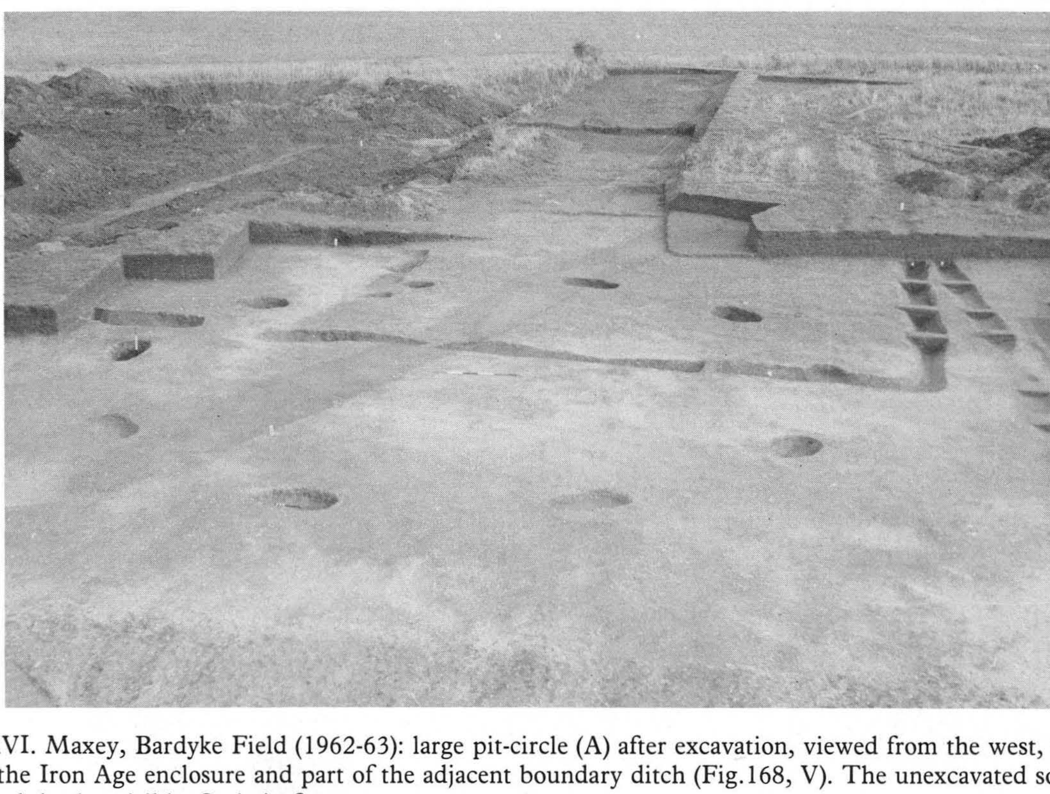

Plate XXVI. Maxey, Bardyke Field (1962-63): large pit-circle (A) after excavation, viewed from the west, also showing the Iron Age enclosure and part of the adjacent boundary ditch (Fig.168, V). The unexcavated south cursus ditch is also visible. Scale in feet.

Plate XXVII. Maxey, Bardyke Field (1962-63): south-west quadrant of the central mound (Fig.168, IV), after removal of ploughsoil and disturbed subsoil. Scale in feet.

Plate XXVIII. Maxey, Bardyke Field (1962-63): as Plate XXVII, taken after excavation of the mound material. Scale in feet.

Plate XXIX. Maxey, Bardyke Field (1962-63): section through the central ring-ditch (Fig.168, IV). Note the outcrop of gravel concretion on the west (right) side. Just beyond the ranging pole, the fill of the south cursus ditch may be seen on either side. Scale in feet.

Plate XXX. Maxey, Bardyke Field (1962-63): general view of the small square enclosures (Fig. 168, VI) from the north, showing relationship to the ditches of the large Romano-British enclosure (Fig. 168, VII). Scale in feet.

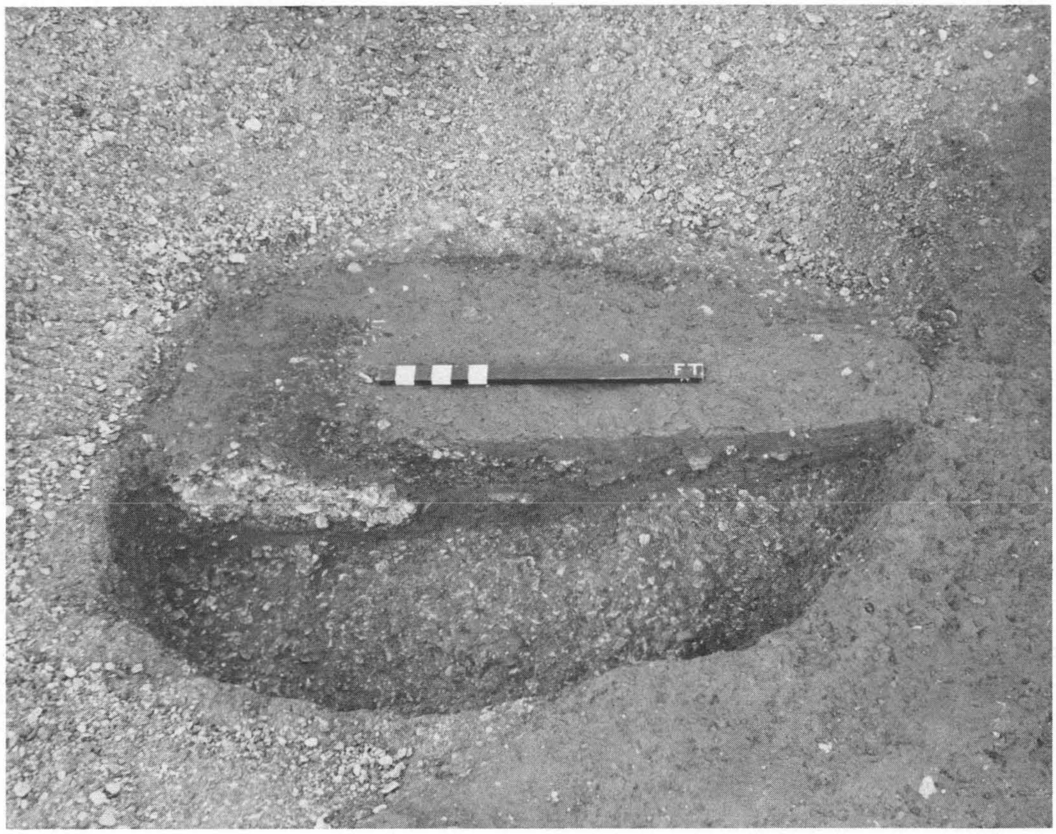

Plate XXXI. Maxey, Bardyke Field (1962-63): a 1st century AD pit cutting the fill of the truncated ditch of small square enclosure VIb at its north-west corner. Scale in inches.

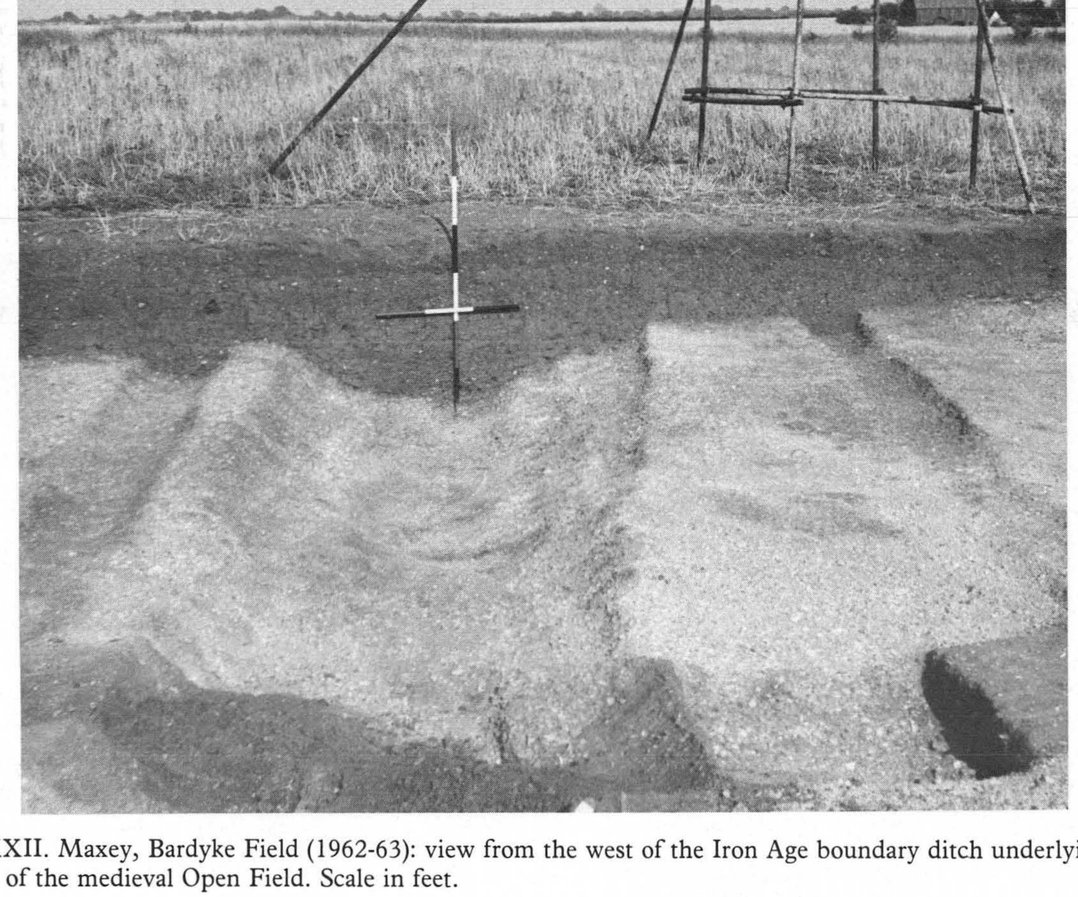

Plate XXXII. Maxey, Bardyke Field (1962-63): view from the west of the Iron Age boundary ditch underlying the headland of the medieval Open Field. Scale in feet.

Plate XXXIII. Barnack/Bainton: general view of the North Field, looking north. The gap in the spoil heap coincides with the plough headland; the modern hedge studied by French (Chapter 4, part V) is that nearest the camera, left.

Plate XXXIV. Barnack/Bainton: trench showing depth of alluvium at the north end of the North Field (the stream runs beneath the thorn bushes, immediately beyond). 2m scale in 0.5m divisions.

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