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Further Investigations at Arbury Camp, Cambridge: The Eastern Entrance – A Monumental Architecture

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With contributions by S. Boreham, C.A.I. French, Q. Mould, E. Simmons, C. Swaysland, M. Taylor, L. Webley and B. Wills

The excavation of the main, eastern entrance of Arbury Camp is outlined. Involving a monumental gateway architecture, plan-reconstruction suggests that it may have actually been pivoted, rather than hinge-hung (the operation of 'Camp'/hillfort entranceways being otherwise little understood). Among the finds recovered from the enclosure's waterlogged ditch circuit was a quantity of fungus and its possible uses are, accordingly, fully considered.

This paper reports the results of a seven week-long excavation in the winter of 2003/04 of the main eastern entranceway of Arbury Camp, a great Iron Age ringwork located on heavy, third-terrace sub-soils along the north side of Cambridge (at *c.* 12.5m OD; TL 44366142; Fig. 1). Whilst the excavations occurred anticipating development within the immediate area (with the work funded throughout by Gallagher Estates Ltd.), the development plans did not entail any further destruction of the enclosure's circuit and, particularly, its entranceway. Rather, the work arose because previous investigations had demonstrated that the main ditch fills were waterlogged at this point and, therefore, any substantive building in the area could threaten the survival of these deposits.

Because the results and broader context of the first two phases of the site's evaluation fieldwork has already been thoroughly published (Evans & Knight 2002a), there is no need here to rehearse its background and setting at length. Moreover, issues relating, for example, to the enclosure's landscape setting, plan morphology and regional affinities have also already been fully outlined in the 2002 publication and, therefore, need not be repeated here.

In 1990 and 1995 evaluation fieldwork was undertaken at the site (Evans 1991a & b; Knight 1995) previously investigated by McKenny Hughes at the turn of the century (1904 and 1906) and Alexander and Trump in 1970. Radiocarbon dated to the 4th–2nd centuries BC as a result of the recent campaigns, the interior of the enclosure was then sample investigated with no evidence of settlement found. A series of trenches were excavated across its circuit, one of which located the enclosure's entranceway (and tower-like gate) (Fig. 2; Evans & Knight 2002a: fig. 5 & 14). The basal fills of the ditch terminal proved to be waterlogged and a quantity of what was thought to be contemporary leatherwork was recovered. A most rare and entirely unexpected finding, this material has since been on permanent display within the British Museum. However, based on the recent excavation this is now known to have been misidentified, with the organic material proving to be fungus (see Mould & Wills below). Fieldwalking and ploughsoil test-pitting demonstrated that a late Roman pottery scatter extended across much of the enclosure and seems to continue northeast beyond its circuit.

The summer of 2002 saw another stage of enhanced evaluation fieldwork (Evans & Knight 2002b). The results of this essentially confirmed the earlier findings (or were otherwise negative): the interior of the Camp seems devoid of contemporary settlement. No direct evidence of Romano-British settlement was found within the enclosure or beyond its northeastern perimeter, and it was determined that the finds of this date were all manuring-derived. (The enhanced values of the Romano-British pottery recovered through the evaluation's test-pitting programme all related to the 'volumetric enhancement' of the soils in the deeper berm created by the medieval headland on that side of the enclosure's circuit.) In 2005 further trenching also occurred, subsequent to the main excavation, within the 'Car Zone' plot in the southeastern sector of the Camp (Fig. 1). Although confirming the line of the enclosure's perimeter, its circuit had there been severely truncated through the parking lot construction.

The previous phases of work had demonstrated that, apart from a low density of Romano-British pottery sherds, the upper fills of the enclosure's ditch were essentially sterile. Therefore, during the 2003/04 entranceway excavation we extended a sampling methodology already employed to successful effect on the site (Evans & Knight 2002a): after hand- and spit-excavating two metre-square columns through these deposits (one in each ditch terminal), the upper profile of the ditch was machine-excavated to just above the basal organic fills.

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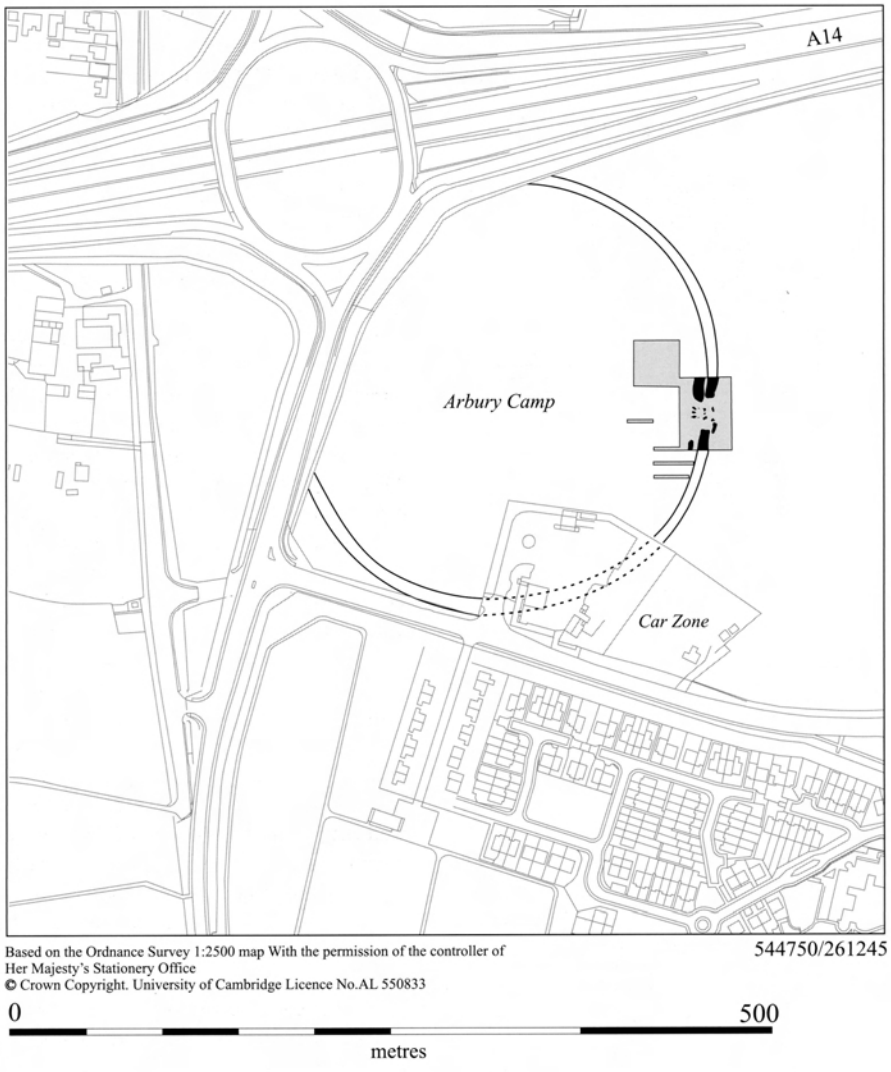

Figure 1. *Location, showing enclosure and 2003/04 area of excavation.*

In order to maximise section information (interrogated for potential re-cuts, etc.), the ditch was dug in longitudinal half-sectioned segments: first alternative halves and, then, the remainder. In an effort to provide a spatial dimension to any finds from the primary fills, within the staggered segments these were spit-dug in metre squares (Fig. 8). However, because of the high level and intense flow of groundwater, after failed attempts at *in situ* trowel excavation, these deposits were generally dug-out by spade and then hand-sorted (by spit and square) on shovelling boards. Otherwise, the more minor features – including the 'great' gateway's huge postholes – were excavated by a conventional half-section method, though all were eventually dug in their entirety.

Excavation Results

The excavation results cover three main areas: A) Entranceway (*c.* 1610m^2); B) Interior Open Area (*c.* 900m^2); and, C) Interior Trenches (Fig. 2). Areas B and C produced no significant archaeological deposits beyond some natural hollows and foundations/services belonging to recently demolished farm buildings. Area A exposed the entire entranceway of the ringwork. The results, therefore, focused upon the three key components of the entranceway: The Gate, The Bank and The Ditch Terminals. It also includes a description of a Blocking Ditch and a series of charcoal-filled hollows.

The Gate (Figs. 3, 4, 5 & 11)

The gate plan was made up of eight substantial post-pits, the majority of which showed signs of being re-cut. These were arranged in a simple rectangular plan of two front-, three middle- and three rear-posts (Table 1). With the exception of the mid-central post, which was circular, the post-pits

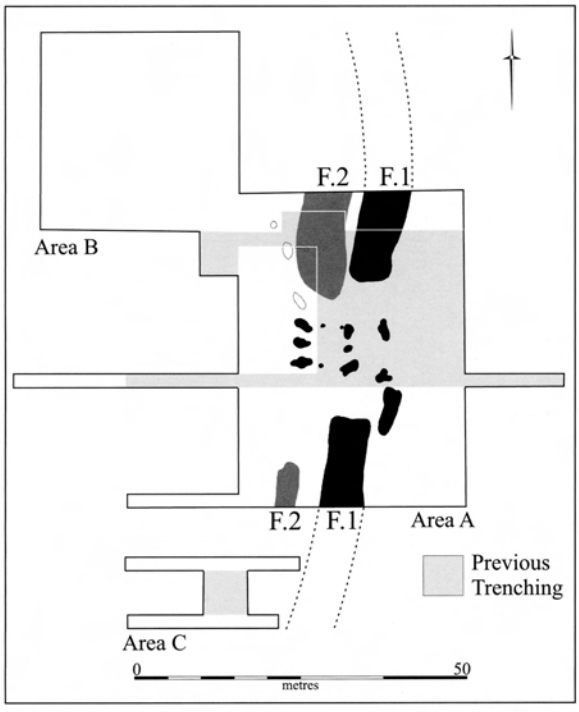

Figure 2. *Areas excavated in 2003/04, with earlier-phase trenching indicated.*

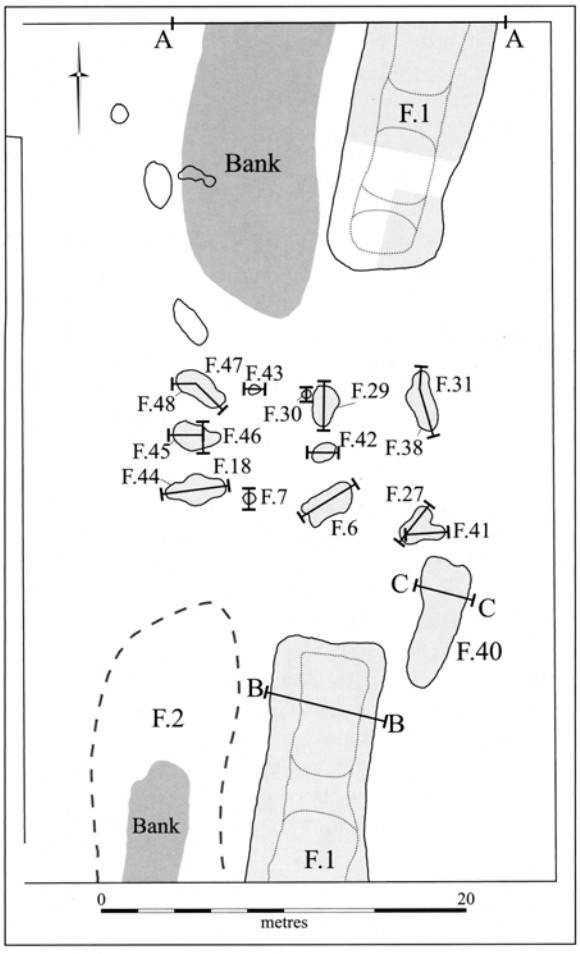

Figure 3. *The Eastern Gateway, main features, including main ditch basal 'segment-lengths' (note whitened portion of F. 1 in north indicates area of 1990 & 1995 excavation; see Fig. 8).*

tended to be 'teardrop' or oval-shaped and either had conjoining post-ramps (one end being vertical whilst the other comprised a *c.* 45° ramp) or deep steep-sided profiles.

The overall construction measured 13.50m in length, but was wider at its front (8.50m) than at its rear (6.45m). In plan, the gate structure can be separated into front and rear 'boxes' or bays by the middle row of pits. The front box was trapezoidal in shape and measured approximately 7.75 x 5.50m (42.62m^2), whereas the rear box was more rectangular and slightly larger, 7.50 x 6.75m (50.62m^2). The rear box had three additional ancillary post-pits, two located centrally to its side walls, F. 7 and F. 43, and one situated next to post-pit, F. 30. These were, by comparison, insubstantial (average diameter 0.50m) and all had straightforward profiles (vertical sides and rounded bases). The two front post-pits comprised primary (F. 31 & F. 41) and secondary (F. 27 & F. 38) oval-shaped cuts that were evident by their divergent orientations. Of the middle row (F. 6, F. 29, & F. 42) only the central post displayed any clear indication of being cut twice (F. 28 truncated F. 42), whereas all three of the rear posts had distinctive primary (F. 44, F. 45 & F. 48) and secondary pits (F. 18, F. 46 & F. 47). In every case, the primary pits were distinctive by their gravel or 'sand-rich' fills, as opposed to the clay content of the secondary cuts; none had post-pipes.

The only artefacts associated with a post-pit were a large and partially broken rotary quern stone situated at the base of the primary centre post-pit, F. 42 (Figs. 5 & 11) and an iron ring from its re-cut, F. 28. While the stone appears to have been utilised as a post-pad, having a centrally worn cupmark-like hollow in its upper surface, it could well have had other structural connotations (Fig. 11; see below).

The relationship between primary and secondary post-pits, at the very least, illustrates a two-fold sequence. The re-cutting could imply that the gate was constructed twice in exactly the same position or, alternatively, it could also mean that the primary post-pits relate to the construction phase whereas the secondary pits relate to its demolition. If the latter interpretation is correct, then the orientation or direction of the post 'extraction' or bedding ramps should indicate both the direction and sequence of construction/dismantlement. When plotted, all of the posts' ramps point inwards, as if the gate was erected/demolished in on itself and away from the adjacent earthworks (i.e. the ditch and bank).

The Bank (Figs. 3 & 7)

Earlier phases of excavation had removed sections of the bank (F. 2), including part of the northern bank terminal. The extended area of excavation did, however, expose a previously un-investigated section immediately north of the excavated northern terminal, as well as the truncated remnants of part of the southern bank terminal. The northern section of bank proved to be the best preserved; it stood to a height of 0.42m (including a 0.08–.10m thick buried soil base) and was 6.80m across. The tail of the bank was over-

	Primary Post-pits				Secondary Post-pits			
	Feature	*Length*	*Width*	*Depth*	*Feature*	*Length*	*Width*	*Depth*
Front	31	2.00m	0.75m	0.65m	38	2.42m	1.22m	0.66m
	41	2.20m	0.88m	0.42m	27	2.20m	0.95m	1.03m
Middle	6	2.30m	1.00m	0.60m	n/a	n/a	n/a	n/a
	42	1.00m	1.00m	0.50m	28	0.95m	0.90m	0.29m
	29	1.90m	1.10m	0.49m	n/a	n/a	n/a	n/a
Rear	44	1.90m	0.81m	0.99m	18	2.34m	1.10m	0.95m
	45	1.60m	0.82m	0.72m	46	1.85m	0.72m	0.89m
	48	1.95m	0.82m	1.01m	47	2.35m	1.30m	0.99m

Table 1. *Gateway posthole dimensions.*

lain by a thick and extensive silty loam 'headland' deposit, whereas its front was overlain by a silty sandy clay 'wedge' that was similar in its composition to elements of the bank.

It was possible to distinguish the upcast bank deposits from the *in situ* buried soil because of a thin and dark 'organic' deposit that capped the old land surface. The diagonal pitch of the bank deposits also contrasted with the broad horizontal character of the buried soil. It was possible to identify two types of material involved in the construction of the bank: re-deposited buried soil (grey in colour and sometimes visible as 'slabs' or turfs) and re-deposited natural (brown-orange in colour and visible as dumps of gravels and clays derived from the adjacent ditch). The basal layer comprised a 0.08m thick band of re-deposited buried soil that occupied a 3.00m wide band at the front of the bank. This was followed by the first deposits derived from the ditch and represents a direct inversion of the natural sequence by piling the normally deeper, 'subterranean' gravels atop of surface clays. Further turf-like layers finished the bank sequence in a series of diagonal bands situated at the tail-end of the earthwork.

As with the majority of features associated with the gate structure, there were no artefacts found within the bank or within its underlying land surface. Similarly, no pre-bank or contemporary features were identified beyond a few irregular hollows, some of which contained charcoal-rich fills. The southern section of bank was badly truncated by late agricultural activity (including brick-built foundations). In plan, the bank survived as a thin veneer of gravel upcast overlying a 'splodge' of buried soil.

The Ditch Terminals (Figs. 3, 6 & 7)

The gate structure occupied the centre of a broad entranceway (21.00m across) that was flanked by two square-ended ditch terminals (F. 1; north & south). In plan, the interval between the two terminals comprised a single central gate structure flanked by two 6.00–6.50m wide 'carriageways' (see below). The two ditch terminals were almost identical in character measuring *c.* 6.00m across and 1.25m deep, with very broad 'U'-shaped profiles with flat bases. Correspondingly, both also shared very similar depositional sequences, although 'materially' the two terminals did vary somewhat. The base of the northern terminal was divided into rectangular segments (*c.* 4.00 x 3.50m) by a series of small steps or ledges. The southern terminal had similar but less well-defined basal features (Fig. 3).

The primary deposit within both ditch ends consisted of a dark organic silty clay that was at its thickest towards the terminals, but also occurred within the slightly deeper segmented elements of the base. This deposit yielded the vast majority of artefacts recovered from both lengths of ditch. Above the basal silts, the ditch in-fill included successive edge-erosion deposits that were consistently more concentrated along the bank-side. Secondary and tertiary fills comprised comparatively sterile sequences that increased in their loam content towards the top.

The basal deposits within both sections of ditch were excavated by grid in a metre-square pattern. The southern length produced the bulk of material, although this was partly because much of the northern terminal had already been excavated. Objects included pottery, animal bone, fragments of wood, pieces of 'leather/skin'/fungus (see below), burnt stone, flint and a small part of a rotary quern stone. The distribution of material within the southern section demonstrated a focus towards the terminal, although fragments of wood and bone were distributed throughout (Fig. 8).

The northern ditch portion did not produce any pottery (an attribute consistent with the previous excavation; one sherd previously being found there) and only a few fragments of animal bone (and a single fragment of 'leather'/fungus). A Roman coin was found in the tertiary fill within the northern section. Single metre-square sample columns were excavated down through the upper ditch-fill profiles in both ditch terminals. That in the south proved to be devoid of finds, whereas two large sherds of Roman pottery came from the uppermost fill in the northern length.

Blocking Ditch (Figs. 3, 6 & 7)

Feature 40 was a short length of ditch (7.00 x 2.50m) that cut across part of the main entranceway blocking the southern 'carriageway'. Only *c.* 0.35m deep, this had a broad flattened profile and, like the main perimeter ditch terminals, had a squared end parallel to the alignment of the gate structure. Its in-fill consisted of a single deposit of silty sandy clay that increased in its gravel content towards its base, and included five fragments of pottery.

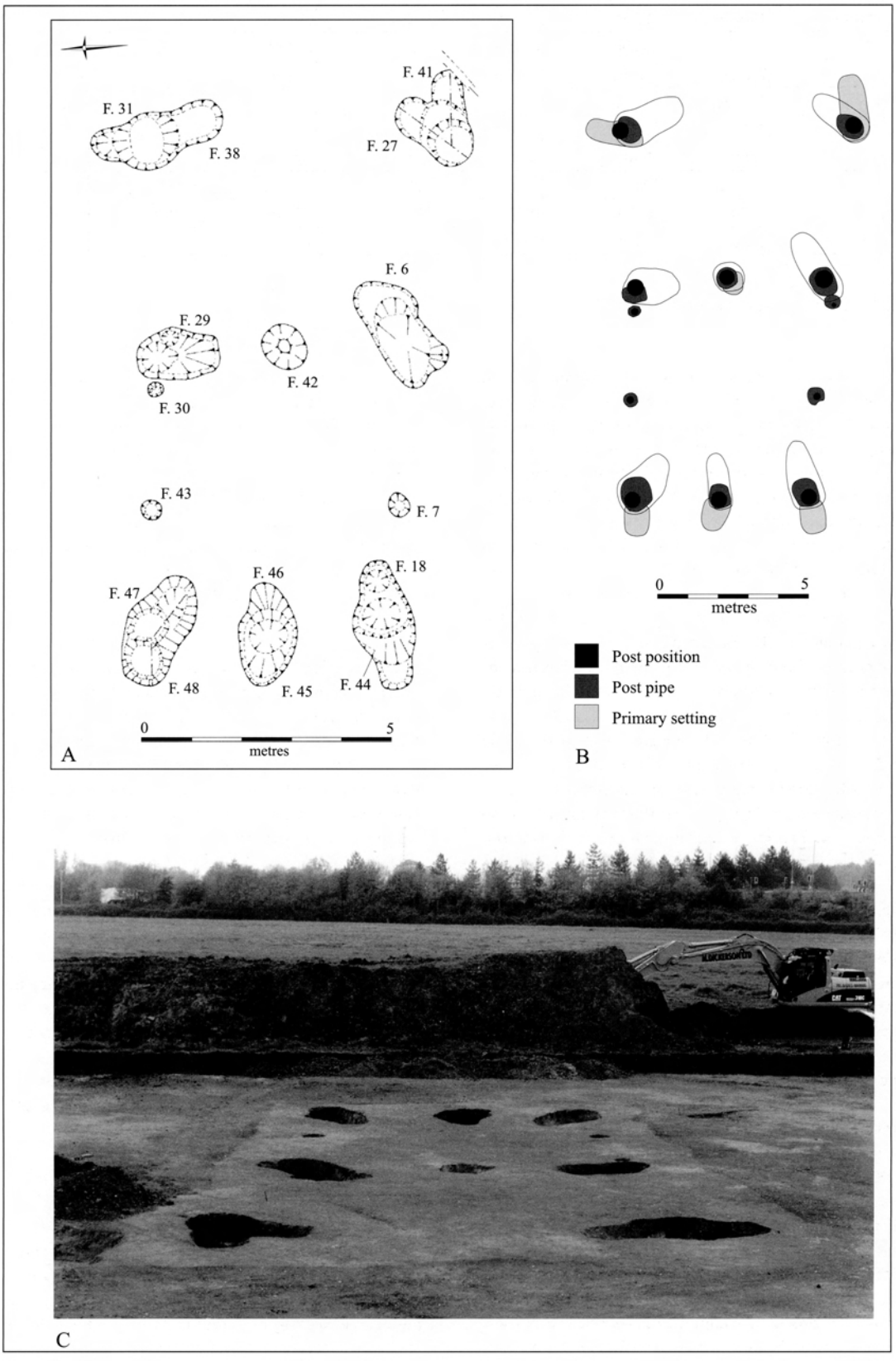

Figure 4. *The Gateway: A) base-plan; B) with post positions indicated; C) photograph looking west through entranceway (D. Webb).*

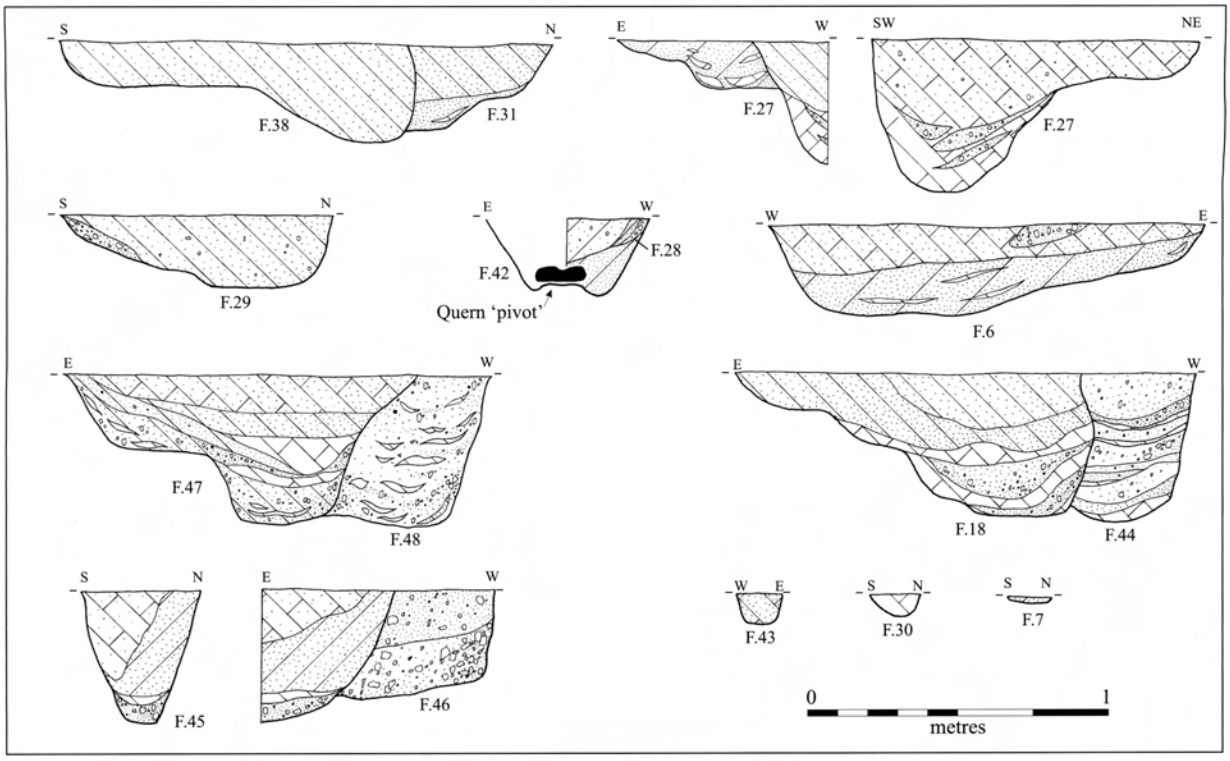

Figure 5. *Gateway Sections (see Fig. 3 for location and Fig. 7 for conventions).*

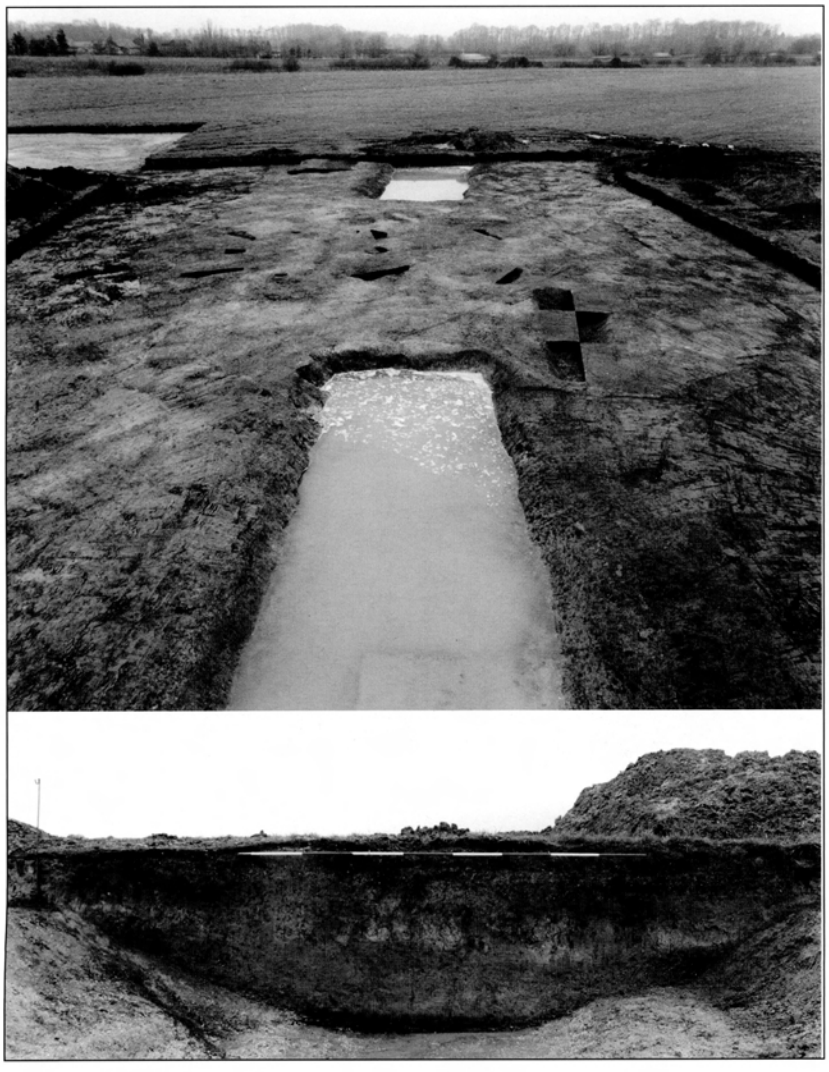

Figure 6. *Looking north along water-filled line of the main ditch circuit (top; note 'Blocking Ditch' F. 40 middle-ground right); below, southern edge-of-excavation section of F. 1 ditch (photographs D. Webb).*

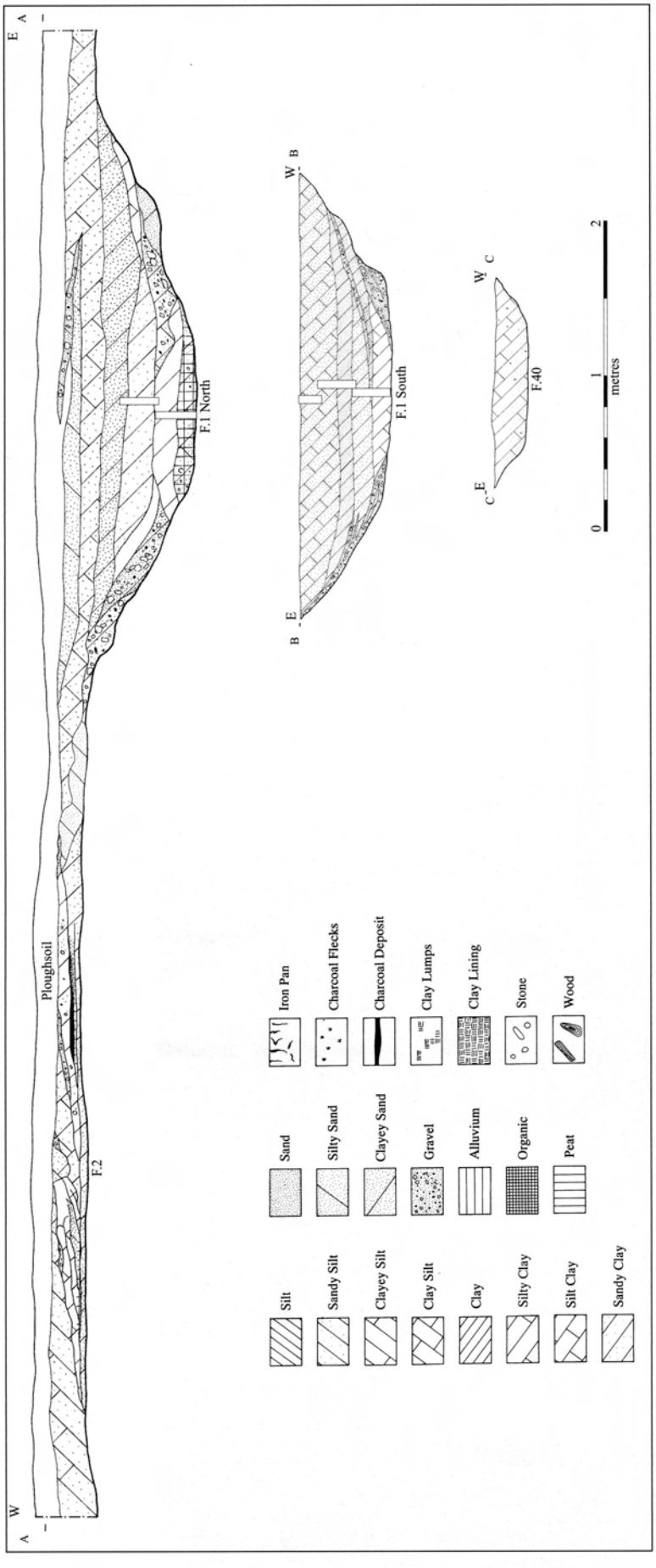

Figure 7. *Main Ditch Sections (F. 1 & F. 40; see Fig. 3 for location).*

Material Culture

Iron Age Pottery

Leo Webley

In contrast to only two sherds of Iron Age pottery forthcoming from the 1990 and 1995 campaigns (Lucas in Evans & Knight 2002a: 43), a total of 140 sherds (2818g) was recovered from the 2003–04 excavation. The bulk came from the primary fill of the southern ditch terminal, with the remainder from ditch F. 40 nearby (Fig. 8). Aside from some crumbs, only seven vessels are represented, two from F. 40 and five from the ditch terminal, with some of the latter being substantially complete (Fig. 9). Unusually, therefore, this assemblage can be described on a vessel-by-vessel basis:

Southern Circuit Terminal

*V*essel 1. Complete profile of a small globular jar (Fig. 9.4); height 10.5cm, rim diameter 10cm, base diameter 8cm, girth diameter 11cm (three sherds, 177g). The rim is slightly everted with an internal bevel. The base is pinched out. Fabric: fairly soft with moderate quartz sand, moderate medium-very coarse red iron ore/oxide and rare unburnt flint gravel.

Vessel 2. Parts of a large, very fragmented slack-shouldered vessel (Fig. 9.1); base diameter 13cm, rim diameter c. 20cm (56 sherds, 1379g). The rim top has diagonal fingernail impressions, slanting clockwise from the outer to inner edge. The base is pinched out. Chaff impressions to surfaces. Fabric: soft with moderate quartz sand, rare flint gravel and rare medium-very coarse red iron ore/oxide.

Vessel 3. Complete rim and upper body of a slack-shouldered jar (Fig. 9.3); height >10.5cm, rim diameter 12cm (11 sherds, 430g). The rim is upright and rounded. The exterior has extensive burnt residues and has suffered from spalling. Fabric: hard with moderate quartz sand.

Vessel 4. Substantial fragments of the base, body and rim of a slightly ovoid shoulder-less jar (Fig. 9.2). The rim is upright, rounded and slightly tapered on its inner side; the base is simple. Height c. 10-12cm, base diameter 10cm, rim diameter 11cm (48 sherds, 557g). Highly burnished exterior. Traces of burnt residues to interior and exterior. Fabric: hard with very common medium-very coarse burnt flint.

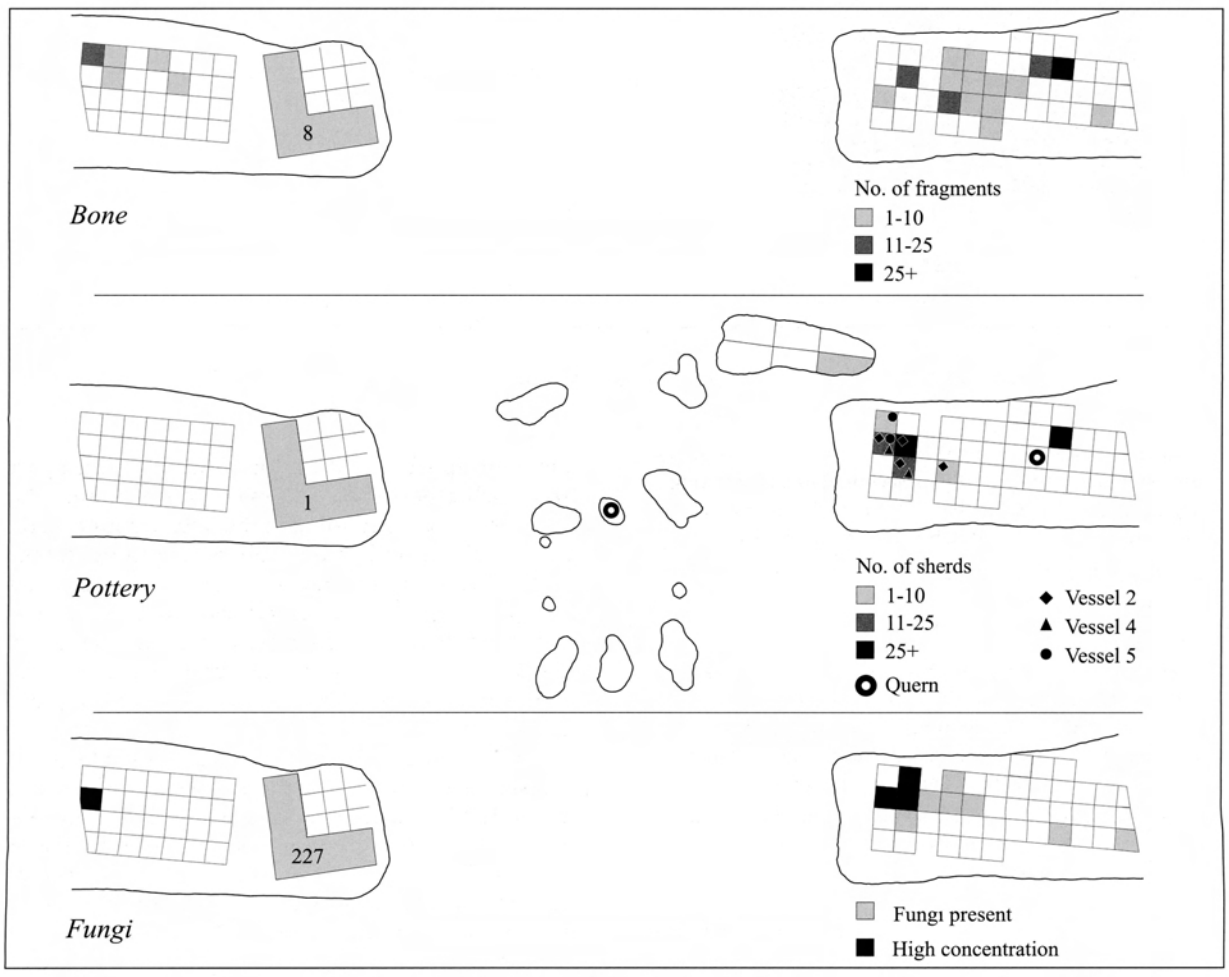

Figure 8. *Artefact Distributions, F.1 basal deposits and ditch F. 40 (note for northern F. 1 terminal, toned 'L'-shaped swathe indicates area of 1990 & 1995 excavation cuttings, with their respective finds numbers shown).*

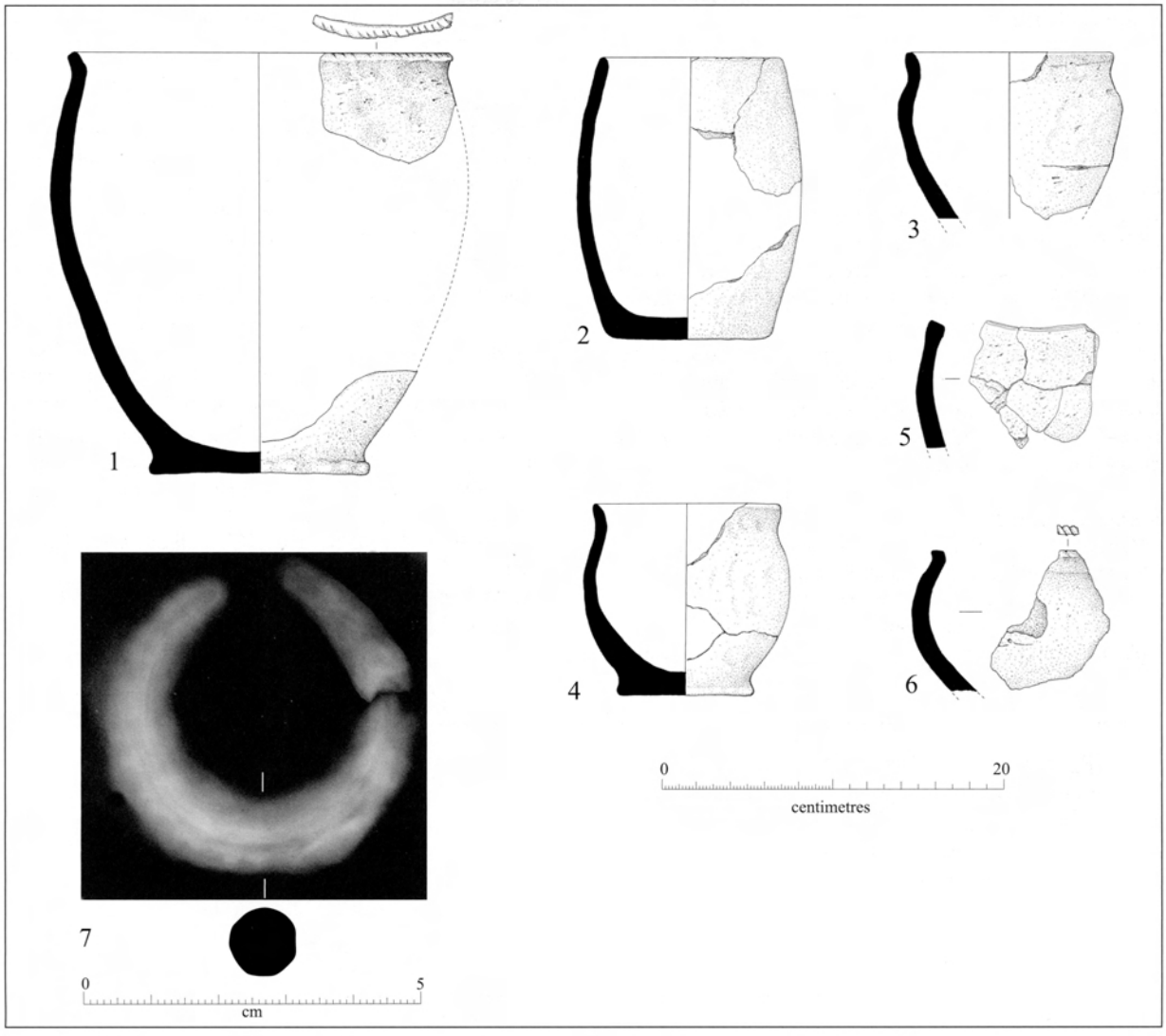

Figure 9. *Pottery Drawings (1-6; F. 1 & F. 40) and the F. 28 iron ring (7).*

Vessel 5. Parts of the rim and body of a rounded shoulderless vessel with an inwardly projecting flattened rim (Fig. 9.5; dia. 14cm; 17 sherds, 190g). Fabric: fairly soft with moderate voids from vegetable matter; soapy feel.

Crumbs of pottery in a sandy fabric (6g) were also recovered.

Ditch F. 40

Vessel 6: Part of the rim and body of a globular vessel with an upright flattened rim (Fig. 9.6; height >9cm; four sherds, 70g). The rim top has diagonal fingernail impressions, slanting clockwise from the outer to inner edge. Fabric: hard with moderate quartz sand.

Vessel 7: Body sherd with a row of fingertip impressions along the shoulder (9g). Fabric: hard with common medium-very coarse burnt flint.

The pottery from the southern enclosure ditch was found in a fairly tight cluster at the ditch terminal. Sherds from individual vessels either occurred within a single metre-square or in immediately adjacent squares, with the exception of Vessel 2, fragments of which could be found at least 2m apart from each other. The impression gained is that the five vessels were deposited in the ditch terminal soon after breakage and in one coherent episode, rather than being surface refuse that incidentally became incorporated into the ditch fill over an extended period. Admittedly, the edges of many of the sherds are abraded, especially in the case of Vessel 2, but the fairly soft fabrics of these vessels will have played a role in this.

It is unusual to find an Iron Age assemblage of this size with such a restricted range of vessels and relatively high degree of completeness. The concentration of pottery in the southern ditch terminal and the neighbouring F. 40, with a complete absence of pottery from the primary fills of any of the previously investigated parts of the ringwork ditch, is also noteworthy.

This is an important assemblage as it seems to occupy a transitional point in the development of local ceramic styles. The bulk of the assemblage (Vessels

1–3 and 5–6) are in the Middle/later Iron Age tradition, as shown by the sandy fabrics and slack-shouldered forms. The remaining two vessels (4 and 7) show features that link them to the earlier Iron Age tradition. Both are tempered with burnt flint, and the fingertip decoration around the shoulder of Vessel 7 is a feature often found in assemblages of the 'Early' part of the period, but almost never in the Middle Iron Age. Though the single sherd that represents Vessel 7 could be residual, the same cannot be said of Vessel 4 of which substantial parts were recovered. Vessel 4 is particularly interesting in that it seems to be transitional in type. While the burnt flint temper and highly burnished black exterior surface are Early Iron Age traits, the simple ovoid form is more akin to the period's 'Middle-phase' vessels. A date for the assemblage around or shortly after the transition from the Early to Middle Iron Age can thus be proposed, i.e. the fourth–third centuries BC. This is compatible with the radiocarbon dates obtained from elsewhere in the ringwork ditch (see below and Evans & Knight 2002a).

Close local comparisons for this assemblage are not easy to find, as most can be categorised more easily as dating either to the earlier or later Iron Age. However, it is worth comparing the material with that from the morphologically similar circular ringwork at Wandlebury, south of Cambridge. Only small amounts of fragmentary pottery have been recovered from the primary ringwork ditch at Wandlebury, which has been described as including sherds of both earlier and later Iron Age character (Hill 2004). While the earlier Iron Age material could well be residual, an alternative interpretation would be that the ringwork dates to the same transitional period as Arbury. A series of pits inside and outside the Wandlebury ringwork largely contain earlier Iron Age pottery predating the assemblage from Arbury. However, a few pits contain slightly later material, including a sherd with a comparable soft sandy fabric and tapered rim form to Vessel 1 at Arbury (Webley 2005). This may indicate at least some contemporary activity at the two ringworks.

Faunal Remains

Chris Swaysland

A small assemblage of 117 fragments (837g) of animal bone was recovered, the vast majority of it from the southern ditch terminal (Fig. 8). The bone was in a variable state of preservation, with some having evidence of weathering prior to deposition (see Swaysland in Evans & Knight 2005 concerning the methodology of study and Note 4 in Evans & Knight 2002a concerning Serjeantson's study of the 23 bones recovered from Iron Age contexts during the 1990 season).

All the bones that could be distinguished between sheep and goat were identified as sheep and it is, therefore, assumed that no goats were present. Sheep make up 50% of the sample. One sheep mandible was recovered, this had an age at death of 4–6 years; no epiphyseal sheep ageing data was recovered.

Cattle make up 40% of the assemblage. One cattle mandible was recovered, which had an age at death of 3–6 years; an articulated astragalus and calcaneus from a juvenile animal were also present.

A horse metatarsal was also found; it was broken but, when reconstructed, was found to be mostly present. The

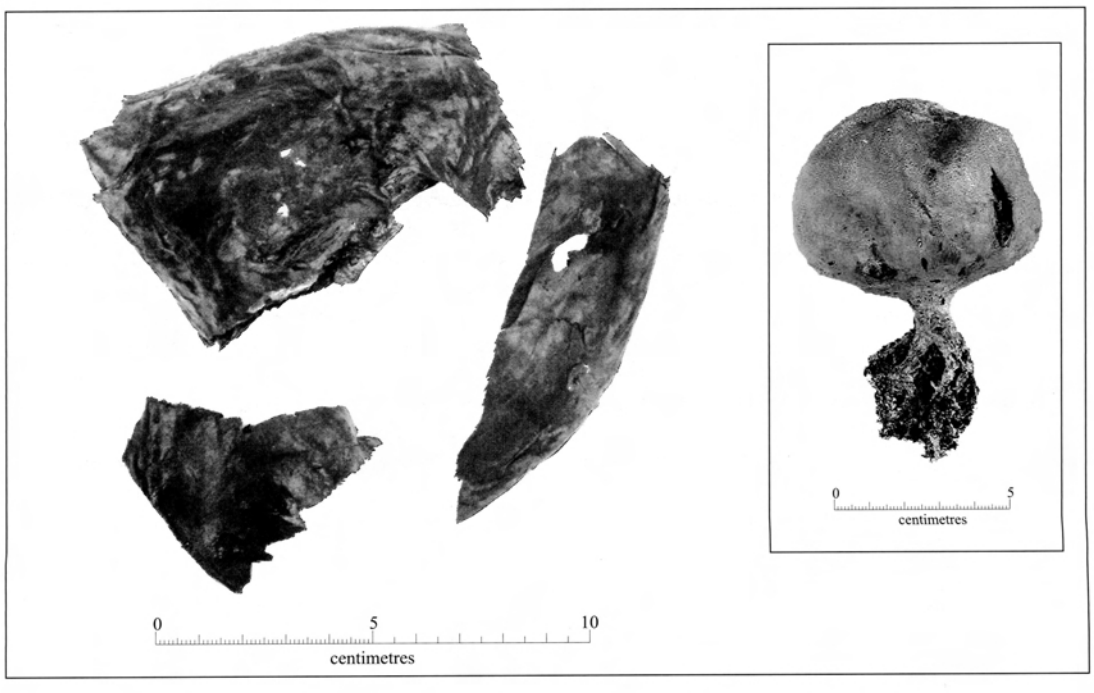

Figure 10. *Fungi: left, typical pieces recovered from F.1 basal deposits; right, modern example of the scaly earthball* (Scleroderma verrucosum).

articular ends showed wear indicating that the bone had been exposed and suffered weathering before being deposited. When measured, it provides a withers (shoulder) estimate of 11.2 hands. By modern standards this would be considered a pony (<14 hands); Maltby (1981) in a review of several Iron Age sites indicates horse withers heights ranging from 10–14 hands.

One bone, a sheep humerus, showed two horizontal, light cutmarks on the anterior face near the distal end, which may be indicative of dismemberment. A sheep tibia showed evidence of carnivore gnawing.

Table 2. *Relative species proportions within Iron Age features (involving a restricted suite of skeletal elements and all mandibular teeth, 'POSAC' refers to the methodology used to quantify the assemblage; see Swaysland in Evans & Knight 2005).*

Species	POSAC	POSAC %
Sheep	5	50
Cattle	4	40
Horse	1	10

In conclusion, the assemblage is very small so any conclusions must be tentative. All faunal material was recovered from domestic mammals, predominantly sheep and cattle. Horse remains were scant, but indicate an animal of small stature typical of the period.

Iron Age Fungus

Quita Mould and Barbara Wills

During the 1990 excavations an organic-rich deposit was observed in the northern ditch terminal in Trench IV. Investigation of the deposit, described as a waterlogged, dark brown-black 'muck', suggest that it had been produced in reed swamp conditions in 0.30–0.40m of standing water.[1] The deposit was found to contain a small amount of bone, worked wood and 227 fragments of an organic material thought to be leather (Fig. 8; Evans & Knight 2002a: fig. 13). A sample of this organic material was radiocarbon dated to between the 4th and 2nd century BC. Consequently these small organic fragments, though rather unprepossessing in themselves, were of the greatest interest, as leather of this date is rarely recovered.

The pieces were accepted by the British Museum (Registration no. P1990, 12–3) where they were successfully conserved and a selection put on permanent display.[2] At that time the identification as leather was not doubted and conservators who treated the material described the pieces as 'tanned leather fragments'. Later, in 2000, a preliminary assessment of the material was made by Quita Mould and this was included in the fieldwork summary published in this journal (Evans & Knight 2002a: 42–3). At that time, the conserved material was considered not to be vegetable (oak bark) tanned leather, but most likely to be semi-tanned (oil-tanned) leather. In that publication the hope was expressed that a more extensive investigation of the assemblage would be possible and it is to the credit of all those involved that this has been achieved and the results (incorporating the 50 more larger such pieces found in 2003/04) presented here.

Examination of the 'fresh' material from the recent excavations suggested it was unlikely to be semi-tanned leather because of the characteristics of the surface. The possibility of it being an internal skin product or viscera was considered. While the thinner 'skin/membrane' observed might suggest the remains of an internal organ, the recovery of larger pieces, clearly showing that the thin membrane was directly associated with a thicker 'pith-like' core, made this interpretation unlikely.

A fungus of some kind was suggested. Re-examination of the earlier 1990 material in the British Museum confirmed our suspicions that it, too, was the same. The differing properties observed initially in separate small pieces in the first-phase assemblage material were, in fact, components of a single material, now seen in the larger, more indicative fragments from the 2003/04 excavations. The occasional elliptical holes seen previously, also occurred on larger, excavation-phase pieces and did not derive from stitching. The apparent 'cut' edges observed earlier material were the result of clean breaks in the thicker membrane (Fig. 10).

As investigation continued it was suspected that all the material was, indeed, some sort of fungus, possibly puffball or a bracket fungus. Three samples from 2003/04 were sent to the Mycology section, The Royal Botanic Gardens, Kew. Dr. B. Spooner confirmed that he had seen similar archaeological material in the past which were usually found to be puffballs, particularly *Handkea utriformis*. His colleague, Dr P. Roberts, was able to identify the sample pieces as being puffball. The puffball may well be *Handkea excipuliformis* (Scop.) Kreisel, the pestle-shaped puffball, a large and common type, but a more exact identification was not possible from the material submitted. The three samples examined were mature and contained abundant spores and capillitium (specialised hyphae). Subsequently, the remaining 2004 material, some sixteen samples, were examined by M. Parslow. These were identified as fragments of fruitbody of larger fungi, all belonging to the genus *Scleroderma*, the earthballs; similar in shape to puffballs but not closely related (Parslow 2005). Despite some variation the material could be identified as one single species, or two closely related taxa. Within the known British species today, they are closest to *S. verrucosum* (Bull.) Pers, scaly earthball: a relatively common and widely distributed species (Fig. 10). A single sample also contained smaller spores possibly from a Lycoperdales fungus, a puffball or a bovist. Other macrofossil fungi from archaeological contexts in Britain subjected to mycological identification are either puffballs or bovists (Spooner & Roberts 2005). Bracket fungus has been noted during excavations at Flag Fen, Peterborough (M. Taylor pers. comm.); the earthballs at Arbury are the first recorded occurrence of such from an archaeological context.

Possible Uses

The following section draws heavily on information provided in an internal report regarding the identification of the Arbury material by Parslow (2005) to Dr Roberts (Mycology Section, the Royal Botanic Gardens, Kew). While it is difficult to establish the number of specimens represented by the fragments retrieved from the 2003/4 excavations, it is estimated that at least seven fruit bodies of earthballs and

more than one puffball were recovered. The three samples of puffball identified were mature and the earthballs appear to have been collected just prior to maturity. When kept in favourable conditions, an immature fungal fruit body will continue to ripen and produce spores. Those picked when too young fail to produce spores and die. Those left undisturbed open at the top, the upper part disintegrates and the spores are dispersed. All the earthballs examined from 2003/04, bar one, had been collected when just sufficiently large to continue the maturing process and produce spores, but prior to complete maturity. This suggested that they had been deliberately collected and had been selected at a particular stage of their development. A wet ditch would be an unusual habitat for puffballs or earthballs to thrive. While it is conceivable that mature puffballs growing in the locality may have blown into the ditch, it is most unlikely that the earthballs had occurred there naturally.

The reason that they had been collected is uncertain. The larger puffballs are considered edible when young, that is immature before they have produced spores, and are gathered for food. While it is unknown whether mature puffball was collected for food in the distant past, it was not eaten in the recent past and would certainly be unpleasant to today's palate. It is unlikely that mature puffball, as that found at Arbury, was eaten. Similarly, earthballs are generally considered to be inedible or lightly toxic (Parslow 2005 quoting Imazeki, *et al.* 1988). It is more likely that the fungi from Arbury had been gathered for another purpose. Traditionally the dry fibrous mass of thread-like hyphae (capillitium), that remains after puffball spores have been expelled, have been used as tinder and as a styptic for wounds (Watling & Seaward 1976: 170–1). It has also been suggested that they were used as insulation (Watling 1975). While earthballs do not have capillitium but generative hyphae, it has been observed that when collected just sufficiently mature to produce spores, as observed in the Arbury examples, the generative hyphae dry and resemble modern expanded polystyrene (Parslow in litt.). It may be that the Arbury fungi had been collected for medicinal uses, for tinder or a packing material rather than as a food source.

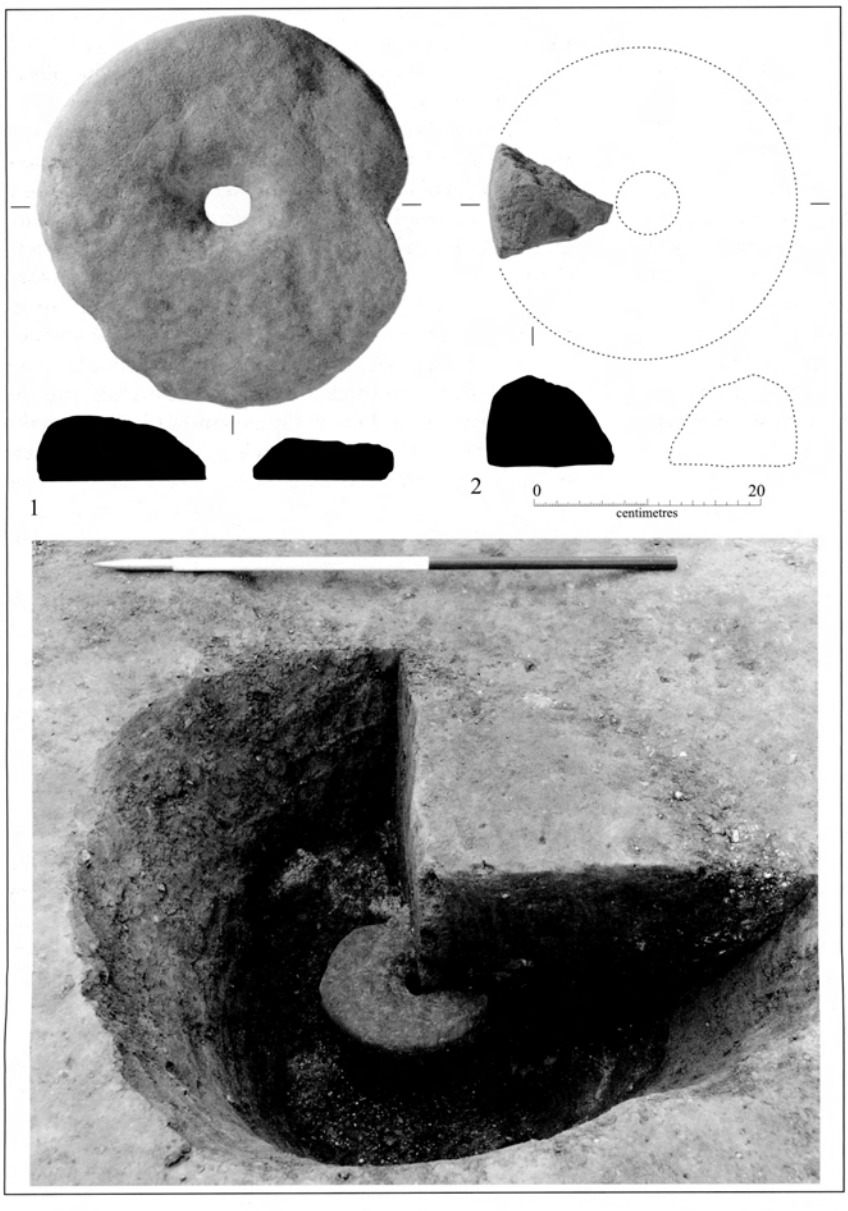

Figure 11. *The Quernstone 'Pivot' (bottom; F. 42) with details of recovered quernstones above (1 & 2; photographs, D. Webb).*

Macrofungal material has been recovered from a small, but increasing, number of archaeological contexts, principally of Iron Age and Roman date (Watling & Seaward 1976: 165–6). The majority has been found to be species of puffball. As far as we are aware, Arbury is the first site from which earthballs have been recorded. Macrofungal material from waterlogged contexts is difficult to recognise. At Arbury, the material was first considered to be a semi-tanned leather or skin product, but recovery of a larger sample allowed its true identity as fungus to be determined. It is most likely that other small fragments of organic material from waterlogged Iron Age contexts have been similarly misidentified previously. It is of interest here, that a fragment of organic material from a waterlogged context at Haddenham, Cambs, previously described as possibly being of hide (Evans & Serjeantson 1988), was identified as an immature fruit body of the Mosaic Puffball *Handkea utriformis* (Bull.) Kreisel (Parslow 2005) during this study.

The Waterlogged Wood

Maisie Taylor

Fifteen pieces were recorded from the 1990 evaluation: three pieces of roundwood and a number of tiny, disintegrating twigs, six woodchips (one off roundwood) plus three pieces of fairly thick bark; all the wood chips were very thin, often 1mm or less, and often fragmentary (Taylor in Evans & Knight 2002a: 41–2). Much of the wood from the 2003/04 season was also in very poor condition, although one or two pieces were slightly better preserved. It included nine pieces of roundwood, seven pieces of roundwood debris, 13 woodchips, with the remainder being fragments of bark with some other debris, probably woodchips, and roundwood which was too decayed for analysis.

Roundwood and roundwood debris

Much of the roundwood and roundwood debris is from coppiced material, although the 1990 material is much more twiggy. Most of the material is 20mm and less with two or three pieces between 20 and 35mm. This means that all the material falls within the range which is considered useful for hurdle or fence making, although tending to be rather light-weight (Forestry Commission 1956). Many prehistoric hurdles are lighter weight than modern ones, however (Morgan 1988: Table 2).

The poor condition of the material made precise species identification difficult. Most of the non-oak samples examined microscopically were either hazel (*Corylus avellana*) or alder (*Alnus glutinosa*). Both species were widely used in prehistory for wattle work.

Bark

The bark from the 1990 excavations is very thick, 15–25mm, suggesting it had derived from a mature tree. The material from the 2003 excavation comes from a larger range of thicknesses, (2–10mm) suggesting a range of younger tree.

Woodchips

Most of the woodchips are tangential and fairly small such as might be generated by sharpening posts, or trimming up raw material for coppice.

The assemblage is very small, but appears to be quite coherent. Almost all the debris is derived from the production of wattle, or preparing the coppiced wood for use. This is particularly clear in the material from the 2003 excavation. Most of the material is either hazel (*Corylus avellana*) or alder (*Alnus glutinosa*), although there is a small amount of oak (*Quercus* sp.). The combination of these common species, together with the size of the material, suggests that the material was destined for local fencing.

Other Finds

Aside from only three worked flint and two sherds of Roman pottery, a greyware base and a complete amphora handle (see, respectively, Beadsmoore and Andersen in Evans & Knight 2005 and also Lucas in Evans & Knight 2002a: 43), four fragments of burnt stone (980g) were found in three contexts: F. 40 and from the southern ditch terminal (F. 1). All the pieces derived from large, rounded sandstone pebbles.

The worked stone assemblage consisted of two, upper stones of rotary querns; the one near-complete (F. 42; Fig. 11.1) and, the other, a wedge-shaped fragment (F. 1; Fig. 11.2). The former was 34cm in diameter, had an oval-shaped central perforation (*c.* 4.5cm dia.), was 5.5cm thick and weighed 7kg; it had a worn cupmark-like hollow (120mm dia; 45mm deep) in its upper surface, which evidently did relate to its usage as a quern. The latter piece came from a 32cm diameter quern, was 8.5cm thick and had a tall arched profile. Both pieces were Lower Greensands (S. Timberlake pers. comm.). Although previously thought to date no earlier than the Late Iron Age, rotary querns have now been recovered from 5th century BC contexts in Britain (Gussage All Saints, Danebury and Thorpe Thewles: Waits 2002: 28).

Metal-detecting the ditch fills produced a single copper alloy coin from the tertiary fills of the northern ditch section (F. 1). Reported upon by A. Challands, it is a worn and corroded Gratian dated AD 367–383.

A single piece of ironwork was recovered from the excavation of entrance features, comprising a 'closed' penannular ring.

<047>, F. 28 Concreted and corroded penannular iron ring (two refitting pieces), creating an almost complete ring, with circular cross-section and tapering terminals (confirmed by X-ray; Fig. 9.7). Dimensions: external diameter 57mm, internal diameter 22mm, weight 43g. Recovered from 'gate' posthole, F. 28, the recut of F. 42 with its redundant rotary (top) quernstone.

It is not possible to ascertain the function of this ring, although a number of similar rings have been recovered, of varying sizes and including split-rings, from Danebury, Wilthshire (Sellwood 1984: 366, fig. 7.22)

Environmental Studies

Micromorphological Analysis
C.A.I. French

Exposure of the associated bank and palaeosol sequence in Trench IV in 1995 and Profile D in 2003/04 permitted sampling for micromorphological analysis (after Murphy 1986 and Bullock *et al.* 1985). Two sections through the rampart and underlying buried soil sequence were taken (see French in Evans & Knight 2005 for detailed micromorphological descriptions of the Trench IV samples, the results of which are summarised in Table 3 below; see also French in Evans & Knight 2002a: 39–40).

The soil profile in Trench IV is described as:

0 –21 Ap; dark brown silt loam with occasional fine-medium gravel, <30mm; distinct boundary.
21–34 redeposited subsoil; greyish white/yellowish brown mottled, silty clay marl; distinct but irregular and undulating boundary.
34–40 redeposited? turf; dark greyish brown silt/very fine sandy loam; distinct but irregular and undulating boundary.
40–41 lens of reddish yellow/brown iron pan; distinct but irregular boundary.
41–44 *in situ* turf; dark brown silt/very fine sandy loam with occasional flecks of charcoal, <10mm; variable thickness; merges over 20mm.
44–60 buried soil; pale greyish brown silt loam with rare flecks of charcoal, <5mm; distinct boundary.
60+ subsoil; yellow/white mottled silty calcareous marl.

A continuous soil profile was taken through this sequence from the base of the bank material (at *c.* 29cm) to the top of the subsoil (at 60cm) for micromorphological analysis.

A second exposure through the rampart and buried soil was recorded and sampled for micromorphology in 2003/04 from Profile D. While this profile was ostensibly similar to that in Trench IV, at least three layers of compressed turves (totalling 5–6cm in thickness) were observed at the base of the bank, placed on the truncated surface of the buried soil, with a 2mm thick iron pan developed at that contact surface. In addition, on the outside of the clay and gravel upcast of the rampart bank was a *c.* 30cm thick zone of turves that may represent a former turf stack on the exterior side of the rampart/interior side of the ringwork ditch.

The description of the thin-sections taken through the rampart and soil sequence are summarised in Table 3.

Beneath the present day ploughsoil is a 1.5cm thick zone of loamy sand exhibiting much sesquioxide impregnation, with horizontal and parallel crack patterns on the upper surface of the mixed loamy sand and gravel deposit which comprises the inner rampart. This zone could represent turf development on the former rampart's surface and/or iron pan development at the transition between the base of the present ploughsoil and the upper surface of the rampart.

The underlying context was composed of a similar loamy sand main fabric, but in addition it contained irregular aggregates and zones of clean, very fine quartz sand. This heterogeneous mixture of soil and subsoil was probably also part of the rampart upcast. In the field, there were also thought to be small lumps of turf-like material within it.

There is then an abrupt change to a thin zone of heavily iron impregnated, highly organic loamy sand. In thin-section this appears as two lenses of iron impregnation, 'sandwiching' a thin zone of loamy sand material. This turf zone is highly compressed and oxidised, and possibly represents one horizon of laid turves on top of the *in situ* turf. In addition, the upper 500µm of the upper surface of the turf exhibits a 'crust' of silty clay, as if it was a trampled upper surface (after Gé *et al* 1993). In contrast in Profile D, at least three layers of individual turves were recognisable in the field at this level, but in this case they were laid directly on the truncated soil that had already had its turf removed.

Table 3. *Summary of micromorphological results.*

Depth below surface (cm)	Description	Interpretation
29-31.5	loamy sand	similar to buried soil
31.5-33	loamy sand with much sesquioxide impregnation, and horizontal/parallel cracks	turf on/within the rampart
33-40	loamy sand with small gravel pebbles throughout	upcast material from external ditch comprising the rampart
40-46	loamy sand with irregular aggregates/zones of very fine sand	mixed soil and subsoil, probably also upcast material of rampart
46-46.2	surface 'crust' of silty clay on a lens of iron impregnated organic material	compacted/trampled surface on former turf
46.2-46.8	loamy sand	redeposited soil with turf
46.8-47	lens of iron impregnated organic material	compacted former turf
47-60	loamy sand with very fine organic component and irregular zones of greater silty clay content	buried soil, probably disturbed and truncated before burial
60+	terrace sands and gravels	subsoil

The soil beneath is a similar loamy sand fabric to the other contexts, but exhibits a greater amount of finely comminuted amorphous organic matter and occasional zones of greater amounts of non-laminated silty clay within the fine groundmass. As this buried soil has an homogeneous composition and few features of note, it therefore contains few pointers as to the history of its development. Nonetheless, the relatively small amount of within-soil illuviation of fines down the profile does point to the rather poor development of a former brown earth (Avery 1980).

The thin-section analysis has mainly served to confirm the field observations of a brown earth with turf development sealed by deliberately dumped material containing turf, soil and subsoil material presumably derived from the earthmoving activities associated with the digging of the outer rampart. The buried soil is now severely oxidised and mixed by the soil fauna, with some evidence for soil disturbance given by the relative abundance of dusty or silty clay within the fine groundmass. Former turf development on this soil points to an open, grassland landscape prior to rampart and ditch construction. The thinness of the turf (<1cm) points to considerable compression, compaction and organic degradation, by an estimated factor of at least ten (given an average turf depth of about 10cm).

It was very unusual to find an intact soil profile without a reasonable depth of overburden, even more so in such an intensively utilised arable field as at Arbury. Several examples of Iron Age ringworks have now been investigated in Cambridgeshire using micromorphological analysis and either field assessment or some degree of excavation: Borough Fen Site 7 (French in French & Pryor 1993, 73–4; French 1995a), Wardy Hill, Coveney (French 1993 and in Evans 2003), Stonea Camp (French 1995b and 1997) and Wandlebury (French 2004a and b). Of these, all but Wandlebury are either in a fen-edge or gravel terrace in a river valley location, and have been severely affected by intensive modern arable farming and/or past desiccation. Every site, except Borough Fen (French & Pryor 1993: 73–4) was no longer damp, let alone once waterlogged, and most have suffered truncation of the earthworks and associated buried soils as a result of subsequent ploughing and/or landscaping, despite their often 'protected' status, for example Stonea Camp, Wandlebury and Borough Fen. Nonetheless, in each case, it has been possible to extract some information either about land-use practice and/or rampart construction using micromorphological techniques (Table 4).

Pollen Analysis

Steve Boreham

Three monoliths (A, B & C) from a ditch fill south of the main entrance to Arbury Camp (Fig. 7) and a block sample of sediment from the bank/'rampart' north of the main entrance from the excavations are considered in this report (see Table 5 for pollen percentage data, Boreham in Evans & Knight 2005 concerning methodology and Note 7 in Evans & Knight 2002a for previous pollen sampling).

Monolith C

Three samples of sediment (5cm, 25cm & 42cm) were analysed from this monolith. Pollen concentrations varied enormously from 2,191 to 198,748 grains per ml respectively. There was a clear improvement in pollen concentration and preservation of palynomorphs from the base of the sequence upwards. The basal sample (5cm) contained oxidised and corroded pollen grains, and as a consequence, only eight pollen grains were counted from an entire slide. It was judged that further analysis of this sample would not

Table 4. *Iron Age enclosure soil and land-use history.*

Site	Date	Soil	Pre-site Land-use
Borough Fen Site 7 (SAM 222)	Middle to Late Iron Age (380 cal BC - 80 cal AD; Har-8512)	argillic brown earth and relict arable soil with included occupation debris; on fen gravels; sand and gravel dump rampart	once wooded, cleared, then ploughed; subject to periodic alluviation; molluscs also suggest dry, open, short-turved grassland
Stonea Camp	later Iron Age	poorly preserved sandy (clay) loam; on March gravels; dump rampart	suffered truncation, leaching, oxidation and some illuviation; nearby pre-Roman soil from Stonea Grange exhibited open ground, some alluviation and middening (French 1997)
Wardy Hill, Coveney	later Iron Age	gleyed brown earth with ? turf; on Gault clays; presumed clay subsoil used for rampart	? grassland on the fen-edge; poorly drained subsoil and peat fen encroachment, now severely truncated by ploughing
Arbury	later Iron Age	brown earth with turf; on terrace deposits; soil, subsoil and turves used for rampart	open grassland; much oxidation
Wandlebury	Early to Late Iron Age	Rendsina with turf; often with turf removed; on chalk; chalk subsoil for rampart	grassland on high ground, both now and in the Iron Age; possibly ploughed previously

have been cost-effective. However, the samples from 25cm & 42cm produced counts of 305 and 335 grains respectively, which exceeds the statistically desirable minimum of 300 pollen grains.

The sample from 5cm produced a pollen signal dominated by grass (*c.* 25%), sedges and herbs, with pine and ferns (Pteropsida). The percentage of Asteraceae pollen was rather high (*c.* 37.50%) indicating that soil processes had impoverished the pollen assemblage through oxidation. The sample from 25cm was also dominated by grass (32.5%) and herbs, and also contained somewhat elevated amounts of Asteraceae pollen (29.8%) indicating that soil processes had begun to act on the pollen assemblage. However, a range of herb taxa were recorded, and arboreal pollen including birch (1%), alder (6.2%) and hazel (5.9%) were present. Spores of the polypody fern, which often grows on trees, were recorded, and spores of other ferns (Pteropsida), and pollen of the emergent aquatic bur-reed (*Sparganium*) were also counted. In contrast, the sample from 42cm, although dominated by grass pollen (79.1%), showed little sign of

Table 5. *Pollen Percentage Data (* denotes low main sum).*

	<209>	<209>	<206>	<205>	<204>	<204>	Rampart	Rampart
	Mono C	Mono C	Mono C	Mono B	Mono B	Mono A	Block	Block
	5cm	25cm	42cm	71cm	91cm	110cm	Turf	Buried Soil
Trees & Shrubs								
Betula		1.0	0.9					
Pinus	12.5*		0.3					12.5*
Quercus			0.6					
Alnus		6.2	1.2					
Fraxinus			0.3					
Corylus		5.9	2.7					
Herbs								
Poaceae	25*	32.5	79.1	100*	100*	100*	60*	25*
Cyperaceae	12.5*		1.2					12.5*
Asteraceae (Asteroidea/ Cardueae) undif.	25*	12.8	2.1					25*
Achillea type		0.7						
Asteraceae (Lactuceae) undif.	12.5*	17.0	0.9				20*	12.5*
Caryophyllaceae		0.3	0.6					
Chenopodiaceae		0.3						
Brassicaceae			0.6				20*	
Malva type		0.3						
Plantago lanceolata type		0.3	3.3					
Ranunculus type		0.3	0.6					
Rumex undiff.		0.3	1.5					
Sanguisorba			0.3					
Apiaceae (Umbelliferae)		0.3						
Lower Plants								
Polypodium		4.3	0.3					
Pteropsida (monolete) undif.	12.5*	16.1	2.4					12.5*
Pteropsida (trilete) undif.		1.3	1.2					
Aquatics								
Sparganium type		1.6	1.8					
Summary								
Sum trees	12.5*	7.2	3.3					12.5*
Sum shrubs		5.9	2.7					
Sum herbs	75*	65.2	90.1	100*	100*	100*	100*	75*
Sum spores	12.5*	21.6	3.9					12.5*
***Main Sum**	**8**	**305**	**335**	**1**	**1**	**1**	**5**	**8**
Concentration (grains per ml)	**2191**	**41758**	**198748**	**<1000**	**<1000**	**<1000**	**<1000**	**1744**

post-depositional oxidation. A range of arboreal taxa were represented including birch, pine, oak, alder, ash and hazel. Herbs were also well represented, and included sedges, strapwort plantain (3.3%) and dock (1.5%). Spores of the polypody fern, other fern spores (Pteropsida), and pollen of bur-reed (*Sparganium*) were also present.

Monolith B
Two sediment samples (71cm & 91cm) were analysed from this monolith. Pollen concentrations were extremely low at <1000 grains per ml. The preservation of palynomorphs was very poor with only a single grass pollen grain recognisable on each slide. Since the samples were so badly oxidised it was impossible to describe the assemblage, other than to say that it once may have been dominated by grass pollen

Monolith A
The single sample (110cm) analysed from this monolith yielded very low pollen concentrations (<1000 grains per ml). The preservation of palynomorphs was very poor with only a single grass pollen grain recognisable on the slide. As above, the sample was so badly oxidised that it was impossible to describe the assemblage, other than to say that it once may have been dominated by grass pollen

'Rampart' Block
The pollen sample from the buried turf produced a very low pollen concentration (<1000 grains per ml), while the buried soil sample was almost as poor (1744 grains per ml). The preservation of palynomorphs was generally quite poor with grains showing signs of oxidation and corrosion. The turf sample yielded only five grains from a single slide, and the buried soil yielded only eight grains. These counts are far below the statistically desirable minimum of 300 pollen grains and, therefore, the results should be treated with caution.

The turf sample was dominated by grass pollen (60%) with herbs including Asteraceae (20%) indicating alteration of the pollen assemblage by soil processes. The buried soil sample was dominated by grass (*c.* 25%), sedges and herbs, with pine and ferns (Pteropsida). The percentage of Asteraceae pollen was rather high (*c.* 37.50%) indicating that soil processes had impoverished the pollen assemblage through oxidation.

In conclusion, the base of the ditch fill (Monoliths A–C) has clearly been subjected to some oxidation, but the sample from 5cm shows an assemblage dominated by grass with sedges and herbs. A clearer idea of the vegetation can be gleaned from the 25cm sample, where grass dominates the signal, with herbs, hazel and alder scrub, and bur-reed growing in wet conditions. The sample from 42cm gives the clearest and most reliable data for the reconstruction of surrounding vegetation. Grass is the dominant vegetation here, but this signal could represent (at least partly) reed-swamp, rather than meadow grassland. Indeed, the presence of sedge and bur-reed add credibility to this interpretation. The disturbed ground indicator *Plantago lanceolata* (strapwort plantain) suggests trampling or soil disturbance at the site, and dock is a herb typical of riparian (bank side) habitats. The arboreal signal suggests fragments of mixed oak woodland, probably some distance from the site, and local scrub of alder and hazel. Unfortunately, very little can be concluded from the pollen samples taken from Monoliths A and B, since almost all the pollen has been oxidised and destroyed by soil processes.

The absence of cereal pollen from these samples indicates that this was an ostensibly pastoral landscape, probably of meadows and grassland with alder scrub in the wetter areas and hazel scrub on drier ground. Curiously, in most Iron Age settings a strong arable signal might be expected, which seems absent here. The silty and clayey sediments appear to have been deposited in a water-filled ditch, probably covered by reed-swamp vegetation.

Very little can be concluded from the pollen obtained from the 'Rampart' Block. There is, at least, a confirmation that grass was a dominant component of the vegetation, and that sedges and other herbs grew nearby. The presence of pine pollen is not considered important here, since it is an ubiquitous and widespread pollen type.

Environmental Samples
Ellen Simmons

Five samples were selected for analysis from the ditch terminals deposits and three from gateway posthole features (see Simmons in Evans & Knight 2005 for full methodology and sample species-list). Preserved plant remains were identified in the terminal ditch samples and in posthole F. 45. A consequence of waterlogging, preservation of this material was generally very good, although more fragile seeds may have been damaged during drying.[3] Samples from the shallower postholes to the east of F. 22 contained no preserved plant remains.

The seed taxa present can be divided into three general groupings:

- Aquatic plants living in or at the margins of water
- 'Ruderal' plants associated with human activity such as cultivation and pasturing, disturbed ground and nutrient enrichment.
- Plants associated with damp, shady, wooded and grassland environments.

The ringwork ditch itself contained water suitable for habitation by a wide range of aquatic and semi-aquatic plant life, as well as water fleas (*Daphnia*) and aquatic molluscan taxa (*Planorbis leucostoma* and possible *Lymnaea truncatula*). Aquatic plant species present in the ditch samples include pondweed (*Potamogeton* sp.), horned pondweed (*Zanichella palustris*) and, possibly, floating club rush (*Eleogiton* c.f. *fluitans*), all of which inhabit streams or ponds and ditches with standing permanent water. Additional semi-aquatic species of the margins of ponds and rivers present include sedges (*Carex* sp.), rushes (*Juncus* sp.), spike rushes (*Eleocharis* sp.) and club rushes (*Scirpus* sp.), as well as marsh stitchwort (*Stellaria palustris*) and possible marsh dock (*Rumex* c.f. *palustris*).

Human activity in the area around the ditches led to the presence of a number of plant species favouring disturbed/trampled ground and soil enriched by nutrients, such as

where animals are pastured or manuring is carried out in conjunction with cultivation. Such 'ruderal' plant species present include thistles (*Cardus* sp./*Cirsium* sp.), prickly sow-thistle (*Sonchus asper*), dandelion (*Taraxacum* sp.), stinging nettle (*Urtica dioica*), henbane, (*Hyoscyamus niger*), knotgrass (*Polygonum aviculare*) and stitchwort (*Arenaria serpyllifolia*). Also present are plant species known as common weeds of crop cultivation, such as goosefoots (*Chenopodium* sp.) and fool's parsley (*Aethusa cynapium*).

The environment local to the ditch, within which human activities encouraged the presence of a number of ruderal plant species, appears to have been one of generally damp grassland with shady hedgerow/woodland plants also present. Plants present in the ditches, such as meadow buttercup (*Ranunculus acris*), crowfoots (*Ranunculus* subgen. *Batrachium*), silverweed (*Potentilla anserina*), greater chickweed (*Stellaria neglecta*), blinks (*Montia fontana* ssp. *chondrosperma*), bramble (*Rubus fruiticosus* agg.) and wood stitchwort (*Stellaria nemorum*), all favour shady damp grassland, hedgerow or woodland environments.

One posthole sample of the three analysed contained waterlogged plant remains, a similar suite of the three groups of plant taxa although at slightly different proportions (from F. 45, the deepest of gateway postholes). The combination of damp grassland, hedgerow and woodland plant species such as blinks, silverweed, crow foots and greater chickweed, with 'ruderal' plant species such as stinging nettle, stitchwort, thistle and field poppy (*Papaver rhoeas*) predominant. It is unlikely that this feature contained water, although the waterlogging of the soil is reflected by the seeds of rushes, club rush and sedge.

In summary, the ditches have been found to have contained waterlogged plant remains indicating the presence of standing water within both terminals. Plants growing locally to the ditch included species characteristic of damp grassy habitats and damp shady hedgerows and woods. Human activities such as trampling, pasturing and cultivation also led to the presence of a number of ruderal plant species and weeds of cultivation.

Dating Evidence

In addition to the two radiocarbon assays from the evaluation-phase, two further dates were obtained from 2003/04 material. Both derive from the basal deposits of the main ditch (F. 1), the first being an AMS sample from a piece of fungus, the second from a wood fragment:

1) ARB–04/[052] – 2210±40BP/380–170 cal BC (Beta – 215386)
2) ARB–04/<080>SQ5 – 2100 ±40BP/200–30 cal BC (Beta – 215387)

Entirely consistent with the results of the earlier samples (see Evans & Knight 2002a), these would, again, attest to the Middle/later Iron Age attribution of the enclosure (though see below concerning the possibility of its 'Early' origins).

Discussion: *A Lowland Monumentality*

The 2003/04 excavations both confirmed and detailed many aspects of the site's interpretation and character arising from the previous phases of investigation (Evans & Knight 2002a). The basic feature components were largely as recovered in 1991: the great ditch (with waterlogged fills), its interior bank/rampart, the circuit's broad entranceway and the imposing gate tower. The only new elements that the excavations contributed were another, more westerly bay/set of gateway posts and the F. 40 ditch. The evidence from the site's finds assemblages was also comparable and, apart from dismissing the attribution of its 'leather' (and adding the intriguing possibility of Iron Age fungus collection/usage; see Mould and Wills above), it essentially only extended the range of what had previously been recovered. Certainly, the quantity of material in the southern circuit terminal (and also ditch F. 40) is far greater than had been encountered elsewhere around the enclosure. Yet, the finds were so localised and their numbers still so relatively low that they certainly would not point to any kind of major occupation presence. Equally, the recovery of only three worked flints, would further emphasise the paucity of 'early pre-Camp' activity on the terrace's heavy sub-soils. This being said, as indicated by French's micromorphology studies, the enclosure would seem to have been built within an 'open' (i.e. cleared) grassland environment.

The opportunity to excavate the Camp's circuit at length allowed for the revelation of the quasi-segmented character of the ditch's construction, and basically it seems to have been dug as a series of interconnecting, elongated hollows (Fig. 3). This raises a number of interpretative possibilities. These hollows are, for example, directly comparable to the primary form of the outer ditch at Wardy Hill, which there only locally survived because a portion of its circuit had been bridge-crossed and, otherwise, had subsequently been re-cut away on either side (Evans 2003: 34, fig. 23). From this, it could be extrapolated that Arbury's circuit had been left in a relatively pristine state and not extensively re-cut and maintained. (A functional logic could also be applied to this ditch form; that its builders themselves had trouble with high groundwater and, consequentially, left these ridges to control/dam its along-ditch flow.) Relating to this, it is equally possible that – whilst undoubtedly a distinct divide – the ditch itself was relatively unimportant as a boundary and that really its main purpose was to provide quarry upcast for its interior bank, which was the predominant enclosure-defining feature *per se*.

Unfortunately, due to 20th century disturbance and the cumulative impact of evaluation trenching in this area, it could not be determined whether the bank's construction was also segmented, or if it had been laid continuously. It is, however, here presumed that the latter would have been the case. The current excavation did conclusively determine that the bank's construction was 'simple'. Belying earlier speculations

tions that it possibly involved timber elements, it was clearly demonstrated that its bulk was supported only by a turf-stack revetment. How, the line of the bank is reconstructed is of crucial importance for the enclosure's interpretation and is discussed at length below.

Of the site's dating and finds, the recovery of the group of Middle Iron Age bowls from the southern circuit terminal are entirely consistent with the 4th–2nd century BC radiocarbon assays achieved (see Evans & Knight 2002a); though the recovery of flint-tempered vessels, normatively of 'Early' attribution, could suggest that it origins might lie in the later 5th century (see below). Otherwise of the finds, those *complete* items from the central middle gateway posthole(s) – the rotary quern base from its primary form (F. 42) and the iron ring/hook from the F. 28 re-setting (and as the only finds whatsoever from the gateway and bank contexts) – could conceivably attest to 'set placement', but this, also, is an issue we will have to return to. Given the restricted range of the site's artefacts, the recovery of a second quern fragment (from the main southern ditch terminal) to some degree belies the lack of evidence of arable production; the non-occurrence of cereals from both the bulk environmental samples (see Simmons above; though arable-associated weeds were present) and, too, the pollen record (see Boreham). There seems to be little evidence of fields within the Camp's immediate environs and, rather, it appears to have lain in grassland/meadows with scrub. Of course, the range of contexts sampled for environmental remains was essentially restricted to the enclosure's entrance 'architecture' and is not necessarily reflective of the Camp's interior throughout. Nevertheless, now taking the evidence of the many phases of its evaluation fieldwork and what was recovered during the 2003/04 campaign, the enclosure could only have ever hosted a relatively minor settlement component.

If one wished, an explanatory 'story' could be constructed from findings at the site. Drawing upon the negative evidence of the trenches cut south of Area A in 2003/04, this would relate to the recovery of the pottery and bone from the southern circuit terminal (almost alone) with the occurrence of the F. 40 ditch-line. The only really asymmetrical element in the entranceway's layout and without an obvious access-related function, this short boundary may have contributed to a small animal pen or the like, delimiting a space between the ditch terminal proper and the southern side of the gateway. Of course, it is always possible that a minor occupation 'presence' (perhaps amounting to no more than a small roundhouse) escaped our sampling grid in the area of the entranceway's interior, but it is equally conceivable that the gateway itself may have been modified to provide some manner of shelter. The much smaller postholes associated with its back/western bay could suggest that it was later enclosed to serve as a 7.50 x 6.75m room, perhaps the sometime abode of herders.

This would, indeed, be a convenient story, if not a very convincing one. Of this matter, all we can know for certain is that evidence of some very limited domestic activity was forthcoming. Given, however, the great scale and 'formality' (albeit simple) of the Camp-enclosure, this does not itself seem terribly significant. Despite our now sustained efforts, the site still evades ready interpretation. The excavation's pollen cores could, admittedly, be enlisted to further support the idea that it essentially related to stock management (which the evidence of fence-manufacture within the wood assemblage could also complement, though a bank-top barrier is another possibility). Be this as it may, it was still a great *monumental enclosure* and its construction would certainly have marked a 'commanding gesture', staking a group-claim to what were then, obviously little used, lowlands (Evans 1992).

How the enclosure's entranceway is thought to have actually functioned is almost entirely dependent upon how the bank system is reconstructed (Fig. 12), as, much denuded (especially in the south), there can be no certainty that all of its line survived and/or was distinguished (the immediate area being greatly disturbed by modern farm buildings). Here, two models are proposed. In the first, the arrangement of the bank terminals, is essentially accepted at face value, with the southern projected to mirror that of the north. By this, there would, indeed, have been 'carriageways' flanking the ends of the ditch and the timber gateway. The latter would have stood proud of the bank/rampart, and, in effect, have been a case of almost 'folly-like' *show architecture* making little functional sense (see Bowden & McOmish 1987 concerning the 'display' attributes of hillforts and their role as social group-building 'projects'; see also Bowden 2006). Over the almost 15 years since the Camp's main entranceway was first discovered, no parallels for such a free-standing structure have been forthcoming. Yet, as depicted in Figure 12, shared construction principles can be recognised, but nothing close to a direct parallel.

The second model would reconstruct the bank more fulsomely and have its terminals out-turn to flank the entranceway. By this, the small posts associated with the northern and southern sides of the gateway's western bay would not so much relate to a 'room-like' space, but to the revetment of bank deposits which then would have been directly stacked against its sides; due to the tail-off of the bank terminals, such revetment would not have been necessary within the eastern 'front' bay. In this reconstruction the latter may not, in fact, have existed as an integral part of the gateway as such. The two front postholes, F. 31/38 and F. 27/41, may have simply held marker posts that were not structurally tied-in (*cf.* Rainsborough's 'arch'; Fig. 12.C). As it would be envisaged in this option, the large central posts of the western bay, F. 28/42 and F. 45/46, could have both contributed to carrying a second-storey 'watch' platform and, also, have blocked the gate-doorways proper. In this regard it is crucial to recognise that, while affording 2.00–2.50m wide passage between themselves and the gate's side posts, these central supports would

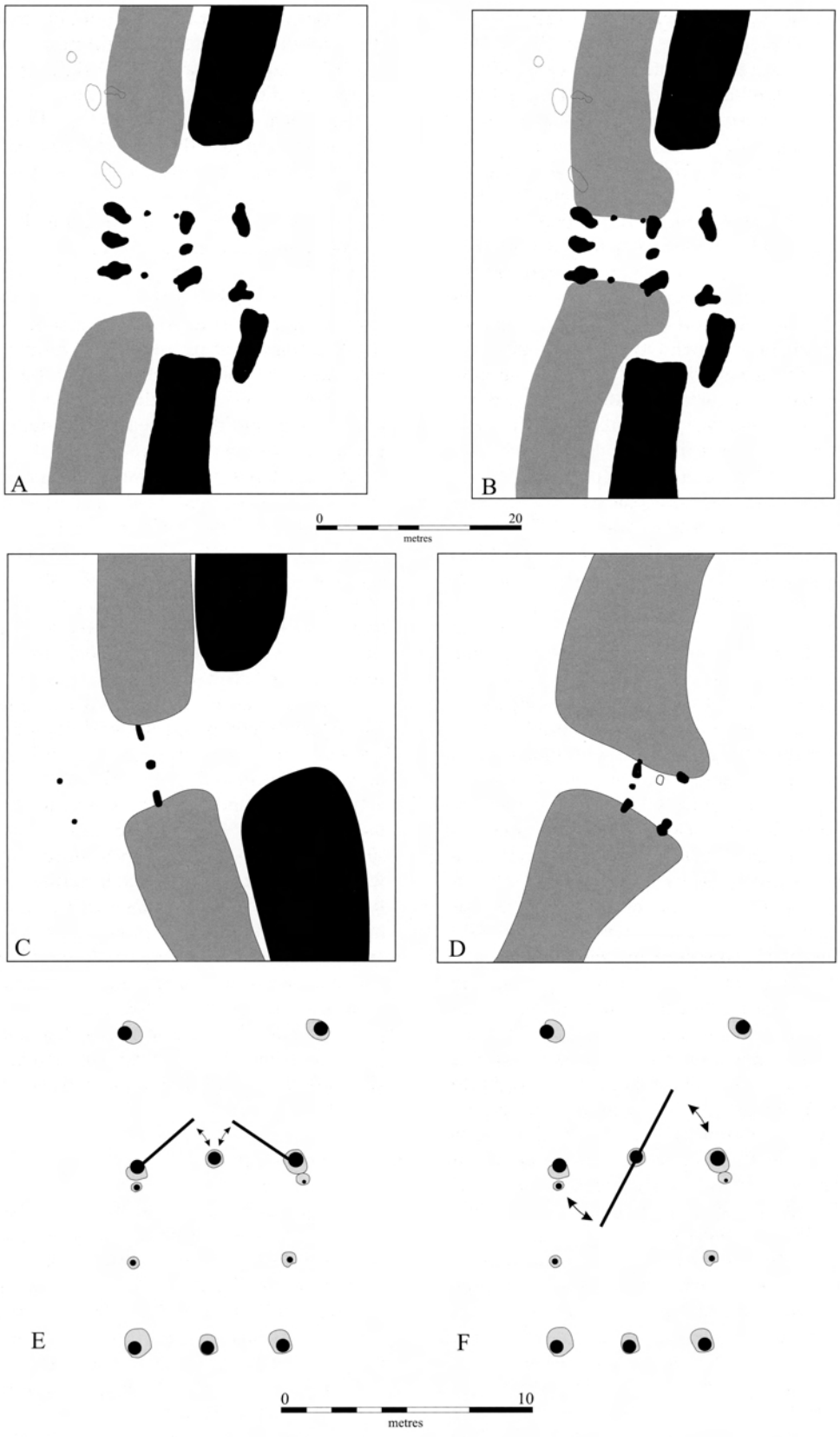

Figure 12. *Entranceway Reconstructions: A) Gateway as freestanding 'show architecture' (Model 1); B) bank-flanked 'classic hillfort-type' arrangements (Model 2); C & D) comparative hillfort entranceway, Rainsborough (C; after Avery et al. 1967: fig. 16) and Danebury's southwest entrance (D; after Cunliffe & Poole 1991: fig. 3.16 & .19); E & F) alternative Arbury gate-layouts - 'conventional' two-door (E) and central, single-door pivot operations (F).*

have impeded any 'carriage' by carts or even chariots into the enclosure. As shown in Figure 12 (B), this second model would be more akin to 'classic' hillfort entranceways and, making far greater structural/defensive 'sense' (admitting that this is now considered a greatly loaded term), is held to be the more likely reconstruction format. It would, moreover, correlate with the fact that the main, 'back-bay' posts had evidently been reset from 'inwards', the north and southern exterior sides being excluded as they would have been bank-sealed. Equally, it would also account for the somewhat splayed arrangement of the two front posts relative to the western bay, as these would not have been structurally integral to the gate itself.

As illustrated in Figure 12 (C & D), three-post gateways are not an uncommon hillfort entranceway setting. Yet, there has been little detailing of the operations of their doorways proper. As remarked upon by Avery (1986: 220) concerning their entrances generally: "The structure of the gate itself, the moving part, is obscure. Excavators have assumed that it was hung from gate supports, but this seems impossible, given the absence of metal fittings". (Avery, instead, postulated some manner of lattice-like timber 'piece-gate' settings, whose elements could be dismantled and re-erected as necessary to provide closure/access; *ibid*: fig. 1.) The key question being, how such doors opened and closed without large (iron) hinge fittings, as these have never been recovered. Rather surprisingly, Arbury's gateway may provide crucial insights from the top rotary quernstone set into its central-front posthole (Figs 5, 8 & 11). It is its upward-set non-grinding face that had a deep-worn cupmark-like depression in its middle, which would not have resulted from its use as a quern. As set into the 'post-hole', this might not have so much as served as a post-pad, but a central pivot upon which its post would have spun (Fig. 12.F). Therefore, instead of having the gate hang 'conventionally' with two doors opening outwards, it would have had a single large, squarish, planked door attached to this central post, which – almost in the manner of a revolving door – would have opened and closed upon this central upright. In order to provide securely flush-closure, when shut the door's sides would have been set into opposing rebate recesses within the flanking side posts. (Whether or not the complete iron ring recovered from the F. 28 'recut' of this feature – essentially its then open upper profile in which the post turned – abetted this mechanism or was a fixture of the door itself, is unknown.)

Finally, the argument could be mounted that the deposition of semi-complete vessels within its southern ditch terminal was deliberate and that they had been 'placed' there (Fig. 8). Such reasoning could even go further; linking the enclosure's plan with that of the eavesgully-surrounded roundhouses of the period and the characteristic, high artefact densities often found within the southern gully terminal of their generally east-/southeast-facing entranceways. Yet, it has been advocated that, rather than any manner of distinctly ritual behaviour, this 'sided-ness' in the case of roundhouses rather reflects a degree of 'handed-ness': convenient throwing of household refuse to the right upon exiting the building (Evans 2003: 212, fig. 105; Evans & Hodder 2006: 147, fig. 5.57). While, as remarked upon by Webley above, the recovery of a group of near-complete vessels from the Camp's ditch terminal is, admittedly, unusual, 'convenience' might also be a factor here. On the one hand, the pots were clearly associated with tossed animal bone and, together, they seem to simply constitute large-piece domestic waste. (The ditch's soft organic deposits would ensure that they wouldn't have broken on impact nor be subject to subsequent trample-fragmentation. On this factor also turns Webley's assignment of its recovered pottery as representing an interrelated/contemporary 'transitory' group; given the depositional conditions – and if the circuit's maintenance/mucking-out was not intense – then it is quite conceivable that it included both Early and Middle Iron Age vessel-types.) The southward 'sided-ness' of this deposition is, on the other hand, further explained if, as argued above, the F. 40 blocking ditch - without there being any comparable closure on the gateway's northern side – directly reflected the entranceway area's sometime domestic utilisation. In other words, if a 'focus' of occupation was on that side of the gateway, then it is not surprising that the ditch terminal there received the bulk of deposition.

Of course, though perhaps sharing general, Iron Age 'world-view' principles with the period's roundhouses in terms of the basic articulation of circular space, ultimately the Camp-enclosure was not a house but a monumental-scale construct. Clearly, its erection would have furthered social-group cohesion, binding-up communities through participation within *en masse* building. Yet, in contrast, for example, to earlier causewayed enclosures, the 'Camp' had certain attributes: strict perimeter closure and controlled access (and whose gateway tower offered elevated overview of its surrounding pasture lands). While it would have surely been 'many things to many people' – community-building project, stock compound, place of refuge, etc. – its prime attributes were defensive and, essentially, it would have served as a *fort*.

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Endnotes

1) A sample of the water from the main ditch was submitted to Dr CAI French for chemical testing to see if this contributed to the preservation of organic remains within its fills. The pH was 7.5 (or slightly basic/calcareous); the conductivity was 1133 uS, which is quite high and probably reflects the input of solute-rich groundwater accumulating in the ditch. The redox was low at 14mV and the dissolved oxygen quite low at 3.4%. In short, the groundwater conditions proved quite similar to those found elsewhere in the lower river valleys entering the Cambridgeshire fen. The good organic preservation would have been a combined result of the high groundwater table and the depth of burial leading to permanent oxygen exclusion since deposition.

2) The material was conserved by impregnation with polyethylene glycol followed by freeze-drying at the end of 1995.

3) A monolith column-sample from the main ditch circuit's basal fills was submitted to Dr Mark Robinson of Oxford Museum in order to assess the preservation of insect remains. A 1kg sample of the organic sediment was examined and it was found that the survival of such remains was very poor; all that could be found was the head of a *Forficula auricularia* (earwig) and a couple of unidentifiable elytral fragments of Curculionidae (weevil). Having little potential for insect studies, no further study was considered warranted (see, however, P. Murphy's summary of the ditch fills environmental microfossils in Evans & Knight 2002a: 41–42).

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