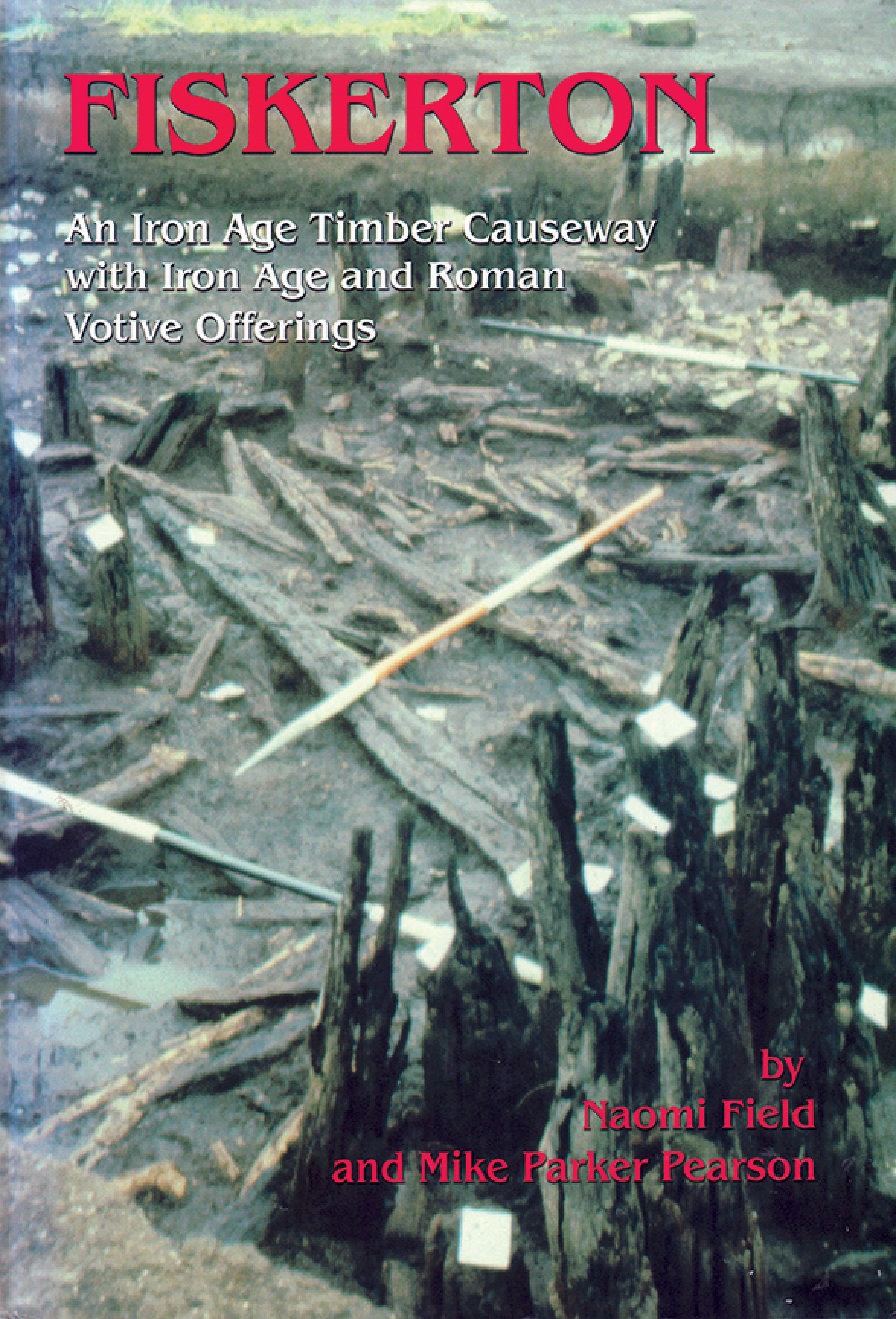

FISKERTON

An Iron Age Timber Causeway with Iron Age and Roman Votive Offerings

by
Naomi Field
and Mike Parker Pearson

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An Iron Age Timber Causeway with Iron Age and Roman Votive Offerings: the 1981 Excavations

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NAOMI FIELD and MIKE PARKER PEARSON

With contributions by

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PREFACE

Naomi Field and Mike Parker Pearson

Fiskerton is one of a handful of excavated watery deposition sites in Europe which together provide a fascinating insight into important aspects of Iron Age religion and culture. Its finds of metalwork and Celtic art are of the La Tène style, the name given to a similar site in association with a wooden structure in Switzerland. The Iron Age finds from Fiskerton are earlier than those from La Tène and also those from the classic Welsh site of Llyn Cerrig Bach on Anglesey. The precise dating of the Fiskerton causeway by dendrochronology establishes it as one of the earliest known structures in Europe belonging to the La Tène period.

In 1981 archaeological excavations by NF on the north bank of the River Witham revealed three north-south lines of timber posts in association with a spread of Iron Age and Roman metalwork, pottery and bone. Two of the post rows formed a causeway at least 160m long, constructed in the winter of 457 and the spring of 456 BC and repaired on at least nine occasions over the next 150 years. The last timber posts were erected after 321 BC and probably before 291 BC. In this period and into the third century BC, a large number of artefacts were deposited beneath and around the causeway, including 11 spearheads and six Early La Tène swords, one with a fine coral-inlaid handle. Further from the structure a group of large axe-heads, metalworking tools, files and a saw, all of Iron Age date, were also found. These lay close enough to the causeway to have been thrown from it. An enigmatic discovery was a large number of bone spearpoints. Over 200–300 years later, in the Roman period, the site of the causeway was used for the deposition of Kentish ragstone whetstones, pottery and metalwork. Owing to differential settling within the sediments, there is no stratified sequence of finds but the La Tène-style metalwork is most probably dated to the period of the causeway's repair and disuse in the fourth/third century BC.

The causeway and its finds provide clear evidence of votive deposition in water, complementing previous discoveries such as the Witham shield and scabbard. Whether the causeway was used for funerary rites is uncertain: only three human bones were located and, in any case, corpses and other organic materials would probably have floated away downstream. The use of the causeway need not have been entirely ceremonial and it may also have served as a jetty for boats crossing the river since it enters the Witham at a suitable point for land traffic moving north-south along the eastern spring-line of the Lincolnshire limestone ridge. The Fiskerton offering site can be compared with British Late Bronze Age sites such as Flag Fen and Clifton-on-Trent but comparisons from the La Tène period can be found at La Tène itself, in Switzerland, at Llyn Cerrig Bach in Wales and at Hjortspring in Denmark.

Fiskerton was the first relatively large-scale excavation of a waterlogged site within the fens of eastern England, predating the discoveries at Flag Fen. Since then the Flag Fen excavations, the Fenland Survey (Hall and Coles 1995) and work at other major sites such as Etton have further demonstrated the potential of sites with this high level of preservation, as well as improving the techniques and methodology of excavating waterlogged sites. It was unfortunate that the Witham valley was omitted from the Fenland Survey since this area has produced spectacular finds of all periods, particularly from the Iron Age. The short-lived excavations at Fiskerton, confined to a single field season, have provided a remarkable glimpse of the structures and artefacts potentially remaining on the site although nearly 20 years of desiccation may well have limited what can now be salvaged. Rescue excavations in 2001 (to be reported on elsewhere), south of the 1981 excavation, have indicated good preservation of deposits in the deepest part of the site between the North Delph and the river channel.

Since the excavations in 1981 there have been many advances in environmental and wetland archaeology. The integration and extensive use of palynological, entomological, palaeobotanical, geomorphological and other environmental techniques have certainly improved. Studies of wood technology have also developed in leaps and bounds in that time. Whilst the dendrochronological work at Fiskerton was pioneering for its time, the almost total selection of vertical timbers for dating prevented the horizontal planks – and thereby the stratified layers in which they lay – from being precisely dated.

Fiskerton still remains the pre-eminent Iron Age river offering site in Britain and has not been superseded by any subsequent excavation of a votive site of this period although a number of other timber causeways have been found elsewhere in Britain. The Fiskerton causeway and its associated deposits, furthermore, do not stand in isolation but are part of a complex of such finds in the Fiskerton/Washingborough area probably from every major period between the Earlier Neolithic and the High Medieval period. This may even be just one multi-period complex out of as many as ten in the Witham valley. Thus the Fiskerton/Washingborough locality and the entire valley provide an unrivalled possibility to explore some 4500 years of continuous or near-continuous votive deposition which only ended just over 600 years ago.

SUMMARY – RESUMÉ – ZUSAMMENFASSUNG

The lower reaches of the River Witham, in Lincolnshire in eastern England, have yielded finds of metalwork of all periods from the Early Bronze Age to the fifteenth century AD. Most of these finds have been made in the last 230 years during the canalisation of the river course and other works associated with navigational improvements. The quantities of La Tène metalwork from the Witham are less than those from the Thames but the quality of some, such as the Witham scabbard, the Tattershall *carnyx* and the Witham shield, are outstanding. Until recently the contexts of these prehistoric finds from within the river were not understood.

In 1981 an archaeological excavation was carried out on part of a double row of timber posts running north-south on the north bank of the river at Fiskerton, forming a causeway. A metal detectorist had discovered the coral-inlaid handle of a La Tène sword in the vicinity of the posts which were now visible above ground, as the result of ploughing, over a distance of at least 160m northwards from the canalised river channel. The posts, made of oak and alder, had pointed bases and had been driven into the mud up to a depth of 4m–5m. The double row of posts (195 posts within the excavated areas) was also accompanied by another, single row of 19 timbers parallel to it but about 6m to its west. Dendrochronological study of the felling dates of these posts indicates that they were erected on at least ten different occasions over 150 years from the initial felling of winter 457/spring 456 BC. The subsequent felling dates are: 456 BC, 447/446 BC, 440/439 BC, 423–421 BC, 406/405 BC, 390–387 BC, 385/384 BC, 375/374 BC, and 341–338 BC. The last timber posts were erected after 321 BC and probably before 291 BC. In one of these construction phases (406/405 BC), enough bark-edge dates were recovered to be able to reconstruct the post row as two parallel lines, 2.40m wide and with posts approximately 1m–1.50m apart, similar to the post arrangements within a hillfort's box rampart. A single date from the third row suggests that it was constructed during the replacement of the double row in 385/384 BC. The earliest structure consisted of a staked-down twig deposit which is undated but may well pre-date the timber rows. The stratified layers above it include pegged-down brushwood and a deposit of limestone rubble. Unfortunately it was not possible to relate the stratigraphy of these deposits to the absolute dates of the vertical timbers. The problem of dating these deposits and their artefacts was further compounded by the propensity for heavier artefacts, regardless of their date, to sink deeper than lighter ones. As a result, whetstones of Roman date were found below finds of the La Tène period.

The artefacts from the Early La Tène period consist of 6 swords, one with a fine coral-inlaid anthropoid hilt, and 11 spearheads beneath the double post row. Various fragments of bronze fittings probably derive from scabbards and shields, including a roundel inlaid with red glass. There were also two unusual sheet bronze artefacts – a possible shoulder plate (epaulette) and a three-dimensional 'figure-of-eight' folded circle. Further away to the west, a group of large axes, metalworking tools, files and a saw, all of Iron Age date, were also found. These lay close enough to the causeway to have been thrown from it. An enigmatic discovery was a large number of utilized bone spearpoints. There were also whole or substantially complete pots and a variety of small ornaments and tools, including beads of amber and a jet ring. La Tène artwork was found on six artefacts – the anthropoid sword hilt, the antler handle of a file, the blade of a saw, the red glass-inlaid roundel, the 'figure-of-eight'-shaped bronze artefact, and a partial cut-out in bronze. The anthropoid hilted sword and one other, which appears to have a coral ring on its upper loop plate, can both be assigned to La Tène I (Stead's stage I; Stead 1996) whilst the decoration of the file handle is La Tène II (Stead's stage II). Most of the assemblage probably dates to the third century BC.

Fragments of human bones, radiocarbon-dated to the fifth–fourth centuries BC, include a portion of skull with an unhealed cut which probably results from a sword blow to the side of the head. The small assemblage of animal bones cannot be assigned to either the Iron Age or Roman period but includes the remains of cattle, sheep, pig, horse, red deer, dog, beaver, wild fowl and fish. The cattle, sheep and beaver showed signs of butchery.

Over 250 years later in the Roman period, the site of the causeway was used for the deposition of pottery, two bronze bowls of Irchester type, a copper alloy bracelet, tile fragments and large whetstones of Kentish ragstone. The pottery includes Nene Valley colour-coated ware, black burnished and dales wares, ranging in date from the later first century AD to the third century or beyond.

Analysis of beetles, pollen and other plant remains indicates that this part of the timber causeway was located in an area of freshwater reedswamp in a cleared area within alder carr. The area became progressively drier, with grazed meadow grassland on the edge of open water. The causeway may have passed through a zone of freshwater pools, located to the north of the river's braided channel. Further work should clarify the environmental setting of this site.

The causeway and its finds provide clear evidence of votive deposition in water. It is not certain whether the causeway was constructed entirely for ceremonial purposes or also served as a crossing point or jetty for movement across the Witham's wide floodplain and channel. ceremonial purpose, however, may have been paramount given the timing of the vertical timbers' erection. The ten datable episodes of felling closely match the occurrence of total lunar eclipses during midwinter in this period. The statistical strength of this correlation is such that it is extremely unlikely to have arisen by chance. The fact that one of these fellings occurred in the same year as a total eclipse which was not fully visible above Fiskerton's horizon indicates that the eclipse cycles were predicted rather than simply marked. Correlations of bark-edge felling dates with midwinter total lunar eclipses for other timber causeways in Europe and the British Isles suggest that this may have been a practice observed across northern Europe from Switzerland to Ireland and beginning as early as 998 BC.

The lunar eclipse hypothesis is currently being tested by further dendrochronological work at Fiskerton, resulting from a rescue excavation in 2001 in advance of riverbank repairs. Amongst the finds from this current excavation (to be reported in a future volume) are another sword, a dagger, bronze and gold scabbard or shield fittings, an axe hammer and two logboats, one of which was pegged-down in the causeway. A Hallstatt C iron socketed axe and a Late Iron Age hafted currency bar were also found. Further research is planned on this and other sites within the Witham valley in the next few years.

RESUMÉ

Le cours inférieur de la rivière Witham, situé dans le comté de Lincoln dans l'Est de l'Angleterre, a fourni des objets en métal datant du début de l'âge du bronze jusqu'au 15ème siècle ap. J.-C. La plupart de ces vestiges furent amassés au cours des dernières 230 années, lors de travaux associés à la canalisation de la rivière et à l'amélioration des conditions de navigation. Les quantités d'objets laténiens en provenance de la Witham sont inférieures à celles de la Tamise mais la qualité de certains, comme par exemple le fourreau de Witham, le carnyx de Tattershall et le bouclier de Witham, est tout à fait remarquable. Jusque récemment, le contexte archéologique de ces découvertes préhistoriques en provenance du fleuve demeura inconnu.

En 1981, une fouille archéologique fut effectuée près de Fiskerton sur le banc nord du fleuve sur un site comprenant un double alignement de poteaux en bois orientée nord-sud. Une poignée d'épée en corail marqueté datant de la période de La Tène avait été découverte a proximité des poteaux suite à des prospections au détecteur de métal. Les poteaux furent mis à jour lors de labourages qui s'étendaient sur une distance d'au moins 160m au nord du lit canalisé de la rivière. Les poteaux en chêne et en aulne possédaient une extrémité pointue qui fût fichée dans la boue jusqu'à une profondeur variant entre quatre et cinq mètres. Dans la surface fouillée, la double rangée de poteaux comprenaient 195 poteaux et elle fut également accompagnée d'une rangée simple de 19 poutres. Cette dernière fut orientée perpendiculairement à la première à environ six mètres sur le côté ouest. L'étude dendrochronologique a établi que l'abattage initial des premiers arbres remonte à l'hiver 457 ou au printemps 456 av. J.-C. et que la mise en place des poteaux s'est effectuée à dix reprises durant une période s'étalant sur 150 ans. Les dates ultérieures d'abattage sont: 456 av. J.-C., 447/446 av. J.-C., 440/439 av. J.-C., 423–421 av. J.-C., 406/405 av. J.-C., 390–387 av. J.C., 385/384 av. J.-C., 375/374 av. J.-C., et 341–338 av. J.-C. Les derniers poteaux furent érigés après 321 av. J.-C. et probablement avant 291 av. J.-C. Durant une de ces phases de construction (406/405 av. J.-C.), suffisamment de dates de bords d'écorce furent obtenues pour permettre de reconstruire l'alignement de poteaux en tant que deux lignes parallèles, écartées de 2.40m et comprenant des poteaux placés approximativement entre 1 et 1.50m les uns des autres, semblable donc à l'arrangement qu'on observe dans le rempart des enceintes fortifiés de hauteur. Une date unique obtenue sur la troisième rangée suggère qu'elle fût construite lors du remplacement de la double rangée en 385/384 av. J.-C. La première structure est composée d'un dépôt non daté de brindilles fixées au sous-sol et qui semble être plus ancienne que les rangées de poteaux. Les couches stratifiées situées au-dessus de ce premier niveau archéologique comprennent des broussailles piquetées au sol ainsi qu'un dépôt de pierres calcaires. Malheureusement, ce n'était pas possible d'associer la stratigraphie de ces dépôts aux dates absolues obtenues pour les bois de construction verticaux. Par ailleurs, le problème de la datation de ces couches ainsi que du mobilier archéologique y contenu, fut compliqué par la tendance des objets lourds de s'enfoncer plus profondément que les objets légers. En conséquence, des pierres à aiguiser romaines furent retrouvées en dessous du matériel laténien.

Parmi les objets datant du début de la période de La Tène et qui furent découverts sous la double rangée de poteaux on compte six épées dont une avec une poignée anthropoïde en corail marqueté ainsi que onze flèches. Diverses garnitures en bronze comprenant entre autre un rondeau en verre rouge cloisonné sont probablement originaires de fourreaux et de boucliers. Il y avait également deux objets façonnés peu communs en tôle de bronze – possiblement une épaulette et un disque tridimensionnel plié en figure-de-huit. Plus loin, à l'ouest on a aussi retrouvé un ensemble de grandes haches, des outils à travailler le fer, des limes et une scie. Ceux-ci furent retrouvés suffisamment près de la chaussée en bois pour qu'ils aient pu être jeter à partir d'elle. Une découverte énigmatique consistait dans la présence d'un nombre élevé de flèches en os. Il y avait également des céramiques entières ou alors quasi complètes et une variété de petits ornements et outils, y compris des billes en ambre et un anneau en jais. Des décorations laténiens furent retrouvées sur six objets façonnés – la poignée anthropoïde de l'épée, le rondeau cloisonné en verre rouge, l'objet en bronze en figure-de-huit ainsi que sur un décors partiel découpé en bronze. L'épée avec la poignée anthropoïde qui semble posséder un anneau en corail sur la boucle supérieure ainsi qu'une des autres épées peuvent être assignées à la période de La Tène I (Stage I suivant le systême de Stead 1996) alors que la décoration du manche de la lime date de La Tène II (Stage II de Stead). Le plupart des objects est probablement du troisième siècle av. J.-C.

Des ossements humains datés du 5ème au 4ème siècle av. J.-C. par la méthode du carbone 14, comprennent la partie d'un crâne qui porte une trace de blessure non guérie et ayant probablement résulté d'un coup d'épée sur le côté de la tête. Le petit ensemble d'ossements d'animaux ne peut pas être attribué directement à l'âge de fer ou à la période romaine mais inclut des restes de bœufs, de mouton, de porc, de cheval, de chevreuil, de chien, de castor, de volaille sauvage et de poisson. Des marques de boucherie furent retrouvées sur les os de bœufs, de mouton et de castor.

Plus de 250 ans après, durant la période romaine, le site de la chaussée a été utilisé pour le dépôt de céramiques, de deux cuvettes en bronze du type d'Irchester, d'un bracelet en alliage de cuivre, de fragments de tuile et de grandes pierres à aguiser en calcaire oolithique. Le mobilier céramique qui date de la fin du 1er siècle au 3ème siècle ap. J.-C. comprend des poteries à englobe du type Nene Valley Ware, des tessons noirs et lissés et des tessons typiques de Dales Ware.

L'analyse des coléoptères, des pollens et d'autres restes végétaux indique que cette partie de la chaussée boisée fût placée dans une zone marécageuse à roseaux qui fut dégagée et située à l'intérieur d'une aulnaie. Par la suite, cette zone s'est progressivement asséchée permettant ainsi l'établissement de pâturages sur le bord de l'eau. La chaussée a pu traverser une zone comprenant une série de mares d'eau situées au nord du cours tressé de la rivière. De futures analyses devraient permettre de clarifier encore davantage les conditions du milieu naturel.

La chaussée et les découvertes archéologiques qui y sont associées indiquent clairement le dépôt d'offrandes votives dans l'eau. Il n'est pas certain si la chaussée fût construite entièrement pour des raisons cérémonielles ou si elle a également pu servir de point de croisement ou de jetée à la traversée de la large plaine d'inondation et du lit de la rivière Witham. Cependant, son but cérémoniel a pu être primordial si on considère la date de construction des poutres verticales. En effet, les épisodes d'abattage coïncident étroitement avec l'occurrence d'éclipses lunaires totales durant les hivers de cette période. Du point de vue statistique, il est très peu probable qu'il puisse s'agir là d'une pure coïncidence. Le fait qu'une de ces phases d'abattages se soit produite la même année qu'une éclipse totale qui n'était pas entièrement visible au-dessus de l'horizon de Fiskerton indique que les cycles d'éclipse furent prédits plutôt que simplement marqués. Des corrélations similaires établis pour d'autres chaussées en Europe et dans les îles Britanniques entre les dates d'abattage obtenues sur des échantillons à écorce avec des éclipses lunaires totales durant la saison hivernale, suggèrent qu'il s'agissait peut-être d'une pratique plus répandue, s'étendant de l'Europe du Nord à la Suisse et ayant débuté dès 998 av. J.-C

Les études dendrochronologiques sur lesquels se base l'hypothèse des éclipses lunaires se poursuivent actuellement à Fiskerton suite à des fouilles de sauvetage effectuées en 2001 et par anticipation à des travaux de réparation sur le bord de la rivière. Parmi les découvertes de la campagne de fouilles actuelle (qui seront publiées ultérieurement dans un autre volume) il faut relever une autre épée, un poignard, des garnitures en bronze et en or de fourreaux ou de boucliers, une hache-marteau et deux pirogues dont une fût fixée à la chaussée. On a aussi découvert une hache à talon en fer datant du Hallstatt C ainsi qu'une barre aplatie à extremité étirée en forme de douille de la fin de l'âge du fer. Dans les années à venir, davantage de recherches sont prévues sur ce site ainsi qu'en d'autres endroits de la vallée du Witham.

ZUSAMMENFASSUNG

Im unteren Lauf des Flüßchens Witham in Lincolnshire im Osten Englands sind Metalgegenstände gefunden worden, die von der Frühbronzezeit bis zum 15. Jahrhundert reichen. Die meisten dieser Gegenstände sind in den letzten 230 Jahren bei Arbeiten am Flußbett, die der Flußbegradigung oder der allgemeinen Schiffbarkeit dienlich waren, zu Tage gebracht worden. Obgleich die Anzahl der La Tène Metallfunde vom Witham nicht so hoch ist wie die der Themse, so ist doch die Qualität von einigen, wie der Schwertscheide von Witham, des Flügelhorns (*Carnyx*) von Tattershall und dem Schild von Witham hervorragend. Bis vor Kurzem war der Kontext dieser prähistorischen Flußfunde nicht bekannt.

1981 ist eine archäologische Ausgrabung an einer Doppelreihe von Holzpfählen, die in Nord-Süd Richtung am Nordufer des Flußes in Fiskerton verlaufen und die Reste eines Damms darstellen, ausgeführt worden. Bei Pflugarbeiten waren die Pfähle, die sich mindestens 160 m nordwärts vom begradigten Fluß erstrecken, freigelegt worden. Mit einem Metallsuchgerät ist in der Nahe dieser

Pfähle der mit Korallintarsien verzierte Griff eines La Tène Schwertes gefunden worden. Die Pfähle selbst, deren gespitzten Enden bis zu 4–5m tief in den Schlamm geschlagen wurden, sind aus Eiche und Erle. Parallel zu der Doppelreihe (195 Pfähle innerhalb des Ausgrabungsbereiches) verläuft außerdem etwa 6m westlich von ihr eine Einzelreihe von 19 Pfählen. Die dendochronologisch ermittelten Schlagdaten dieser Pfähle zeigen, dass diese über 150 Jahre hinweg vom ersten Schlagdatum Winter 457/ Frühling 456 v. Chr. zu mindestens zehn verschiedenen Zeitpunkten errichtet wurden. Die weiteren Schlagdaten sind: 456 v. Chr., 447/446 v. Chr., 440/439 v. Chr., 423–421 v. Chr., 406/405 v. Chr., 390–387 v. Chr., 385/384 v. Chr., 375/374 v. Chr., und 341–338 v. Chr. Die letzten Holzpfähle sind nach 321v. Chr. und vermutlich vor 291 v. Chr. errichtet worden. Für eine dieser Konstruktionsphasen (406/405 v. Chr.) sind ausreichende Daten mit Waldkante vorhanden, um die Rekonstruktion der Pfahlreihe als zwei parallele Reihen mit 2,4m Abstand zueinander und etwa 1–1,5m Abstand zwischen den einzelnen Pfählen zuzulassen. Die Anordnung ähnelt der einer in Kastenbauweise errichteten Befestigungsmauer einer Höhensiedlung. Ein Datumspunkt der dritten Reihe legt die Vermutung nahe, daß sie während Erneuerungsarbeiten an der Doppelreihe im Jahre 385/384 v. Chr. errichtet wurde. Die früheste Struktur bestand aus einem bisher nicht datiertem Zweigwerk, das mit Pflöcken festgehalten wurde und das zeitlich durchaus vor den Holzpfahlreihen stehen könnte. Die darüber liegenden Schichten bestehen unter anderem aus mit Pflöcken festgemachtem Reisig und Kalksteingeröll. Leider war es nicht möglich die Stratigraphie dieser Lagen mit den absoluten Datumspunkten der aufrechten Hölzer in Verbindung zu bringen. Des weiteren ist die Datierung dieser Ablagerungen dadurch erschwert, daß schwerere Artefakten unabhängig ihres Herstellungsdatums dazu tendieren, tiefer zu sinken als leichtere Artefakten. So wurden Wetzsteine aus der Römerzeit unterhalb von Fundstücken der La Tène-Zeit gefunden.

Die Fundstücke aus der La Tène-Zeit bestehen aus 6 Schwertern, von denen eines einen großartigen mit Korallintarsien versehenen anthropoiden Griff hat, und 11 Speerspitzen, die sich unterhalb der Doppelpfahlreihe befanden. Verschiedene Bruchstücke aus Bronze, unter anderem ein Schildbuckel, das mit rotem Glas eingelegt ist, stammen vermutlich von Schwertscheiden und Schilden. Des weiteren gab es noch zwei ungewöhnliche Stücke aus Bronzeplatten – das eine vermutlich eine Schulterplatte (Epaulette), das andere ein dreidimensional gefalteter Kreis in der Form einer Acht. Etwas weiter westlich sind eisenzeitliche Gegenstände, bestehend aus einer Gruppe großer Äxte, Werkzeug für die Metallverarbeitung, Feilen und einer Säge, gefunden worden. Diese lagen nahe genug am Damm, um von dort geworfen worden zu sein. Rätselhaft war die Entdeckung einer großen Anzahl von benutzten Speerspitzen aus Knochen. Außerdem gab es ganze oder nahezu vollständige Töpfe und verschiedene kleine Ziergegenstände und Werkzeuge, darunter Perlen aus Bernstein und Gagat. La Tène Kunst ist auf sechs Fundstücken zu sehen - dem anthropoiden Schwertgriff, dem Geweihgriff einer Feile, dem Blatt einer Säge, dem mit rotem Glass eingelegten Schildbuckel, dem Bronzekreis in Form einer Acht und dem unfertigten Ausschnitt aus Bronzeblech. Der anthropoide Schwertgriff und ein weiteres, welches einen Korallenring an seiner oberen Schleifenplatte hat, können beide aus La Tène I (Stage I von Stead 1996), die Verzierung des Feilgriffes dagegen ist La Tène I (Stage II von Stead). Die Fundstücke gehören wahrscheinlich überwiegend in das 3. Jh. v. Chr.

Unter den gefundenen Menschenknochen, die mittels Radiokarbonmethode auf das 5.-4. Jh. v. Chr. datiert wurden, befindet sich ein Schädelfragment, das eine unverheilte Schnittwunde, die vermutlich auf einen Schwertschlag auf die Seite des Kopfes zuruckzuführen ist, aufzeigt. Die wenigen gefundenen Tierknochen stammen vom Rind, Schaf, Schwein, Pferd, Rotwild, Hund, Biber, Geflügel und Fisch, können jedoch weder der Eisen- noch der Römerzeit zugeordnet werden. Beim Rind, Schaf und Biber sind außerdem Schnittspuren nachgewiesen.

Über 250 Jahre später, in der Römerzeit, haben sich im Bereich des Damms verschiedene Töpfe, zwei Bronzeschalen des Irchester Typs, ein Armband aus einer Kupferlegierung, Kachelscherben und ein großer Wetzstein aus Ragstone aus Kent angesammelt. Zu den Töpferarbeiten gehört Firnißkeramik aus dem Nene-Tal, schwarze polierte Keramik und Daleskeramik, die in ihrem Herstellungsdatum vom 1. bis ins 3. Jh. n. Chr. oder darüber hinaus reicht.

Die Untersuchung der Käferfauna, sowie von Pollen und anderen pflanzlichen Rückständen weist darauf hin, daß sich dieser Bereich des Damms in einem Süßwasser Schilfsumpf in einem gelichteteten Stück feuchten Erlenwäldchens befand. Die Gegend trocknete zunehmend aus und bestand später aus begraster Wiese am Rand des offenen Wassers. Der Damm könnte durch ein Gebiet mit mehreren Süßwassertümpeln, die sich nördlich des verzweigten Flußgebildes befanden, geführt haben. Weitere Untersuchungen dürften die Ökologie dieser Fundstätte klären.

Es ist klar, daß die Fundstücke bei diesem Damm Weihgaben sind, die dort ins Wasser gegeben wurden. Es ist jedoch nicht eindeutig, ob der Damm einzig zeremoniellen Zwecken oder auch als Brücke oder Anleger für den Verkehr über die Aue des Witham und des Kanals diente. Ihr zeremonieller Zweck hat aber wohl in jedem Fall überwogen, wie die Zeitpunkte der Errichtung der aufrechten Pfähle zeigen. Die datierbaren Schlagepisoden sind nahezu zeitgleich mit mittwinterlichen totalen Mondfinsternissen, die in diesem Zeitraum stattfanden. Statistisch gesehen ist diese Korrelation so stark, daß es äußerst unwahrscheinlich ist, daß sie rein zufällig zustande kam. Da eine dieser Fällungen im Jahr einer Mondfinsternis stattfand, die an Fiskertons Horizont nicht in ihrer Gesamtheit hätte beobachtet werden können, kann man darauf schließen, daß der Zyklus der Finsternisse berechnet und nicht einfach nur bemerkt wurde. Die Korrelation zwischen Fälldaten mit Waldkante und mittwinterlichen Mondfinsternissen für andere Bohlenwege in Europa und den Britischen Inseln deutet darauf hin, daß dieser Brauch über Nordeuropa von der Schweiz bis nach Irland verbreitet war und bereits 998 v. Chr. existierte.

Diese Mondfinsternistheorie wird derzeit mit weiteren dendrochronologischen Untersuchungen an Material aus Fiskerton, das von einer Rettungsgrabung in 2001 im Zuge der Uferausbesserungsarbeiten stammt, genauer geprüft. Unter den Fundstücken dieser aktuellen Ausgrabung, über die in einer späteren Ausgabe berichtet werden wird, befindet sich ein weiteres Schwert, ein Dolch, Schwertscheide- oder Schildverzierungen aus Bronze und Gold, eine Hammeraxt und zwei Einbäume, von denen einer mit Pflöcken im Damm festgehalten ist. Eine Eisenaxt mit Fassung im Stil von Hallstatt C und eine Geldbarre wurden auch gefunden. Weitere Untersuchungen an dieser und anderen Abschnitten des Withamtals sind für die folgenden Jahre geplant.

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1 THE TIMBER CAUSEWAY

(The larger plans and sections from this chapter are in a pocket at the back of the book)

TOPOGRAPHY AND SETTING

By N. Field

The parish of Fiskerton lies in the Witham valley about 6km east of Lincoln (Fig. 1.1). The River Witham rises in the limestone hills southwest of Lincoln and runs northeastwards, cutting through the limestone ridge at Lincoln. From Lincoln the Witham flows east and then southeast to Boston and the sea.

The Witham valley at Lincoln is narrow and well-defined, being only some 2km wide. From Lincoln it gradually increases in width to about 6km at Potterhanworth and remains at approximately the same width until it meets the expanse of the Lincolnshire silt fens at the Kyme Eau. From Lincoln to Washingborough the sides of the valley are formed from the limestones and clays of the limestone ridge, while below Washingborough the valley runs through extensive deposits of boulder clay and old river sands and gravels.

Before the eighteenth century the valley remained largely undrained and a thick layer of peat accumulated in the valley bottom. (The Car Dyke which flanks the western edge of the valley may however have been dug to drain the area in Roman times; Simmons 1979). Until the locks at Boston and Stamp End were constructed after 1762, the river was tidal as far as Lincoln (though Fiskerton had not been tidal in the Iron Age; see Osborne, Chapter 2). From that time the character and environment of the valley were rapidly transformed.

Various campaigns to straighten the course of the river and to drain the adjacent land were carried out in the latter part of the eighteenth century and it was as a result of these activities that metal artefacts of all periods came to light, especially during the dredging of the river in 1787–88 (see Chapter 9). It was thanks to Sir Joseph Banks, who advertised in the local press for information on any discoveries, that many of the artefacts survive to this day. The stretch of river between Lincoln and Bardney was straightened and canalized after 1812. Large numbers of finds were made at Washingborough in 1816 and during the construction of the lock at Bardney. In 1826 and 1829 further improvements were undertaken and discoveries were made below the Stamp End lock immediately east of Lincoln. In addition to metal artefacts, 19 log boats have been found along the course of the Witham, with a large concentration of boats at Short Ferry, at the east end of Fiskerton parish (White 1979a). One of the Fiskerton boats (TF 0896 7120), found in 1952, produced a radiocarbon date of around 1000BC but not all the boats were necessarily prehistoric in date.

In order to appreciate the environment of the Witham valley in the Iron Age it is necessary to be aware not only of the impact of the modern drainage work which, it is estimated, has caused the land level to fall by approximately 2m in the last 170 years through shrinkage and erosion (D. Robson, pers. comm.) but also of the very different coastline. The work of Brian Simmons has done much to explain the changes that have taken place around the Wash since the Iron Age (Simmons 1979; 1980; 1993). The modern erosion of peat in the Witham valley has begun to reveal buried landscapes, including large round barrow cemeteries east of Fiskerton in Barlings and Stainfield parishes and south of Fiskerton in Washingborough and Heighington parishes (see Chapter 9). Environmental and soils evidence suggests that water levels began to rise in the Bronze Age (Wilkinson 1987) and evidence from the site at Fiskerton shows that by the Iron Age the area had been under water for some time.

The discovery

The modern Witham is embanked and flanked by two large drains, the North and South Delphs, into which flow a network of smaller perpendicular drains. In 1978 the North Delph was dredged and recut by the Witham Internal Drainage Board and weathering of the bank exposed two lines of staggered posts, approximately 2m apart, in the edge of the drain. These were seen in June 1980 by Mr Vernon Stuffins who was metal detecting along the banks of the delph and was attracted to the area by the newly-exposed posts. He found various items in their vicinity including animal bones, four bone 'gouges', a La Tène I sword in its scabbard, the tang of a second sword, an iron linch-pin and a fragment of a Roman ribbed bronze bracelet (White 1981: 63). He also found a remarkable Early La Tène coral-inlaid sword handle with openwork bronze plaques (see Stead, Chapter 4). The finds were taken to the City and County Museum, Lincoln for identification and the museum asked the North Lincolnshire Archaeological Unit to conduct a trial excavation in the field (TF 0495 7158), adjacent to, and north of, the North Delph, to follow the two post rows.

A small trial trench 5m by 2m was dug in December 1980 immediately north of the posts visible in the delph, and within the area that was subsequently to become part of Area B (see below). This established that the timber posts continued northwards from the North Delph bank. Two wood samples from these posts in the trial trench were taken for radiocarbon dating. A well-preserved timber structure of any date would have been of interest but the chance that it could be Iron Age – and provide for the first time a context for some of the high-quality metalwork from the Witham – gave the site a special significance.

THE EXCAVATION

By N. Field, C. Palmer-Brown and M. Parker Pearson

A twelve-week season of work began in June 1981, funded by the Department of the Environment's Inspectorate of Ancient Monuments (later English Heritage), with the intention of spending two or three seasons on the site (Field n.d.; 1982; 1986). In the event funding did not continue beyond the first season and investigation of the site did not resume until 2001 (Rylatt and Palmer-Brown [Pre-Construct Archaeology] in preparation).

On the north bank of the North Delph, about 45m east of a small footbridge, an area 64m east-west by 34m north-south was laid out and stripped of topsoil. Within this excavation area a smaller area (30m east-west by 20m north-south) was sub-divided into six equal-sized blocks: A, B and C on the south side running from west to east and D, E and F on the north side running from west to east (Fig. 1.2). Only Areas B, E and F (each 10m by 10m square) were excavated by hand below the base of the topsoil. Running north-south through the eastern halves of Areas B and E were two parallel rows of large timber posts (Figs 1.3 and 1.4; Plate 1). A third row of posts lay 6m west of this double post row. A further small trench, Area G, and a machine trench, originally intended for taking environmental samples, were examined *c.*18m and 10m to the north of Areas E and F, immediately south of the pre-1981 parish boundary between Fiskerton and Washingborough. Limited recording was undertaken in a small trench on the immediate south bank of the North Delph (Area H), where the posts were also visible. After the excavations had finished samples for dendrochronological dating were taken from the timber posts.

Context numbers **1–637** were assigned for the purpose of recording soil layers, features and their contents and the majority of posts and other timbers. These numbers are shown in bold in the text and are also used to annotate the accompanying plans and section drawings. Special finds, including pottery, were all individually recorded with three-dimensional co-ordinates and assigned finds numbers from ***1–447***. These numbers are shown in bold italics in the text and the artefacts are described in Chapters 4–6. Included amongst the special finds were human bone and some worked pieces of timber.

The earliest deposit 332 and the earliest timber structure

The deepest deposit examined was a grey-blue silt containing reed fragments (soil horizon *5* from 1.41m below ground surface; see Whiteman and MacPhail, Chapter 2). This was reached in Areas B, E and F but was only exposed to any extent in Area B where several features overlay it or cut into it. It is interpreted as silt deposited in slow-moving water, probably in a reed swamp. Five small pieces of worked timber were found in this silt. Three (***346***, ***359***, ***375***) were pegs or stakes, of which one had a charred tip and another was found *in situ*, driven vertically into the silt.

A curvilinear spread of twigs (**421** and **467**) ran north-south along the full length of Area B, immediately to the west of the double post rows (Figs 1.5 and 1.6). It had been disturbed and dispersed to some extent. Eight stakes (stakeholes **353**, **354**, **396**, **397**, **416**, **417**, **418**, **419**) appear to have been inserted from the top of **332** and their holes were filled with mixtures of crushed shell, moss and twigs (Figs 1.7 and 1.8). A ninth stake (stakehole **415**) may have been inserted later from a higher layer. The stakes were removed prior to the formation of peat (**195**) on top of **332**. The juxtaposition of the twig deposit and the stakeholes with the subsequent lines of posts may not be fortuitous: two of the stakeholes lie on the line of the twig deposit, at its south end.

Cleaning around a cluster of posts in Area B at this level revealed two parallel rows of what appeared to be wattling, 0.50m apart and running northwest-southeast (Fig. 1.9). Possibly associated was a single vertical stake, *c.* 0.05m in diameter, on the east side of the eastern line of wattling, visible next to the tip of the ranging pole in Fig. 1.9. These rows of wattling lay inside the two major post rows, ran across the line of the western post row and appeared to be earlier than it. The western wattle line, **635**, ran between posts **143** and **144**. The eastern wattle line, **636**, ran past post **148** and was cut by post **147**. At least four layers of horizontal twigs were exposed on the eastern wattle line, which had spread to either side of the uppermost surviving wattle layer, presumably through compression of the overlying deposits, but the base was not exposed (Fig. 1.10). A length of 2.40m was recorded along the eastern wattle line but its full extent is not known. About 1.50m of the western wattle line were recorded. Its alignment was similar to that of the curvilinear spread of twigs **421/467** and the two features may have been associated with each other.

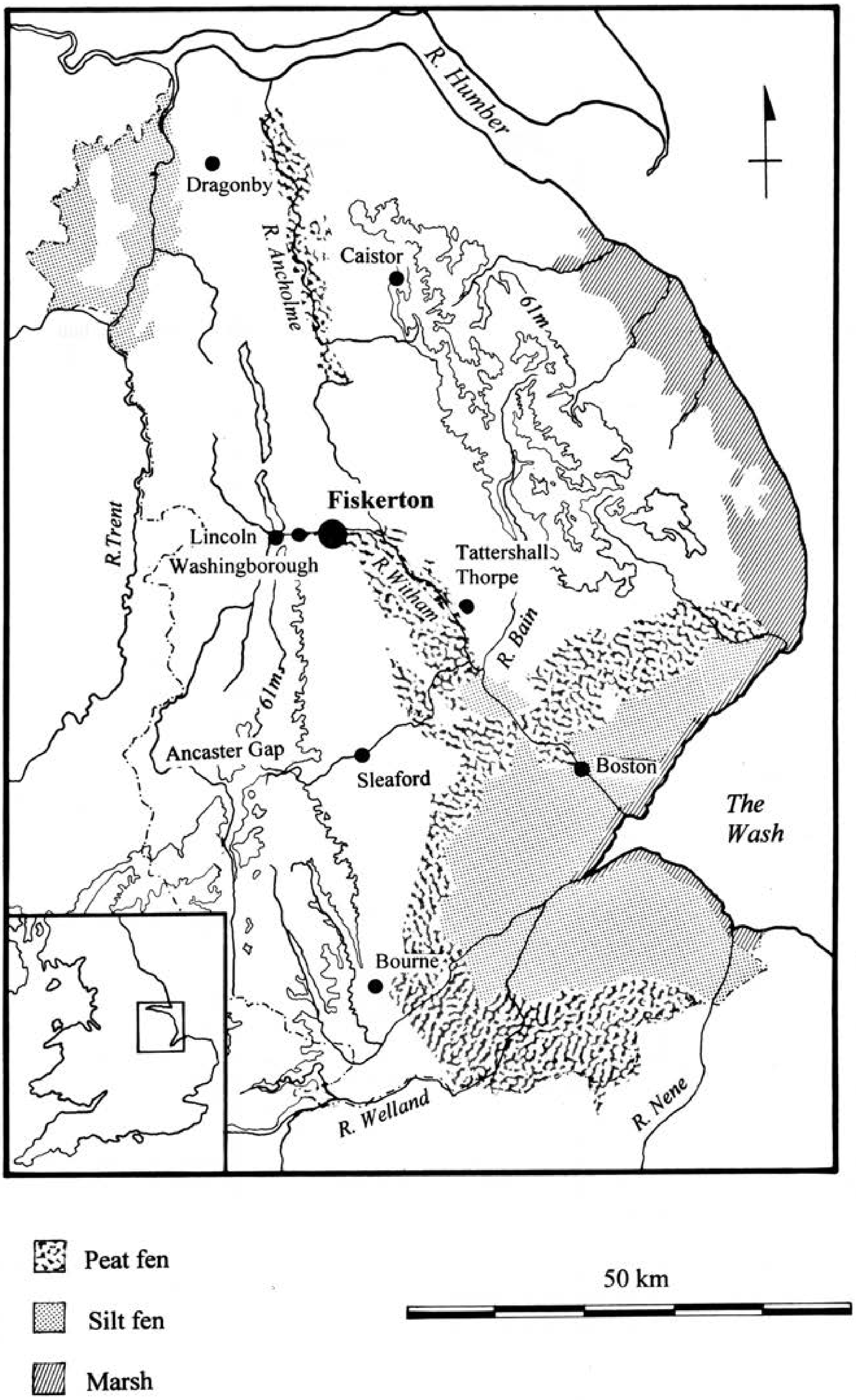


Fig. 1.1 Fiskerton, Lincolnshire, site location (N. Smith).

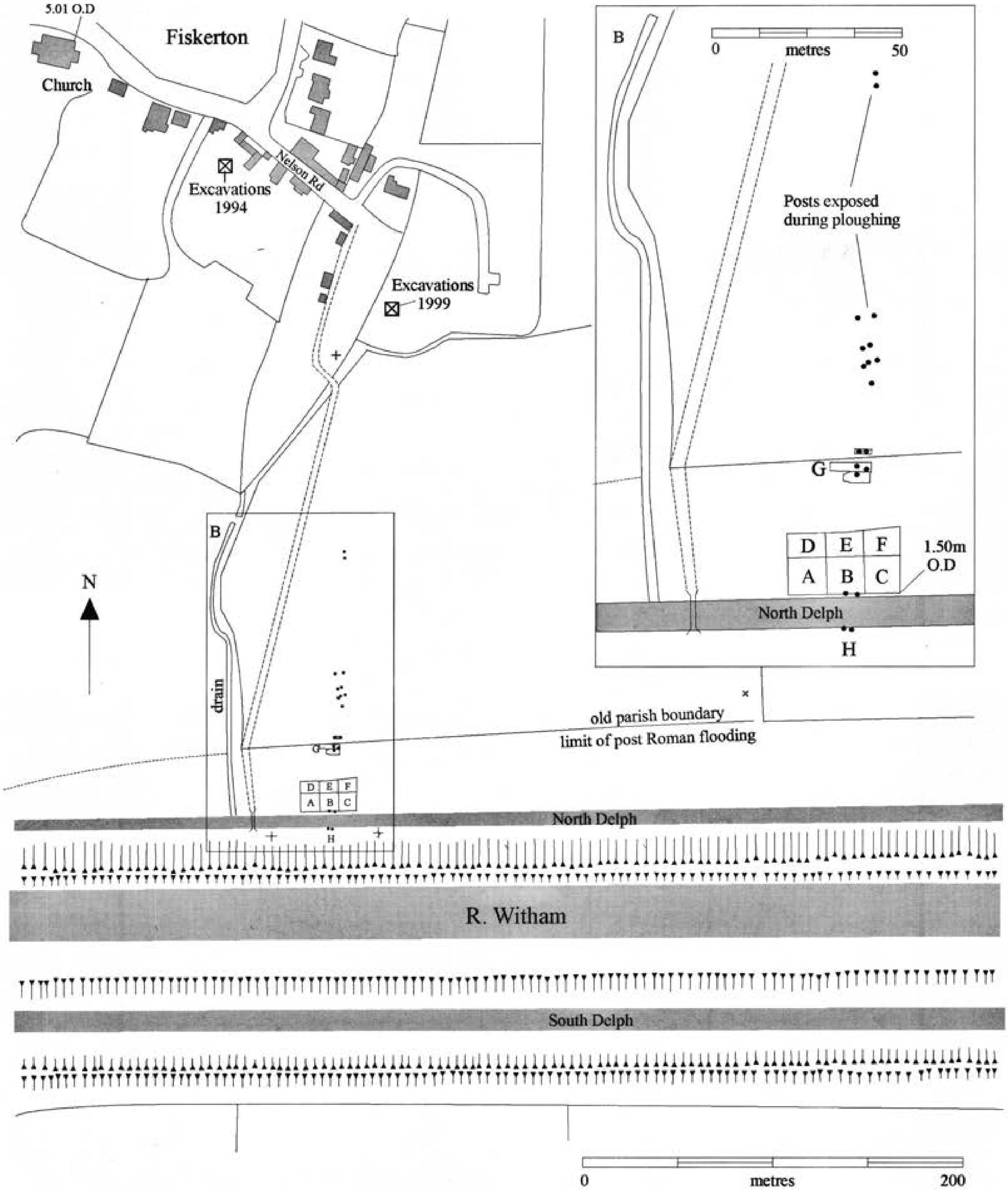


Fig. 1.2 Trench location plan and setting (M. Williams, based on survey by M. Clark).

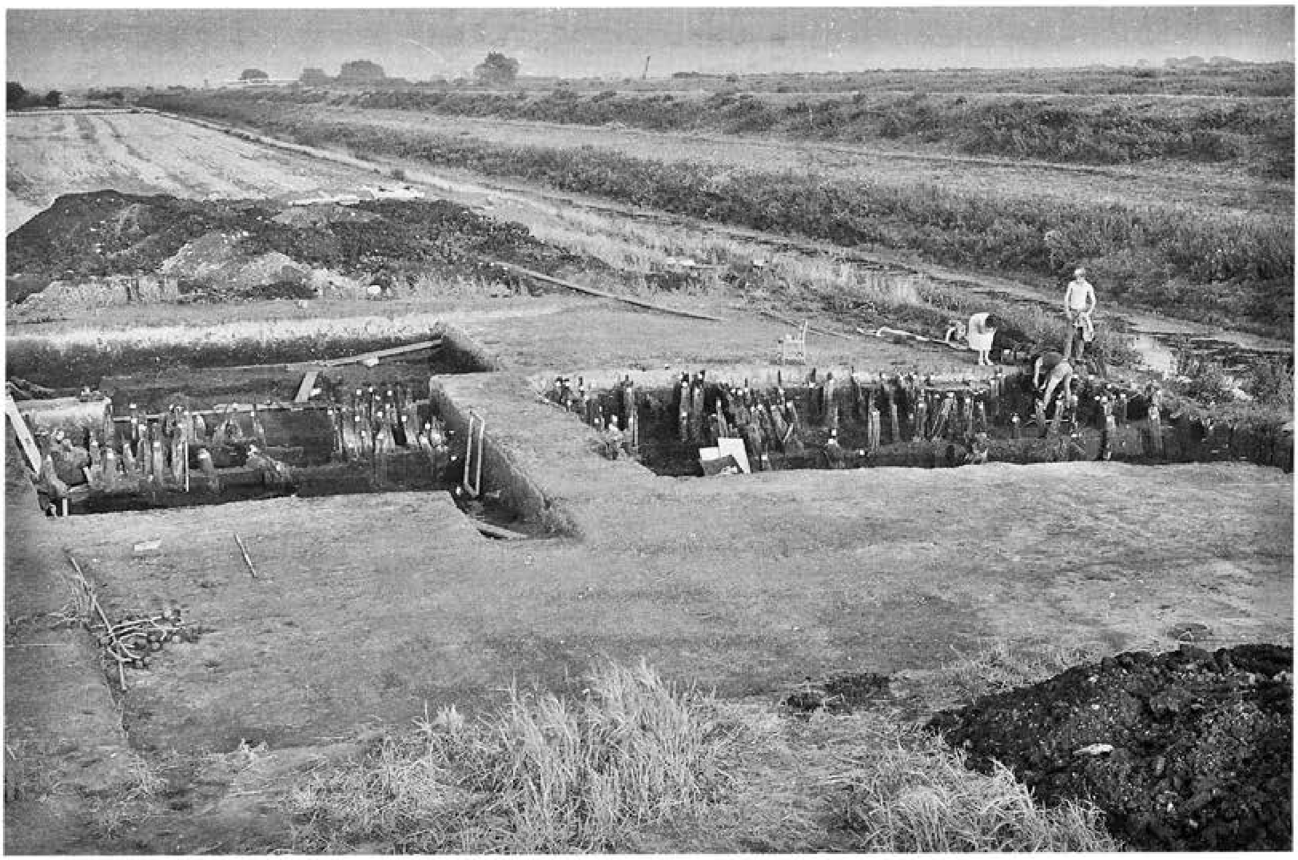


Fig. 1.3 General view of the excavations looking east with the North Delph to the right and the River Witham beyond the high bank (N. Field).

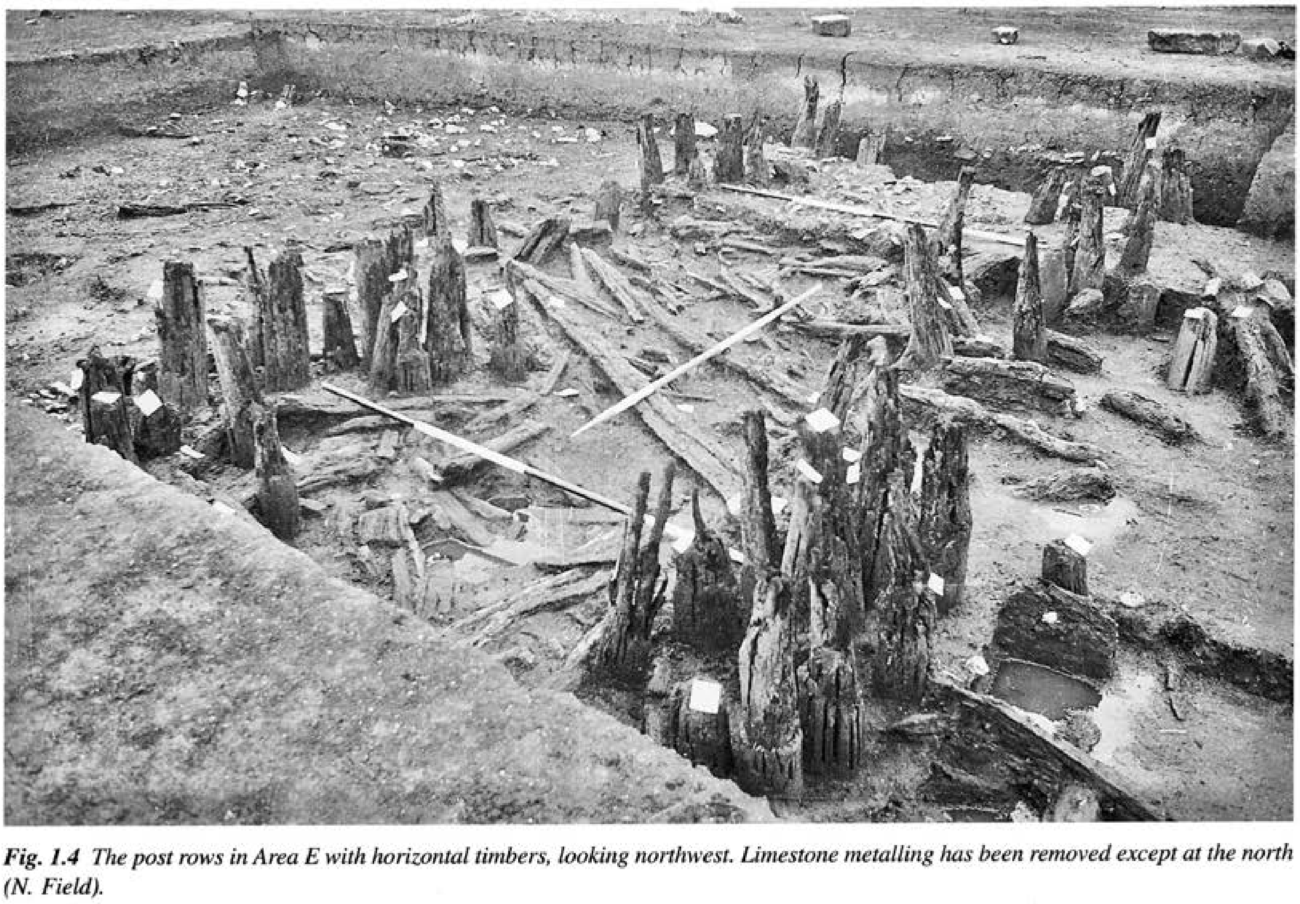


Fig. 1.4 The post rows in Area E with horizontal timbers, looking northwest. Limestone metalling has been removed except at the north (N. Field).

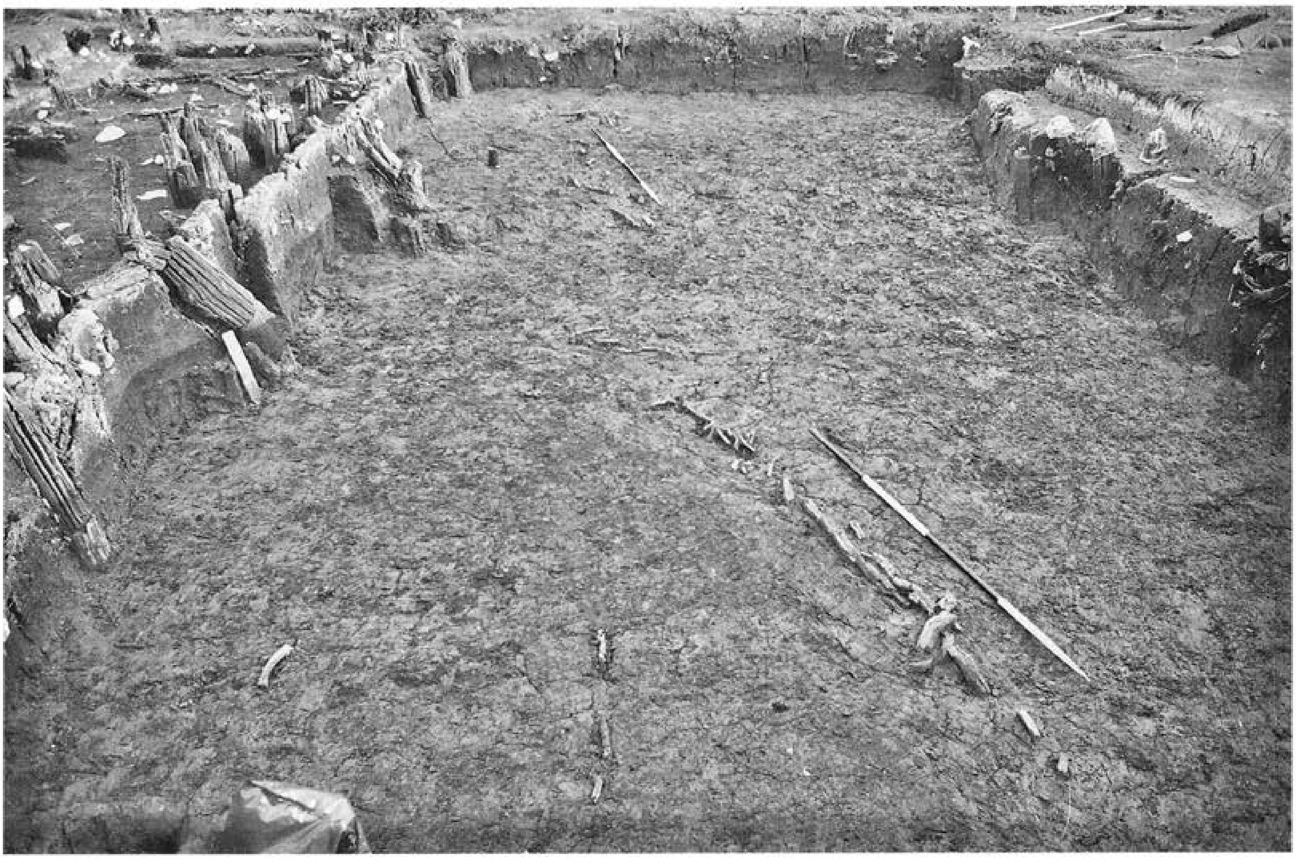


Fig. 1.6 Area B. Curving spread of twigs 421/467 in silt layer 332, looking south (N. Field). Scales 2m.

Fig. 1.7 Area B. Stakeholes which predate the causeway (N. Field). Scale 0.50m.

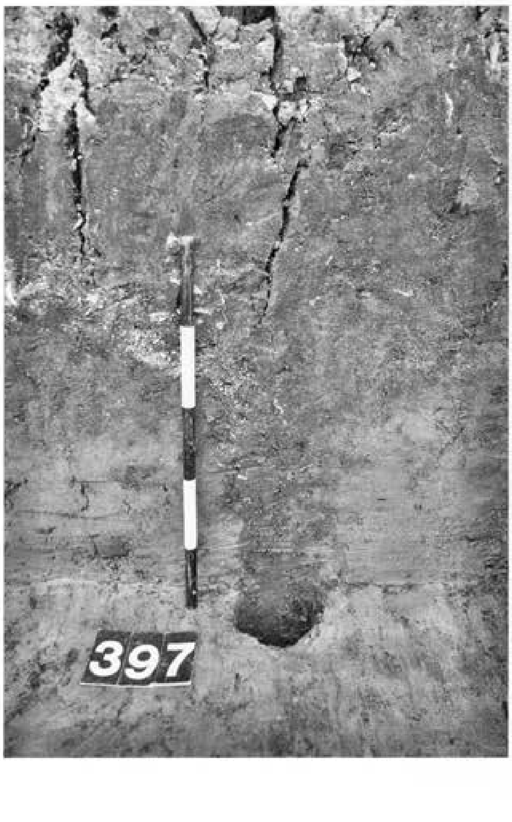


Fig. 1.8 Area B. Stakehole 397 (N. Field). Scale 0.50m.

Fig. 1.9 *Area B. The rows of wattle 635 and 636, cut by the western row of causeway posts, looking northwest (N. Field). Scales 0.50m and 2m.*

Fig. 1.10 *Close-up of the east line of wattling 636, showing spread of twigs, looking west (N. Field). Scale 0.50m.*

The timber causeway

Two rows of north-south aligned posts, 2.40m apart, ran through the east side of Areas B and E, forming the main structure on the site (Plates 2 and 3). The excavations in 1981 revealed 87 posts along the west row and 82 along the east. A further 10 posts had been recorded in December 1980 in the west row, and two in the east row, but high water levels in the North Delph prevented their reinvestigation the following summer. South of the main excavations eight posts were recorded on the south side of the North Delph (Area H, Fig. 1.2). To the north of the main excavations two posts were recorded in the machine trench (one of which, **637**, was removed by machine and found to be 5m in length) and four posts were recorded in Area G, giving a total of 195 recorded posts in the two causeway rows. The tops of further vertical timbers were exposed and surveyed in during ploughing in 1981, running in a north-northeasterly direction (3°) for at least 160m across a field towards the modern village of Fiskerton (Fig. 1.2). Further posts were revealed *c.* 3m south of Area H in 2001, along the berm between the North Delph and the river embankment.

The excavated area of 1981 is thus a tiny part of the total stretch of this remarkable timber structure. Its southern limit beyond the modern flood bank flanking the north side of the River Witham is unknown but excavations in 2001 revealed no evidence for a post alignment directly opposite on the south bank of the river (though there is one about 800m upstream).

In each row the posts formed six clusters centred about 3m apart, although there were no gaps in the rows wider than 1.50m. The posts were predominantly of oak, with a small number of alder posts; the diameters of the majority of the posts fell within a range of 0.12m to 0.20m. Dendrochronological analysis (see Hillam, Chapter 3) demonstrates that the construction sequence of the rows of timbers can be separated into an initial build followed by a series of at least nine repairs over a period of 135 years after 457/456 BC. (Undated timbers may belong to periods extending the life of the causeway.)

In amongst the posts were pegs, wedges and stakes *in situ* which may have been used to secure horizontal planks but no such horizontal timbers were found in association with these wedges, pegs and stakes (Fig. 1.11). The three terms have been used to describe the form of these pieces of worked wood, rather than their separate functions, which were indistinguishable. Split timbers triangular and rectangular/square in cross-section are described as wedges and stakes respectively. Those that were circular in cross-section are referred to as pegs. These small worked timbers were found at several levels in the sequence (see **195** and **313** below). All were of much smaller dimensions than the posts, characteristically between 20 and 50mm in cross-section.

The timber posts present two considerable problems. One is how we establish from what stratigraphic level they were hammered into the river silts. The other is what sort of superstructure these posts supported. The stratigraphic pinpointing of the construction of a causeway is made problematic because of the possible scouring and

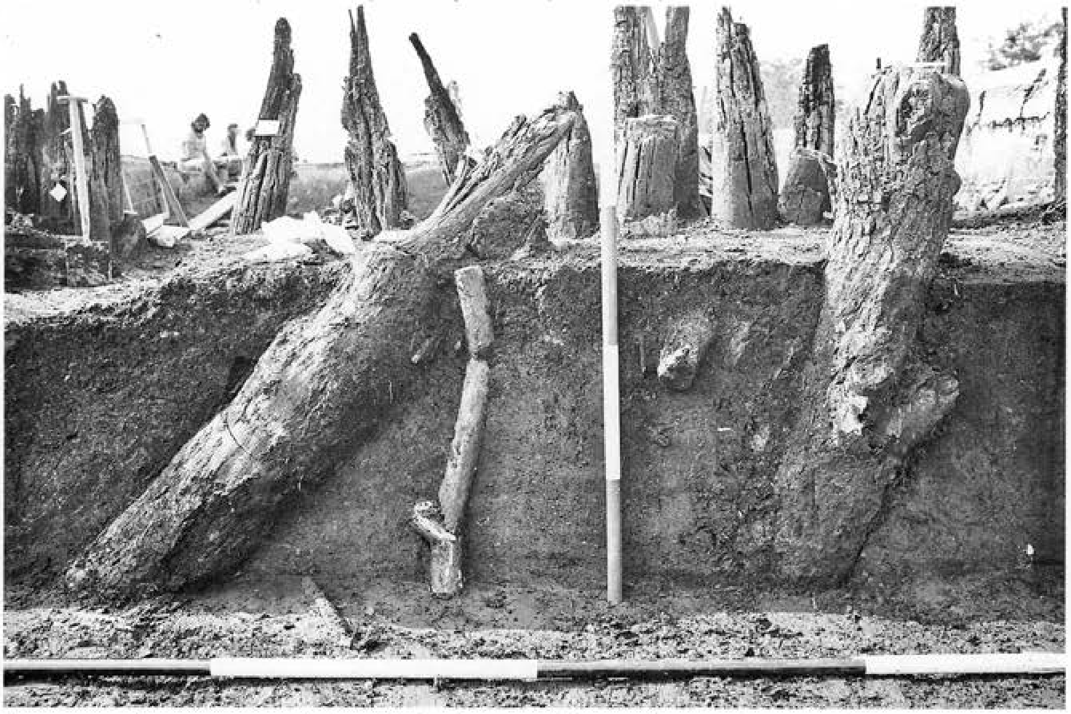


Fig. 1.11 *The east row of causeway posts in Area E, showing one of the pegs between the posts. Compression of the peg has created a concertina effect (N. Field). Scale 0.50m.*

Fig. 1.12 Removal of a causeway timber post from the machine trench (N. Field).

removal of certain layers within the Iron Age and Roman periods, and by the difficulties of identifying any clear horizon from which the posts were driven in. The posts must be later than any layer through which they were driven. One of the posts in the machine trench was pulled out with a mechanical excavator (Fig. 1.12) and was found to be 5m in length, driven considerably deeper than the bottom of the excavation trench (dug to a maximum depth of 1.75m). We cannot be certain from which layer the timbers were driven. Some were certainly in place by the time that the layers **192**, **331**, **313** and **32** were laid down because voids (interpreted as eddy holes) had been scoured out around the posts before these layers formed (see below 'The dating and absolute chronology of the deposits').

The tops of the posts have long since rotted away and we have little idea of their original length. At least some were probably over 5m in length but a few which had fallen over and could be fully recorded on site were much shorter (*e.g.* post **68** in Area F). They must have been hammered into the silt and peaty mud of the riverbed but presumably they would have continued to sink even deeper if they had supported traffic over a continuous period. In recent years the shrinkage of peat in the riverine sediments has caused the deposits around the posts to fall in height relative to the heights of the posts.

The original form of the structure at Fiskerton is still unclear. Would the posts have supported a bridge-like raised walkway of horizontal planks or were they the base of a seasonally submerged and low-lying trackway in which horizontal timbers were pinned down on top of the river silts? The extent of peat shrinkage and possible scouring of deposits makes firm support for either possibility difficult.

In support of the raised walkway interpretation, it is worth noting that the excavation revealed no pegged-down planking, even though there were contexts in which pegs remained *in situ*. In opposition to the raised walkway idea is the fact that the post rows are wholly unlike those of the Iron Age putative bridges at La Tène and other Alpine sites. Furthermore the Fiskerton posts have no angled or raked timbers to provide buttress supports, and there is no evidence for crossbeams to tie the opposing posts of the causeway together for greater strength. The balance of evidence points to interpretation of this structure as a low trackway rather than a raised walkway (see Chapter 8 for further discussion).

The western alignment of single posts

Along the western edge of Areas B and E, about 6m to the west of the double post row, ran a third north-south row of 19 timber posts (Fig. 1.13). They were similarly of oak and alder, with one of poplar or willow, and their diameters ranged between 0.14m × 0.16m and 0.23m × 0.28m. Although the area to their west (Areas A and D) was not excavated below the topsoil, the absence of a fourth line of posts protruding though the subsoil (layer **3**) indicates that this alignment was not the eastern side of another causeway. This post row was not dated by radiocarbon determination but the felling of a single post (**217**) was dendrochronologically dated to 385 BC. All other posts in this alignment were unsuitable for dendrochronological dating. As with the causeway, there are problems in ascertaining at what stratigraphic level this post alignment was driven into the river's deposits.

The purpose of this post row can only be surmised. Its density of posts is much less than that of the causeway rows but the clustering of posts aligns with the main clusters recorded on the causeway, confirming, along with the single dated post, that the two structures were probably in contemporary use. Amongst the possibilities are that the alignment acted as a 'groyne' to protect the causeway when the flooded river was in full spate, that it provided points to tie up boats, or that it was a post row added to provide greater solidity in the deeper water, similar to the additional rows in the middle of the Flag Fen timber alignment (Pryor 1998: 130–7; Pryor 2001).

The reed peat 195, 543, 500, 508–510

Much of Areas B and E was covered by **195**, a thick layer of reed peat (Fig. 1.14; soil horizon *4*; see Whiteman and MacPhail, Chapter 2). Layer **543** in Area F almost certainly equates to **195**. Within Areas E and F, contemporary with **195** was a sequence of reeds *in situ* (**510**) overlain by reedy peat (**509**) and reeds in grey-green clay (**508**). Covering most of the northeast corner of Area F was another dense patch of reeds (**500**), apparently still in their growing positions. The presence of reed peat indicates that the ground was dry enough to encourage a healthy growth of reeds.

The items of worked wood from these deposits were four pegs (**544, 614, 615, 631**) in Area E, four pieces of worked timber (**439, 366,** ***369, 370***) and a tree bole of a bog oak (**479**) in Area F, and three pegs (***402,*** **405** and ***406***) in the north section of Area F.

The deepest bone and inorganic artefacts came from these layers and comprised a horse mandible, two bone 'gouges', three pieces of iron binding (***197***), an incomplete iron bar (***230***), a small iron reaping hook (***407***), two Roman whetstones (***227*** and ***246***) and 28 sherds of Romano-British and Iron Age pottery. The occurrence together of Roman and likely Iron Age artefacts in these layers indicates that there has been a considerable degree of vertical mixing, no doubt as a result of downward movement of artefacts through the soft peaty muds of the reed swamp during their deposition and subsequently by fluvial disturbance of the peats. There were two base sherds of a Roman rusticated jar, whose adjoining sherds were mostly found 0.70m higher up and sherds from three other Romano-British vessels were also found at both this level and at higher levels. Thus these sherds do not date the layer but were introduced subsequent to its formation.

An undated broken post, **22**, was already present when layer **195** formed. Consequently the initial construction of the post row pre-dated this layer, probably being associated with layer **332** or earlier.

Twig and brushwood layers 503/507: structural work above the reed peat layers

Lying on top of the reed peat (**195, 543, 500, 508–510**) in Area E and the west edge of Area F was a thin localized layer of twigs (**503** in Area E and **507** in Area F). Its full extent was not recorded but it was visible in the north section of Areas E and F, from 0.90m west of the post rows to the western edge of Area F. This brushwood layer may have been laid deliberately to consolidate the ground whilst constructing or repairing the timber causeway and there is good evidence for the causeway's structural modification at this level, in the form of stakes, pegs and wedges.

Between the reed peat (**195, 543, 500, 508–510**) and the silts (**192, 196**) above, along with the brushwood layer was a collection of stakes and pegs. Most of these were *in situ*, apparently driven in from the top of or within the reed peat layer (**195**). Nine (**279, 280, 282–287, 290**) were in Area B and were spatially associated with the west post row. In Area E there were pegs and wedges associated with a depression (**626**), interpreted as an eddy hole. Halfway down the east post row in Area E, the position of one peg (**632**) may have been related to one of the posts (**566**). A sharpened post (**68**), possibly a fallen vertical, was found in layer **500** and embedded in layers above (**25, 26** and **194**).

It is possible that a wooden trackway was constructed at this level, with brushwood laid down and pegs driven into the top of the reed peat (**195**). Most of the pegs are set amongst the posts of the causeway's west post row and there are only one or two outlying pegs. There is no evidence of what the pegs were intended to hold down other than brushwood since there are no planks or horizontal timbers at this level. A deer mandible from **503** articulates with another from layer **31**, indicating that bones as well as artefacts have moved down through the silts.

Silt layers 192, 196, 496, 502, 506

The entire area of reed peat on the site was covered by a series of silts and silts containing wood (soil horizon *3a*; see Whiteman and MacPhail, Chapter 2). The most extensive and homogeneous of these (**192**) contained twigs and shell fragments. In Area B it covered three-quarters of the trench, thinning from 0.25m thick at the north end to 0.10m in the south where it graded into a silt without organic inclusions (**196**). In Area E it was present at the south end and was probably the same as another mixed silt (**502**) which overlay the twig deposit (**503/507**) and extended across all but the eastern part of this trench. A roughly circular patch of silts (**496**) lay over the reed peat in Area E, probably filling a shallow depression in layer **195**. In Area F layer **192** occurred with another silt layer (**506**) and a localized spread of grey-brown silt in the trench's central-east area over a reed bed (**500**).

Within **192** in Areas B and E there were 12 worked timbers. One was a peg (***132***) but most were simply off-cuts. Six of these timbers had been stripped of their bark. There were two worked timbers (**504, 516**) in **502** but none in **196, 496** or **506**. Layer **192** in Area F produced a thick mat of twigs and small twig fragments, 11 chopped logs, two planks and at least six pegs. The pegs had secured the twig matting into the soft mud but they were extremely difficult to locate and many were probably missed.

Pottery from **192** was of Romano-British date, with sherd joins to material in higher layers. A human skull fragment with a sword wound (***212***) was found within **192**, along with four bone 'gouges' (***166***, ***178***, ***187***, ***191***), an iron axe-head (***413***), and another piece of worked bone (***195***). Within **196** were another two bone 'gouges' (***159*** and ***160***), an iron stud (***210***) and a piece of bronze binding (***161***).

The erection of post **6** appears to have predated the deposition of layer **502** since this silt deposit sealed the top of an eddy hole (**626**) which had formed around the post. The felling of post **6** is dated to 375/4 BC and thus these silt layers (**502** and the equivalent layer **192**) are later than this date. This accords well with the radiocarbon date of the human skull fragment in **192** (see Marshall, Chapter 7). A posthole (**330**), from which a post had been removed, was cut from layer **192** and sealed by layer **26**.

Brushwood and silt layers 194, 313, 331, 499

Above the first group of peaty silts was another series of four silt deposits containing large quantities of crushed twigs and large pieces of wood, some of which were worked but not *in situ*. The wood covered the southern half of Area F and a quarter of the southern part of Area E. Overlying the circular silt deposit (**496**) and layer **502** in Area E was a silt layer (**313**) which was contemporary with a brown silt layer (**331**) further to the south and extending into Area F where it covered two-thirds of the trench and merged into the third silt layer (**194**) on the north side (Fig. 1.15). Layer **194** was a loose deposit of silt containing large quantities of brushwood, nutshells and mussel shell fragments; it extended into the northeast corner of Area E. It was very dense and difficult to record but appeared to have been secured in place with pegs (Figs 1.16 and 1.17). It did not extend into Area B and its extent coincided with the largest clusters of posts. The brushwood/twig matting may have been laid to stabilize the peat deposits in an area affected by scouring, having a similar function to the willow and reed mattresses still used along riverbanks today for the same purpose.

Layer **499** was a localized spread of grey-brown silt covering the central area of Area F over the reed bed (**500**). No comparable levels for the layers described above are recorded for Area B but layer **331**, recorded in Areas E and F, is drawn on the south section of Area E; it was therefore either recorded as another layer in Area **B** or diminished immediately between Areas E and B.

The worked wood from **331** in Area E included two chopped timbers, six pegs and five pieces of planking. Six more pegs, four pieces of planking and six chopped timbers were found in **331** in Area F. Finds from **313** included notched plank fragments, horizontally-lying stakes and pegs, nine chopped or stripped logs and large

Fig. 1.17 *Area F. General view of the brushwood layer 194, looking west (N. Field).*

quantities of unworked logs and branches. In Area E there were 13 pegs or wedges which had been driven in from the top of or within layer **313**; one of these (**61**) may have been a later addition from layer **26** above. Apart from two vertical pegs in Area F, most of the pegs and other worked wood were amongst or close to the double row of causeway posts. These remains appear to be debris associated with repair of the causeway.

Other finds in **331** in Area F included two iron axe-heads (***331, 383***), an iron bench anvil (***384***), an iron hammerhead (***403***), a Roman whetstone (***345***), a fragment of tile (***285***) and three sherds of Romano-British pottery from the same vessel. Finds in **313** included a bronze ring (***385***), four bone 'gouges' (***344, 350, 378, 379***), a worked flint flake (***404***), a hammer stone (***357***), a broken limestone net weight (***339***) and 15 sherds of Iron Age pottery.

There was an impressive collection of artefacts in layer **194** in Area F, including an iron sword (***149***), a bronze band (***330***), two iron punches (***140, 327***), five iron files (***171, 292, 298, 312, 329***), a sixth file with an antler handle (***364***), a decorated saw with an antler handle (***288/A***), a metalworking hammer (***332***), a possible poker (***288/B***), a possible iron gouge (***301***), eight bone 'gouges' (***137, 145/151, 147, 152, 153, 167, 289, 295***) and another in Area G (***172***), a piece of worked bone (***342***) and a piece of worked antler (***333***), and Iron Age and Romano-British sherds. Among the animal bones was a cattle skull with its atlas vertebra in place (***116***). As in earlier and later layers the metalworking and woodworking tools were concentrated in Area F. Most came from the northern part of Area F but the bench anvil and one axe-head (***331***) were recovered from its southeast part. Axe-head ***413*** from layer **192** was also found in this part of the site, at a lower depth.

The dark silt layer 26

A layer of almost black silt (**26**), containing wood chips, twigs, larger wood, quartz pebbles and small quantities of shell, extended over the whole of Areas B and F and part of E, petering out just north of Area E's south baulk. It was also encountered in Area H. It overlay layer **331** in Areas E and F and layers **192** and **196** in Area B. In Area B layer **26** was thickest on the west side of the trench (0.15m), decreasing to 0.10m on the east side. It did not cover layer **313** in the northern part of the main site.

Large quantities of worked horizontal timbers, many of them notched planks, were found in this layer. In Area B there were five planks (**35, 427, 428**, ***362, 367***), of which one (**427**) was notched and possibly chamfered and another (***362***) was cut obliquely at one end. Of the 39 worked horizontal timbers lying between the causeway posts in Area E, ten were planks. In Area B there were 11 logs with evidence of lopping and four pegs (**562**, ***315, 361, 368***), of which one (***368***) was *in situ* close to the single post alignment west of the causeway. In Area E there were 15 logs with evidence of lopping, three pegs and five wedges. In Area F timbers were not so dense. Eleven were felled logs, otherwise unmodified, six were pegs and one was a wedge. At the north end of the trench there were three posts (**66–68**), one of them (**68**) 3m long (see Fig. 3.25), sharpened to points and leaning over, perhaps moved from their original positions. None of the planks was pegged down and the debris, of which they form a part, suggests that if the timber causeway had been a raised walkway, it was now decayed and possibly collapsed or dismantled.

The best preserved of the spearheads (***391***) was found in Area E, west of the causeway, whilst the jet ring (***349***) and one of the two amber beads (***122***) were found between the posts of the causeway in Areas E and B respectively. There were eight bone 'gouges' from Area B (***117, 119, 126, 136, 144, 154, 185, 360***), seven from Area F (***69, 76, 86, 99, 123, 128, 131***) and one from Area E (***343***). 'Gouge' ***117*** joined piece ***440*** found in layer **32** above and may have been deposited at that level. The two near-complete crushed Iron Age pots (see Fig. 5.1) were found in this layer, with stray sherds from both pots in other layers. Further Iron Age and Romano-British pottery in layer **26** included sherds from a Black Burnished Ware dish (see Fig. 6.1) with sherd joins to layers **192** and **195** below, and above to layer **32**. Five Roman tile fragments (***80, 81, 85, 102, 313***) were also found in this layer.

The limestone rubble spread 31 within the shelly silt layer 32

Over most of the site layers **26** and **313** were sealed by a thick dark layer containing much larger quantities of crushed shell (**32**). Layer **32** was also recognized in Area G and may be the accumulation of a series of flooding events rather than one single deposit (Figs 1.18–1.23). Sandwiched in the middle of layer **32** was a spread of limestone rubble or metalling (**31**) with occasional flint and chert nodules, concentrated in the area between the posts of the causeway but also scattered to its east and west (Fig. 1.24). The only difference between the layers of **32** above and below the limestone layer was the relatively low proportion of worked timbers above. Layers **32** and **31** are equivalent to soil horizon *2b* (see Whiteman and MacPhail, Chapter 2).

In the lower part of layer **32** there were long, worked horizontal timbers (1.28m to 2.70m), five of them planks, with 20 logs (some of them chopped and stripped of their bark), four pegs and one wedge. Worked timbers **63**, **160**, **183** with **436**, **197** and **65** (the boat fragment) were found in layer **32** (see Taylor, Chapter 3).

In layer **32** in Area B were found an iron spearhead socket (***90***), fragments of a circular bronze mount (***3***), an oak handle (***311***), an Iron Age sword (***429***) and two bone 'gouges' (***186, 303***). Apart from a few isolated Iron Age sherds, the pottery was Romano-British, mostly deriving from a colour-coated jar, a grey ware jar, a dales ware vessel and a rusticated pot. Each of these pots joined with sherds in layers below **32** but not above it. There were also two Roman tile fragments (***14*** and ***447***).

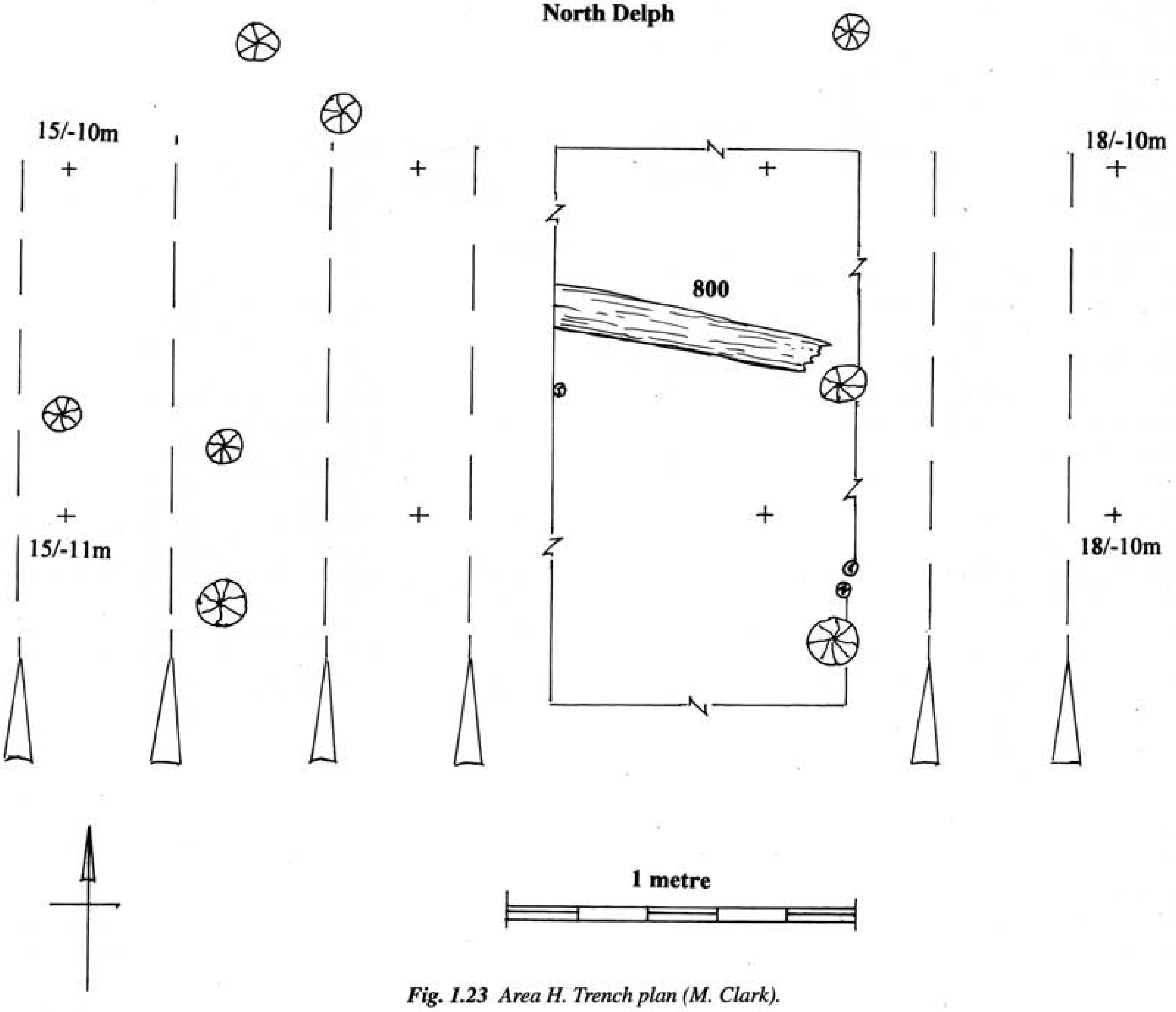


***Fig. 1.23** Area H. Trench plan (M. Clark).*

In layer **32** in Area E there were a Roman coin (***199***), two iron spearhead sockets (***203***, ***260***), a fragment of an iron cleaver (***216***), a bronze binding (***248***), an amber bead (***168***), six bone 'gouges' (***440***, ***174***, ***186/257***, ***190***, ***209***, ***215***,) and six tile fragments (***177***, ***184***, ***229***, ***244***, ***259***, ***266***). A fragment of human tibia was also found in this layer. Animal bones consisted of a sawn bone (***188***) and a claw (***170***). There were also Iron Age and Roman sherds. In Area F, non-wooden finds from layer **32** consisted of a tile fragment (***64***) and two sherds (***39*** and ***45***) from the Black Burnished pot described in layer **26**.

Between the two rows of posts, in or on top of layer **31** in Areas B and E, and extending into the western edge of Area F, was found an impressive array of artefacts, many of them of Iron Age date. There were four iron spearheads (***218***, ***268***, ***300***, ***423***), an iron sword (***222***), a unique bronze 'figure-of-eight' (***208***), an iron spearhead socket fragment (***220***), a linch-pin (***280***), two iron rod fragments (***293***, ***299***), a flat iron strip (***283***), half an iron ring (***294***), an iron nail (***437***), two unidentified iron objects (***269***, ***302***), a whetstone (***431***), three fragments of Roman tile (***62***, ***320*** and ***322***) and seven bone 'gouges' (***228***, ***258***, ***277***, ***281***, ***291***, ***297***, ***424***). A bronze 'shoulder piece' (***237***) with three joining fragments from a piece of bronze binding (***247***) was found just west of the posts in Area E. There was very little pottery, just a few Iron Age and Romano-British sherds. In Area G a medieval iron axe-head (***323***) and a bone 'gouge' (***321***) were also recovered from this layer, along with sherds of mostly Roman pottery.

Descriptions of individual artefacts' locations within layer **31** indicate that they were found between, and trapped amongst, the stones. It is possible that many lay on or near the surface of the soft mud (**32**), to be squeezed amongst the stones as these were dumped and compressed into the layers below (**32** and **26**). The height of the causeway posts relative to the limestone horizon cannot be determined owing to an unknown degree of peat shrinkage between the posts' insertion and 1981: it is entirely possible that the limestone may have been dumped at a level equivalent to the tops of the posts even though the tops of the posts poked up above layers **31**, **32**, **25** and **3** in 1981.

Fig. 1.24 Area E. Limestone metalling between the causeway posts, looking north (N. Field). Scale 2m.

The creation and use of the limestone layer (**31**) seems to have been a relatively brief moment within the sequence of deposition evidenced by layer **32**. The relative absence of timbers above layer **31** suggests that the wooden trackway had gone out of use by this point, to be replaced by a roadway surfaced with limestone hardcore. The final deposition of layer **32** may indicate the abandonment of the causeway although a few metal and bone finds came from within the upper part of layer **32**.

The 'postholes' reinterpreted as eddy holes

Cutting into layers **32**, **26**, **313**, **331** and **195** was a series of steep depressions within which were some of the causeway posts (Fig. 1.25). These 52 holes, varying in diameter from *c.* 20mm wider than the posts themselves to *c.* 300mm wider, were filled with material comprising twigs, bark, shell and peat, some containing more shell than twigs, others more twigs than shell. They were initially thought of as postholes, dug to allow one or more phases of posts to be placed in position before being hammered into the mud, but the dendrochronological analysis (see Hillam, Chapter 2) indicates that the posts in these 'postholes' were not all of one phase. These depressions are thought to have been formed by eddy currents during flooding, with the swirling action around the posts removing the soft silts and peats. Alternatively, the 'postholes' may have been formed by human action, the result of unsuccessful attempts to dislodge the posts from their deep settings.

The dating and absolute chronology of the deposits

Twenty-eight of the 52 eddy holes were associated with posts dated by dendrochronology; 22 of the holes had secure stratigraphic associations with the deposited layers. Sadly most of the eddy holes are of little help in linking the absolute felling dates of the posts with the relative chronology of the stratigraphic sequence. For example, two eddy holes sealed by layer **32** were associated with posts which had been felled in 406 and 389 BC yet a timber dated to 375 BC was associated with one of the holes which cut layer **195**, well *below* layer **32**. However, of all the dated posts with associated eddy holes, those with the *latest* felling dates (posts **214**, **251** and **344** in eddy holes **590**, **556** and **577** sealed by **32**) do provide some assistance in dating the deposits that fill those holes and, to some extent, the artefacts within those deposits.

Layer **502** (equivalent to **192**) dates to some time after 375/4 BC because of its stratigraphic relationship with post **6** (see p. 11). Layer **32** seals eddy holes around the three posts dating to 359–317 BC; thus layer **32** must date to some time after 359–317 BC. Within these stratigraphic associations, the posts provide *termini post quem* for the deposition of those layers which seal each eddy hole. Of course, layers **192/502** and **32** may have each been deposited quite some time after 375 BC and 359–317 BC respectively.

It can be concluded that the excavated layers from layer **32** upwards were deposited after the middle of the fourth century BC and thus were later than the majority of the post erection episodes. Unfortunately the downward movement of artefacts, especially the smallest and heaviest ones, makes their dating difficult on stratigraphic grounds but those in layers **192**, **331**, **313** and **26** cannot have been deposited before 375 BC whilst those in layers **32**, **31** and **25** cannot have been deposited before 359–317 BC. Layer **32** may also have been the surface onto which Roman items were later deposited (see Chapter 10 for further discussion).

The peat and crushed shell layer 25

In all of the excavated areas, layer **31/32** was sealed by a homogeneous layer of silt mixed with peat and crushed shell (**25**), varying between 0.12m and 0.25m in thickness. They are equivalent to soil horizon *2b* (see Whiteman and MacPhail, Chapter 2).

The only timber recorded from this layer was an unworked vertically-set log (**269**). Artefacts from layer **25** were a bone 'gouge' (***164***) and a late medieval bronze buckle (***182***) so it is possible that this layer is post-Roman in date. However, the evidence for extreme vertical movement in the layers below urges caution in dating with absolute certainty this upper layer to the medieval period.

The silt flood deposit 3

Layer **25** was sealed in all areas by a light beige silt (**3**), wholly different to earlier layers, which was dug by hand but proved to be virtually sterile. It was thickest on the north side of Area B (0.50–0.60m) but was not present in the machine trench dug to the north of Area G. This is a mineral soil of alluvial shelly marl (soil horizon *2* – 0.17m–0.53m below ground surface; see Whiteman and MacPhail, Chapter 2). The east-west running parish boundary appears to delineate the northern limit of the beige silt, marking the edge of the flood zone prior to the river's canalization in the early nineteenth century. Protruding through this deposit, the causeway's posts were easily identified and, although the field had been under plough for only three years, their tops had already suffered considerable damage. Layer **3** appears to be post-Roman in date, and produced five medieval tile fragments including part of a thirteenth century glazed tile. A late fifteenth/early sixteenth century buckle (***182***) was found beneath it in layer **25**. The presence of a fragment of bone 'gouge' (***207***), conjoining with a fragment (***190***) in layer **32**, indicates some degree of vertical disturbance in these uppermost layers.

Above layer **3** there was a 0.30-0.40m deep layer of ploughed topsoil (layer **1**), containing a single medieval

Fig. 1.25 *Area B. Broken causeway post 22, in the western post row, showing shelly fill (32) of eddy hole around broken post (N. Field). Scales 1m and 0.50m.*

and 47 post-medieval pottery sherds. Only two sherds were of seventeenth/eighteenth century date, the remainder being later, which is entirely consistent with the area being drained for agricultural purposes in the early nineteenth century. This was in contrast to the range of finds recovered during fieldwalking in the adjacent field to the north, which lay beyond the flood deposit layer **3**. At least 11 Late Saxon vessels were represented together with medieval sherds of thirteenth/fifteenth century date, suggesting that this land, closer to the modern settlement, was under cultivation for a much longer period of time.

2 THE ENVIRONMENTAL SETTING OF THE CAUSEWAY

THE SOILS

By C. Whiteman and R. MacPhail

Five soil horizons, all with clear or abrupt boundaries, were recognized within a 2m profile penetrating into the peat (Table 2.1).

1. The uppermost horizon (Ap horizon) is currently a plough layer (0–0.20m). An Ag horizon, developed under long pasture, has been ploughed up and coarser material of the Bg horizon has been incorporated into the new Apg horizon [layer **1**].

2. The mineral soil overlying the peat is made up of silts and coarser material of fine stone-sized shells and shell fragments, mixed with fen peat (0.17–0.53m). The Bg horizon contains very dark grey organic-rich silt lenses and lines of shell fragments. This horizon can be divided into three layers:

2a (0.17–0.25m; Munsell soil colours 7.5YR2/3, 5YR4/6–8 [layer **3**]) is a silt with much comminuted shell.
2b (0.22–0.30m; 7.5YR2/3 [layers **25**, **31** and **32**]) has a greater shell concentration with the mineral soil occurring only as pockets within the shelly material.
2c (0.27–0.53m; 7.5YR3/1–2/1 [layer **313**]) also contains less mineral soil than *2a* and has very prominent iron-rich clay coats in vertical channels, terminating abruptly at the top of *2c* and penetrating down into horizon *3* and the very top of *4*.

These iron-rich coats represent clay and iron illuviation from the topsoil and indicate that the water table has fallen to at least their lowest point, presumably as a result of land drainage. Their abrupt upper limit may indicate deep-ploughing of the soil or other surface disturbance. Rather than resulting from overbank flow of the modern river, which was only cut in the last century, the coarser material in horizon *2* may relate to original stream-bed deposition, especially as shelly deposits do not appear to extend further than the old river course. The finer deposits could relate to either river or flood deposits of the old river. A line of stones occurs at the junction of this mineral soil with the underlying peat, apparently predating mineral deposition by the river.
3. A very woody peat with common large fragments of wood up to 100mm in diameter, fragments of limestone and abundant shells and shell fragments (0.52–0.93m [layers **192** and **503/507**]). In comparison with horizon *4*, the profile suggests an increase in terrestrial vegetation with a water table that would still have been quite high. The uppermost part of this layer, *3a* (0.52–0.70m; 10YR1.7/1 with channel coats 2.5YR3/6 [layer **192**]), is a fine, well-humified peat which suggests slightly wetter conditions than *3b* (0.68–0.93m; 7.5YR1.7/1 [layer **503/507**]), a woody peat.

4. A well-humified peat or very organic mud with impersistent silty lenses (0.90–1.32m [layers **195** and **508**]). It can be divided into four units:

4a (0.90–1.09m; 10YR3/2 with root stains 7.5YR1.7/1)
4b (1.07–1.23m; changes from 7.5YR2/1 to 7.5–10YR2/1 very rapidly on exposure)
4c (1.22–1.32m; 10YR3/2 with root stains 7.5YR1.7/1)
4d (1.32–1.41m; changes from 7.5YR2/1 to 7.5–10YR2/1 very rapidly on exposure)

The few reeds in the lowest of the four units (*4d*) tend to be replaced upwards by occasional fragments of wood, which might suggest a gradual but perhaps fluctuating shallowing of the water level with aquatic vegetation giving way slowly to more terrestrial species. Alternatively, the local distribution of the inorganic lenses may indicate the presence of very small water courses rather than a general, periodic raising of the water level, while the increase in fragments of wood is probably due to the presence of the causeway.

5. The top of a silt layer (10YR3/2 [layer **332**]) was seen at 1.41m, containing common occurrences of undecomposed compressed reeds. This derives from a low-energy depositional environment, probably the standing water of a reed swamp.

Table 2.1 Soil/sediment analysis (C. Whiteman).

Horizon	Context No.	Depth (cm)	Standard colours	Acid ($CaCO_3$) Reaction	Particle size / Stones	Structure/Pores	Mottlings	Organics	Lower boundary
1. Ap	1	0/20-0/17	7.5YR2/1 Nodules 5YR3/6	Strong	Silty clay loam; some small clasts occas. 2-3cm incl. sub-angular flint & chert, small stones, no quartz; inclusions from subjacent horizon	Moist; weakly developed, fine blocky fragments; few (<5%) fine pores; friable	Rare, v. fine-ext. fine soft Fe nodules (from below?)	Common, v. fine roots; few medium roots; cereals. Few/common mollusc shells	Sharp, wavy
2a	3	20/25-17/22	7.5YR2/3 5YR4/6-8	Strong	Silty & much comminuted shell	Apedal; med-coarse blocky in 1cm earthworm channels contrasts with apedal material; a zone of mixing with 1, channels & pockets; no obvious pores	Few, prominent, sharp, medium 5YR4/6-8 common v. fine-fine motts.	Rare fine roots; one 1.5cm long peat fragment; much comminuted shell; lighter patches where shell concentrated	Clear, wavy
2b	25, 31 and 32	25/30-22/27	7.5YR2/3 Shell 10YR7/6	Strongest	Less mineral soil than 2a; occurs as pockets in shelly material	Apedal	As above & ?fragments of more continuous vert. channels in 2c	As 2a but much greater shell concentration (10YR7/6); common whole or broken shells; no roots	Clear, wavy
2c	313	30/53-27/53	7.5YR3/1-2/1 Coats 2.5YR3/6 Shell 10YR7/6 Speckled	Strong	Less mineral soil than 2a; occas. fragments of topsoil	Apedal; v. prominent Fe rich clay coats in 1cm dia. vert./sub-vert. channels, abruptly terminated at top of horizon, extending down to base of horiz. 3 or just below		Abundant shells; no roots	Gradual, smooth
3a	192	53/68-52/70	10YR1.7/1 Channel coats 2.5YR3/6	Medium		Channels as above but less prominent in darker peat; apedal; no pores except in channels		Fine, well humified peat; occas. twigs to 1cm width. Abundant shells & shell fragments	clear, smooth/wavy
3b	503/507	68/93-70/90	7.5YR1.7/1	Only shells	Angular stone fragment	Channels extend occasionally into top 5cm		Woody peat; common timbers up to 10cm in profile; larger elsewhere at same horizon; less shell but larger frags. prominent	Abrupt, wavy
4a	508/195	93/107-90/109	10YR3/2	None	Silty; less organic than 4b & 4d; silty beds impersistent	Apedal	Root stains 7.5YR1.7/1	Well humified peat. Gyttja? Few timbers, 2-3cm. Few reeds	Abrupt wavy/smooth within 4
4b		107/123 - 109/122	7.5YR2/1 to 7.5-10YR2/1	None	Silty; more organic than 4a & 4c; silty beds impersistent	Apedal		Well humified peat. Gyttja? Few timbers, 2-3cm. Few reeds	
4c		123/132 - 122/132	10YR3/2	None	Silty; less organic than 4b & 4d; silty beds impersistent	Apedal	Root stains 7.5YR1.7/1	(Well humified peat. Gyttja? Few timbers. Few reeds)	
4d		132/141 - 132/141	7.5YR2/1 to 7.5YR-10YR2/1	None	Same as 4b	Apedal		As 4c.	Abrupt, smooth
5	332	>141->141	10YR3/2	None	Silty	Apedal		Common undecomposed compressed reeds	Not seen

THE PLANT REMAINS: MACROFOSSILS AND POLLEN

By J. Greig

Evidence of the environment of the site and its surroundings, before and during the construction and use of the causeway, was obtained from a column sampled through the peats from the present ground surface down to a depth of 2m (omitting the top, disturbed 0.20m–0.40m ploughed topsoil). This series of samples includes both large samples taken as 50mm slices of peat, and also a monolith which was collected in metal boxes of 250 × 100 × 100mm. Additional samples were collected from the excavation by NF but were not analysed.

The intention of the environmental work was to find out what activities went on around the causeway, and what changes had taken place. In the event, shortage of resources has meant that the soil column was sampled at wide intervals at only four points within the 2m sequence, although hopefully the main features of interest have been discovered.

Methods

Bulk samples from 0.50m (layer **313**), 0.75m (layer **503/507** – details of sample size and appearance now missing), 1.00m (layer **508**) and 1.75m depth (layer **332**) in the column were dispersed in water and sieved on meshes of 4mm, 1mm and 0.3mm to give size fractions that were convenient to sort under a microscope. All remains were picked out, including beetles, snails and a few fish bones.

Samples for pollen analysis were prepared in the normal manner from 0.75m (layer **503/507**), 1.00m (layer **508**), 1.50m (layer **332**) and 2.00m (layer **332**) depth but pollen was not well preserved in all samples and only the middle ones (1.00m and 1.50m) had pollen that could be counted.

Table 2.2 *Soil descriptions of bulk environmental samples.*

Depth	Layer	Size	Description
0.50m	313	0.4 litres	woody lumps, some charred material; snail opercula and partly dissolved shells, fish remains
1.00m	508	0.6 litres	black peat, granular and humified
1.75m	332	0.4 litres	fibrous peat and silt; few seeds

Results

The main results come from plant macrofossils (Table 2.3), complemented by the beetle results (see Osborne, below) and the fish bone identifications (see Jones, Chapter 7). There is some pollen evidence too, which can be compared with results from a core taken nearby.

Wetland plants

The main sign of the surroundings given by the plant remains recovered from samples at all depths is – hardly surprisingly in a peat section – of wetland. Typical plants are *Ranunculus sceleratus* (celery-leaved buttercup), *Hydrocotyle vulgaris* (marsh pennywort), *Oenanthe aquatica* (water dropwort), *Mentha* cf *aquatica* (probably water mint), *Galium palustre* (marsh bedstraw), *Alisma* sp. (water-plantain), *Iris pseudacorus* (yellow flag), *Sparganium* spp (bur-reed) and the numerous Cyperaceae (sedges and club-rushes).

The lower silt (within soil horizon *5* – layer **332**) also contained numerous large stems of reeds which were not identified, and it is possible that a major part of the vegetation was *Phragmites* sp. or *Cladium* sp., even though these species are unrepresented in the closely identifiable remains. There are very few remains of aquatic vegetation that would indicate standing water, only some possible *Nuphar lutea* (yellow water-lily) and a trace of *Potamogeton* sp. (pondweed) in the lower pollen sample. The evidence for the environment is rather slight as the sample from 1.75m was not rich in macrofossils but the plant remains do suggest a swamp with some aquatic vegetation either growing there in more open water, or swept there by floods. Given that there is a small quantity of *Alnus* sp. (alder) also present in this lowest sample, there was some alder carr in the vicinity of the reed-swamp.

The swamp was therefore present at the time represented by the change from inorganic sediments (soil horizon *5* at the bottom of the profile – layer **332**) to peaty organic sediments (soil horizon *4a* – layer **508**), a change which is so far undated. Valley peats often have some connection with erosion so the deposition of the upper peaty sediments would appear to have occurred during the prehistoric period when farming was causing sufficient erosion for soil to be washed into the river valley and leading there to a change in hydrology, thus starting the formation of peat.

As well as remains of wetland and aquatic plants, indicating the continuing presence of swamp and some open water, the sample at 1m also contains some *Alnus* sp. and the sample at 0.75m (layer **503/507**) has large amounts of *Alnus* sp. seeds and catkins as well as unidentified wood remains. At this level (within soil horizon *3b*) the peat is highly humified and this sample at 0.75m (layer **503/507**) was the richest in macrofossils. The abundant remains of *Alnus* sp. at this depth suggest that the extent of alder carr around the site at Fiskerton had grown over time.

Table 2.3 *Plant remains (absolute numbers). Name given in CAPITALS when pollen record only.*

sample: macrofossils depth	**0.50m**	**0.75m**	**1.00m**			**1.75m**	**depth**
pollen				**1.00m**	**1.50m**		**depth**
PINUS	-	-	-	1	-	-	pine
Chara (oogonia)	5+	-	-	-	-	-	stonewort
Ranunculus a/r/b	-	-	3	-	-	-	buttercup
Ranunculus sceleratus L.	-	-	2	-	-	15	celery-leaved buttercup
Batrachium (DC) A. Gray.	-	-	6	-	-	-	water crowfoot
RANUNCULUS type	-	-	-	-	+	-	buttercups etc
? Nuphar lutea (L.) Smith	-	3	+	-	-	+	yellow water-lily
ULMUS	-	-	-	+	1	-	elm
URTICA	-	-	-	2	4	-	nettle
QUERCUS	-	-	-	15	18	-	oak
BETULA	-	-	-	3	2	-	birch
Alnus glutinosa (L.) Gaertn.	1(1)	66	7(1)	-	-	4	alder
ALNUS	-	-	-	72	63	-	alder
Corylus avellana L.	=1	-	-	-	-	-	hazel
CORYLUS	-	-	-	30	22	-	hazel
Atriplex sp.	1	-	-	-	-	-	orache
Stellaria media (L.) Vill.	8	-	-	-	-	-	chickweed
TILIA	-	-	-	+	+	-	lime
BRASSICACEAE	-	-	-	1	-	-	cabbage family
SALIX	-	-	-	3	-	-	willow
FILIPENDULA	-	-	-	-	1	-	meadowsweet
Rubus fruticosus	-	5	1	-	-	-	bramble
Prunus spinosa L.	-	2	-	-	-	-	sloe
PRUNUS tp.	-	-	-	+	-	-	sloe
FABACEAE	-	-	-	+	-	-	clover family
MYRIOPHYLLUM	-	-	-	+	-	-	milfoil
LYTHRUM	-	-	-	-	1	-	purple loosestrife
RHAMNUS CATHARTICUS	-	-	-	1	2	-	buckthorn
Hydrocotyle vulgaris L.	-	-	2	-	-	-	marsh pennywort
Berula erecta (Hudson) Cov.	-	-	-	-	-	1	lesser water-parsnip
Oenanthe aquatica (L.) Poiret	1	3	8	-	-	-	water dropwort
Conium maculatum L.	-	-	-	-	-	1	hemlock
APIACEAE	-	-	-	3	1	-	umbellifers
Solanum dulcamara L.	1	14	5	2	8	1	bittersweet
MENYANTHES	-	-	-	-	+	-	bogbean
Stachys palustris L.	-	-	6	-	-	-	marsh woundwort
STACHYS tp.	-	-	-	-	+	-	woundworts etc.
Mentha cf. *aquatica* L.	-	1	93	-	-	-	water mint
Lycopus europaeus L.	2	1	-	-	-	-	gypsywort
PLANTAGO LANCEOLATA	-	-	-	3	1	-	ribwort plantain
FRAXINUS	-	-	-	1	5	-	ash
RHINANTHUS tp.	-	-	-	+	-	-	yellow rattle etc
Galium cf. *palustre* L.	-	-	-	-	-	1	marsh bedstraw
Galium sp.	-	-	-	-	-	3	bedstraw
Sambucus nigra L.	-	2	5	-	-	-	elder
VIBURNUM tp.	-	-	-	-	+	-	wayfaring tree
ADOXA tp.	-	-	-	-	+	-	moschatel?
CIRSIUM/CARDUUS tp.	-	-	-	+	-	-	thistles
CICHORIOIDAE	-	-	-	+	-	-	composites
Eupatorium cannabinum L.	-	-	-	-	-	1	hemp agrimony
ARTEMISIA tp.	-	-	-	1	-	-	mugwort
COMPOSITAE (T)	-	-	-	1	-	-	composites
Alisma sp.	-	2	22	1	1	-	water-plantain
Potamogeton sp.	17	-	-	-	1	-	pondweed
Eleocharis sp.	-	-	2	-	-	-	spike-rush
Scirpus sp.	2	-	-	-	-	4	club-rush
Carex pseudocyperus L.	-	-	5	-	-	-	cyperus sedge
Carex hirta L. (or *C. riparia* Curtis)	-	-	12	-	-	1	sedge

sample: macrofossils depth	**0.50m**	**0.75m**	**1.00m**			**1.75m**	**depth**
pollen				**1.00m**	**1.50m**		**depth**
Carex cf. *remota* L.	-	-	1	-	-	-	remote sedge
Carex sp(p).	2	55	-	-	-	-	sedge
CYPERACEAE	-	-	-	10	5	-	sedges etc
GRAMINEAE	-	-	-	52	62	-	grasses
Sparganium erectum/ emersum	-	-	1	-	-	-	bur-reed
Sparganium natans L.	-	-	2	-	-	-	least bur-reed
SPARGANIUM/TYPHA ANG.	-	-	96	11	-	-	bur-reed etc
Iris pseudacorus L.	-	-	1	-	-	-	yellow flag
fish	+	-	-	-	-	-	
insects	+	+	+	-	-	-	
molluscs	+	-	-	-	-	-	
wood	+	-	-	-	-	-	

Plants of dry land

The upper samples also contain more of a scrub and dryland flora, and may be in some way associated with the horizon around 0.70m (layer **192**) in which were found many Iron Age and Roman artefacts as well as layers of twigs and worked wood. The dryland plants are more likely to be connected with human activities than the wetland flora. Few species were represented: macrofossils of *Stellaria media* (chickweed) and *Atriplex* sp. (orache), both weeds of cultivated ground, were found only in the uppermost sample, and pollen of *Artemisia* sp. (mugwort), *Plantago lanceolata* (ribwort plantain, which is mainly a grassland plant) and thistles was identified at a slightly greater depth in the deposits. Some of the Gramineae (grass) pollen could also have come from dryland grasses. This is a very small flora for an archaeological site and there are no cultivated plants present.

As well as insect fauna that indicate still or slowly flowing water and marshland, the sample at 0.75m (layer **503/507**) also contained beetles that live in open meadow and animal dung (see Osborne, below). Perhaps the greater mobility of beetles allows them to represent dry land better than the very limited flora.

Scrub and woodland

In the samples at 0.75m (layer **503/507**) and 1.00m (layer **508**) there is a modest scrub flora consisting of macrofossil records of *Prunus spinosa* (sloe), *Rubus fruticosus* (bramble) and *Sambucus nigra* (elder). *Solanum dulcamara* (woody nightshade, bittersweet) was identified at all levels but is more common in these two middle samples. *Rhamnus catharticus* (buckthorn), *Viburnum* tp. (wayfaring tree) and *Urtica* sp. (nettle) occur in the pollen record.

Alder dominates the tree pollen in both pollen samples, followed by hazel and oak, with some birch, elm, lime, ash, pine and willow also present.

Changes in the nature and use of the site

The uppermost sample has some great differences in that the humified peat also contains inorganic silts. There are signs that the soil at this depth was slightly calcareous, since *Chara* (brittlewort) oogonia were present, as well as numerous opercula of molluscs, probably *Bithynia*, a water snail. Acid groundwater had mostly dissolved other molluscan shell remains up to the point where their presence could be noticed but not their identities. There were also many fish bones (see Jones, below). The water conditions seem to have altered too. Although the sample from 0.50m (layer **313**) had fewer wetland species than at deeper levels, it did contain fairly numerous seeds of *Potamogeton* sp. (pondweed) which grows in standing water. The equivalent soil horizon *2* includes deposits of sediments that may relate to episodes of flooding.

The plants identified in the four samples (Table 2.3) show some environmental change – from reed-swamp and alder carr to swamp, scrub and grassland. An undated pollen diagram (now lost) from a core taken by Kathy Groves at a little distance from the main samples showed little variation over time except for a possible *Tilia* sp. (lime) decline. If it is assumed that the sediments sampled in this pollen core were roughly equivalent to the deposits at the Fiskerton site itself, this leads to the conclusion that there may not have been great changes taking place on the dry landscape apart from continuing forest clearance.

So what of the use and occupation of the site? The artefacts retrieved from the site are certainly signs of human activity but the plant remains do not contribute evidence of an actual settlement of any period at Fiskerton. The environmental work suggests that the causeway in its early phases would have been situated in a most inhospitable swamp, although with nearby carr and woodland where both alder and oak were growing. In deposits later in the sequence there were weeds and beetles that may indicate dry land which could have been inhabited but they may also have arrived in the swamp by natural dispersal, or they could have been brought here, if perhaps the causeway was used as a droveway. If a droveway existed here, some of the thorny plants such as the buckthorn and sloe may have been used for hedging, which would explain their presence in this swamp deposit. However, crucially there is no sign of the free-draining ground and bank and ditch which Pryor considers to indicate the presence of prehistoric hedges (Pryor 1998: 84–7).

THE INSECTS

By P.J. Osborne

It is unfortunate that funds were available only for a preliminary analysis of insects. Two small samples were investigated, from 1.60m (layer **332**) and 0.75m (layer **503/507**) within the soil column. Both samples were of highly organic peaty material. The beetle faunas showed small differences which are made apparent by listing them side by side, although the material was not quantified (Table 2.4). Insect remains were less abundant in the lower sample and, other than the beetles listed, only a few fragmentary caddis (Trichoptera) larvae and pieces of adult Hymenoptera were noted. In the higher sample at 0.75m (layer **503/507**) there were remains of not only many more beetles but also representatives of bugs (Hemiptera), dragonflies (Odonata), caddis and alder flies (*Sialis* sp.) and true flies (Diptera), as well as the statoblasts of the freshwater bryozoan *Cristatella mucedo.*

The silt layer at 1.60m

Although the fauna from the lower sample (from 1.60m, within layer **332** – a silt layer of compressed reeds of soil horizon *5*) is meagre, it presents a uniform picture of a reed-bed environment. The two carabid ground beetles specifically identified from this level, *Odacantha melanura* and *Dromius longiceps*, are both found among stems of *Phragmites* and *Typha* growing beside or in water, while *Corylophus cassidioides* is found amongst fallen and rotting accumulations of reed stems. The ladybird *Anisosticta 19-punctata* is also found in marshy places on swamp or water plants, and the most abundant beetle species of this sample, *Plateumaris braccata*, lives on *Phragmites communis*, the adult on the emergent leaves and the larva in the roots beneath the water. *Ochthebius minimus* is the only aquatic water beetle recorded in this horizon and suggests still or slowly flowing water. The other members of the fauna, although not specific to a marshy or aquatic habitat, could have made themselves at home amongst waterside vegetation and plant detritus.

The woody peat layer at 0.75m

The upper of the two samples (from 0.75m within layer **503/507** – the woody peat of soil horizon *3b*) provides a slightly larger and more diverse beetle fauna, as well as including the other orders mentioned above. Here, again, there is a strong aquatic and waterside element. The dytiscids *Agabus*, *Rhantus* and *Colymbetes*, the whirligig beetle *Gyrinus*, the hydrophilid *Hydrochus* and probably *Helophorus* all live in still or slowly flowing water which is also the habitat of the freshwater bryozoan *Cristatella mucedo* mentioned above. The weevil *Tanysphyrus lemnae* is identified, although its food plant, the floating duckweed *Lemna*, was not identified amongst the plant remains. The

Table 2.4 *Insect fauna from 0.75m and 1.60m depth in the Fiskerton column sample (Coleoptera arranged after Kloet and Hincks (1977))*

SPECIES	**0.75m depth**	**1.60m depth**
Carabidae		
Carabus sp	+	-
Bembidion fumigatum (Dufts.)	+	-
Bembidion sp.	-	+
Pterostichus aterrimus (Hbst.)	+	-
Odacantha melanura (L.)	-	+
Dromius longiceps Dej.	-	+
Dytiscidae		
Agabus sp.	+	-
Rhantus sp.	+	-
Colymbetes fuscus (L.)	+	-
Gyrinidae		
Gyrinus sp.	+	-
Hydrophilidae		
Hydrochus sp.	+	-
Helophorus sp.	+	-
Cercyon sp.	+	-
Megasternum obscurum (Marsh.)	+	+
Histeridae		
Onthophilus striatus (Forst.)	+	-
Hister sp.	+	-
Hydraenidae		
Ochthebius minimus (F.)	+	+
Ptiliidae		
Acrotrichis sp.	+	-
Silphidae		
Silpha atrata L.	+	-
Staphylinidae		
Lesteva heeri Fauvel	-	+
Carpelimus sp.	-	+
Platystethus ?nitens (Sahlb.)	-	+
Anotylus rugosus (F.)	+	-
Stenus spp.	+	-
Lathrobium terminatum Grav.	+	-
Xantholinus linearis (Ol.)/ *longiventris* Heer	+	-
Gabrius sp.	-	+
Staphylinus olens Mull.	+	-
Aleocharinae indet.	-	+
Geotrupidae		
Geotrupes sp.	+	-
Scarabaeidae		
Aphodius sp.	+	+
Onthophagus ovatus (l.)	+	-
Phyllopertha horticola	+	-
Dryopidae		
Dryops sp.	+	-
Elateridae		
Agriotes sp.	+	-
Anobiidae		
Anobium punctatum (Deg.)	+	-
Corylophidae		
Corylophus cassidioides (Marsh.)	+	+
Coccinellidae		
Anisosticta 19-punctata (L.)	+	-
Chrysomelidae		
Donacia sp.	+	-
Plateumaris braccata (Scop.)	-	+
Chrysolina polita (L.)	+	-
Chrysolina sp.	+	-
Curculionidae		
Strophosomus sp.	+	-
Sitona lepidus Gyll.	+	-
Hypera punctata (F.)	+	-
Alophus triguttatus (F.)	+	-
Tanysphyrus lemnae (Payk.)	+	-

carabid *Pterostichus aterrimus* is a markedly hygrophilous species, living in fenland on wet ground beside water, whilst *Bembidion fumigatum* also lives in marshy places. Reeds are again suggested by *Corylophus cassidioides* and by the presence of *Donacia* sp., whose larvae live on the submerged roots of reeds and other waterside plants. Botanical evidence in this layer for such reeds was not evident although *Sparganium* (bur-reed) pollen and macrofossils occur in the 1.00m sample and much of the Poaceae pollen could have come from reeds.

In this sample from 0.75m (layer **503/507**), however, there is a dryland element, mostly indicative of open meadowland. The chafer *Phyllopertha horticola* and the elaterid *Agriotes* sp. both live on the roots of grassland plants during their larval stages. The phytophagous Chrysomelidae and Curculionidae identified in this layer are also indicative of plants that grow on open ground. *Chrysolina polita* is polyphagous, feeding on herbaceous plants such as mint (*Mintha* spp.), while *Sitona lepidus* and *Hypera* are associated with members of the Leguminosae, of which slight traces occur in the pollen record. Dung beetles of the genera *Geotrupes*, *Aphodius* and *Onthophagus* indicate the presence of grazing animals. Some of the other beetles recorded, including *Megasternum obscurum*, *Onthophilus striatus*, *Hister* sp. and *Anotylus rugosus*, may be found in dung but will also live in other accumulations of decaying vegetable material.

The only species that is not compatible with a picture of grassland bordering open water with reedy margins is the furniture beetle *Anobium punctatum*. This insect requires dry, seasoned wood for its development and, in natural habitats, it is usually found in trees which have died but remained standing. It is far more abundant in situations where people have provided wood in the form of structural timbers or, as its name implies, in the form of furniture or other wooden objects kept indoors. As a single infestation, in either natural or artificial circumstances, can produce large numbers of individuals which fly readily, little can be said about the origin of the Fiskerton specimens except that the timber piles may have provided a suitable habitat.

Neither at this level nor at the 1.60m level (layer **332**) was there any fauna that might suggest a tidal environment. Although the River Witham was tidal as far as Lincoln in the eighteenth century, this water regime must be considered to have had a post-Iron Age inception. The insect fauna indicates that this part of the Witham at Fiskerton was *not* tidal in the pre-Roman period, as might otherwise have been assumed.

There was no faunal evidence suggesting a climate different from that of today. The most interesting species encountered was *Pterostichus aterrimus* which is today very rare in Britain. However, its present restricted distribution is probably due more to the disappearance of its fenland habitat than to climatic factors. Luff (1998) notes that the only recent records of this species are from a *Sphagnum* bog in Hampshire (1969-73), although there are more recent records from Ireland, and it occurs widely across Europe from Spain to southern Scandinavia and Russia. The present restriction of *Odacantha melanura* must similarly reflect the drainage of fens, since Dinnin (1991) notes it as far north as Shirley Pool, South Yorkshire, in post-medieval deposits, whilst Luff (1998) shows its range this century only as far as Norfolk.

ENVIRONMENTAL OVERVIEW

By M. Parker Pearson

Our understanding of the environmental context of the causeway is restricted by the difficulties of establishing how the horizontal stratigraphy relates to the driven-in vertical posts of the causeway and by the limited resources that were available for compiling the specialist studies. Unfortunately the various silt and mud layers cannot be dated by the artefacts within them since their softness allowed many artefacts to drop through the surfaces onto which they were deposited. The dendrochronological work on the posts and the posts' relationship to eddy holes do provide dates for the deposition of some of the upper sediments sampled: soil horizons *3a* and *2c* were deposited after 375 BC and horizon *2b* was deposited after 359–317 BC.

Stratigraphic evidence of horizontal worked timbers – undated – suggests that an early trackway of wattle, pegs and twigs may have been constructed at the interface of the grey-blue silt (**332**) and the reed peat (**195, 510, 508** *etc.*) above. The laying of these spreads of twigs **421/467** and wattling **635/636** at this interface may well have preceded the construction of a more substantial wooden trackway in association with the post rows, a trackway which is tentatively linked to the surface of **332** and subsequent deposits **508** and **195** and the pegs and brushwood **503/507** lying *above* the reed peat. Thus the samples from 1.60m (layer **332**) and 1.75m (layer **332**) lie below layers containing wood associated with the building of the timber causeway.

These silts at the base of the sequence are thus almost certainly older, perhaps considerably so, than the causeway and its artefacts. Their sedimentary characteristics are those of a low-energy depositional context, interpreted as the standing water of a reed swamp. This is borne out by the plant remains and beetles. The pollen from this level indicates the proximity of carr and woodland where alder and oak were growing. These swampy conditions are likely to have continued into the period when the timber post rows were first erected (which may be loosely correlated with the sample from 1.00m – layer **508**).

The formation of peat on top of the silt layer is attributed by Greig (see above) to possible soil erosion altering the valley's hydrology. Within the upper layers, probably contemporary with the causeway's later use, the environmental picture is rather different from before. Although there are few remains of reeds, rushes and sedges present in these upper levels, conditions were still wet and suggestive of marsh. The interpretation of alder carr at this level may be overstated, given the possibility that the alder seeds, catkins and wood could have derived from maintenance of the causeway. Plant remains and beetles indicate a dry, grazed meadow grassland and scrub environment bordering on open water. Characteristic vegetation includes pondweed, sloe, bramble, elder and woody nightshade. Insects include dung beetles and feeders on decaying vegetation. Greig warns that the presence of these botanical and insect remains might be due not to natural dispersal but to their having been carried to this spot along a droveway, giving a false impression of a dry landscape when in fact conditions were still wet.

The presence of the furniture beetle in the upper insect sample is presumably linked to the timbers of the causeway. Just where those timbers were obtained is difficult to know but it is not impossible that the lower quantities of arboreal pollen in the later levels reflect the felling of nearby oaks and alder trees for the causeway's construction and maintenance.

Most surprising is the lack of any beetles indicating that this part of the Witham was tidal. The fish bones recovered (eel, perch and carp; see Jones, Chapter 7) are also those of creatures able to live in fresh water. This stretch of the river may have been a freshwater pool or creek, separated from the main channels of the river which may even have been tidal upsteam beyond Fiskerton as far as Lincoln (J. Rackham pers. comm.).

3 THE WOODEN REMAINS

TREE-RING ANALYSIS OF THE CAUSEWAY TIMBERS

By J. Hillam

Finds associated with the causeway are Iron Age and Roman in date but the post rows themselves are radiocarbon dated to the Iron Age. Two samples from oak posts **57** and **553** produced dates of 2460±70 bp (HAR-4472), calibrated to 800–390 BC, and 2280±70 bp (HAR-4471), calibrated to 480–170 BC respectively. Three other samples from oak posts dated to 2450±70 bp (HAR-6728), calibrated to 800–390 BC, 2630±70 bp (HAR-6729), calibrated to 920–540 BC, and 2480±70 bp (HAR-6730), calibrated to 800–390 BC. It is worth noting that the latter three samples selected for radiocarbon dating were dated dendrochronologically to 436–405 BC, 433–405 BC and 500–455 BC respectively. The dendrochronologically derived calendar dates are thus near the ends of the radiocarbon date ranges. Nonetheless, the dendrochronological dates for two of the three are still within the calibrated radiocarbon ages, albeit towards the ends of those ranges. This is a product of the calibration curve for this period (P. Marshall, pers. comm.) since the Harwell Laboratory has a programme of quality assurance procedures whose international inter-comparisons show no offsets for wood measurements (Scott *et al.* 1990; Rozanski *et al.* 1992).

In order to obtain more accurate dates for the timber structure, most of the 206 posts revealed on the north side of the North Delph were sampled for tree-ring analysis. Whilst absolute dating was considered very important, it was by no means certain that a Fiskerton tree-ring sequence would match any of the few reference chronologies available for the first millennium BC. However, many of the posts still retained their bark so that relative dating would give an accurate picture of how, and over what time period, the causeway was constructed. The large number of untrimmed posts offered a rare opportunity to examine the amount of sapwood present, a factor which is vital in the interpretation of tree-ring dates. Analysis was also undertaken to identify the species of wood used and the size and age of trees from which the posts were taken, as well as evidence for woodworking (see Taylor, below). The samples were examined and the data analysed in 1982–84 (Hillam 1985; 1992a and b). During that period an additional worked timber – a plank (**800**) – was sampled from Area H, between the Witham and the North Delph, south of the main excavation. The results of all the analyses are presented below.

Methods

The samples were prepared for examination and measurement following the method given by Hillam (1985). They were then divided into oak and non-oak samples. Oak (*Quercus* spp) is readily identifiable by the presence of distinct growth rings plus wide medullary rays which run radially from pith to bark (*e.g.* Schweingruber 1978: 144). The non-oak samples were identified by taking thin sections from the transverse, radial longitudinal and tangential longitudinal planes, and examining them under a microscope.

The oak timbers were sub-divided into those suitable for ring-width measurement and those which, because of too few rings, very narrow rings or the presence of knots, were not. Tree-ring samples with fewer than 50 rings are usually rejected for dating purposes because their ring patterns may not be unique. If a building or archaeological site produces only one or two timbers, then ideally they should have at least 80 rings and preferably more than 100. However, because of the relatively large number of samples from Fiskerton and the presence of bark in many instances, it was thought worthwhile to measure the ring widths of any sample with more than 30 rings (Table 3.1).

Tree-ring graphs or curves were then produced by plotting the ring widths on transparent semi-logarithmic recorder paper. The curves were compared with each other by superimposing one graph over another and searching for similarities between them. When several curves cross-matched, a working master curve was constructed from them by averaging the ring widths. Unmatched curves were tested against this and more matches found because the construction of a master curve eliminates much of the background noise present in individual samples, leaving an enhanced general climatic signal. The Belfast computer program (Baillie and Pilcher 1973) was used to check the results. This calculates the value of Student's t for each position of overlap between two sets of ring width data.

Values greater than 3.5 indicate a match provided that the visual match is acceptable. The program was actually written for use with ring sequences over 50-80 years long so in the Fiskerton study greater emphasis was placed on visual matching and, more importantly, replication (see 'Dating', below). When more curves had been dated a new master curve was made and the remaining unmatched sequences tested against it until no more could be cross-matched.

A note was made of the size of the timbers, whether they had been worked and how many rings were present. If bark or bark edge was detectable, the outer ring was examined: a complete ring indicates that the timber was felled in winter or early spring, whilst an incomplete one denotes late spring or summer felling. Sometimes the outer sapwood rings were very narrow and the season of felling could not be determined; occasionally the rings were so narrow that they could not be measured with accuracy. Instead these rings were counted as accurately as possible so that a rough felling date could be given.

Similar details were taken of the oak samples that were not suitable for ring measurement and of the non-oak samples. The rings of the latter were not measured because, with the exception of one piece of willow or poplar, they were all alder (*Alnus glutinosa*). This species is not normally used for tree-ring dating because its rings are not annual (Elling 1966). Work is in progress at Sheffield on the suitability of alder for dating purposes but no conclusive results have yet been obtained (A. Crone, pers. comm.). Poplar and willow (*Populus* and *Salix* spp) have been examined by Morgan (1984) but were found unsuitable for relative dating. All the ring width data are stored in the Sheffield Dendrochronology Laboratory.

Results

Of the 171 samples examined (Table 3.1), 27 were alder (*Alnus glutinosa*) and 143 were oak (*Quercus* spp). The ring widths of 108 oak samples were measured but the remaining 35 samples were rejected (Fig. 3.1) either because they had fewer than about 30 rings (*e.g.* **36**, **199**) or because their ring patterns were not clear enough for accurate measurement (*e.g.* **103**, **158**).

Poplar/Willow

Post **559** was found in the third row of posts, to the west of the more substantial double row. It contained about 16 annual rings and still had its bark attached. The outer ring was complete indicating that the post was felled in winter or early spring. It had a diameter of 110mm excluding the bark. Poplar and willow have similar wood structures. As only one post was found, no attempt was made to differentiate between the two wood types.

Alder

Alder posts were scattered randomly throughout the three rows of posts. The samples were usually from complete stems and in many cases the bark was preserved (Table 3.2). **153** was the only post where there was evidence of deliberate woodworking. This had been hewn on two sides to give a rectangular-shaped post. Most of the posts were definitely winter felled; the remainder were narrow-ringed so that the season of felling could not be determined. The average diameter of the stems varied from 85–270mm but the majority fell within the range 120–190mm (Fig. 3.2). The age range was far more variable (Fig. 3.3). The youngest stem was about 16 years old when felled and the oldest about 85 years. These results show that the alders

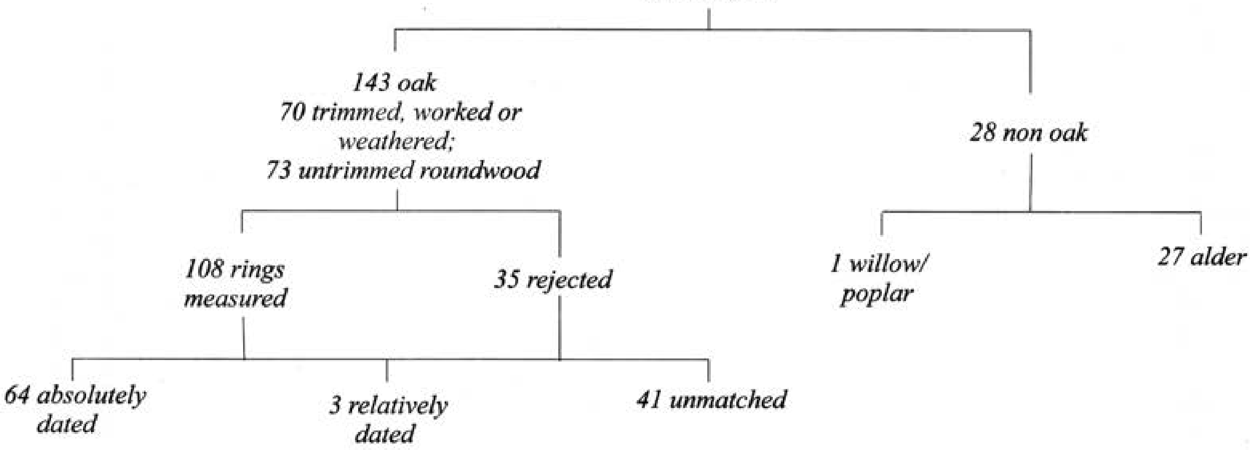


Fig. 3.1 Summary of tree-ring samples, and their suitability for dating purposes.

Table 3.1 *Oak samples (†=absolute date; *=unsuitable for tree-ring dating).*

Post No.	No. of Rings	No. of Sapwood Rings	Season Felled/ Worked	Average Ring Width (mm)	Dimensions (cms) (excluding bark)
6†	104	56–66	winter?	0.88	16 × 20
9	33	1	trimmed	2.46	15 × 15
20†	64	3	trimmed	1.37	18 × 18
23†	+121	16	worked	1.64	23 × 11
24*	21	10–11	winter	-	15 × 18
29	40	-	trimmed	2.28	18 × 19
36*	18	9	winter	-	18 × 24
37*	19	7	winter	-	16 × 17
38*	20	8–10	winter	-	16 ×16
39*	17	7–8	winter	-	14 × 14
40*	18	7–8	winter	-	13 × 15
47†	c.89 (78meas.)	c.35 (24 meas.)	?	1.78	19 × 24
48†	97	35	close to bark/ worked	1.02	14 × 16
49†	35	11–15	winter	2.52	14 × 17
50†	73	25	trimmed	1.36	16 × 21
52*	25	8	squared	-	19 × 19
53*	26	13–14	winter	-	14 × 15
56*	29	8–9	winter	-	c.22 × 22
57	66	9	trimmed	1.28	11 × 17
58*	18	8–9	winter	-	12 × 16
59	25	8–9	winter	2.86	18 × 20
60	32	10–11	winter	2.87	18 × 19
67†	84	33–53	winter	1.16	16 × 18
69	70	26–30	winter	1.01	12 × 12
92	29	8–10	winter	1.94	11 × 12
93†	c.93 (89meas.)	c.33 (29 meas.)	?	1.42	18 × 24
94†	33	9–11	summer	2.7	18 × 18
97†	35	14–16	winter	2.14	14 × 16
98*	27	9–17	winter	-	16 × 19
99*	28	3	trimmed	-	16 × 18
100†	56	14	trimmed	2.02	19 × 19
101*	27	-	trimmed	-	17 × 17
102†	57	12	trimmed	1.59	18 × 18
103*	?	11–14	winter	-	15 × 17
104†	54	28–34	winter	1.56	15 × 16
107*	27	11–17	winter	-	12 × 14
108†	38	17–19	winter	1.55	12 × 14
110†	90	34	winter?/ trimmed	1.01	8 × 21
111	+65	11–15	winter	1.13	14 × 17
112*	c.45	13–17	winter	-	13 × 14
114	40	-	trimmed	2.23	14 × 14
115*	28	-	trimmed	-	17 × 17
116†	32	14–16	winter	3.33	19 × 24
117†	57	17–21	winter	1.43	17 × 17
119	32	-	trimmed	2.48	12 × 14
120	85	30–40	felled/ trimmed	0.98	16 × 16
121	43	21–24	winter?	1.49	12 × 13
122†	39	14–18	felled	2.48	18 × 20
123*	26	9–13	winter	-	14 × 16
124†	48+	c.45–55	felled/ trimmed	1.54	17 × 18
125	47	-	trimmed	1.9	13 × 15
126†	43	15–19	winter	1.43	14 × 19
127†	30	10–12	summer	2.9	17 × 19
128†	35	9–12	winter	2.01	16 × 21
129†	52	16–20	winter	2.17	19 × 20
130†	73	32–39	winter?/ trimmed?	1.31	18 × 19
131†	36	22	winter?	1.93	12 × 14
132	c.105 (85meas.)	c.44 (24 meas.)	felled/ trimmed	1.33	15 × 16
133	34	-	trimmed	2.31	15 × 15
134	35	-	trimmed	1.83	13 × 16
135*	32	-	trimmed	-	15 × 16
137†	35	16–19	winter	2.55	19 × 20
138	52	20–31	winter	1.8	16 × 17
139	58	-	trimmed	1.57	14 × 17
140†	44	16–20	winter?	1.7	14 × 16
142	37	-	trimmed	2.38	14 × 18
143†	36	17	winter?	1.91	13 × 14
145	49	12–18	winter?/ trimmed	2.33	17 × 18
146*	?	9–11	winter	-	14 × 17
147†	33	16–22	winter?	1.82	13 × 15
148†	57	21–25	winter	1.61	16 × 18
149†	29	13–14	winter?	2.37	16 × 16
150	30	11–12	winter	2.55	14 × 15
157†	34	34	winter?/ trimmed?	1.99	12 × 14
158*	?	-	trimmed	-	15 × 16
181*	21	11–12	winter	-	12 × 13
199*	16	9–10	winter	-	14 × 15
200†	108	17–27	felled/ trimmed	1.24	19 × 24
201†	37	9–15	winter	2.52	17 × 19
202†	78	-	squared	1.37	15 × 17
204†	58	-	squared	1.68	15 × 16
205†	34	15	shaped	2.98	16 × 16
206	72	3	worked	1.83	12 × 23
208*	30	-	trimmed	-	18 × 20
209	38	-	trimmed?	2.62	17 × 19
210	29	-	trimmed	3.76	20 × 22
213†	78	21	trimmed	1	17 × 18

Table 3.1 (continued) *Oak samples (†=absolute date; *=unsuitable for tree ring dating).*

Post No.	No. of Rings	No. of Sapwood Rings	Season Felled/ Worked	Average Ring Width (mm)	Dimensions (cms) (excluding bark)
214†	100	17–29	close to bark/ trimmed	1.07	14 × 16
217†	73	29–41	winter	0.98	11 × 12
219	56	42–50	felled?	1.1	10 × 10
238	25	-	trimmed	3.56	17 × 19
239	33	-	trimmed	2.25	15 × 16
242*	?	-	trimmed	-	c.14 × 14
247†	67	22–30	winter?	1.43	14 × 15
248*	22	14 × 15	summer	-	11 × 12
249†	91	37–45	winter	1.09	19 × 19
250	43	-	trimmed	2.26	16 × 21
251†	88	10	radially split	2.15	radius c.18
252	55	-	trimmed	1.24	12 × 15
253†	46	18–21	summer	1.58	16 × 18
254	55	-	squared	1.27	15 × 16
255†	37	18	winter	2.24	15 × 17
256	46	18	trimmed	1.99	14 × 16
257*	24	6–10	winter	-	15 × 19
258†	61	7	worked	1.9	10 × 20
259†	78	2	trimmed	1.35	17 × 18
260	52	12	trimmed	1.65	16 × 18
261	45	18–24	felled	1.58	15 × 16
262†	91	34–46	winter	1.07	18 × 18
263†	46	16–20	winter	1.49	14 × 15
264†	49	3	trimmed	2.21	18 × 18
265†	55	5	trimmed	1.48	16 × 16
266†	69	9	trimmed	1.43	16 × 16
267	43	-	trimmed	2.04	15 × 17
268	48	-	trimmed	1.8	15 × 17
270	31	11–15	winter	1.88	16 × 19

Post No.	No. of Rings	No. of Sapwood Rings	Season Felled/ Worked	Average Ring Width (mm)	Dimensions (cms) (excluding bark)
271	35	10–12	winter	1.5	12 × 13
329	37	20–23	trimmed	2.18	13 × 14
333†	72	26–40	winter	0.95	16 × 16
335†	36	16–21	winter	1.84	11 × 13
336†	66	16	trimmed	1 35	13 × 16
337†	59	-	trimmed	1.47	15 × 18
339*	21	6	trimmed	-	15 × 16
341*	?	-	trimmed?	-	17 × 17
342†	33	15–19	winter	1.85	13 × 15
343†	c.68 (59meas.)	c.29 (22 meas.)	felled?	1.57	19 × 19
344†	92	21	worked	1.61	15 × 19
346†	c.113 (94meas.)	c.32 (13 meas.)	felled?	1.01	14 × 18
348	29	-	worked	3.49	10 × 16
406	36	-	trimmed	2.61	11 × 16
429*	15	6	winter	-	13 × 13
456*	15	2	trimmed	-	7 × 8
553	52	14–16	winter?	1.86	18 × 19
565	34	-	trimmed	2.41	15 × 17
566†	39	11–13	winter	2.24	19 × 21
571*	30–40	10–16	trimmed	-	16 × 25
573†	33	11–13	winter	1.87	16 × 18
595*	15	7–9	winter?	-	12 × 13
622	c.67 (55meas.)	c.44 (32 meas.)	felled	1.23	13 × 14
623*	39	-	worked	-	14 × 15
624	35	2	trimmed	1.64	17 × 17
633*	26	10–16	winter	-	16 × 19
800†	69	26–30	worked	1.01	12 × 11

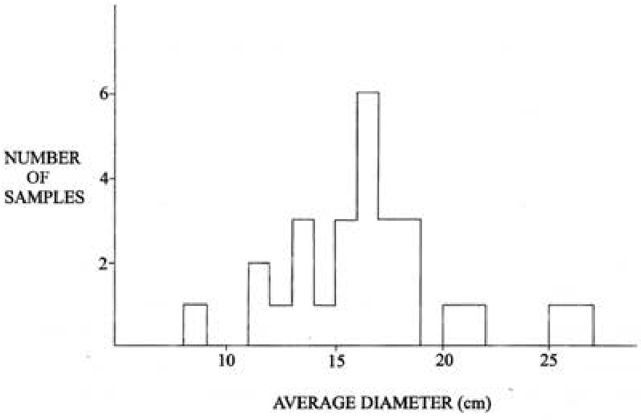


Fig. 3.2 *Size range of the alder samples (diameter does not include bark).*

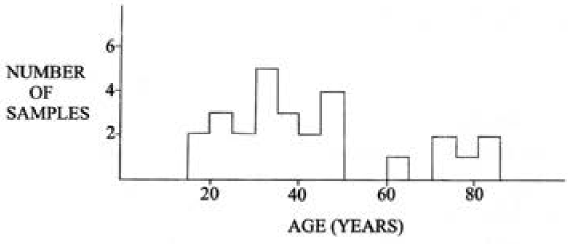


Fig. 3.3 *Age range of the alder samples.*

Table 3.2 *Alder samples*

No. of Timber	No. of Rings	season felled	sample trimmed	dimensions (cm) excluding bark
11	85	?	no	16 × 16
12	85	?	no	11 × 12
46	50	winter	no	23 × 28
54	50	winter	no	18 × 19
62	50	winter	no	15 × 17
96	18	?	?	15 × 18
106	65	winter?	no	14 × 16
136	30	winter	no	16 × 17
141	16	winter	no	20 × 23
144	75	winter	no	14 × 14
151	33	winter	no	12 × 12
153	25		yes	13 × 19
156	50	winter	no	12 × 13
211	75	?	no?	17 × 19
215	45	winter	no	16 × 18
230	35	?	no?	18 × 19
241	40	winter	no	16 × 20
244	80	winter	no	21 × 36
319	25	winter?	no	16 × 19
338	25	?	no	26 × 28
345	35	winter	no	13 × 14
454	33	winter	no	8 × 9
468	35	winter	no	16 × 18
480	40	winter	no	16 × 18
486	40	?	possibly	16 × 17
567	30	winter	no	13 × 15
572	45	winter	no	16 × 16

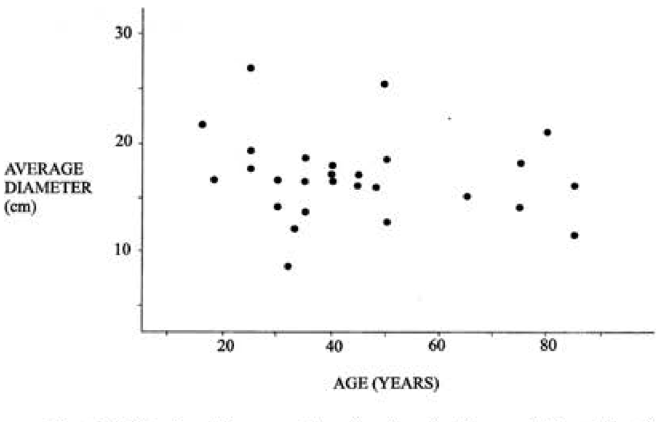


***Fig. 3.4** Scatter diagram showing the size/age relationship of the alder samples.*

were selected for size rather than age (Fig. 3.4). The average ring widths varied from very narrow to very wide: post **12**, with a radius of 55–60mm contained about 85 rings whilst **141** had 16 rings in a radius of 100–115mm. The growth patterns of alder have been little studied but the great variation in average ring widths would suggest the alders grew under varying conditions.

Oak

Seventy-three of the oak posts were untrimmed roundwood, often with the bark still attached, although this quickly dropped off once the posts were sampled. The remaining 70 appeared to have been trimmed in some way. Some of these had merely lost their sapwood (*e.g.* **9**, **119**, **125**). This may have been deliberate or it may have been caused by weathering. Some of the posts were shaped on one side (*e.g.* **48**) leaving the stem intact on the opposite side; others were trimmed on two (*e.g.* **200**) or all sides (*e.g.* **99**). Some timbers had been more obviously worked. Post **52**, for example, had been hewn into a square shape but not much wood had been removed since sapwood was visible all round the circumference. Post **254** on the other hand was square-shaped and had no sapwood. Finally there was a group of fewer than 10 timbers that had been split from larger trees. These came from the northern end of the excavations and generally tended to be later in date (see 'Dating', below). **23** and **253** were radially split segments whilst **344**, for example, was a halved trunk which had been hewn into a shape approaching a triangle.

The size and age of the oak trees used for the causeway posts were determined from the 73 untrimmed samples and seven others that retained all their sapwood at some point on the circumference. The diameters of these 80 mainly unworked posts varied from 100 to 220mm with the majority falling between 120 and 200mm (Fig. 3.5). The worked timber posts all came from trees with diameters greater than 220mm. The age range of the untrimmed roundwood posts (Fig. 3.6) was much greater than that of the worked posts: the youngest was 14 years old when felled and the oldest 104 years. Most of the trees were, however, between 15 and 45 years of age when they were cut down. As with the alder it seems to have been their size rather than their age that was important for selection (Fig. 3.7).

The worked wood came from larger and older oak trees. The tree that produced post **23** must have been about 500mm in diameter and approaching 200 years old when felled. The other worked posts came from trees smaller and younger than **23**. The average ring widths of all posts varied from 0.88mm to 3.76mm so some of the trees must have grown under conditions that were limiting – perhaps crowding from other trees – whilst others had more favourable conditions. This does not necessarily indicate that the trees came from more than one woodland, since a single woodland will produce trees with different growth rates.

Four posts were definitely felled in late spring or summer (**94**, **127**, **248**, **253**). The remainder were either felled in winter or early spring, or the season of felling was indeterminable. In the latter case the outer rings were very narrow, making it difficult to distinguish between a narrow ring which was complete and a wider ring with only its spring wood present. It is probable, however, that most of these timbers were felled in winter.

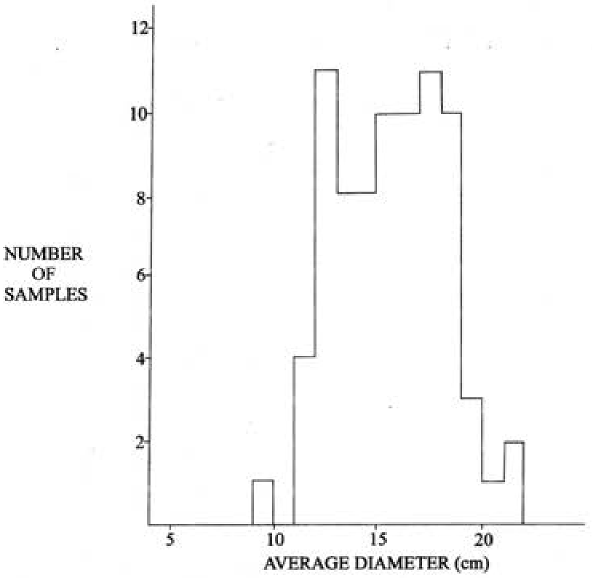


Fig. 3.5 *Size range of the oak samples (diameter does not include bark).*

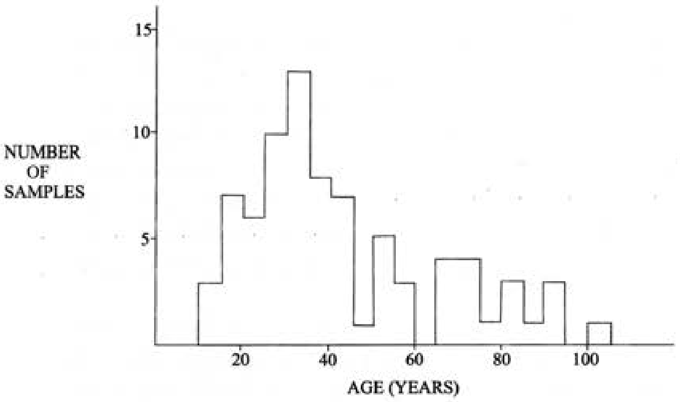


Fig. 3.6 *Age range of the oak samples.*

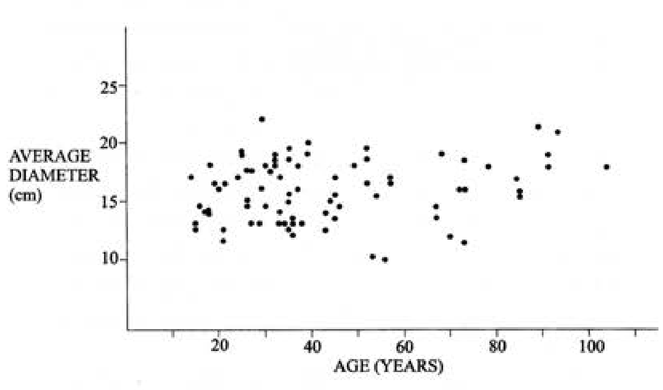


Fig. 3.7 *Scatter diagram showing the size/age relationship of the oak samples.*

Sapwood

Oak is made up of inner heartwood and an outer band of living sapwood, which is usually distinguishable from the heartwood by colour and a change in structure (*e.g.* Hughes *et al.* 1981). The presence of sapwood is of key importance in the interpretation of tree-ring dates. If the sapwood is complete the date of the outer ring is also the date of felling. If some sapwood is present the felling date can be estimated with some precision since the number of oak sapwood rings is relatively constant. In the absence of sapwood, the felling date may only be estimated and is always expressed as a *terminus post quem.*

Dating

After the first stage of the study 45 ring sequences were cross-matched, a further three very short ring patterns seemed to match with each other and 60 were unmatched. The visual matching was difficult because of the short ring patterns but it was found that sequences with 30–40 rings could sometimes be matched. Such matches, however, were only accepted if the ring patterns matched consistently with several others (Fig. 3.8). Any pattern that was not unique (*i.e.* any pattern matched in more than one position) was rejected. The matches were also checked using the Belfast computer program. Although this program was written for longer ring sequences it does seem to work for short sequences as well.

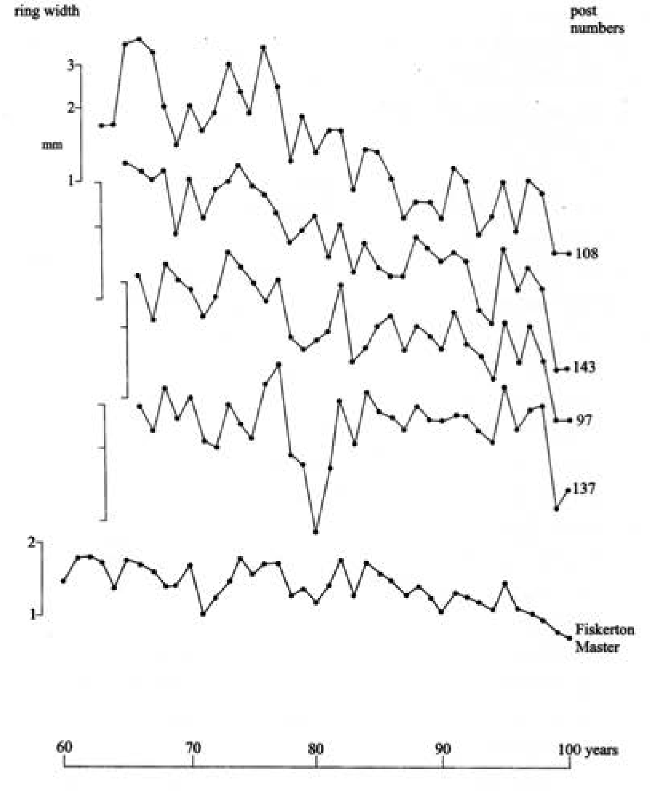


Fig. 3.8 *Matching short tree-ring curves (the horizontal scale is that of the Fiskerton master sequence).*

Table 3.3 The Fiskerton tree-ring width master chronology in 1/100 mm values.

505BC						140	220	190	170	285
500BC	215	200	210	255	165	167	177	256	238	193
	220	238	226	156	202	218	184	218	223	204
	251	224	206	245	183	220	224	282	167	219
	256	203	194	142	124	161	199	137	190	188
	174	190	189	168	160	156	116	162	198	170
450BC	125	167	135	128	137	183	193	175	132	192
	218	183	189	169	197	133	151	193	226	187
	183	190	140	156	133	146	187	123	162	157
	140	123	148	122	122	140	127	115	105	149
	115	125	116	82	76	81	100	106	92	91
400BC	117	94	90	105	110	100	85	90	126	79
	86	111	133	118	99	124	155	115	137	112
	121	118	132	122	160	126	172	160	173	148
	127	135	165	160	135	111	132	127	108	95
	117	144	121	100	101	125	131	108	98	74
350BC	116	96	90	90	102	80	88	132	127	90
	115	80	140	190	110	130	120	150	180	180
	160	180	200	120	140	180	230	130	160	230

When the 60 unmatched samples were compared with the Fiskerton master curve (Table 3.3), more sequences were found to match. Sixty-four samples are now absolutely dated and 41 unmatched, besides the group of three matching sequences which may or may not cross-match the main group (Fig. 3.1). The latter group consists of **59**, **60** and **92** (all in the western row of posts) which have 25, 32 and 29 rings respectively. They do not appear to match the main group but this does not necessarily indicate that they are of a different date. It is more likely that the sequences are too short for relative or absolute dating.

The full Fiskerton tree-ring sequence covers 185 years (Table 3.3; Hillam 1985). The chronology remained undated for many years but was eventually dated to 505–321 BC by comparison with dated chronologies from England, Ireland and Germany (Hillam 1992a and b). Tree **265** began life in 505 BC whilst 321 BC is the date of the last measured ring of **23** (Fig. 3.9). The first trees were felled in 457/6 BC. **201** and **573** were felled in winter or early spring (*i.e.* years 457 or 456 BC) and **94**, **127** and **253** were felled in the late spring or summer of 456 BC. There may in fact be little or no difference between the 'winter-' and 'summer-felled' timbers since the onset of spring growth may vary from tree to tree. **127** is located at the southern end of the excavated area whereas **253/201** and **94/573** are in the northern half of the post rows and appear to be matching pairs of posts (Fig. 3.10; for a summary of all felling groups see Plate 4).

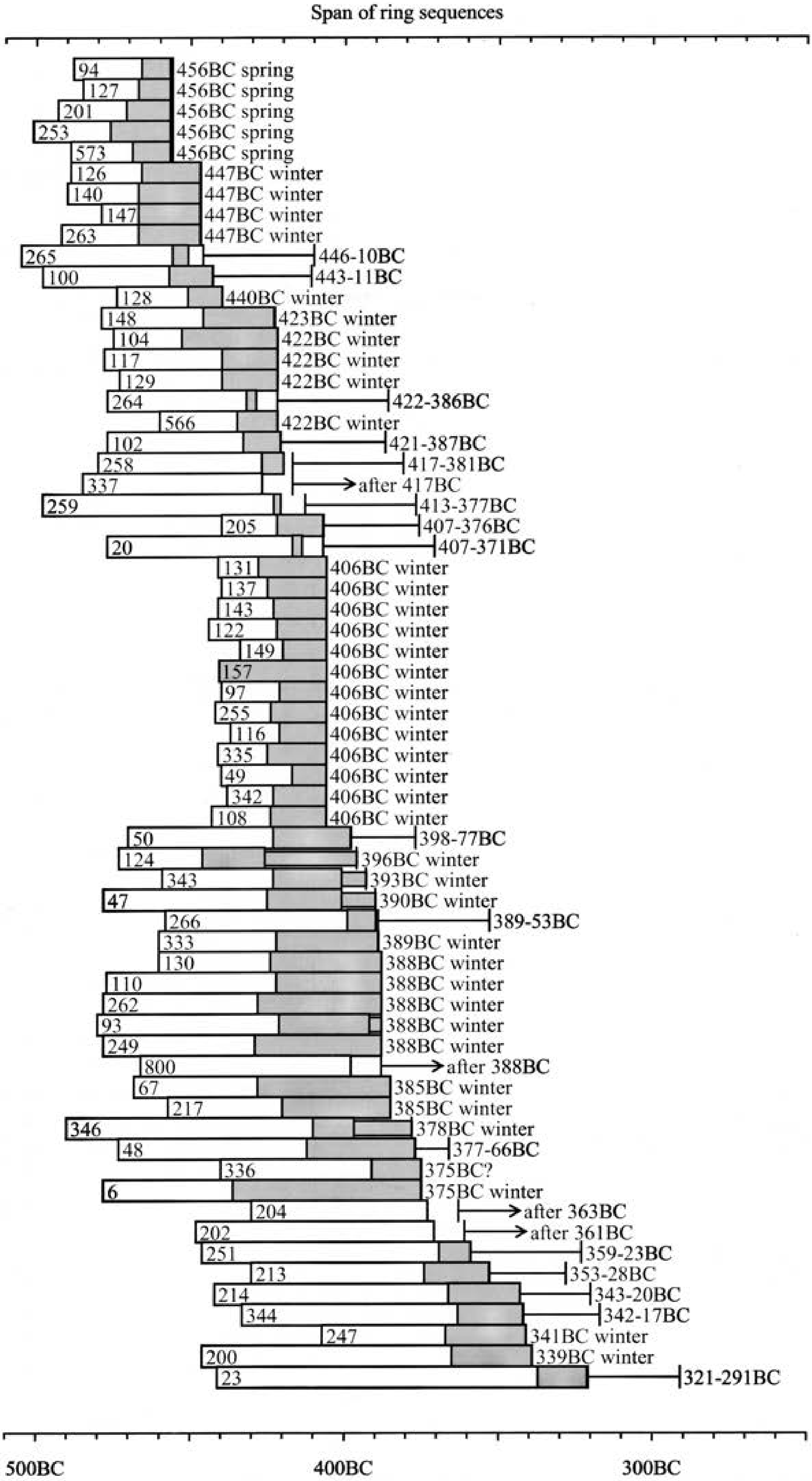
Four sequences (**126**, **140**, **147** and **263**) end in 447 BC and the trees were felled in winter 447/6 BC. They are unpaired and belong to the western row of posts (Fig. 3.11). Post **128** was felled in winter 440/39 BC; **100** and **265** may be of similar date or slightly later. The next group of trees was cut down for the causeway in 423–421BC. This group is made up of five posts: **148** was felled in winter 423/2 BC and **104**, **117**, **129** and **566** in winter 422/1 BC. If the five are considered as a group they can be seen as two pairs: **566/129** and **104/148** (Fig. 3.12). **264** may be contemporary but its dating cannot be proved conclusively.

In winter 406/5 BC, wood for 13 posts was felled from trees aged 29–39 years with diameters of 120–195mm. All were untrimmed boles except for **157** which was either weathered or slightly trimmed on one side. This group of timbers forms pairs of posts covering the length of the excavated causeway although the distances between the pairs are not equal. From north to south they are: **342/335**, **255/?205**, **97/149**, **157/49**, **108/143**, **116/137** and **122/131** (Fig. 3.13). The felling of post **205** (which was weathered or slightly trimmed on one side) could date anywhere between 407 BC and 376 BC but is included in this group on the basis of its possible paired position with **255**.

After 406/5 BC the interpretation of the tree-ring results becomes more difficult as some of the samples do not have complete sapwood. Others have all their sapwood but the outer rings are narrow and cannot be measured accurately. In the latter case the number of rings was estimated by counting these narrow rings as accurately as possible (*e.g.* **343**).

Post **47** was felled in 390/89 BC. Post **333** was felled in 389/8 BC whilst **110**, **130**, **249**, **262** and probably **93** were cut in 388/7 BC. Other timbers, now without their full

Fig. 3.9 Bar diagram showing the relative positions of the dated ring sequences.



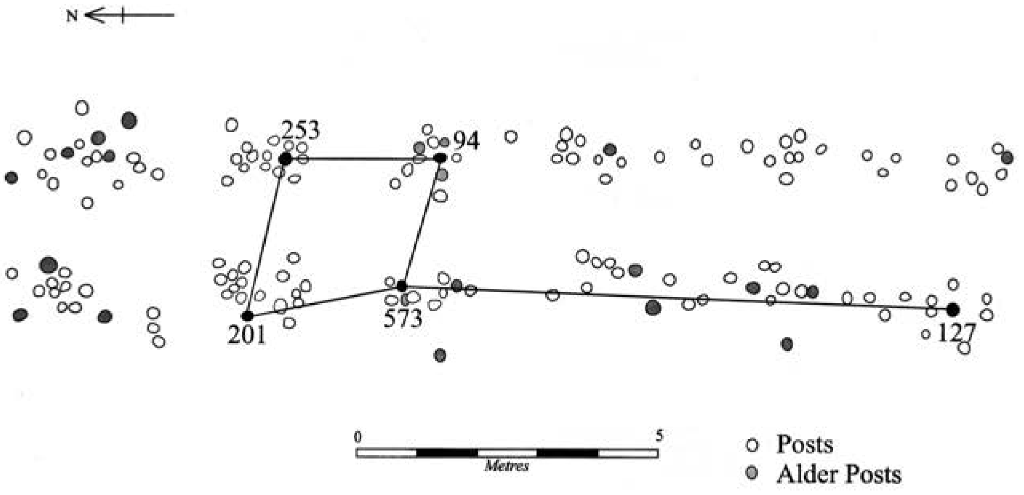


***Fig. 3.10** Plan of the causeway showing posts felled in 457/6 BC. Posts from the same phase are joind by straight lines as visual aid.*

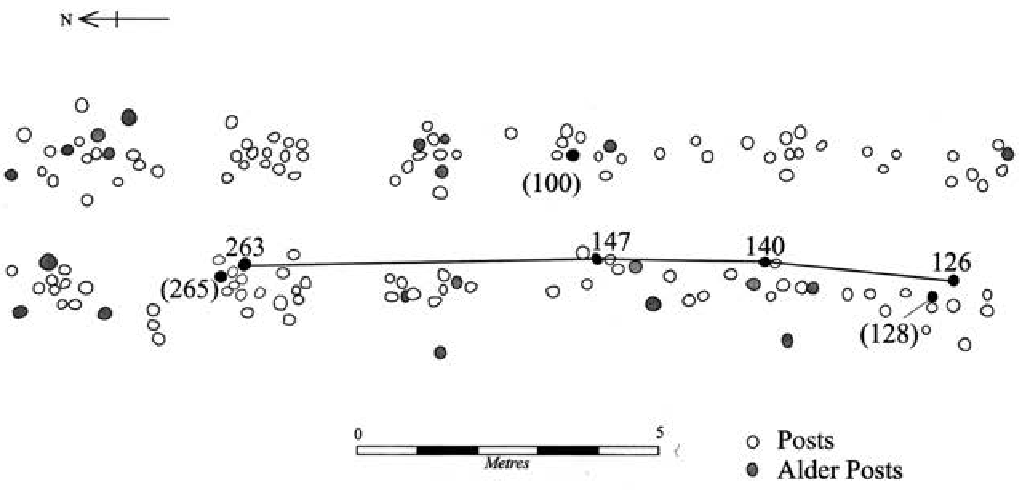


***Fig. 3.11** Plan of the causeway showing posts felled in 447/6 BC and 440/39 BC (post 128). Posts 100 and 265 may be of similar date.*

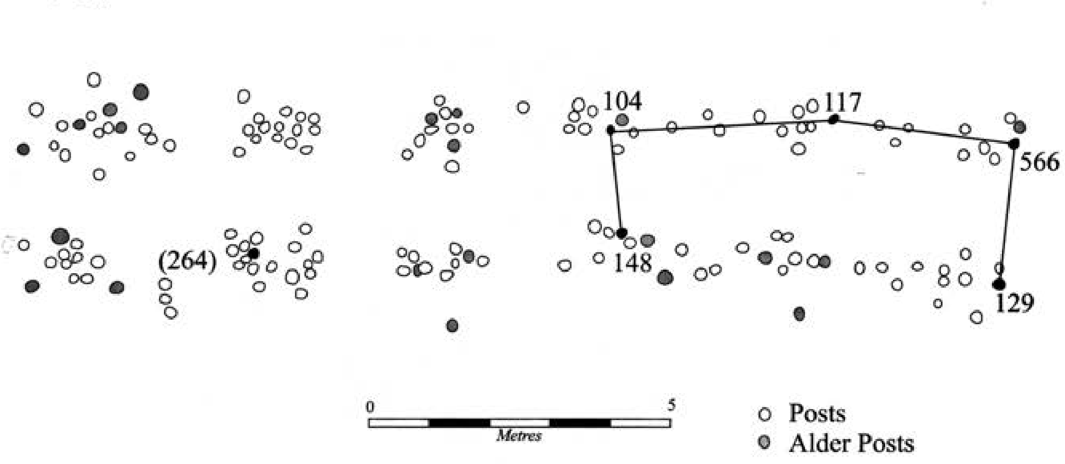


***Fig. 3.12** Plan of the causeway showing posts felled in 423–421 BC. Post 264 may be contemporary with this group.*

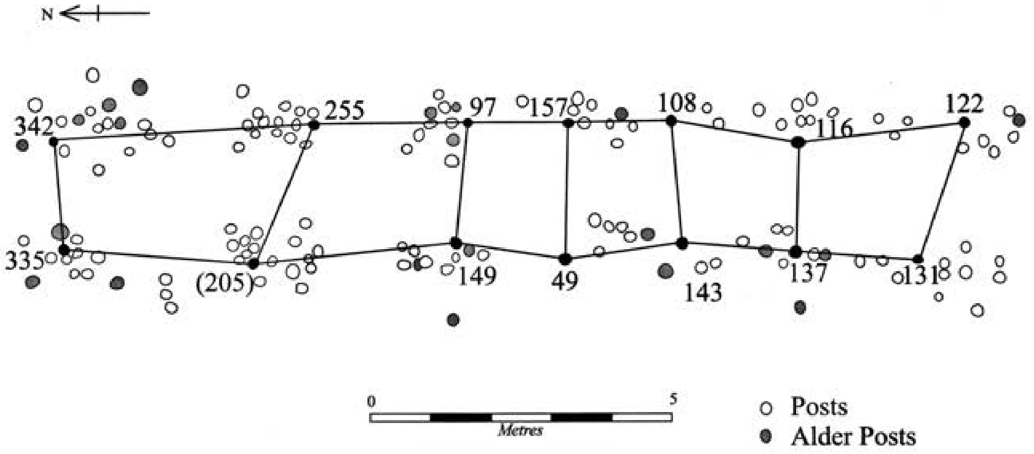


Fig. 3.13 Plan of the causeway showing posts felled in 406/5 BC (with post 205 between 407 and 376 BC).

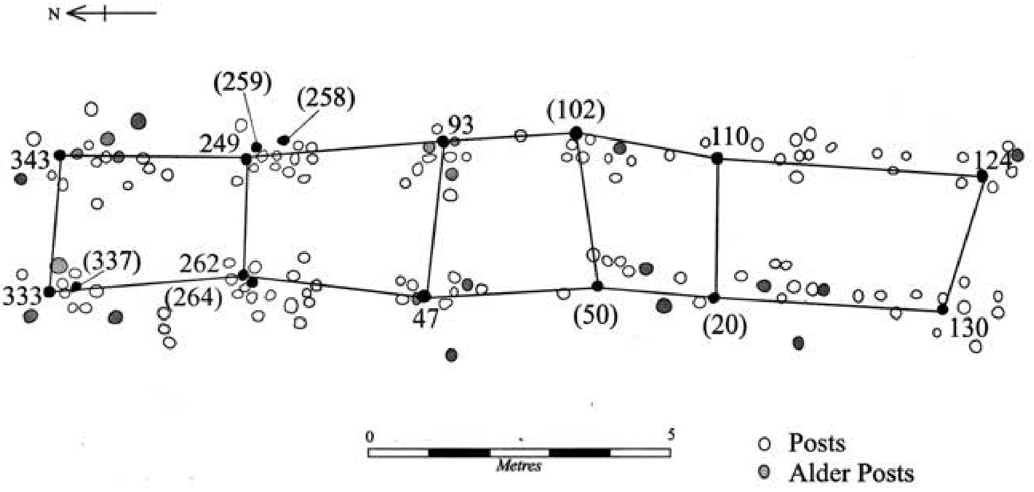


Fig. 3.14 Plan of the causeway showing posts felled between 390 and 387 BC. Posts 124 and 343 are slightly earlier. The posts in brackets may also belong to this group.

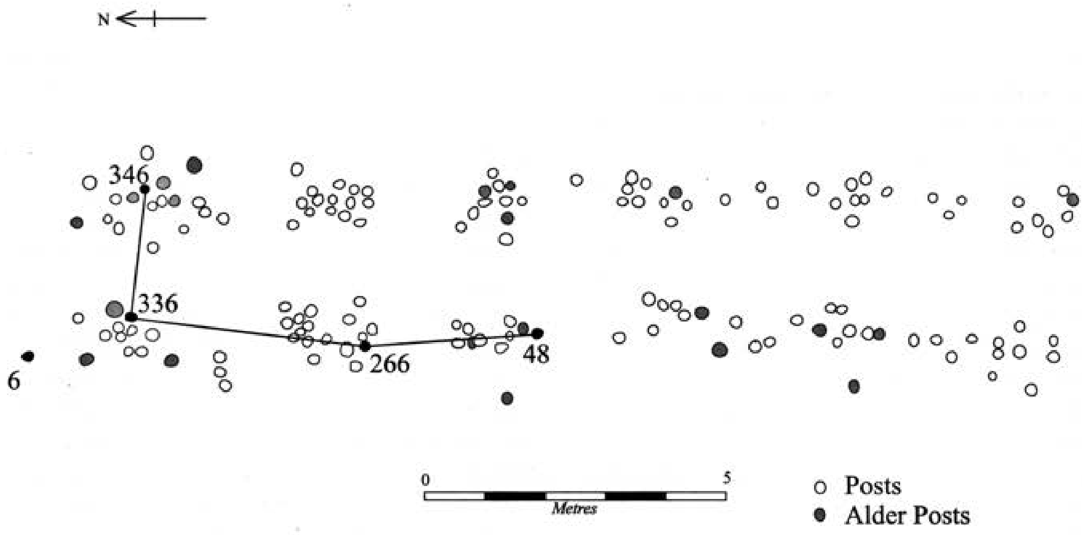


Fig. 3.15 Plan of the causeway showing posts felled between 389 and 353 BC, in 378/7, 375/4, 389–353 and 377–366 BC.

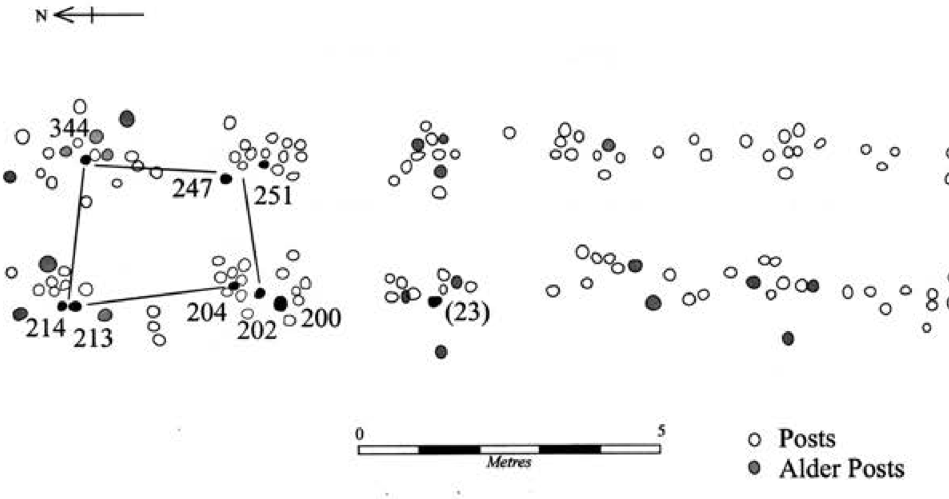


***Fig. 3.16** Plan of the causeway showing posts felled between 363 and 321–291 BC.*

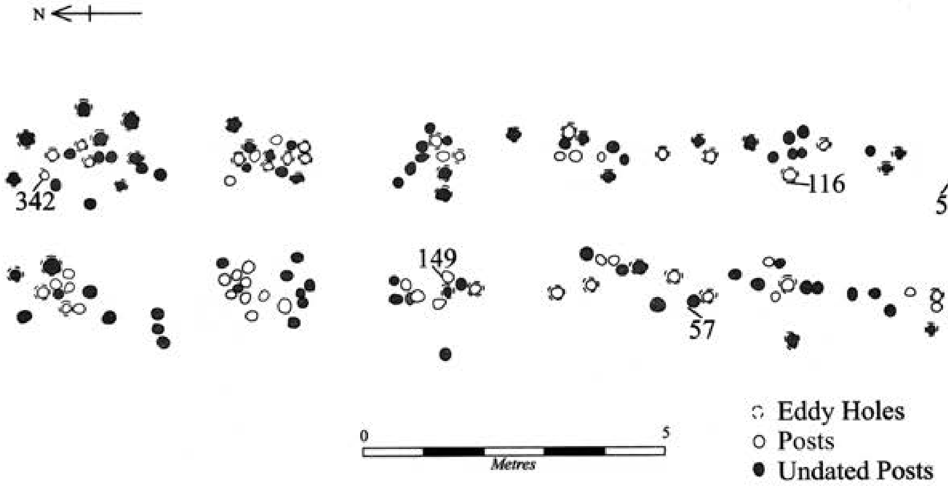


***Fig. 3.17** Plan of the causeway showing most of the undated or rejected posts (marked in black). Numbered posts are for orientation.*

sapwood complement, probably belong to this group. It can therefore be envisaged that more pairs of posts were added during 396–387 BC (Fig. 3.14). From north to south these are: **343/333**, **249/262**, **93/47**, possibly **102** and **50** although these could be a little earlier (421–387 BC and 398–377 BC respectively), **124/130** and **110/?20** (407–371 BC). Four other timbers could be of a similar date but again they may have been felled a few years earlier (**258**, **259**, **264** [see Fig. 3.12], **337**). The only horizontal timber examined was a plank from the drain to the south of the excavated area (**800**). Its estimated felling date, based on a range of 10–55 sapwood rings, is some time after 388 BC and it may belong to this felling phase.

Posts **67** and **217** were felled in winter 385/4 BC. Neither of these posts was from the causeway: **217** was from the northwest corner of the excavation and is the only relatively-dated post from the outlying row of posts, and **67** came from the east of the site. Post **346** was felled in 378/7 BC and post **48** was felled in 377–366 BC. Timbers **6** and **336** were felled in 375/4 BC. Timbers **346** and **336** form a possible pair but no other pairings are obvious; **266**, dating to 389–353 BC, may also belong to this group (Fig. 3.15).

The final group of timbers has similar heartwood-sapwood transitions but only two have definite felling dates – **247** in 341/0 BC and **200** in 339/8 BC. **202**, **204**, **213**, **214**, **251** and **344** were probably felled around this time (Fig. 3.16). All were found at the north end of the causeway but pairing is difficult to establish. Post **344** is opposite **213** and **214**, whilst **247** and **251** are opposite **200**, **202** and **204**. The most recent timber, **23**, is a worked post and was felled after 321 BC but probably before 291 BC. The locations of the undated posts in the double post row are shown in Fig. 3.17.

The construction of the causeway

The oaks and alders used for the causeway posts were selected for their size (about 120–200mm diameter) rather than their age. A similar conclusion was reached from the study of wood from an Iron Age site in Dumfriesshire (W. Boyd, pers. comm.). The trees did not come from coppiced woodland or their ages would have been more constant. The variation in ring widths also suggests their origin was in more natural woodland. Some of the oaks were probably subject to crowding, others had wider rings and may have grown up in spaces left by fallen trees. The alder is likely to have grown on the edge of the wet ground which the causeway traversed. The plant remains suggest the presence of alder carr and oak is present in the pollen samples (see Greig, above).

Most of the timbers were unworked except at one end which had been sharpened to a point. Some trunks appeared to have been slightly trimmed but this may have been due to weathering. They were certainly not worked in a consistent manner. It was only after the causeway had been in use for at least 70 years that large trees, with diameters greater than 220mm, were sometimes selected and split to produce timbers of the required size. These timbers came mostly from trees which started life at about the same time as those used for the earlier phases of the causeway (Fig. 3.9), another indication that the builders were returning to the same stand of trees for their source of timber.

The timber was mostly felled in winter or early spring. It is unlikely to have been seasoned although some timbers may have been kept for up to a year. This would account for groups of timbers felled in consecutive years, for example years 423/2 BC and 422/1 BC or 389/8 BC and 388/7 BC. The dating indicates that the causeway was being constructed and rebuilt over a period of at least 135 years – between 456 BC and 321 BC – and was probably in use for much longer. The first five posts in the dating framework do not constitute a substantial structure so presumably other timbers were already in place or were put in at the same time. As 107 timbers could not be dated for various reasons, this is entirely possible (Fig. 3.17). The causeway was repaired or consolidated on at least nine occasions over the period of 150 or so years. Nine years after the erection of the first five identified timbers four more were added in 447/6 BC, followed by another post seven years later in 440/39 BC.

Three major repair phases followed, each separated by at least ten years and probably around 16–18 years. First, two pairs of posts and a single were added in 423–421 BC then six or seven pairs in 406/5 BC and finally another five or six pairs in 396–387 BC. Three years after this, in 385/4 BC, a tree was felled for the third row of posts at the western edge of the excavation. As none of the other posts from this row are datable it cannot be determined whether this was a repair or whether the whole row was built at this time. After about another ten years four or five timbers were added in 378–374 BC, after which another 11–46 years elapsed before a further eight posts were inserted after 363 BC and before 317 BC, probably around 341–338 BC. The most recent timber was added after 321 BC but before 291 BC.

The three major additions of new posts in 423–421 BC, 406/5 BC and 396–387 BC were each separated by a period of 16–18 years. This may have been coincidental or it may represent a deliberate policy of regular upkeep of the causeway (see Chapter 8). Other repairs or additions seem to be haphazard. There was no correlation between the dating of those posts with 'postholes' and those without. This reinforces the interpretation of these voids around certain posts as eddy holes rather than holes dug for the posts (see Chapter 1).

Discussion and conclusions

The results of the Fiskerton tree-ring analysis are relevant to the fields of archaeology, dendrochronology and environmental studies. They provide information about the type of material in the causeway and the time span over which it was used. Some of the information is sparse because only a relatively short stretch of causeway (20m) was excavated and because only one of the horizontal timbers was examined. The dating is also restricted because the alder and many of the oak samples were unsuitable for tree-ring work.

From a dendrochronological point of view the study was useful for several reasons. It provided a 185-year tree-ring chronology for a period that is represented by very few English ring sequences (Fig. 3.9).

In general the more rings a sample has, the easier it is to date (Fig. 3.18). Sequences of fewer than 100 rings are not always unique so great care must be taken when

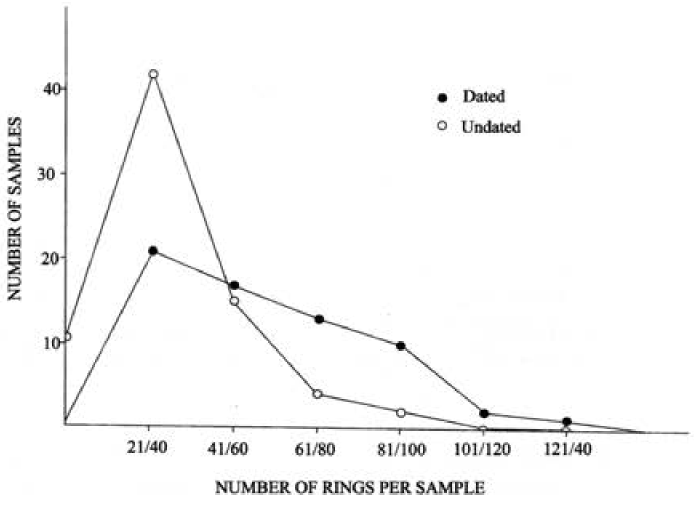


Fig. 3.18 Relationship between the number of samples dated or undated, and the number of rings per sample.

***Table 3.4** Results of the comparisons between the thirteen Fiskerton ring sequences ending in 406/405 BC and post 205 (407–376 BC).*

		t-values															
Timber no.	**No. of rings**	**49**	**97**	**108**	**116**	**122**	**131**	**137**	**143**	**149**	**157**	**205**	**255**	**335**	**342**	**master**	**% agreement**
49	35	-	5.3	3.2	0.2	3.8	3.8	2.8	3.6	4.8	3.3	4.9	1.9	5.4	4.8	4.7	83
97	35		-	3.5	0.2	5.8	2.2	4.6	2.9	5.0	3.2	3.5	1.0	3.5	6.0	4.3	62
108	38			-	3.7	3.2	1.9	4.3	4.2	4.2	3.0	2.2	2.9	1.7	2.4	4.4	79
116	32				-	9.7	2.3	3.7	4.6	5.6	5.0	4.0	6.4	5.0	5.5	5.0	77
122	39					-	2.2	4.9	3.4	4.3	5.2	2.8	1.2	4.6	5.3	4.4	70
131	34						-	3.0	1.4	3.0	1.4	3.2	0.8	3.4	1.5	2.8	65
137	35							-	2.6	2.6	3.5	1.8	0.9	2.5	3.5	4.8	69
143	36								-	3.8	3.6	2.6	1.5	2.1	1.9	3.4	87
149	29									-	2.9	3.5	4.9	4.0	3.1	3.2	71
157	34										-	3.2	6.4	5.2	3.8	4.0	67
205	34											-	3.9	7.3	3.4	5.3	77
255	37												-	1.9	3.9	3.6	83
335	35													-	5.5	3.8	75
342	33														-	5.0	73

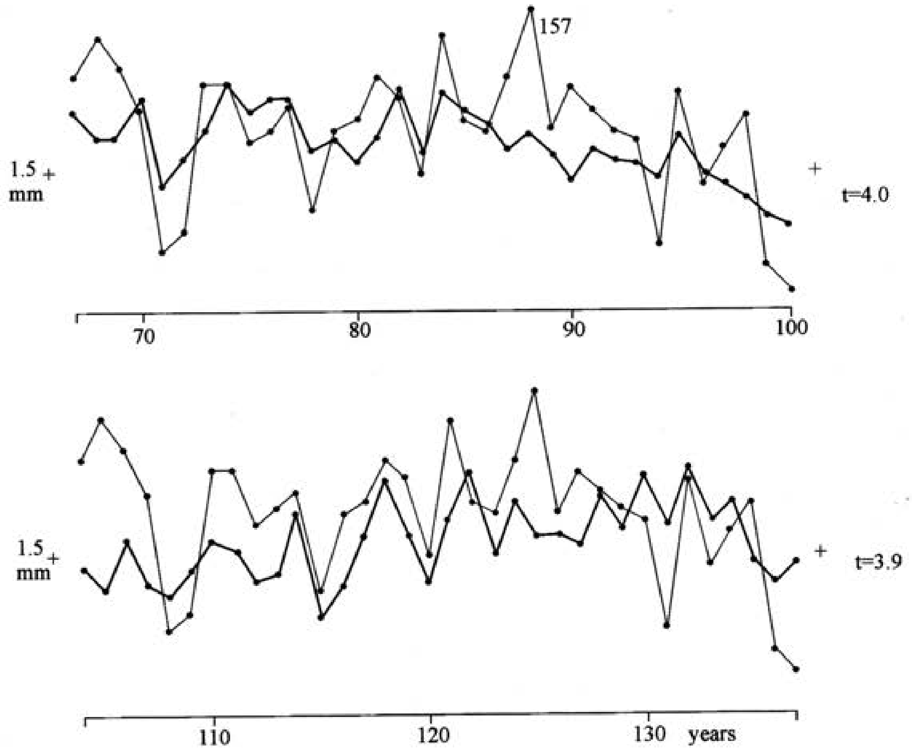


***Fig. 3.19** Problems of dating short ring sequences. Fiskerton **157** compared with the master sequence (bold line). Dendrochronologically, the two positions of synchronization are equally good. Position (a) is correct because **157** also matches 13 other sequences, all of which end in year 100 (vertical scale is logarithmic; horizontal scale in years is that of the master sequence).*

attempting to date them. If, for example, the curves from the 13 posts ending in 406 BC had been taken in isolation it might not have been possible to date them – **157** could end in 369 BC as well as 406 BC (Fig. 3.19). Dendrochronologically these two positions are indistinguishable and the sequence would normally be undatable. However, because **157** matches with 12 other curves, which in turn all cross-match the Fiskerton master in a consistent position (*i.e.* 406 BC), all 13 curves can be reliably dated (Table 3.4).

THE WOOD

By M. Taylor

Introduction

The earliest deposit on the site is layer **332**, a silt laid down in slow-moving river water, which produced five small pieces of worked wood. Timbers ***346*** and ***359*** are stake ends and ***375*** is a chopped fragment. They are not directly related to one another but occur in a 10m 'line' running diagonally across the site. Another early structure survived as stakeholes which had a dispersed distribution all over the site forming no discernible pattern. Diameters of these stakeholes vary between 100 and 200mm. Two parallel lines of wattle (**635** and **636**) 0.50m apart lay between the causeway posts but were earlier than them, being cut by the western post row. A reed peat (**195** *etc.*), which itself contains a certain amount of wood, seals all these earlier deposits.

The reed peat is covered by silts which contain wood including a twig and brushwood layer (**503/507**). It is possible that a trackway was constructed at this level, with brushwood laid down and pegs driven through. Most of the pegs are set amongst the verticals on the western side, with one or two outliers. There are also twig and silt layers possibly associated with repair of the causeway.

The database

The wood data from the site was recorded on pre-printed sheets which were originally designed for use on the Neolithic site at Etton (Taylor 1998). Work was still at an early stage on the creation of the database, and the wood from Etton subsequently turned out to be from a different type of industry (as well, of course, as being Neolithic, and therefore of another period). The data on these sheets was then transferred onto a computer, using the Fenland Archaeological Trust's Maxarc database software (Booth *et al.* 1984). The information that was recorded included provenance, measurements and details of species, woodworking *etc.* The data from Fiskerton was originally recorded on a C/PM based system. This was later transferred onto a MS-DOS based system. For the purposes of this report the data needed subsequently to be transferred to a Windows-based ACCESS file. The data was therefore re-entered directly onto Access files, and data that had not been included in the original records, such as information from material that had been sent direct for dendrochronology, was added. The site records, photos and drawings, were also trawled for additional information. The end result was a detailed record of 404 pieces of wood and timber, which included many of the vertical posts. This record is very useful for comparison with other sites; it also allows some metrical analysis.

Types of wood recovered

The parallel rows of wattle that were found running under the site represent a different kind of structure to those that came later. The two lines are approximately 0.50m apart and have no clear function (Figs 1.9 and 1.10). Although lightweight wattle structures do appear in excavations from time to time, they are not always reliably dated. The edge of the channel at Yarnton, Wilts., however, produced a number of lightweight structures of various shapes and sizes, all made of wattle and dating from the Later Bronze Age. Although the structures at Yarnton were extensive and are well dated, it is still not clear exactly what their function was, although they were doubtless to do with fishing or other waterside activities (Taylor in prep.).

The range of wood, timber and woodworking types recovered from the main site at Fiskerton was not particularly large (Fig. 3.20). Very little small debris was found, and most of the roundwood was quite large. A general impression is formed of a 'heavy' timber site rather than a lightweight (*e.g.* coppice) woodworking site or structure. All the material recovered would fit into the general categories first defined in the report on the wood from the causewayed enclosure at Etton (Taylor 1998: 115). These are summarized below.

Roundwood

With 263 pieces, this made up the largest group of material from the site and is defined as wood that has not been split or hewn but retains the cylindrical shape of the original trunk or branch. It may or may not have been worked by trimming of the ends. Most of the roundwood recorded from Fiskerton was worked (165 pieces) but the figure should actually be higher because some verticals, which were almost certainly worked on their lower ends, could not be recorded as such as only the tops were visible.

A great deal of the recorded roundwood was quite large, with diameters ranging up to 360mm (Fig. 3.21). Perhaps surprisingly, the roundwood from Fiskerton is consistently much larger than that from Flag Fen (Taylor 2001). It is still larger than that recovered from the Fengate Power Station site (Taylor 2001), but not markedly so (Fig. 3.22). Many of the very large verticals from Flag Fen are of timber split down from vast forest oak trees. It is possible that this kind of tree was no longer available by the time Fiskerton was built, or perhaps was not available in the timber catchment area for the building of the site. Provisional examination of the timbers from the later, probably Iron Age, structures from Eton Rowing Lake indicates that most of the wood, including very large pieces, is roundwood, rather than reduced timber (Taylor in progress). Much of it may also be old coppice or from felled woodland that had recovered enough for refelling.

Timber

There were 61 pieces defined as timber (wood suitable for building and structural purposes, whether as standing trees, logs, or converted; smaller pieces are usually termed

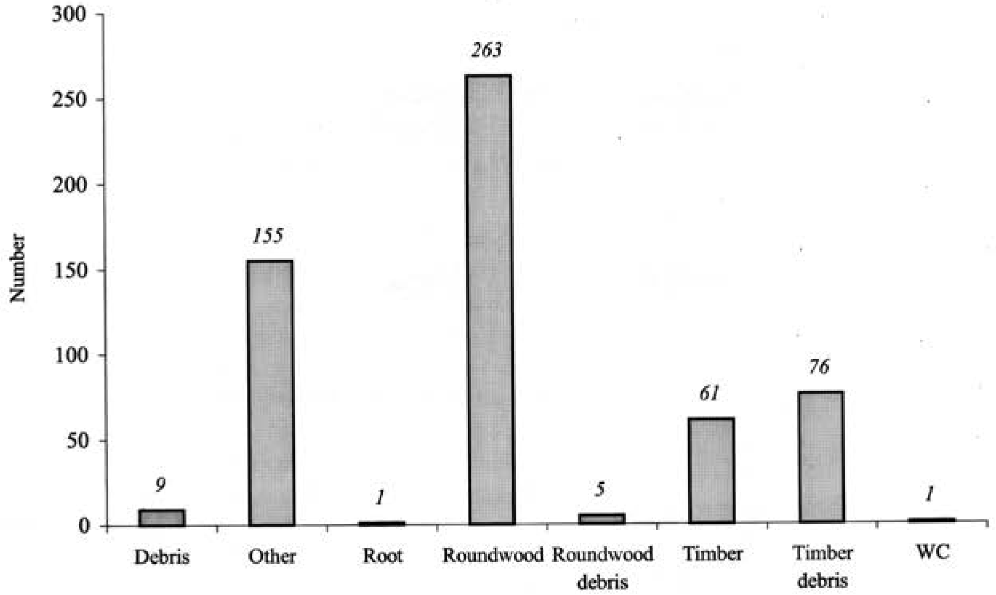


Fig. 3.20 Principal categories of wood and timber found at Fiskerton (total number).

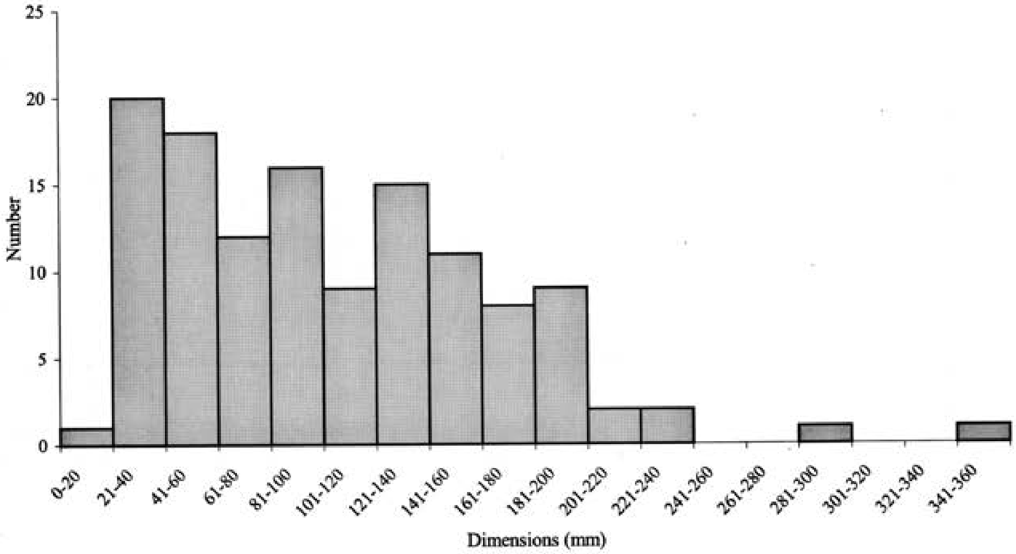


Fig. 3.21 Roundwood diameters from Fiskerton (excluding verticals).

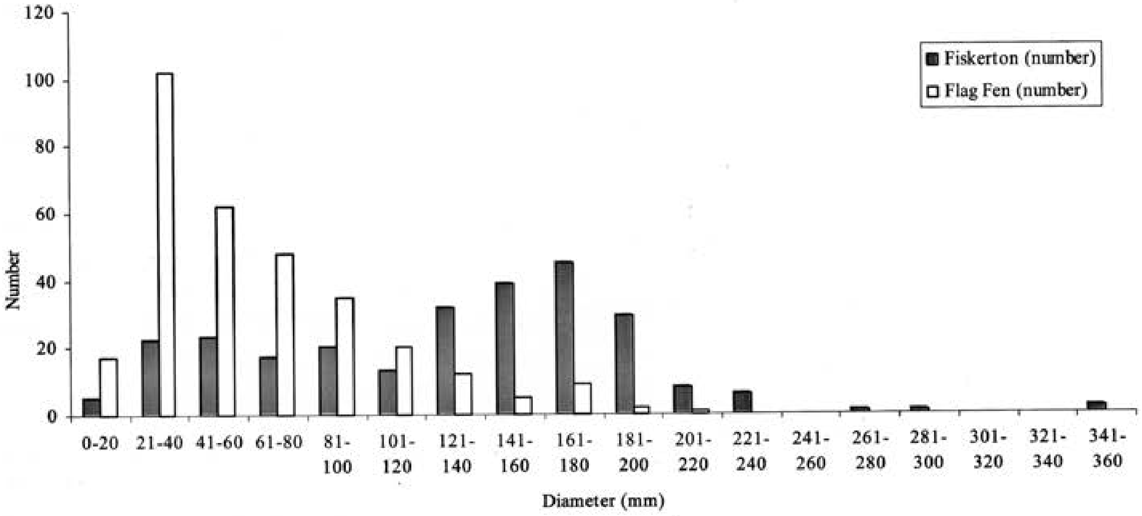


Fig. 3.22 Roundwood diameters from Fiskerton compared with Flag Fen (main site and Power Station).

wood). Most of these were split although a proportion was hewn. A few had been split and then hewn into shape.

Timber debris

Apart from that material which, for one reason or another (usually decay, damage or distortion owing to drying out), cannot confidently be assigned to any specific group ('other'), this was the second largest category of wood from the site, with 76 pieces. Timber debris can be otherwise described as 'off-cuts' from timber. These are relatively small pieces left over from working timber and therefore contain data about methods of reduction *etc.*

The timber debris from Fiskerton most commonly derived from split timber, often both split and trimmed; some pieces were from hewn wood and a very few were from wood which had been both split and hewn (Figs 3.23 and 3.24). Although there are not large quantities of material in these last two categories, the similarity of type between the debris and the timber is very marked and suggests that the debris does relate to working of timber on and around the causeway. There is not, however, a large quantity of timber debris, with only slightly more pieces than there were actual pieces of timber, so we are not looking at intensive woodworking.

Woodchips

Only 10 pieces from the excavation were described as general debris or woodchips. These are fragments, with or without bark, which have been detached by an axe blow or blows. A woodchip is large enough for information to be deduced about the diameter or shape of the wood that was being chopped. As they are by definition small, woodchips may have been washed away, or were perhaps either not recognized in the field, or more likely, their potential importance was not recognized in the early stages of the research.

Roundwood debris

Roundwood debris, of which five pieces were identified here, is a woodchip trimmed from roundwood in such a way that the original diameter of the roundwood can be deduced.

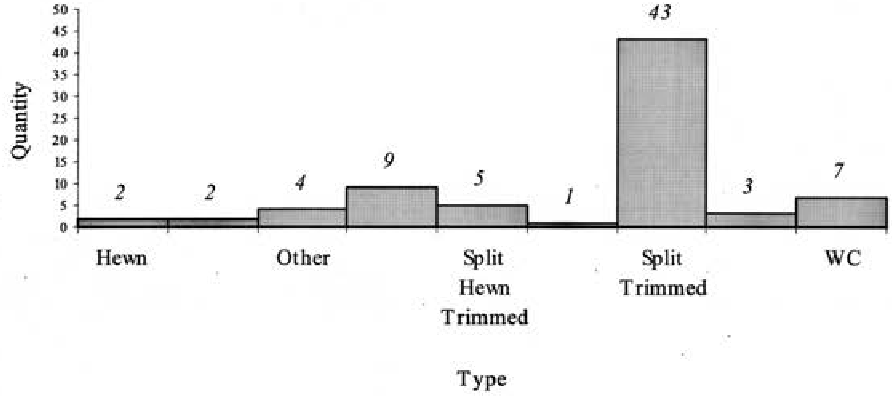


Fig. 3.23 Histogram showing types of timber debris from Fiskerton.

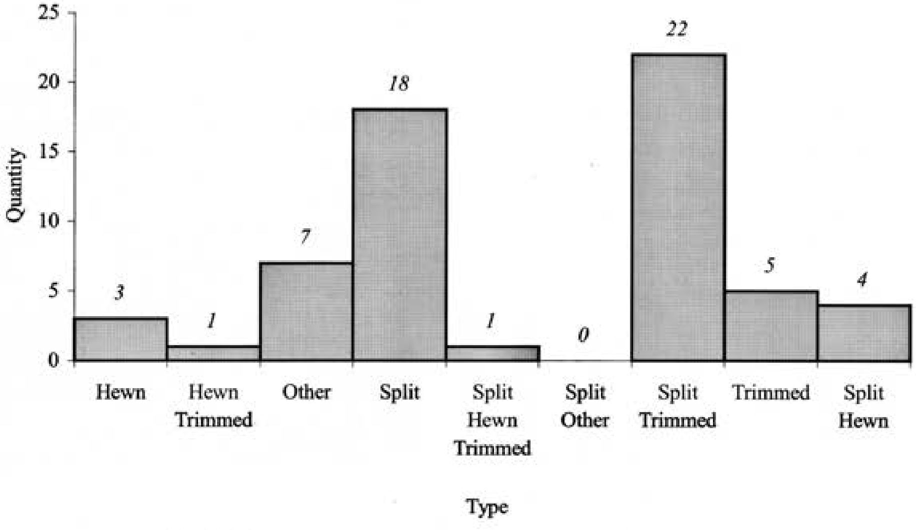


Fig. 3.24 Histogram showing treatement of timbers at Fiskerton.

The verticals

On any timber site, the vertical component can be difficult and expensive to retrieve. Pointed vertical timbers, for example, are very difficult to extract without the points breaking. Recent experience has shown, however, that it is the examination of the tips that usually produces an enormous amount of data about the woodworking and, in particular, the tools (Taylor 2001). Only one complete vertical (**637**) was extracted at Fiskerton, and this was 5m long. The extraction was undertaken with a mechanical excavator and the timber was only slightly damaged (Fig. 1.12). Many of the verticals were sampled, however, and a great deal of data is available about the types of timber, dimensions and species used. A collapsed or fallen vertical, **68,** was excavated and this was sharply pointed and dressed from all directions (Fig. 3.25).

Debris

At the time that Fiskerton was excavated no metrical work had been done on woodchips and woodworking debris. This has subsequently turned out to be a very profitable line of investigation. Very little specific work has been done on Iron Age woodworking debris, although data on the Iron Age woodchips from Market Deeping (Lane 1992) has been made available by Peter Murphy. With a sample of only 10 pieces from the excavations at Fiskerton, there is little to be gained from comparison here. Any future work on the site could profitably target this area of research.

Roundwood

A high proportion of the wood from Fiskerton is roundwood. Wood which has been generally characterized as 'roundwood' can fall into various categories: felled tree, coppice, branch wood *etc*. Four pieces were recorded as felled trees (**63**, **122**, **261** and **343**). Felled trees are those pieces which still have the felled end with no further shaping and are usually identified by the distinctive shape of the felled end. Very early in the use of metal tools, the technique of felling even quite small trees became standardized and the resulting shape is diagnostic (Taylor 2001).

The felled trees from Fiskerton are not particularly large and fall within a limited range of diameters, between 150 and 200mm. The characteristic shape of the felled end is usually removed during subsequent modification, such as trimming to a point. Timbers **63** and **197** are exceptions with mortises cut through the wood close to each felled end on timber **63** (Fig. 3.26), and at one end on timber **197** (Fig. 3.27), for which the ends are intact. None of the ends were well enough preserved to show toolmarks which could be measured.

Evidence for coppicing can be difficult to define, and it is not usually considered sufficient proof that there are stems which are long and straight, unless in very large quantities. It may be important to know the species when considering potentially coppiced wood, as some species

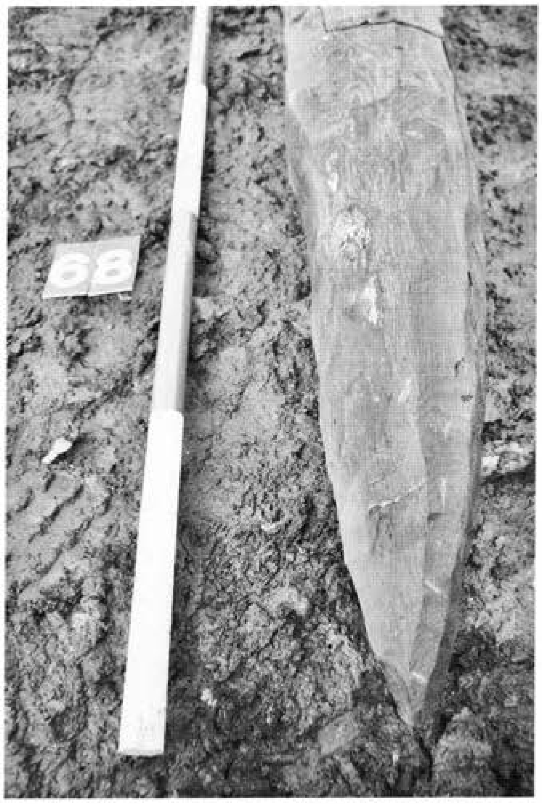


***Fig.** 3.25 Timber 68 in Area F, showing sharpened point and faceted sides (N. Field). Scale 1m.*

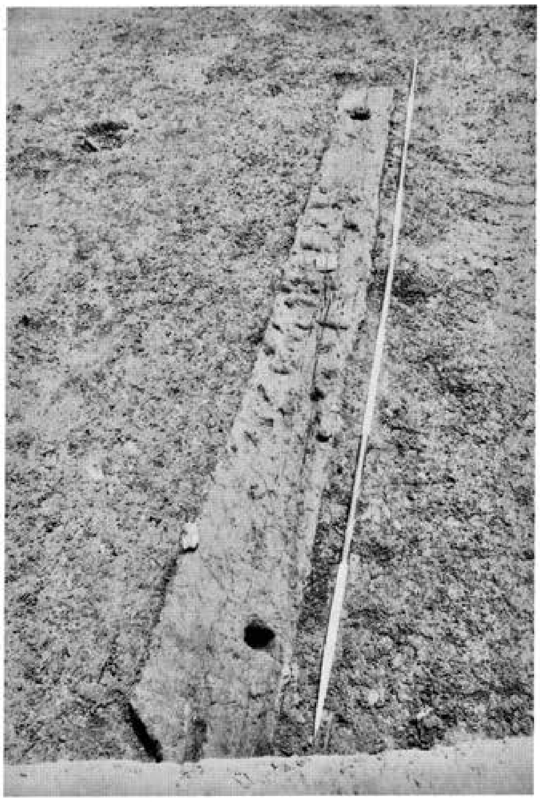


***Fig.** 3.26 Timber 63 in Area F, with mortise holes at each end (N. Field). Scale 4m.*

Fig. 3.27 Timber 197 in Area F, with mortise hole at west end (N. Field). Scales 2m and 0.50m.

grow long, straight stems naturally. All the wood found at Fiskerton came from species that are reasonably suitable for coppicing. Medieval and later coppicing was often done on a set cycle, and coppicing cycles can be detected in the ring patterns of poles and other trees from coppiced woodland. This is more difficult to detect in prehistoric wood. Where ring patterns have been looked at, selection seems to have been made on the size and suitability of poles, rather than on a regular set cycle. A good indicator for the presence of coppicing is where the heel, or sometimes just the curve into the heel, has survived. It may be that poles were cut slightly above the actual heel but when the heel was torn or cut during coppicing, these would be trimmed off before use.

Sixteen pieces from Fiskerton were judged to be potentially coppiced stems. Timber **226** is possibly part of a coppice stool and three other pieces (**616**, **649** and **654**) show a slight curve. The remainder were marked as probable coppices largely because of their long, straight stems. These were up to, and even over, 1.50m long. All of these stems show some sign of trimming. This usually survives only on one end but occasionally two trimmed ends survived (**500**, **546**, **616**, **634** and **656**). Small and medium roundwood usually seems to have been trimmed from either one or two directions, presumably depending on whether the axe cut the stem cleanly with one blow, or a second, neatening blow was required.

Generally speaking, the diameters of the roundwood from Fiskerton are quite large, up to 360mm, with very little in the range of 5–50mm which elsewhere has been found to be the size selected for hurdles and lightweight building and also within the range of sizes most commonly coppiced. The use of overgrown coppices to provide large roundwood verticals is something which has been observed in the early stages of the study of the wood from the channels at the Eton Rowing Lake (Taylor in progress). It is possible that **395** is one such large coppice.

Species

The range of species is very limited and the immediate impression is of some similarity to Flag Fen, where there was a high proportion of alder and oak. At Flag Fen the

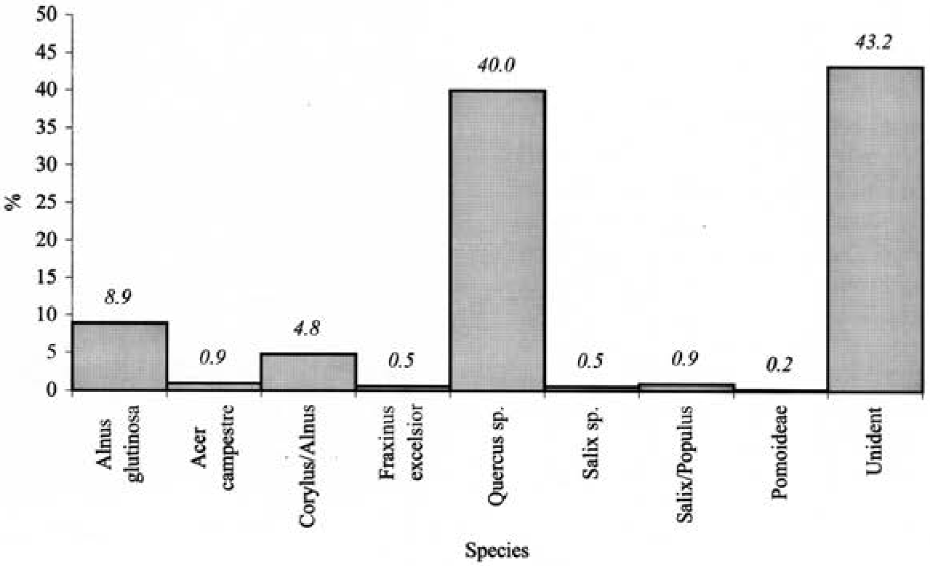


Fig. 3.28 Histogram of species from Fiskerton, including verticals.

alder construction was thought to be earlier than the oak (Taylor 2001). At Fiskerton 76% of the verticals were oak (*Quercus* sp.), with 16% alder (*Alnus glutinosa*) and the remainder either willow/poplar (*Salix/Populus* sp.) or unidentified. There are, however, a few additional species represented among the verticals at Flag Fen, particularly ash (*Fraxinus excelsior*) and occasionally field maple (*Acer campestre*) and apple or similar (Pomoideae).

Taking the site as a whole (*i.e.* rather than just considering the verticals), the variety of species found at Fiskerton is no greater: a few pieces are identified as ash and a few more as either willow or poplar (Fig. 3.28). Taking this broader view we find that the proportion of oak has dropped to only 40% and alder (including possible alder) is slightly lower, at less than 14%. The whole assemblage is, however, very limited and seems to be heavily weighted towards fen species. When the worked wood is considered separately, oak remains the dominant species. There is also a greater variety of species among the handles and hafts, where species selection can be very important, and wood with specific attributes is needed for specific tasks (see below).

Joints

Fourteen pieces of timber or timber debris were recorded as having some evidence for joints. Early joinery may be difficult to identify when material is found out of context and joints are not articulated. Prehistoric joinery does not necessarily fall neatly into the categories used to describe later work. Nine of the joints were described as 'notches' but it is sometimes difficult to distinguish between different sorts of 'notch'. A notch might be cut to be used as a saddle joint (so that a horizontal could accommodate a vertical) or a 'notch' might originally have been part of a lap joint. A joint which started out as a mortise might survive as a 'notch' when wood has subsequently split or been trimmed away as on timber **160** (Fig. 3.29). The inner edge of radial planks may break in use and develop what look like notches. Wood softened by waterlogging may also become deformed under pressure and 'notches' can develop where wood has been pressed hard against later or harder material. The type of timber into which the notch has been cut, or its position relative to the grain, can sometimes be helpful in analysis.

The mortise hole with parallel sides and square corners on timber **197** is one of the most commonly-found joints on prehistoric timbers (Fig. 3.27). One mortise at Fiskerton was articulated (**183** with **436** passing through the mortise; Figs 3.30 and 3.31). The mortise which was cut through **183** is a classic axe-cut, prehistoric mortise with the wood cut at 90° to the grain in a half-split log, and then the wood gouged (or cut out) across the grain. Straight half-split oak logs with slots and mortises cut

Fig. 3.29 Timber 160 in Area B, with notch at north end (right) (N. Field). Scale 2m.

Fig. 3.30 *Timbers 183 and 436 in Area B, the only articulated timbers found on site (N. Field). Scales 0.50m and 1m.*

Fig. 3.31 *Timber 183, after removal of 436, showing open mortise (N. Field). Scale 0.50m.*

through them are a recurrent find (Taylor 2001; Taylor forthcoming). They often appear, from their contexts, to be horizontal structural timbers. Two further timbers from Fiskerton (**63** and **340**) may belong to the same class. They are felled trees which have been split and squared without additional trimming.

Recently, whole trees have been found in the Trent with mortises cut through them (Guilbert and Garton 2001), and the central tree in the timber circle at Holme-next-the-Sea had loops or side-mortises cut through (Brennand and Taylor in prep.), which raises the likelihood that some of the 'joints' at Fiskerton were, in fact, used as tow-holes for transporting the raw material from the woods. There is not enough evidence one way or another to suggest whether the mortise here was cut before or after splitting.

Only one possible tenon (**300**) was found at Fiskerton. These are much less common than mortises, probably because they often break or are difficult to identify when decayed.

Toolmarks

No toolmarks were recorded from Fiskerton (although there were facets surviving on the oak handle ***311***). It is mostly likely that, like Flag Fen, Fiskerton would have produced a great deal of toolmark data from the tips of the verticals. Unfortunately the verticals from Fiskerton were more difficult to remove than those from Flag Fen. Examination of toolmarks statistically has proved to be very productive at Flag Fen (Taylor 2001), Yarnton (Taylor in prep.) and possibly Eton (Taylor in progress). Little or nothing has been done on toolmarks from Iron Age contexts, because of the rarity of data. It would be helpful in the context of Fiskerton, for example, to explore the possibility that the tools used for working the wood on the site were similar to those deposited there.

Tools and wood associated with iron objects

With three iron axe-heads, two woodworking files (one with its antler handle) and a decorated saw (also with an antler handle), the assemblage of iron woodworking tools from Fiskerton is very important (see Fell, Chapter 4). Iron woodworking tools are even more rare than Iron Age woodworking. Some of the tools and other iron objects had associated wood, usually in sockets (Table 3.5).

The choice of species used for specific purposes such as this strongly reflects function. All the spears (***154***, ***218***, ***268***, ***391*** and ***423***; see Stead, Chapter 4) are shafted in precisely the same way (using ash dowels) as the bronze spearheads from Flag Fen (Taylor 2001). All the iron spearheads with wood in the sockets from Llyn Cerrig Bach also had ash shafts and were fixed in an exactly similar manner (Fox 1946). Ash (*Fraxinus excelsior*) dowels are used for the shafts, with rivets precisely at 90° to the ring structure. Ash roundwood has a large pith and sapwood, making poles unsuitable for hafts and shafts, even though they might be very straight. The wood is reasonably easy to split and shape down to a dowel, and, more important, it is one of the strongest woods longitudinally. Many modern tools are hafted in a similar way, in ash.

The wooden component of the sword pommel (***149***; see Stead, Chapter 4) is also of ash. Dagger handles, sword handles and pommels are fairly frequently made of ash, possibly because it is a wood that has often been noted as having good shock-absorbing properties (Coles *et al.* 1978: 7).

A hammer (***403***) and an axe (***413***) both have handles made from rosaceous wood, shaped down from mature wood (see Fell, Chapter 4). This is wood from the group of plants that includes apple and hawthorn. Rosaceous wood is not especially common in handles although there is a socketed axe with *Malus sylvestris* wood in the socket from the fen at Branston (Davey 1973: 72). Apple wood is quite hard but limited in its uses because, being forked and branched, it tends to occur in quite small lengths.

Another axe (***331***) has a handle of hazel (*Corylus avellana*), also shaped down from mature wood. Hazel is more commonly associated with wattle and hurdles but the extreme flexibility needed for wattlework is a particular feature of the young wood. Mature wood from a reasonably sized branch or trunk would be harder and more rigid.

The grain of the oak handle ***311*** is clearly roundwood. This is not common in handles because roundwood tends to split and distort, and may be too flexible for some functions. At Flag Fen only a socketed gouge and the fleshhook had roundwood handles (Pryor 2001: 224, fig. 7.62). A carefully facetted and shaped roundwood handle of similar size to ***311*** was also found (Pryor 2001: fig. 7.64).

The possible boat fragment

One fragment of timber (**65**) was recognized in the field as a possible boat fragment (Figs 3.32 and 3.33; Plate 5). It is carved using the natural curve of the grain and it is thought that 'its overall shape and the apparent appearance of augered (?) holes might suggest that the fragment could have been part of a boat of the type described as Romano-Celtic by authors such as McGrail and Marsden' (N. Nayling, pers. comm.).

Table 3.5 *Identification of wooden shafts and handles on spears and tools (J. Watson).*

Identity	Wood identification	Comments
Spearhead **154**	*Fraxinus* sp. (ash)	Mature wood. Rivet tangential to growth rings
Spearhead **218**	*Fraxinus* sp. (ash)	Mature wood. Rivet tangential to growth rings
Spearhead **268**	*Fraxinus* sp. (ash)	Mature wood. Rivet tangential to growth rings
Spearhead **391**	*Fraxinus* sp. (ash)	Mature wood. Rivet tangential to growth rings
Spearhead **423**	*Fraxinus* sp. (ash)	Mature wood. Rivet tangential to growth rings
Hammerhead **403**	Rosaceae sub-family Pomoideae (e.g. apple, hawthorn)	Mature wood
Axe-head **331**	*Corylus* sp. (hazel)	Heartwood
Axe-head **413**	Rosaceae sub-family Pomoideae	Mature wood
Sword 'pommel' **149**	*Fraxinus* sp. (ash)	

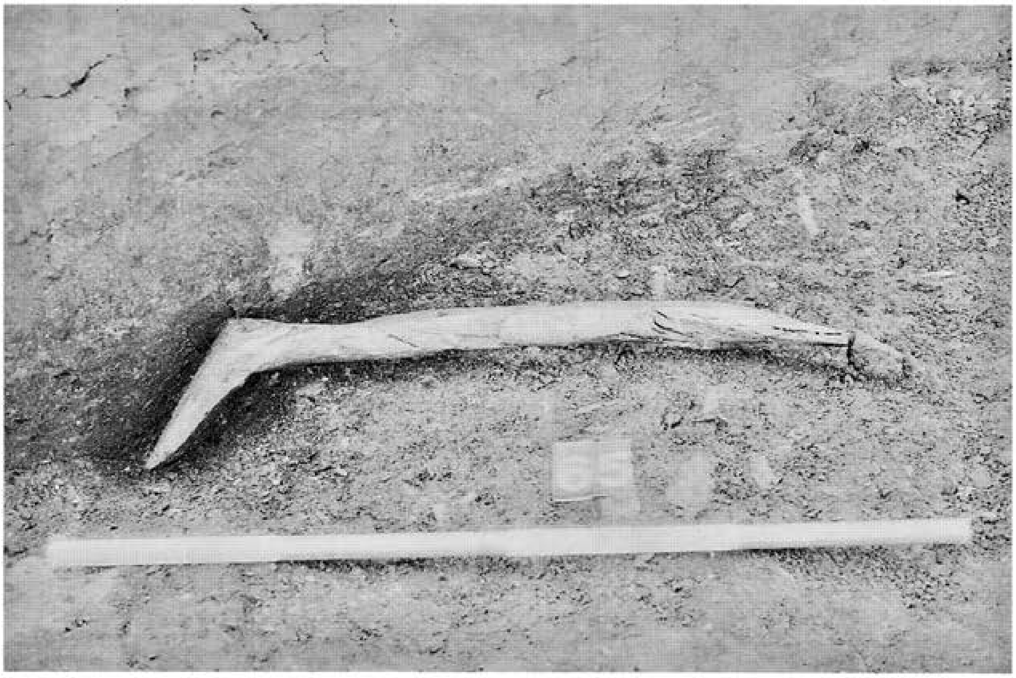


Fig. 3.32 The boat fragment (65) in the northern edge of Area F (N. Field). Scale 1m.

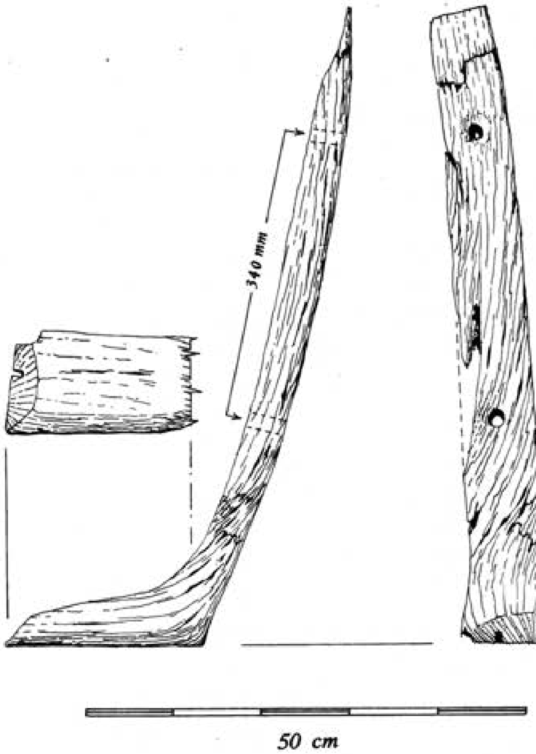


Fig. 3.33 The boat fragment (M. Clark).

Boats with keels and stems begin to occur in Britain during the Roman period. If the top of the timber is a broken scarf joint (although this is not altogether clear) then the piece from Fiskerton could be part of a rib for joining the plank side of the boat to the keel. The poor evidence and lack of distinct joints and fixings make it difficult to comment. It is certain, however, that this piece is a crook and may even be a knee. A naturally curved timber which is a useful shape for boat building is known as a 'crook' in boat building. Where a crook is used as a bracket between two members set at about right angles to each other the piece is known as a 'knee' (McGrail and Denford 1982: fig. 3.5).

Discussion

Where a site is completely composed of wood it may be difficult to see any pattern in the ground during excavation. A careful study of the plans at Fiskerton, however, still reveals no pattern that may give a clue to the use of the site. There is, for example, no planking and no obvious 'trackways'. The difficulty in identifying any kind of regular pattern contributes to the impression that there was no elaborate superstructure. There are no 'intermediate' (*i.e.* diagonal) or bracing timbers, no clear and regular groups of two or four timbers. It is, however, hard to generalize from this lack of evidence of buttresses and bracing timbers since only a small proportion of the site has been excavated. There is little or no evidence for anything being pegged into place as might be expected for either a low-level trackway or a raised walkway. Regular replacement of horizontal planks would have been awkward because of the verticals. All of these things would be needed for any kind of bridge, raised walkway or even a simple trackway with horizontal timbers pinned into place.

The two lines of wattle which represent an early phase of the site are more like the base of a trackway, and they are similar to structures recorded from the Severn (Bell *et al.* 2000) but the main timbers at Fiskerton are quite different in size. The sizes of both track and building timbers were recorded at Goldcliffe, Newport, and neither is in the same size range (Bell *et al.* 2000: fig. 12.21).

Although Iron Age woodworking is rare, there are a number of channel-edge structures of known function that have been looked at elsewhere. If the range of sites and comparative structures is extended to include other periods, then the list becomes extensive: bridges and walkways, trackways, revetments, fish traps and other fishing structures (such as fish-storage tanks), jetties and pontoons. But there are no clear similarities between any of them and the structure at Fiskerton.

Analysis of structures of various dates, of known function, has shown that patterns of wood use can be detected. A first stage of this analysis is to look at the quantity and size of roundwood in a structure. A comparison of the roundwood size from Fiskerton and a range of other sites reveals apparently no similarity with any of them (Fig. 3.34). The roundwood for all the structures seems to fall within a limited range of diameters. It is perhaps not surprising that an ancient hurdle structure, such as a trackway, would be made from similar diameter roundwood to a modern hurdle but even more substantial structures, such as revetments (St. Benedict's, Lincoln; Taylor in press) and an Iron Age longhouse (Assendelft; Therkorn *et al.* 1984), do not use particularly large-diameter trees. This leaves sites such as Flag Fen and the Eton Rowing Lake as more likely candidates for comparison.

The range of wood, timber and woodworking types recovered from Fiskerton was neither large nor sophisticated; moreover there is no small debris to speak of. This would suggest that no extensive woodworking was going on there – although, of course, small woodchips could have been washed away. Joinery is not a common feature of the site and that which does occur is not very sophisticated. This would argue against the possibility that the verticals are part of any sort of 'bridge-like structure'. It would be a strange coincidence if most of the worked timbers and debris had floated away, leaving primarily unworked timbers behind. It should also be noted that the horizontal wood does not seem to be particularly heavy-

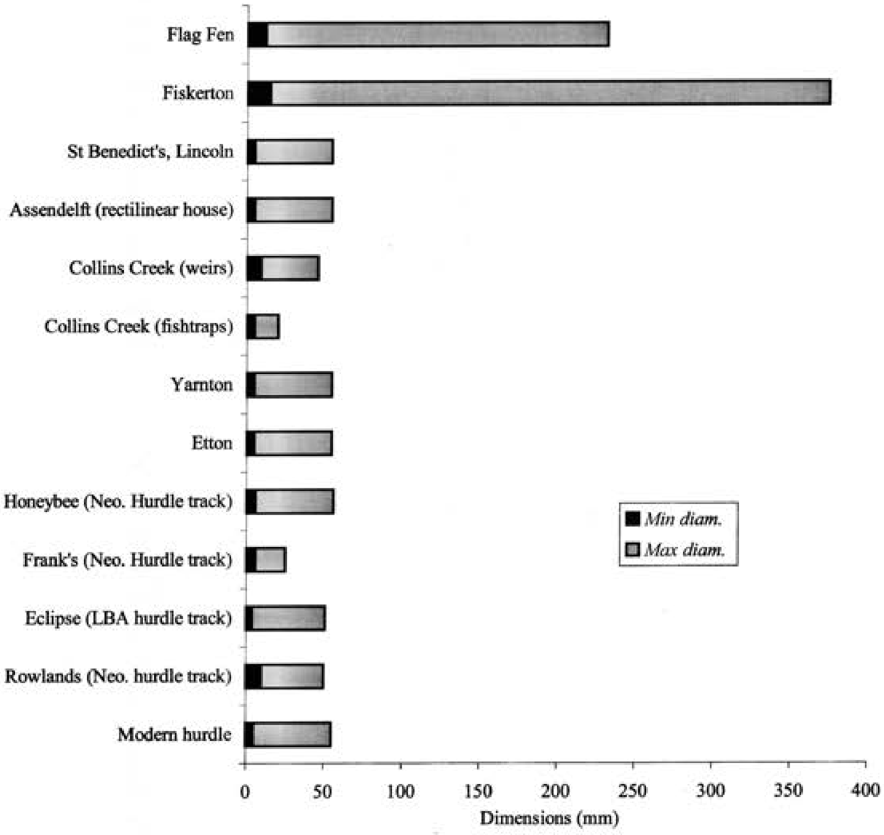


Fig. 3.34 *Range of timber diameters from Fiskerton compared with other sites of known function. Flag Fen: Taylor 2001; St. Benedict's, Lincoln: Taylor in press; Assendelft house: Therkorn et al. 1984; Collins Creek: Murphy 1995; Yarnton: Taylor in prep; Etton: Taylor 1999; Honeybee: Coles et al. 1985; Frank's: Coles et al. 1988; Eclipse: Coles et al. 1975; Rowlands Track: Morgan 1977; Modern hurdle: Morgan 1988.*

weight, whereas some of the verticals are very large indeed. The verticals have obviously been laid out with care but the horizontal component lacks pattern. Of the 160 verticals examined for this report, 132 were roundwood (82%). This can be compared with the figure for the whole site, where 46.8% of all the wood was roundwood.

An early Roman wooden bridge from the Nene has been described and illustrated in some detail (Jackson and Ambrose 1976). One of the noticeable features of this badly damaged structure is the careful positioning of the horizontals relative to the verticals. Any structure built to carry a load has to follow certain rules of geometry if it is to be stable. The lack of formal geometry in the horizontal component at Fiskerton is very marked, when compared with the fragment of bridge from Aldwincle.

The woodworking tools from Fiskerton are very sophisticated and, in the case of the files, not very robust: these tools were possibly designed for a finer kind of woodworking than is represented in the excavated timbers. By the end of the Bronze Age, woodworking had become very sophisticated. A full range of joinery was possible and a range of beautifully finished artefacts has been found from sites in southern England. All this was possible with a much less sophisticated tool kit than we have here. Saws and rasps were not needed for even quite complex joinery.

The decorated saw (*288*) is intriguing in its delicacy (see Fell and Stead, Chapter 4). Large saws are known from Minoan Crete and other places in the Mediterranean, and small copper saws were in use even earlier in Egypt and Mesopotamia. The early saws did not have teeth that were set and would quickly have become congested with sawdust. This problem would have been worse if the wood being sawn was green. Seneca equates the use of saws with luxury: '...blessed were the days before there were architects and plasterers. It is only with the arrival of luxury that timbers were squared and beams cut with the saw straight along the marked line' (Meiggs 1982: 347). The use of the Fiskerton saw cannot be related to any of the woodworking surviving from the site.

Only by excavating for more toolmark data (and possibly through experimental work) can the precise use of these tools be explored. Certainly none of the woodworking from the site, including the mortises, would have required anything other than axes. The sophistication of the tool kit hints at woodworking potential far greater than that seen on the wood actually excavated.

At the time of the excavations, the wood from Fiskerton presented a difficult and unique problem, as there were no on-site computers and technical back-up was in its infancy. Subsequent developments mean that the analysis of the structure would now be approached in a different way from the outset. The original excavations were hampered by the fact that they took place early in the development of the study of prehistoric woodworking, and in the development of wetland archaeology as a whole.

4 THE IRON AGE WEAPONRY AND TOOLS

THE IRON AGE MILITARY ITEMS

By I. Stead

Swords

Metal detector find from the causeway, south bank of the North Delph, June 1980 (Figs 4.1 and 4.2)

The bronze fittings of a sword handle. Excavated by a metal-detectorist, it has been reconstructed from fragments. As found, there are 11 pieces:

1. the grip (the central part of the handle) with four ornamental bronze plaques and a bronze collar;
2. a corroded mass of iron with a decorated bronze finial, two bronze studs on one side, and part of the impression of a disc on the other;
3. a corroded length of iron with a coral-inlaid disc on one side and a bronze stud on the other;
4–7. four bronze finials;
8. a coral-inlaid disc with a bronze ring and iron back;
9. a small bronze ring, probably from a coral-inlaid disc as *8*;
10. a loose knob of coral;
11. a loose knob of coral.

Although completely mineralized, the shape of the iron tang can be established through *1*, *2* and *3* but the three pieces do not join. In *1*, the tang clearly tapers (although it is impossible to give exact measurements) so the top can be distinguished from the bottom. In *2*, the (broken) top of the tang is oval, 4mm × 6mm, and some 32mm away it is rectangular and about 5mm × 11mm. In *3*, the tang cannot be distinguished but, in its upper part, mineral-preserved organics give the shape of the bottom of the grip (or top of the guard). Thus the sequence from top to bottom is *2*, *1*, *3*: as arranged in Fig. 4.2 the angles of the broken ends of *1* and *3* almost match.

The finials

Piece *2* has a finial *in situ* so the relationship, and the angle, between finial and tang can be established. The five finials are lost-wax castings, 23mm–25mm long and 15mm–17mm maximum diameter, each with low relief ornament round the body and an inset piece of coral in the head. Four of them are markedly worn on one side only, the fifth is slightly worn. The worn side of each finial surely belongs to the same side of the hilt – either the front or the back (see below). Four of the finials (*2*, *4–6*) have been attached by bronze rivets which pass through the sockets and have neatly disguised heads. The fifth finial (*7*) stands apart in having no rivet so is here assumed to occupy the unique position as the pommel.

The other four finials divide into two pairs: *2* and *4* are upright with squared ends, whilst *5* and *6* are slightly angled with sloping ends and split sockets. Piece *2* has an upright finial *in situ* – a branch extending outwards and upwards just below the pommel – so presumably the other upright finial (*4*) should be paired with it leaving *5* and *6* to project in corresponding positions at either side of piece *3*. Indeed, there is a trace of an iron stem projecting from the hilt on *3* (for finial *5*, as reconstructed here) but too little survives to establish its angle to the hilt. Finials *5* and *6* have been arranged with the split in the socket facing down towards the blade, where they would fit over the top of the shoulder, but their angle to the tang is unknown.

The coral-inlaid discs

On piece *3*, below the projecting stem for *5* and apparently central on the hilt, there is a coral-inlaid disc with bronze frame (10mm diameter). On the opposite side, apparently on the line of the projecting stem for finial *5*, is a dome-headed stud (or a stud with a large domed washer). On piece *2* there are two comparable studs on the one side (one on the line of the stem of *2*'s finial and the other on the line of the tang), and the edge of the impression of a bronze ring on the other side (central on the line of the tang). The separate ring *9* (12mm diameter) is of exactly the diameter to fit this impression and its patina is damaged where it has pulled away from the impression (with some of the patina retained in the impression). This ring is the frame for a coral-inlaid disc like *8* and the slightly smaller disc surviving on *3*; each has had an iron plate at the back and as there is no hint of a pin presumably they were attached to the hilt with adhesive. It seems that the handle was decorated with coral-inlaid discs on one side and domed studs on the other. Presumably the coral ornament was on the front so, by reference to piece *2*, the worn edges of the finials were also on the front.

One of the loose knobs of coral (*10*, *c.* 8mm diameter) has a central hole that might have held a (bronze) pin:

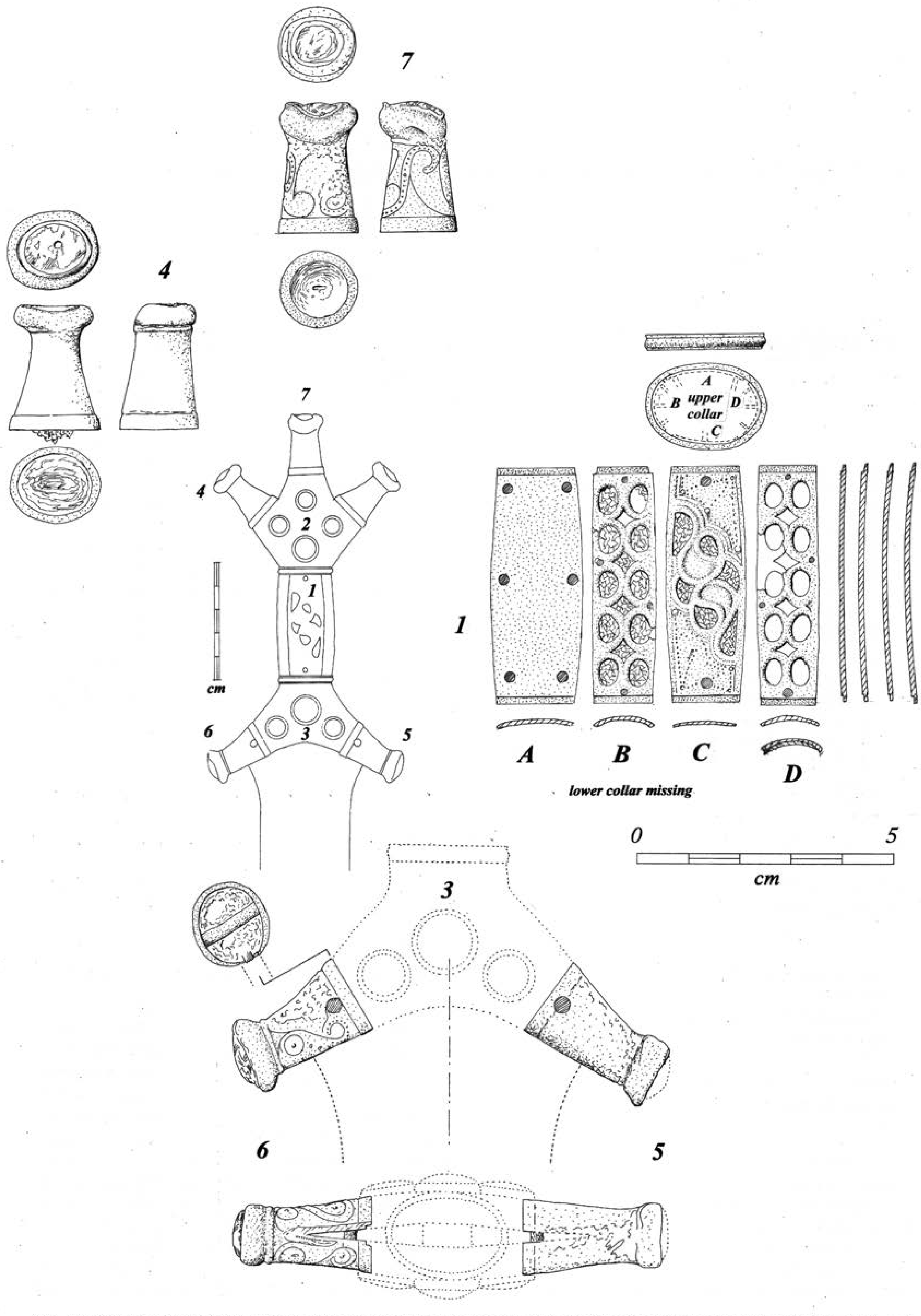


***Fig. 4.1** Reconstruction of the ornate sword handle showing numbered elements described in the text with exploded detail and conjectural reconstruction of elements in the handle (M. Clark). Actual size and ½ size.*

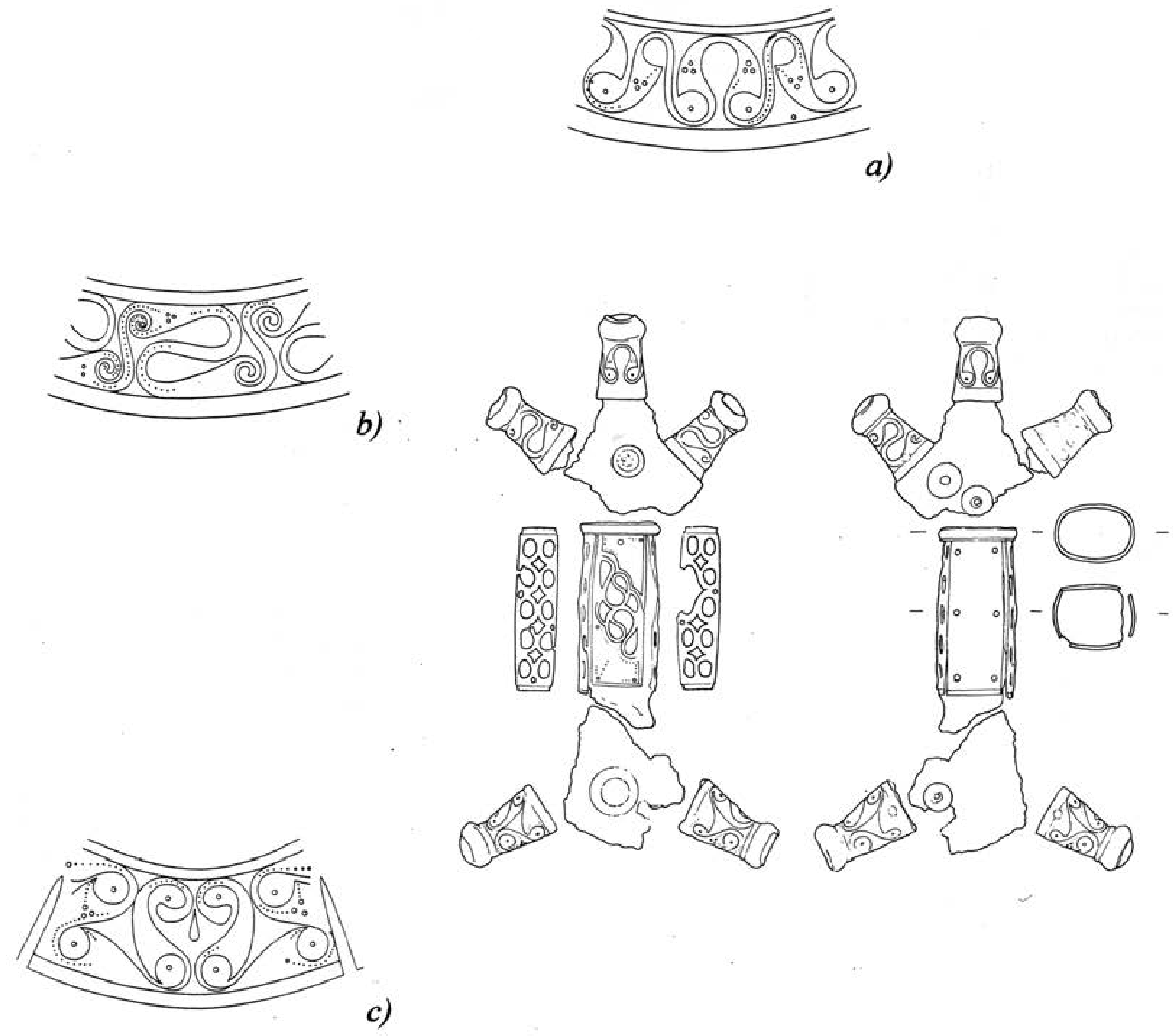


***Fig. 4.2** Schematic drawing of the ornate sword handle and decorative scheme on a) pommel 7; b) upper finials 2 and 4; c) lower finials 5 and 6. Decoration is actual size. (Reproduced by kind permission, British Museum.)*

perhaps it came from the end of *5* (the only finial from which the coral has been lost). The coral in *6*, its pair, has been attached by a coral-covered pin but all the other pieces of coral are complete and unperforated.

The grip

The grip has four bronze plaques:

i a plaque 47mm × 17mm, attached by six bronze pins (only three survive), is undecorated and is surely on the back (A in Fig. 4.1.1);
ii a similar but slightly narrower (16mm) plaque with six cut-out shapes, attached by four bronze pins to the opposite side (the front) of the grip (C);
iii & *iv* two plaques of similar length but only 12mm wide, with open-work oval and diamond shapes, each attached by four bronze pins (one survives on *iii* and three on *iv*) to the sides of the grip (B and D).

This type of handle is rare but it can be compared with two East European examples. A long iron sword from Kysice (Bohemia) has a bronze handle said to have been formed from four separate pieces fitted over the tang: (1) the pommel; (2) the upper branches together; (3) the grip; and (4) the lower branches together, forming the guard (Clarke and Hawkes 1955: no. 11; for different illustrations see Pleiner and Rybova 1978: 417, fig. 20, no. 1, and Pauli 1980: 118, fig. 5, no. 1). The pommel and each of the four branches terminate in a cup-shape, presumably intended to hold inlay, as at Fiskerton. Hawkes (in Clarke and Hawkes 1955: 203–206) regarded this handle as the forerunner of the anthropoid series. Apart from Kysice, the nearest approach to the Fiskerton handle is from a grave at Liebau (Kr. Plauen, Germany) where five domed bronze heads, one on the pommel of a sword and the other four on associated but loose iron shafts, have been reconstructed in the same way (Coblenz 1956: 135–6, fig. 3).

The decoration

The Fiskerton finials are decorated with scrolls in low relief. They are somewhat worn and corroded but three designs can be distinguished: the two pairs are matched (*2* and *4* have one design, *5* and *6* another) and there is a different motif on the pommel (*7*). The design on finials *5*/*6* is based on a popular Celtic theme – a palmette flanked by lotus leaves. Here each lotus leaf is replaced by a string of three split palmettes arranged to form a triangular shape, in a balanced symmetrical design. The origins of this pattern are well-known (*cf* Stead 1985b: 16). The top finial (*7*) bears another version of the same theme, a scroll of six split palmettes, four paired and two single.

The elongated split palmettes on finials *5–7* resemble the triangular forms on the antler handle from file ***364*** – which are rather more developed in that they terminate in tendrils (see below). The continuous design on finials *2*/*4* utilizes two motifs often associated with the palmette and lotus flower on the Continent: 'S' shapes are superimposed on a running-dog scroll (for running-dog scrolls see Jacobsthal 1944: 116, from the Berru helmet, and 1944: 431, from Amfreville). The narrow stems of the scrolls on all the finials have central dotted lines – a feature often employed on similar designs on the Continent (*e.g.* the Besançon flagon, Frey 1955; Basse-Yutz flagons, Jacobsthal 1944: 405–7) – and for the use of three slightly larger dots at the centre of the triangular shapes on designs *5*/*6* and *7*, there is a parallel on a bronze plaque from Comacchio (Jacobsthal 1944: 462). The three designs are simple, symmetrical, and all the motifs employed were current in the fourth century BC (La Tène I); their links are with eastern France and their ancestry is in Italy. (See Table 4.1 and Chapter 10 for La Tène chronology.)

The bronze plaque (*ii*; C in Fig. 4.1.1) on the front of the hilt carries a design that looks forward to later British developments. Within a diagonal band a pair of opposed triangular or 'fan' motifs are central to a simple diagonally balanced design: the lobe below the triangle on the left is matched by the lobe above the triangle on the right, and *vice versa*. The two branches of the design curve towards one another to enclose two repoussé lobes. There are traces of faintly punched dotted lines in the field on either side of the diagonal band but corrosion obscures details. A simple version of this design on a scabbard-plate from Sutton-on-Trent (Fox 1958: pl. 21, centre, bottom) has a short and a long tendril counterbalanced on each side; the motif is important on other decorated scabbards such as Lisnacrogher 1 and Toome 1 (Raftery 1983: nos. 260, 268; see also Parfitt 1995: 90, fig. 35).

Metal detector find from the causeway, between posts subsequently recorded as 52 and 129, June 1980, also known as 'the museum sword' (Fig. 4.3)

A corroded iron sword in its iron scabbard. Found at the same time as the handle described above but too much of the tang of this sword survives for the other to have been its handle. The bottom of the chape is missing but the taper suggests that only the chape-end itself is lost; it may well be that the surviving end of the sword is in fact the tip of the blade. The top, including the tang of the sword and most of the suspension-loop of the scabbard, has been thoroughly cleaned but the sword cannot be distinguished from the back plate of the scabbard which appears to be longer than the front plate by about 10mm.

Table 4.1 *Late Bronze Age and Iron Age chronological schemes.*

Date (approx.)	Reinecke	Déchelette	Stead (art styles)	Period
				Late Bronze Age
1050 BC	Hallstatt B2/3			⇓
750 BC	Hallstatt C			Early Iron Age ⇓
625 BC	Hallstatt D			
475/450 BC	La Tène A	La Tène Ia	La Tène *Stage I*	Middle Iron Age
400 BC	La Tène B1	La Tène Ib	La Tène *Stage II*	⇓
325 BC	La Tène B2	La Tène Ic		
300 BC			La Tène *Stage IV*	
250 BC	La Tène C1	La Tène II		
200 BC	La Tène C2		La Tène *Stage V*	
150 BC	La Tène D1a			Late Iron Age
120 BC	La Tène D1b	La Tène III		⇓
85 BC	La Tène D2			
20 BC				

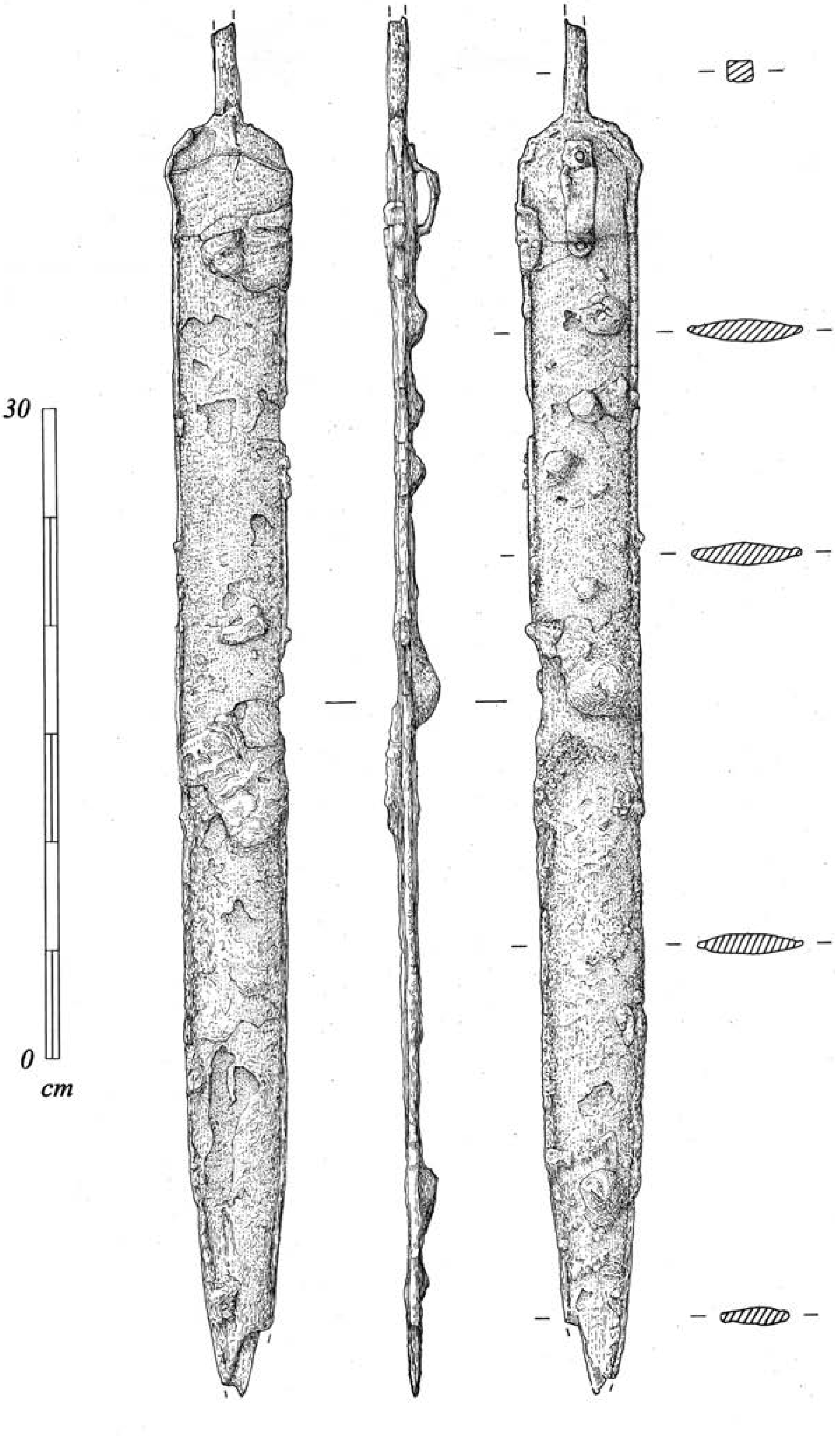


Fig. 4.3 *The 'Museum Sword' (D. Taylor). ¹/₃ size.*

The sword is now 630mm long, lacking the top of the tang but apparently including the tip of the blade. The blade is *c*. 565mm long and *c*. 49mm wide at the top. The tang seems to have been squarish in section but other details are obscured by the scabbard and by corrosion.

The scabbard is now 565mm long (measuring the front plate) and about 52mm wide at the top. There is little taper until about 95mm from the surviving bottom (*i.e.* 470mm from the top of the front-plate). The front plate overlaps the back and there is no median ridge. The chape has a bridge on the back, 4mm deep, and there are slight traces of clamps on the front. Its length, now 53mm, is unlikely to have been more than *c*. 90mm. The mouth of the front plate is rounded and low, no more than 6mm high, but the top of the back plate cannot be distinguished. The suspension-loop is 13.5mm wide and its entire length including the loop-plates is 53.5mm. The end of the upper loop-plate is squared, the lower plate rounded, and they are attached by rivets whose large heads, markedly darker than the surrounding metal and very dense on the radiographs, may perhaps be bronze.

The overall shape of the sword (the blade seems to taper for 1/5 or 1/6 of its length to a sharp point) and the relatively narrow suspension-loop on the back-plate of the scabbard are the most obvious features to show that this is a La Tène I weapon. Several such swords have been found in England, especially in the Thames, and at least three are known from the Witham (one belonging to the Duke of Northumberland, Kendrick 1939; and two in Lincoln Museum, registration no. 2.56, Petch 1957: 9, no. 11; and reg. no. 344.14, White 1979: 5, no. 12). This type of weapon was introduced in the fifth century BC and, in southern England, was replaced by a longer sword probably in the second century BC. [Layer **26**?]

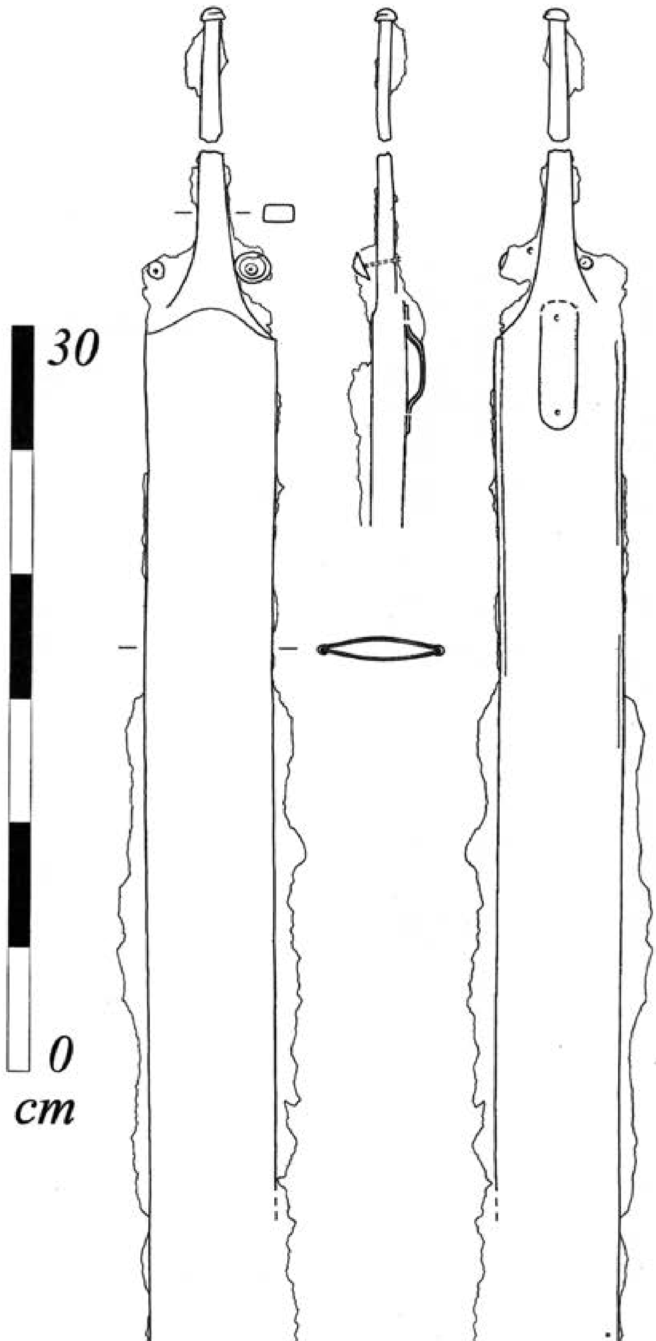


*Fig. 4.4 Iron Age sword **222**. 1/3 size. (Reproduced by kind permission, British Museum.)*

222 (Fig. 4.4). An iron sword corroded into an iron scabbard, lacking the tip of the blade and the bottom of the scabbard. It is considerably corroded and conglomerated - in places there are 8–10mm of corrosion products above the metal. It has been cleaned in part at the top and bottom in an attempt to reveal details. This sword is now in four pieces, of which the broken tang does not join properly, although the X-rays suggest that little is lost.

The sword is now 663mm long, of which the incomplete blade is about 533mm. It seems to be 48–49mm wide at the top but the edges of the blade are obscured by the scabbard. The tang is rectangular in section, neatly rounded over a small washer at the top, and the shoulders slope. Some of the hilt decoration survives – the remains of iron studs at either side above the shoulders. On the right (front) is a shaped stud 16mm diameter and on the left the impression of a washer (7.5mm diameter) with a central iron rivet that projects 16.5mm and is visible as a rounded head on the back.

The front plate of the scabbard survives for about 510mm but the end of the back-plate cannot be distinguished from the sword. The scabbard is 53mm wide at the top and there is no hint of taper 450mm from the top, the lowest point at which it can be measured. The front

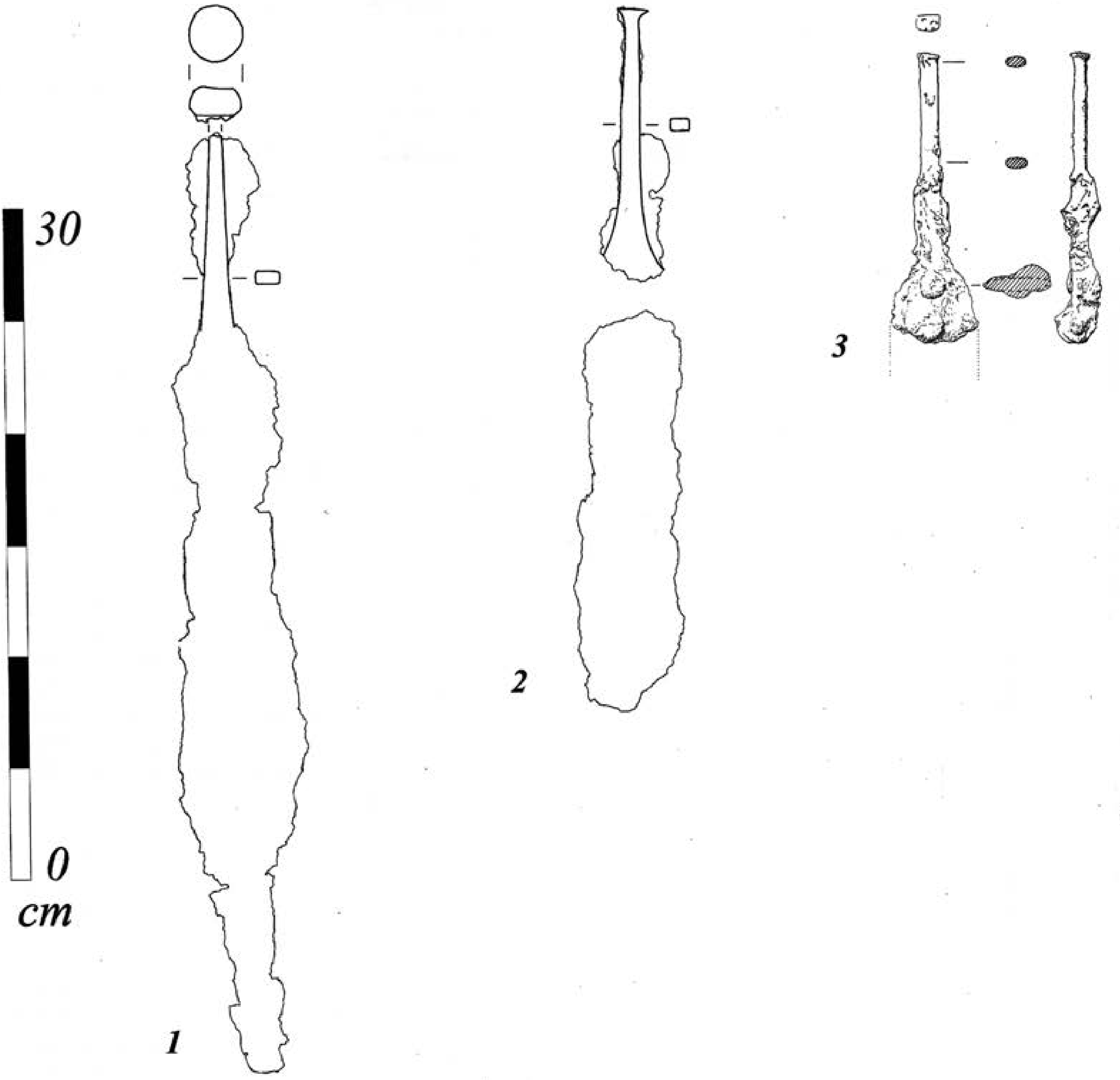


***Fig. 4.5** 1–3. Iron Age swords **149, 429** and metal detector find (British Museum and M. Clark). 1/3 size.*

plate overlaps the back. Nothing of the chape survives. The mouth of the scabbard, distinguished on the front where it has been cleaned, is campanulate and about 13mm high, with a marked median ridge in the top part of the scabbard. The suspension-loop is about 15mm wide and some 50–52mm overall length. It has rounded end-plates (the upper one visible only on X-rays), each attached by a single rivet. A ring possibly of coral, 19mm diameter and 5–6mm thick, is corroded on top of the upper loop-plate and is perhaps a chance association. X-rays suggest three rivet-holes in a line parallel to the edge and near the surviving bottom of the scabbard. They are 11mm and 12mm apart and may have been used in a repair.

This sword may have been similar to the 'museum sword' though it seems to have been longer; certainly the suspension-loop on its scabbard is comparable. The studded hilt may have been a typical La Tène form but very few hilts have survived. For fairly local parallels (from East Yorkshire[1]) see examples from Kirkburn, Rudston and Thorpe Hall (Stead 1979: 62–3, pls 8c, 9; 1991: 66, 70, figs 53, 103) and two excavated in 1984 at Wetwang Slack (Dent 1985; 1990: fig. 3). [Layer **31**]

149 (Fig. 4.5.1). A badly corroded short iron sword, the mineralized iron obscured by a great thickness of corrosion products but cleaned in parts. It is about 420mm long

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[1] The term East Yorkshire is used throughout for sites which are now, in local government terms, in the East Riding of Yorkshire.

including corrosion products and lacking only the very top of the tang; the blade seems to be about 300mm long and about 40mm wide at the top. Its precise shape is obscured by corrosion but X-rays suggest that it tapers for 120mm to a very long narrow point (the tip survives but is obscured by corrosion). The tang is rectangular in section and the shoulders slope. An associated iron knob is presumably the pommel. This knob measures 25mm × 24mm and is up to 13mm deep; it has a cavity on one side, *c.* 11mm–12mm across, lined with mineralized wood (*Fraxinus* sp. [ash]).

The blade is marginally longer than a dagger as defined by Jope (1961: 308) but shorter than a typical Roman *gladius* (Hazell 1981); Gordon (1953: 67) would call it a dirk. In length it may be compared with some of the short swords with anthropoid hilts that occasionally accompany typical La Tène long swords (Clarke and Hawkes 1955). It is longer than the Witham dagger with Lincoln imp pommel (now lost but, judging from Franks' illustration in Kemble 1863: 192, pl. xvii, 2, the blade was less than 250mm long). But not all short swords had anthropoid hilts and if the presumed pommel belongs to ***149*** then it is more comparable with the weapon in Rudston grave 154 (Stead 1991: 70, fig. 112). [Layer **194**]

429 (Fig. 4.5.2). A badly corroded iron sword, cleaned in part. There are now four pieces, with two joins to form (1), a length of blade with no taper, 180mm long and about 40mm wide, thickened in the centre but without a median ridge, and (2), the tang complete with some of the sloping shoulder, 120mm long. The tang is rectangular in section and terminates in a straight and flat expansion. There is no hint of a scabbard. The fragments are quite consistent with the other Fiskerton swords: this was probably a La Tène weapon. [Layer **32**]

Metal detector find, banks of the North Delph, May 1980. (Fig. 4.5.3) A corroded iron sword tang, surviving length 125mm. The tang is complete and is 90mm long, with some of the sloping shoulder of the blade attached. The tang is rectangular in section and terminates in a straight and flat expansion. X-rays could not determine whether a circular piece of corrosion on one side of the shoulder was a stud or just fortuitous. There is no indication of a scabbard. In form and size it is very similar to ***429***.

Iron spearheads

391 (Fig. 4.6.1; Plate 6). Complete and in very good condition, 325mm long of which the socket measures about 60mm to the start of the blade. The maximum width of the blade, 32mm, is only 120mm from the socket and it then tapers gradually, with a slight median ridge. The socket, 18mm diameter externally, is faceted and markedly quadrangular just below the blade. There is a bronze rivet through the socket and wood remains identified as ash (*Fraxinus* sp.). [Layer **26**]

154 (Not illustrated). Mineralized and cleaned, four pieces that do not join, some slightly bent. Lacking the tip of the blade but more than 435mm long, of which the socket to the start of the blade is about 80mm. Its maximum width, now 37mm, is low like ***391*** and the long blade is slightly thickened in the centre. The socket is 21mm diameter, very sharply quadrangular just below the blade, and has a bronze rivet. Corrosion products have migrated to preserve the outer surface of the top of the wooden shaft (identified as ash [*Fraxinus* sp.]), showing that it extended only 65mm into the socket. [Layer **26**]

268 (Not illustrated). Three pieces that do not join, mineralized and cleaned in part. Lacking the tip but at least 350mm long, of which the socket to the edge of the blade (and the length of wooden shaft in the socket) measures 75mm. The blade is similar in shape to ***391*** and ***154*** and seems to have been a little over 35mm in maximum width. The socket is 19–21mm diameter with a bronze rivet and wood remains (identified as ash [*Fraxinus* sp.]) especially round the edges. [Layer **31**]

218 (Fig. 4.6.2). Four fragments that do not join, mineralized and cleaned. The surviving length is at least 147mm of which the socket to the start of the blade is about 50mm. The blade is thickened in the centre and at least 28mm wide. The socket is 16–18mm diameter, has an iron rivet and wood remains identified as ash (*Fraxinus* sp.). X-rays suggest that the shaft penetrates the socket for about 50mm. [Layer **31**]

423 (Fig. 4.6.3). Mineralized and cleaned, the blade is damaged along the edges, lacks the tip and is slightly bent at the top. Now 122mm long of which the socket length to the start of the blade is 62mm. The maximum width of the blade, 23mm, is even narrower than the above examples (90mm from the socket). The blade is thickened in the centre. The socket is 18–19mm in diameter, faceted and quadrangular just below the blade; it has an iron rivet and wood remains identified as ash (*Fraxinus* sp.). X-rays suggest that the shaft penetrates the socket for only 40mm. [Layer **31**]

48 (Fig. 4.7.4). Only the lower part of a socket, mineralized and cleaned, 25mm long. The diameter is 15-16mm and the welding line is clearly visible. There is a hole in only one side of the socket and a line has been filed across it (perhaps to release a previous nail?). Inside the socket are the very clear remains of a wedge which has been used to secure the socket on the shaft. [Layer **32**]

90 (Fig. 4.7.5). Preserved in corrosion products is the wooden core, 48mm long, from a socket about 18mm diameter. [Layer **32**]

203 (Fig. 4.7.6). A socket and start of a blade, mineralized and cleaned. Now 37mm long, of which the socket is 32mm with a diameter of 15–16mm and two opposing rivet-holes filled with corrosion products. [Layer **32**]

220 (Fig. 4.7.7). Much of the socket and some of the

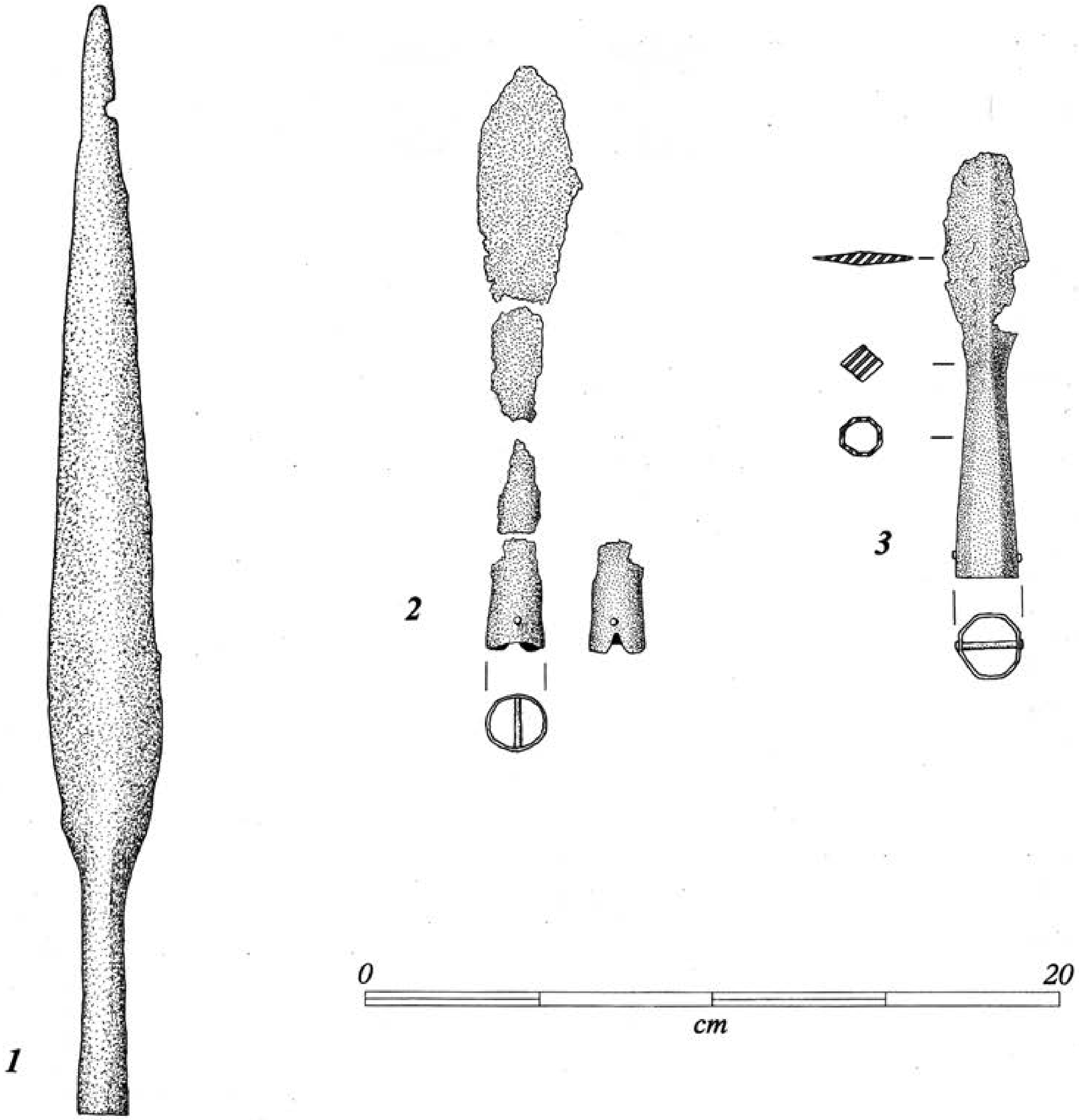


***Fig. 4.6** 1–3. Iron Age spears **391**, **218**, **423** (M. Clark). ½ size.*

blade, completely mineralized and incapable of cleaning (still in the surrounding earth). Now 65mm long with a socket 33mm long which is unlikely to have been much more than 35mm originally. The socket is about 17mm in diameter and corrosion products preserve the impression of a rivet. [Layer **31**]

260 (Fig. 4.7.8). Mineralized and cleaned, a socket (damaged at the end) and start of a blade, with loose fragments from the blade. The main fragment is about 50mm long and the socket to the start of the blade is 38/41mm (longer on one side than on the other). The blade is thickened in the centre. The socket is 16–18mm in diameter with a hint of the edge of a hole in the damaged end; it is solid with corrosion products but no wood can be distinguished. [Layer **32**]

300 (Fig. 4.7.9). A small complete spearhead but mineralized and cleaned. It is 71mm long, of which the socket measures 23mm to the start of the blade. The blade is 15mm maximum width, slightly thickened in section and rounded at the top. The socket is 13mm diameter and quite crudely (but completely) wrapped. There are two rivet-holes, both filed across as if the rivet had been removed, and no wood visible. [Layer **31**]

Only two of these 11 spearheads are complete and only one is in good condition. The others are mineralized and have been cleaned in part; three are represented by little more than the socket and one by the mineralized wood from within the socket. They vary very considerably in length from over 435mm down to 71mm. ***391***, ***154*** and ***268*** are large weapons, whose long narrow tapering blades

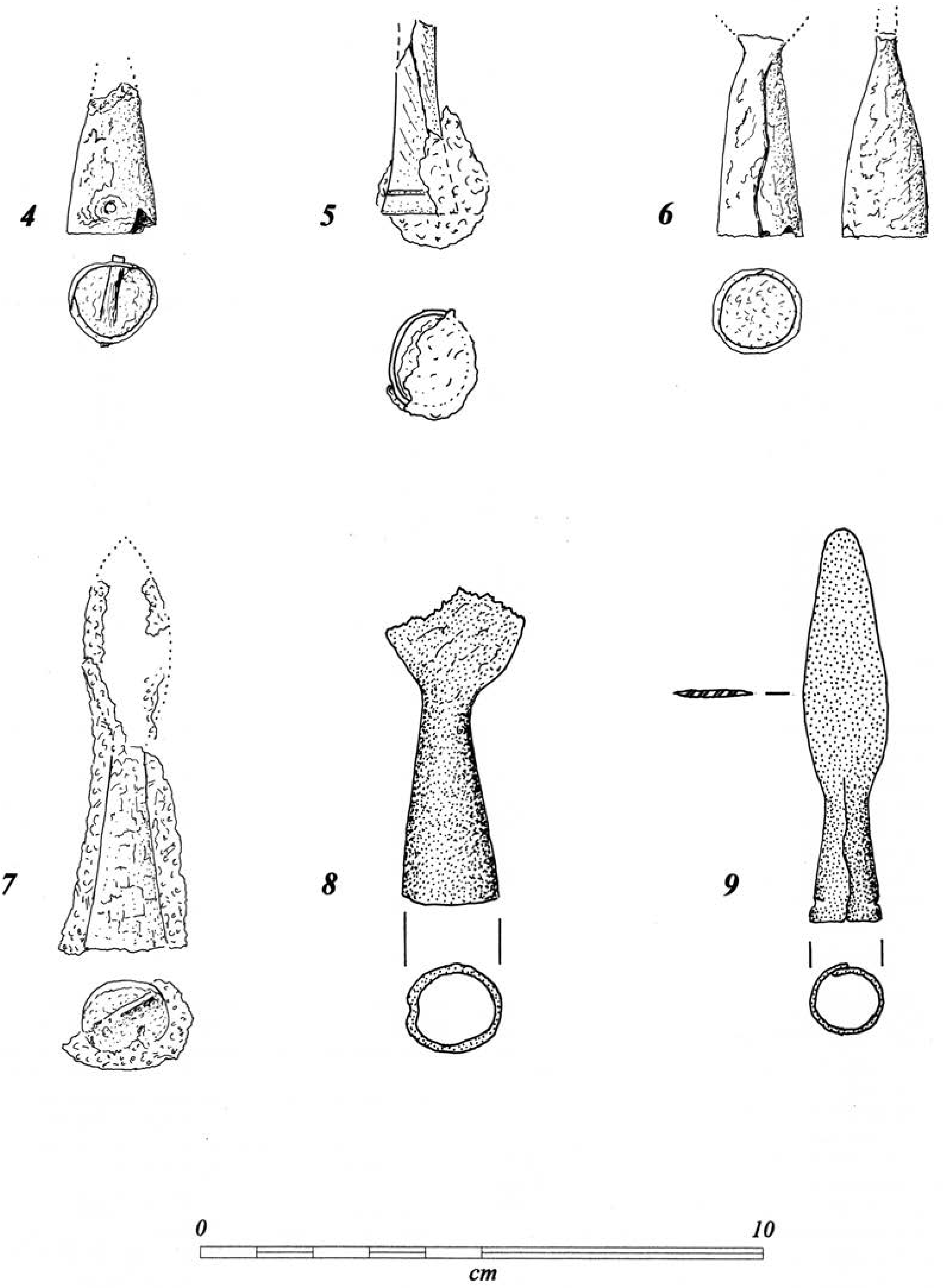


Fig. 4.7 4–9. Iron Age spears ***48, 90, 203, 220, 260, 300*** *(M. Clark). Actual size.*

are thickened slightly in the centre or have slight median ridges; all have bronze rivets to attach the socket to the shaft. ***391***, in very good condition, is especially well made with a fine faceted socket, quadrangular in section just below the blade. ***423*** may well have been a smaller weapon (certainly it is narrower), but its socket has the same features as ***391*** (though with an iron rivet) and is similar in size. ***218*** and ***90*** were probably smaller; ***260***, ***220***, ***203*** and ***48*** were smaller still; and ***300*** is the smallest of the lot. All seem to have been similar, with fairly narrow flattish blades thickened towards the centre and hardly penetrated by the socket. All have closed sockets apart from ***300*** which is wrapped – but tightly wrapped.

In the absence of a detailed study and classification of British Iron Age spearheads there is little that can be said about the Fiskerton examples. It is perhaps worth emphasizing the absence of mid-ribs, because many British Iron Age spearheads do have mid-ribs. The long narrow blades of ***391***, ***154*** and ***268*** are not otherwise unusual, *cf* Fox 1946: pl. 35, where four are illustrated - the longest being 585mm (730mm total length). The use of bronze rivets (which would probably pass unnoticed but for the X-rays) can be matched at Bredon Hill in Worcestershire (Hencken 1938: 75). Where wood survived and was identified (***391***, ***154***, ***268***, ***423*** and ***218***; see Taylor, Chapter 3) it was ash – the same wood was used for Late Iron Age spear-shafts at Llyn Cerrig Bach, Anglesey (Fox 1946: 74, 98) and elsewhere (Taylor 1981: 37; Taylor 2001).

Copper alloy objects

208 (Figs 4.8.1 and 4.9). A bronze S-shape, 241mm long and 96mm wide, composed of two complementary sides tightly riveted together to form a tubular outline 10mm–14mm deep. It may be viewed as two elongated lobes, the smaller hollowed from the metal and the larger a void, with a squat cut-out lobe between them. The overall shape is bordered by a flange through which the two sides are linked by rivets. In this respect the cut-out lobes are treated differently – there is an internal riveted flange round the small squat lobe but the edges of the tube simply touch around the larger elongated lobe. The flange round the outside of the smaller lobe merges with that of the stem of the 'S' – they are cut from the sheet metal without a break. The flanges are in part damaged but six bronze rivets survive and the holes for at least five more can be distinguished. A rivet-hole towards the centre of the smaller lobe may have secured beads of inlay.

There seems to be no wear to give a clue to the function of this S-shape and no means of attachment to anything (unless by the rivet in the smaller lobe, which seems unlikely). Its purpose is unknown. [Layer **31**]

237 (Figs 4.8.2 and 4.9; Plate 7). A curved piece of bronze sheet, 159mm long and up to 118mm wide, superficially resembling a shoulder-piece. Its narrow horizontal flange has holes for five rivets or pins (others could have been lost in corroded areas) and the much shorter vertical flange has five holes (including one that has nicked the edge and been replaced) at much closer intervals. The convex surface is polished and so may have been visible. Three joining lengths of bronze binding (***247***; Fig. 4.10.7) were associated: there is one original end, with facing rivet-holes and part of a bronze rivet, but no other rivet-holes. If the binding covered the horizontal flange, as seems likely, then the rivets in the flange must have been in position before the binding was attached. The opening along the length of the binding varies from 1.2mm to 2.8mm wide.

The resemblance to a shoulder-piece must be fortuitous – Celtic armour is very rare and there is nothing like this piece. Likewise is the resemblance to bronze shapes from Newstead, Borders (Curle 1911: 177, pl. 32) which lack the flanges and are perforated to be sewn to the underside of leather to support the shape of saddles (*cf* Groenman-van Waateringe 1967: 106–21). Purpose unknown. [Layer **31**]

3 (Fig. 4.8.3). Eight fragments (four joining) of a decorative circular mount, 102mm in diameter, 8mm high, from two locations in layer **32**. Three pieces are concave and five are convex, fractured along the rib. The mount's internal radius was 40mm. Three rivet holes survive, indicating that the mount was attached to a flat plate. The surfaces are tinned. The crimped central rib is reminiscent of part of the mount on the Witham shield, the spectacular bronze shield found in the river, probably at Stamp End lock, and now in the British Museum (see Jope 1971 and Chapter 9). [Layer **32**]

415 (Fig. 4.8.4). Part of a shape cut from a bronze sheet, slightly distorted and with a maximum length of 44mm. It is bordered by grooved lines, with zigzag tool-marks along the bottoms of the grooves. There are pin-holes at the ends of the circular motifs and one in the centre of the surviving side. Presumably it was attached by pins to a wood or leather base. [Layer **26**]

409 (Fig. 4.8.5) A bronze roundel, 42–43mm diameter, whose central cut-out motif reveals a dome of 'sealing-wax red' glass. The semi-tubular rim is decorated with radiating grooves, each with close-set walked scorper lines along the bottom. Three bronze rivets attached the rim of the roundel to a base no more than 1mm thick. The red glass would have been pressed into the shaped frame from the underside: below it there seems to be a thin bronze disc and then perhaps a thin layer of iron (possibly corrosion products attached to ?leather). [Area H]

Roundels on the Battersea shield, and from Lexden, Essex, and Hertford Heath, Herts., have red glass pressed into the underside of domed bronze frames in this way (Stead 1985a: 16–17, 34), but the semi-tubular border of the Fiskerton roundel more closely resembles the slightly larger pieces from Bugthorpe, East Yorkshire (Stead 1979: 58) which were thought to be shield ornaments. More recently two somewhat similar roundels, slightly smaller than Fiskerton and with coral ornament, have been found

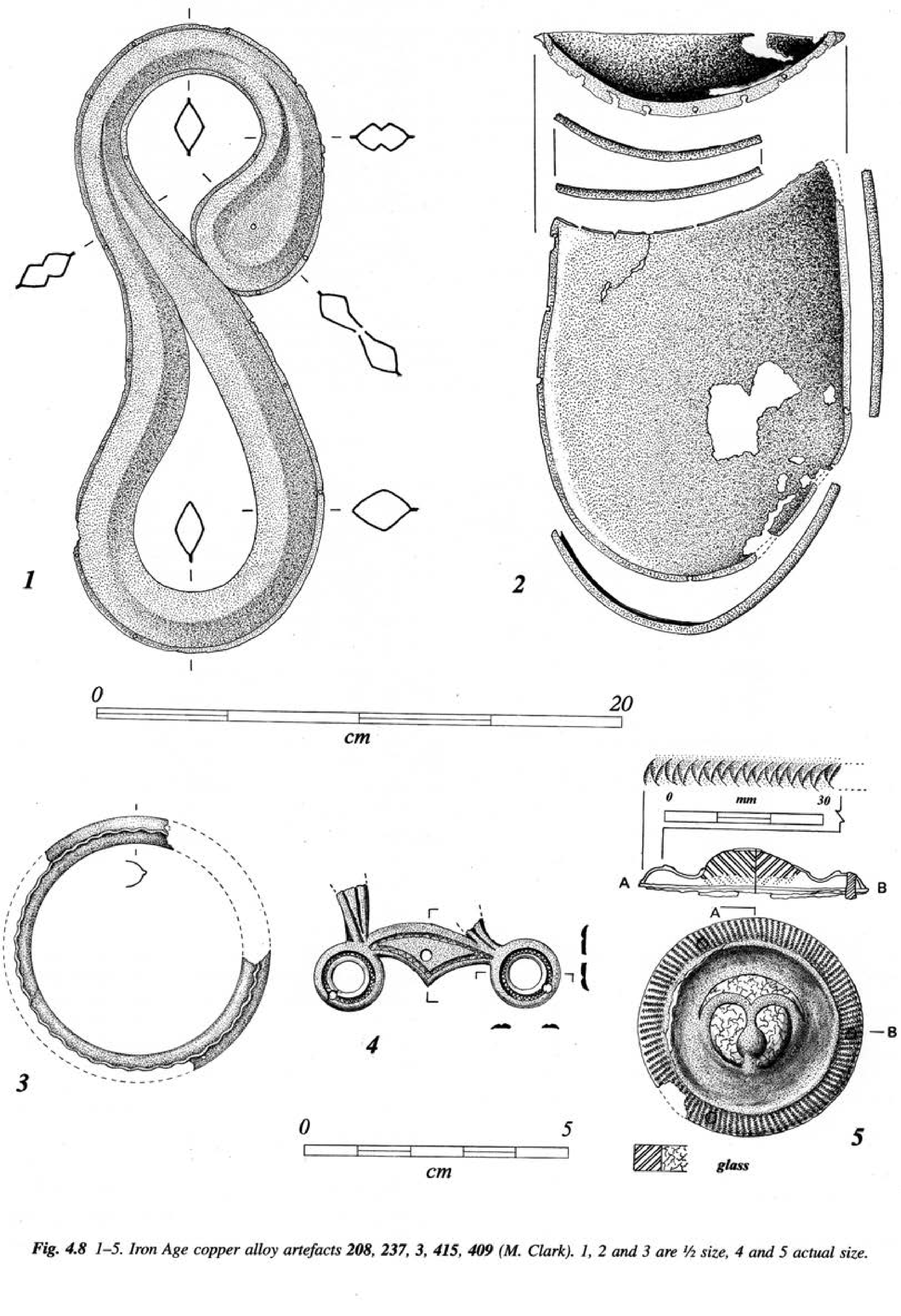


Fig. 4.8 1–5. Iron Age copper alloy artefacts **208, 237, 3, 415, 409** (M. Clark). 1, 2 and 3 are ½ size, 4 and 5 actual size.

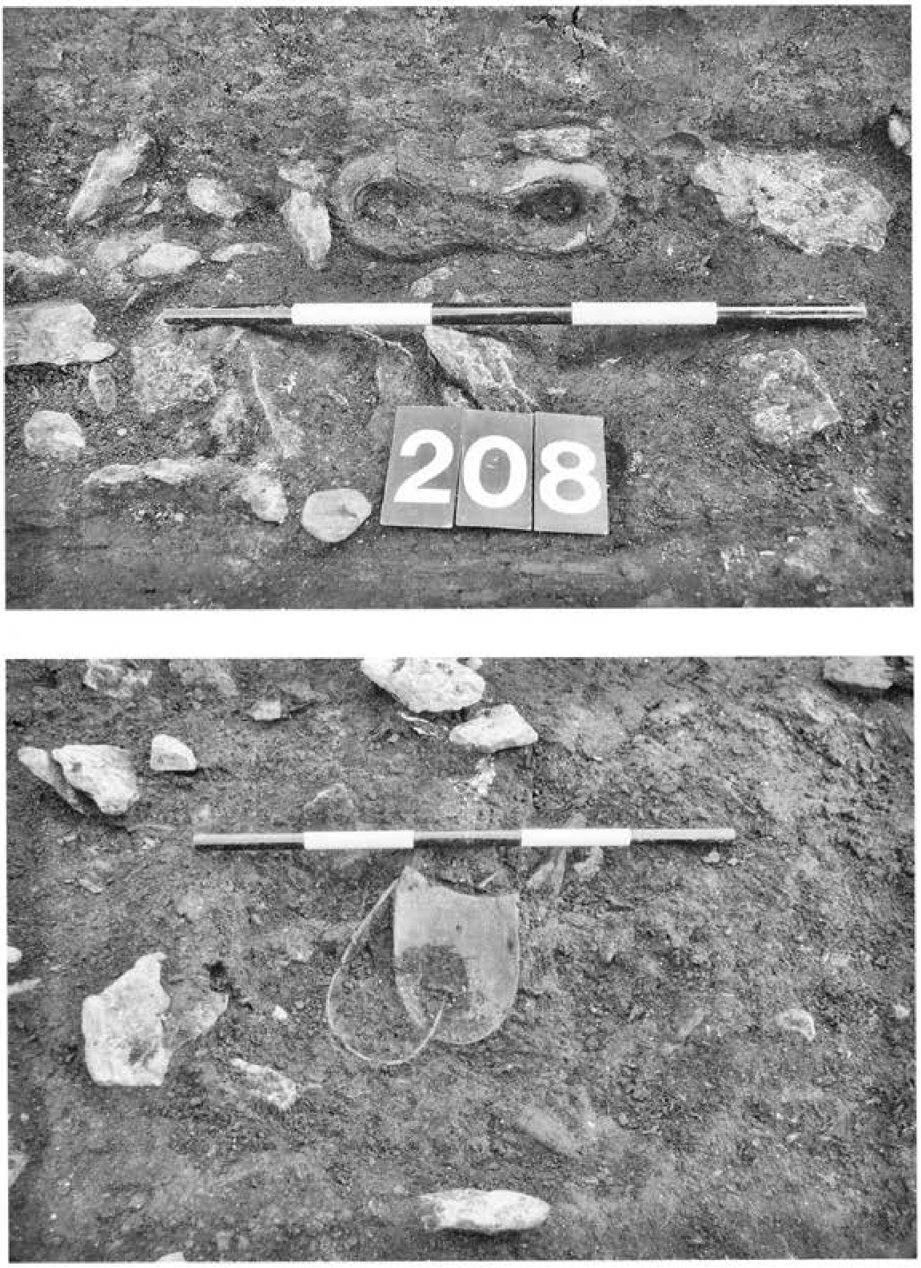


***Fig. 4.9** Finds **208** and **237** in situ (N. Field). Scales 0.50m.*

in a Wetwang Slack cart-burial (Dent 1985); they seem to have been attached to a sword-belt.

243 (Fig. 4.10.1). A very small bronze ring, 17mm by 18mm, formed by a length of metal decorated along the outside with a central wavy line and grooves, then bent into a circle with the terminals touching. [Layer **298**, eddy hole around post **22**]

330 (Fig. 4.10.2). A bronze band, 3mm deep and now 16–17mm external diameter. Its overlapping terminals, perforated to take a rivet or pin, have now sprung apart slightly. Well polished on the outside and unworn inside, it may have been an ornamental collar on a bone or wooden handle. [Layer **194**]

419 (Fig. 4.10.3). A bronze band 7mm deep, 1mm thick and 25mm external diameter with oblique ribbed, crudely executed, decoration 1mm wide. The band overlaps at the join and was originally secured with a rivet, lost in antiquity. There is a countersunk hole, 2mm in diameter, central to the band depth and opposite the join, to take a pin or rivet. It may have been an ornamental collar on a bone or wooden handle. The ring has broken across the hole and been squashed. [Unstratified]

420 (Fig. 4.10.4). A bronze ring, 26.5mm external diameter, deeply ridged on the outside. [Unstratified]

385 (Fig. 4.10.5). A penannular bronze ring of oval cross section (4mm × 2mm and 59mm diameter). The terminals

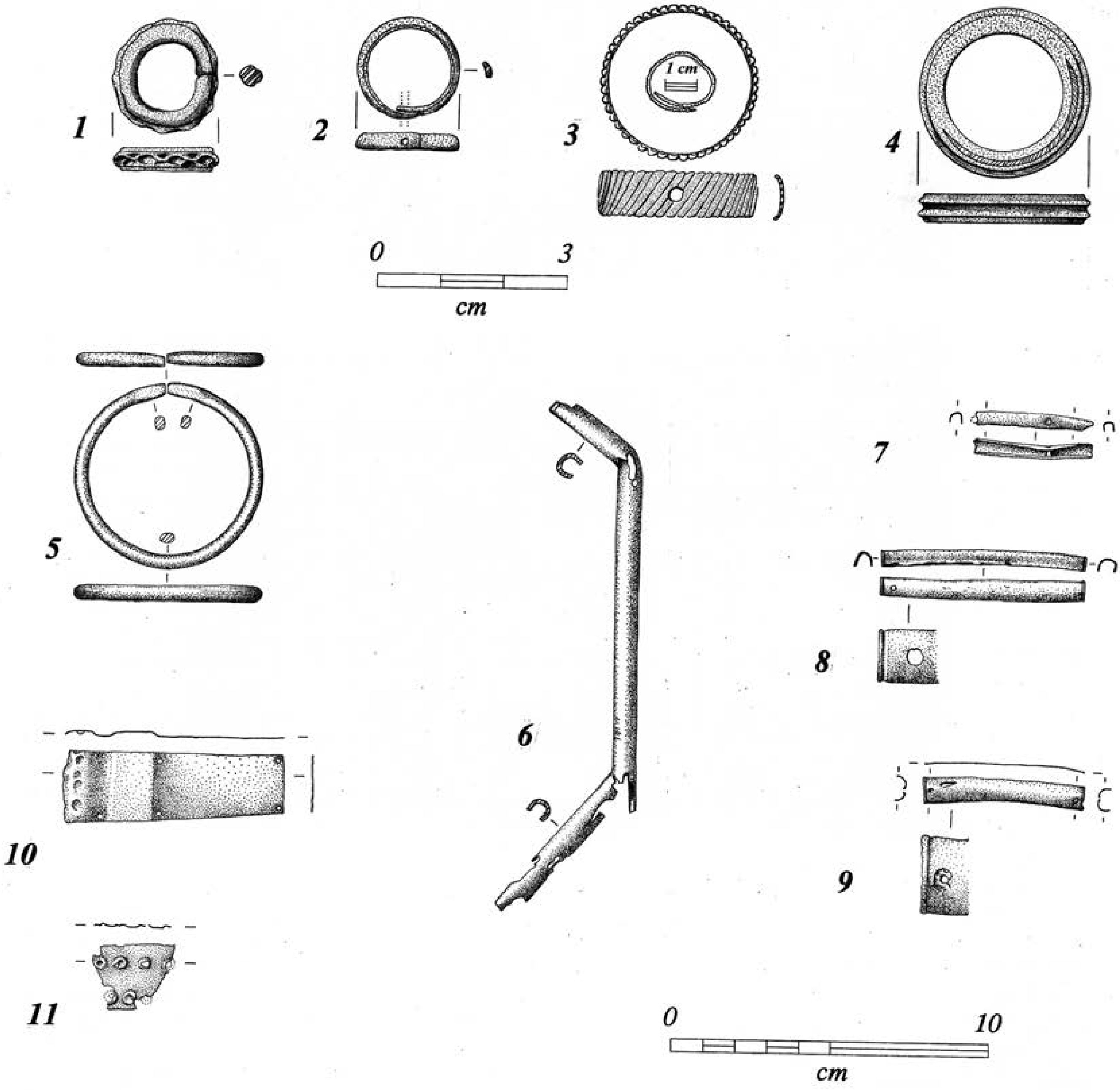


Fig. 4.10 1–5. Iron Age copper alloy rings ***243, 330, 419, 420, 385****. 6–11. Binding* ***161, 247, 248, 421, 192, 410*** *(M. Clark and D. Taylor). 1–4 actual size, 5–11 ½ size.*

are slightly flattened and touching. [Layer **313**]

161 (Fig. 4.10.6). Bronze binding with U-shaped cross section, bent after use. Groove at one end, broken at other. Minimum length 182mm, 6.5mm across, metal 1mm thick [Layer **196**]

247 (Fig. 4.10.7). Fragment of bronze binding 350mm long, 5.5mm across, with a remnant of a rivet hole at one end and a second complete rivet hole, 2mm diameter. [Layer **31**]

248 (Fig. 4.10.8). Bronze binding 650mm long, with U-shaped section, 5.5mm across. Bevelled at each end with a single rivet hole at one end. [Layer **32**]

421 (Fig. 4.10.9). Bronze binding with U-shaped section. Bevelled with a rivet hole, 2mm diameter, at each end. [Unstratified]

192 (Fig. 4.10.10). Thin decorative sheet, incomplete at one end, with punched decoration and three pairs of rivet holes for attachment. Minimum length 70mm, tapers from 22mm at broken end to 17mm wide. [Layer **192**]

410 (Fig. 4.10.11). Thin decorative sheet, fragmentary, with two parallel rows of punched decoration. Minimum length 25mm, 20mm wide. [Layer **26**]

135 (Not illustrated). A ring worked from a rod. It is made of copper alloy with a high lead content. [Layer **26**]

THE IRON TOOLS

By V. Fell

Metalworking tools

Hammers

332. (Fig. 4.11.1) A slender hammerhead with a ball face and a slightly burred rectangular face. Length 183mm, weight 70g. The central third is extensively corroded and the rectangular eye lacks any traces of the hafting. The ball face measures 10mm across but has a curvature of *c.* 7.5mm radius at the extant surface. The rectangular face, a cross-pane measuring 11.5mm × 5mm behind the burr, is slightly convex and is rounded at the edges. [Layer **194**]

The slenderness, length and curvature of the body are typical of hammers for fine metalworking and suggest that this was a tool with very special purpose, perhaps a sinking or bossing hammer for forming sheet metal into tight curvatures.

This hammerhead is similar in form to two others from Britain, both slightly smaller and both having a less pronounced ball face and a narrow cross-pane. One from Bredon Hill (Hencken 1938: 74, fig. 6.4), is from late in the first period of occupation, *i.e.* third to second centuries BC according to recent chronologies advanced for occupation of the hillfort. Another, from gravel quarrying at Hunsbury (Northampton Museum D141/1957–8), is probably from the fifth to second centuries BC occupation of the hillfort.

403 (Fig. 4.11.2). A hammerhead with a rectangular face and a much burred flat face. Length 180mm, weight 476g, superficially corroded. The sides of the hammerhead expand about the rounded-rectangular eye and there are two iron wedges within the remains of the hafting (Rosaceae, sub-family Pomoideae, *e.g.* apple, hawthorn). The narrower rectangular face, a cross-pane, measures 27mm × 9mm and has a curvature of 5mm radius at the edges whereas the centre of the face is rather flatter. The flat face measures 27mm × 16 mm immediately behind the burr. [Layer **331**]

When viewed from the side, the body of the hammerhead is curved so that in use the faces would be angled towards the work piece, a feature typical today of metalworking hammers for raising sheet metal into vessels or other curved forms. The hardness of the cross-pane (see the metallographic analysis, below), together with the high mass of the hammer, would make it eminently suitable for such a purpose. The well-rounded edges and corners of this face would prevent cutting or marking of the work piece. The flat face may have been used for coarser work such as hammering out billets to form sheet metal.

The elongated eye is characteristic of Iron Age hand hammers whereas Roman ones have round eyes (Manning 1985: 6). A fragment of a similar but larger hammerhead comes from Hunsbury (Northampton Museum D137/1957–8), a find from gravel quarrying but probably from the fifth to second centuries BC occupation of the hillfort. There are a number of other hammerheads of Iron Age date from Britain and the Continent (Manning 1985; Fell 1998), but few closely match ***403*** apart from several unprovenanced examples from the Iron Age and Roman collection from Sanzeno, Nonsberg, northern Italy (Nothdurfter 1979: 36, 123, fig. 15, especially nos. 259, 263, 264).

Files

Two of the files are single-sided with offset or 'cranked' tangs and these are listed under woodworking tools (see below). An offset tang facilitates access and clearance during working, an advantage for carpentry although such files could have been used for working other materials such as horn, antler or soft metals. The remaining four files are multi-sided, finely cut and two have straight tangs (the tangs are missing on ***171*** and ***292***). Like other Iron Age files, the cutting faces are formed of parallel transverse cuts and ridges. These 'teeth' are often raked forwards towards the point or tip of the file.

There are numerous other examples of finely cut files with straight tangs, for example from Glastonbury Lake Village, Somerset, occupied mid-third to mid-first centuries BC (Bulleid and Gray 1917: 374, 387-8, figs 137 & 141, nos. I.3, I.47, I.81, I.84, I.98, I.102) and from Meare (West

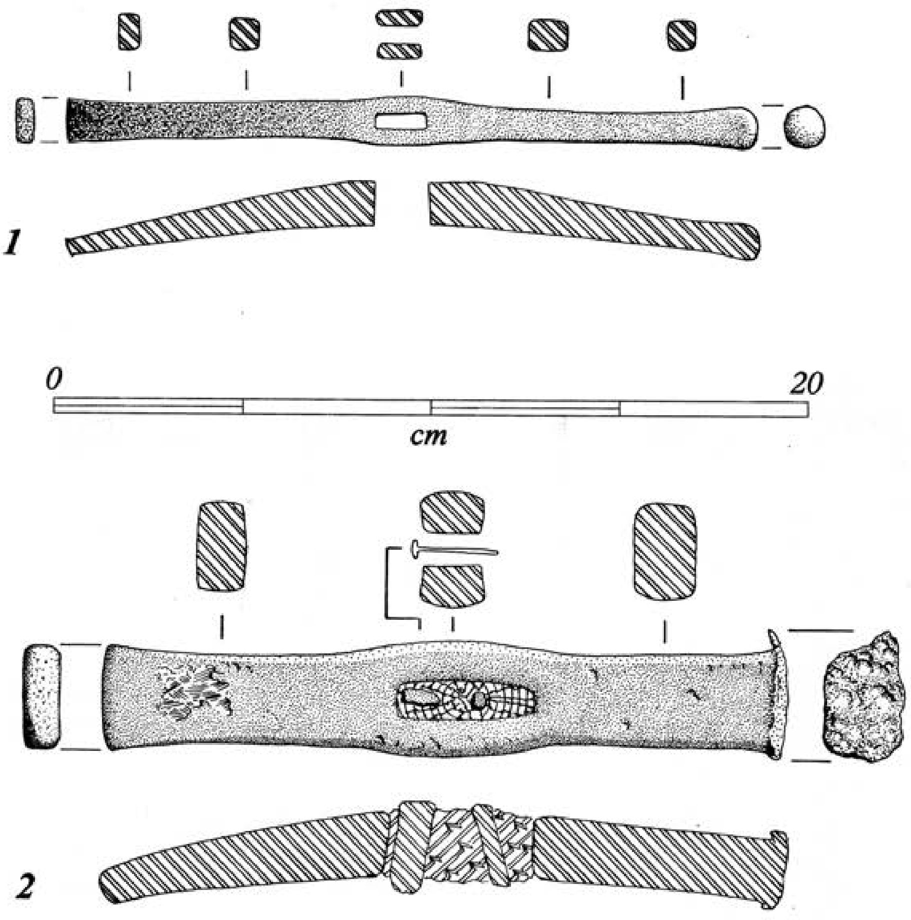


Fig. 4.11 1–2. Metalworking tools: hammerheads 332, 403 (M. Clark) ½ size.

Village), Somerset, occupied third century BC to mid-first century AD (Gray and Bulleid 1953: 238, nos. I.27, I.39, I.55). These files have one or more cut faces, some are convex, and there is considerable variation in size and form. Other examples from the Later Iron Age demonstrate even greater variation, as may be expected in tools for shaping and finishing (Fell 1997). None, however, has pronounced shoulders at the tang blade junctions like ***312*** and ***329***, and knife files like the possible fragment ***292*** have not been recognised previously from Britain.

Files with very closely spaced teeth were more likely to have been used for working metals than fibrous materials, which would tend to clog the teeth. The presence of non-ferrous metallic inclusions within the cuts of files ***312*** and ***329*** is sufficient indication that these two files at least had been used for metalworking and no doubt this was their prime function.

312 (Fig. 4.12.1). A file, sub-rectangular in section, cut on the two opposite narrow sides. The surviving length is 182mm; both ends are incomplete and the file is badly fissured and distorted through corrosion. The tang junction has well defined angled and extending shoulders. The cutting faces are 9mm wide, slightly convex, with transverse and forward raked ridges, which vary between 8.5 per 10mm and 10 per 10mm. Numerous non-ferrous metallic flecks are preserved within the cuts, the largest *c.* 0.6mm across. Four of the flecks were removed for energy-dispersive X-ray analysis (SEM-EDXA, detection limit 0.1%) and all likely alloying elements sought. Three of the flecks were bronze and the fourth was lead. [Layer **194**]

329 (Fig. 4.12.2). A slightly tapering file, sub-rectangular in section, cut on the two opposite narrow sides. The surviving length is 107.5mm; both ends are incomplete, the point broken across in antiquity. The cutting faces are 4.5mm wide, tapering to 3.8mm. One face is flat, the other is convex with a curvature of 3-4mm radius. The ridges are transverse and raked forwards, varying between 10 per 10mm and 14 per 10mm. At the tang junction are pronounced square-set shoulders. The core of the file is totally corroded and voided but, nevertheless, surface detail is well preserved as a layer of corrosion products. There are white, yellow and pink metallic flecks preserved within the cuts but their small size and the fragile condition of the file did not allow sampling for analysis. [Layer **194**]

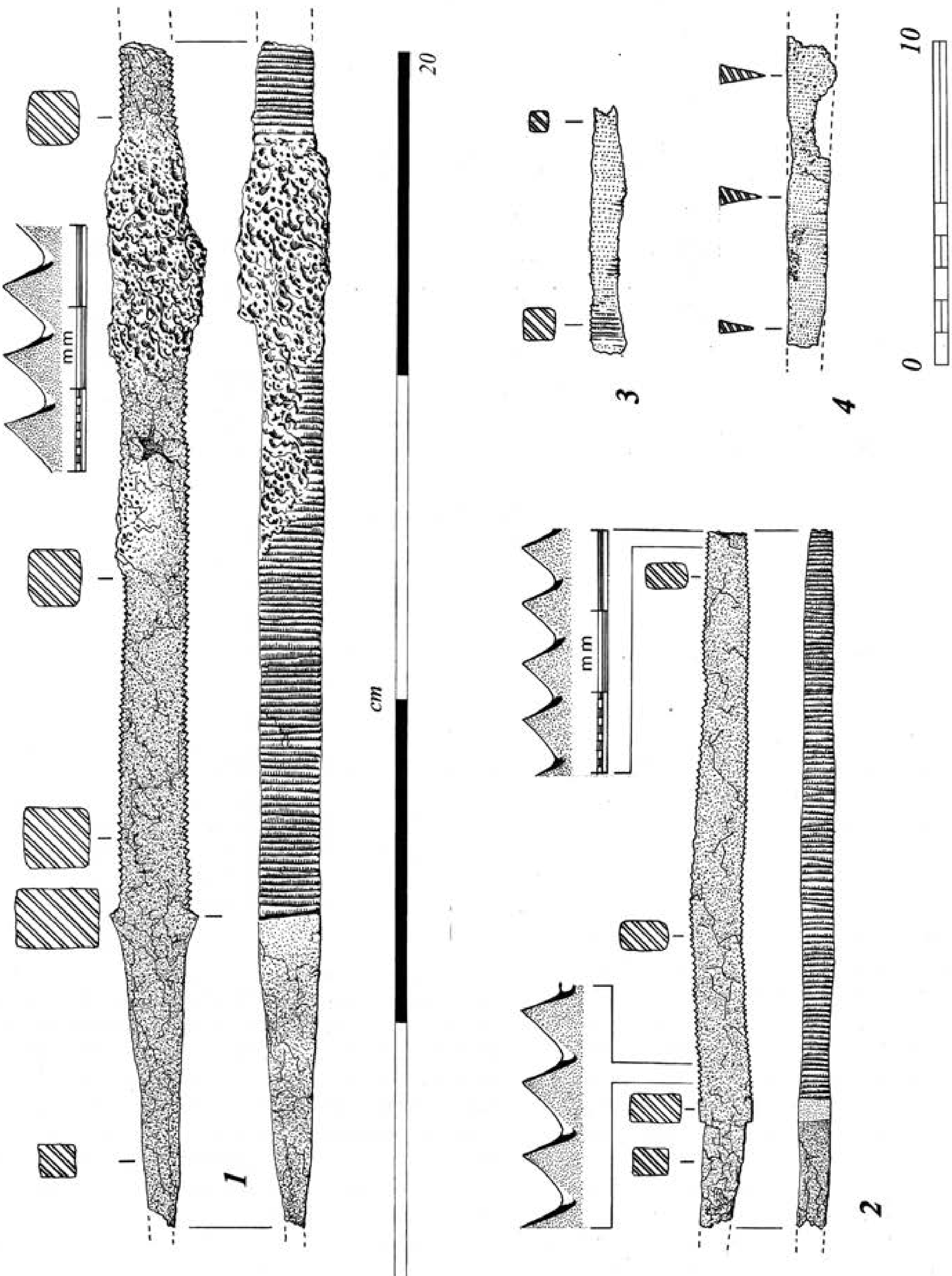


***Fig. 4.12 1–4.** Metalworking tools: files **312, 329, 171, 292** (M. Clark). 1 and 2 are actual size, 3 and 4 are ½ size.*

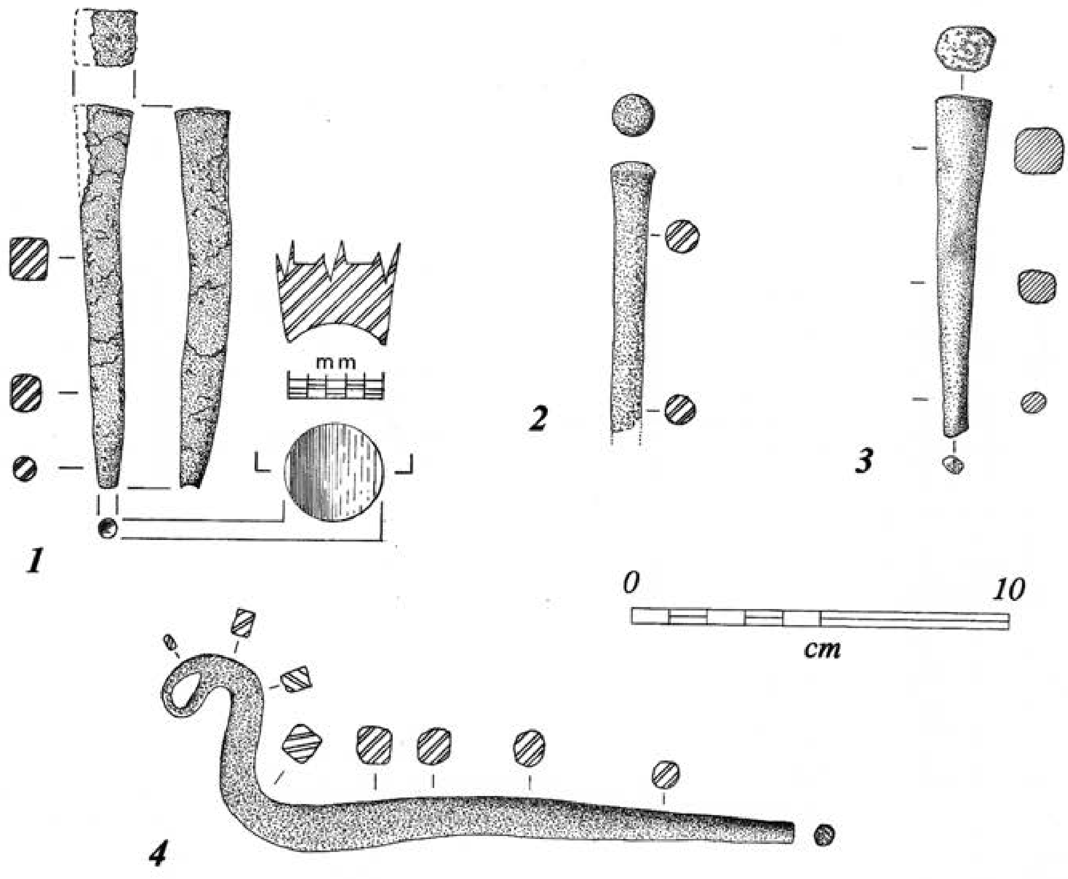


*Fig. 4.13 1–4. Miscellaneous metalworking tools **140**, **327**, **384**, **288/B** (M. Clark and D. Taylor). ½ size.*

171 (Fig. 4.12.3). A fragment of a square-sectioned file, 78mm long, tapering from 10mm to 6mm in width. Both ends are incomplete and the file is voided and distorted through corrosion. There are poorly preserved ridges on three sides and the fourth side is an uncut 'safe' edge. The ridges are transverse; some are upright but others are raked towards the narrower end of the fragment and they vary between 7 per 10mm and 9 per 10mm. [Layer **194**]

292 (Fig. 4.12.4). A fragment of a possible knife file, length 95mm. The section is triangular but slightly rounded on one side. It tapers from 14.5mm in width and 5.5mm in thickness but is fractured across both ends and is very corroded and fragile. There are traces of intermittently preserved ridges on both sides, varying between 8 per 10mm and 12 per 10mm, as well as a number of shallow grooves and ridges (33 per 10mm), the best preserved of which are towards the narrow end on the flat side. Whilst the function of this blade remains uncertain, it was quite conceivably a file. [Layer **194**]

Although knife files have not previously been recognized from early contexts in Britain, a complete knife file was found at the Tumulus de Celles, Cantal (Reinach 1917: 284, fig. 283.50153) and a fragmentary quench-hardened example was found in a first century BC deposit at Magdalensberg, Austria (Schaaber 1963: 185–7, fig. xxvi).

Miscellaneous metalworking tools

140 (Fig. 4.13.1). A tool with a flat, burred head and a grooved tip, possibly a forming tool such as a small top-swage or punch, or a chasing tool. The tapering stem is rectangular in section at the head, becoming round near the tip. Length 100mm, slightly bent and distorted along the stem. The tip is 5mm in diameter with a hemispherical groove 4.5mm wide and 3.5mm radius. [Layer **194**]

327 (Fig. 4.13.2). Fragment of a possible punch, length 71mm, incomplete. The 9mm diameter stem, which has a recent break, thickens to a slightly domed end of 10.5mm diameter. This was possibly part of a doming punch for forming or decorating metalwork. [Layer **194**]

384 (Fig. 4.13.3). A possible bench anvil, length 90.5mm. The cross-section is octagonal at the flat head, tapering to oval at the blunt rounded tip. There is no evidence of wear other than a slight bend in the shaft towards the tip. The form of the tool suggests that it may have been a punch, mandrel or small anvil, although the softness of the metal (see analysis, below) would not be very suitable for these functions. Found slightly away from the main group of tools in Area F, close to axe-heads ***331*** and ***413***. [Layer **331**]

Two similar tools, lengths 124mm and 95mm, described as anvils, were found at Manching, Bavaria (Jacobi

1974: 14, 271, fig. 4, nos. 27, 28). Another, length 104mm, was found with possible metalworking associations at Bagendon, Gloucestershire (Clifford 1961: 192, pl. xlvi).

288/B (Fig. 4.13.4). An incomplete rod, possibly part of a poker. Length 170mm, very corroded and fractured. The complete end has a right-angled bend in the stem and a small loop or perforation, which together may have formed an offset handle. The shaft is round in section and slightly tapering along the length, 11mm maximum diameter, square in section on the bend. The function is unknown but it was possibly a fragment of a poker although no other is known with an offset handle. Conceivably it was part of a latch-lifter or even a handle from a pair of tongs. Found attached, by corrosion products, to pull-saw ***288/A*** (Fig. 4.15.3). [Layer **194**]

312/B (Not illustrated). Fragment of a rod, 101mm long, 9.5mm in diameter, totally corroded and fractured across the ends. This may have been part of ***288/B*** as it is of similar cross-section and was recovered within 0.15m of it. [Layer **194**]

Woodworking tools

Axes

Three axe-heads of Iron Age form were recovered, ***383*** near the main group of tools in Area F and ***331*** and ***413*** slightly away from the group. All are shaft-hole axe-heads and ***383*** and ***413*** are almost identical. The front and rear faces of these axe-heads are slightly downward curved towards the handle, producing cutting edges that are broader than the polls. Two, ***383*** and ***413***, have burred polls suggesting that they were used for hammering, although this was unlikely to have been their main purpose (see discussion in Manning 1985: 15). Their metal structure indicates toughness and resilience rather than extreme hardness (see analysis, below).

Shaft-hole axe-heads are known from several hoards of ironwork of Later Iron Age date but their precise dating is unclear. They are probably later than the more common socketed form (Manning and Saunders 1972). Axe-head ***331*** is similar to one from Bulbury, Dorset (Cunliffe 1972: 302, fig. 6.15) and another from Bigbury, Kent (Boyd Dawkins 1902: 214, fig. 2c). Axe-heads ***383*** and ***413*** are markedly longer than any British examples but are similar to ones found at La Tène (Vouga 1923: 110, pl. xliii especially no. 7). The Fiskerton axes are Iron Age in date rather than Roman since the latter tend to be wider bladed and are often lugged.

331 (Fig. 14.14.1). An axe-head with a broad poll, length 191mm, weight 1500g. The cutting edge is 69mm long and not bevelled. The poll measures 45mm × 40mm. Part of the hafting of *Corylus avellana* (hazel) is preserved within the rounded-rectangular eye. [Layer **331**]

383 (Fig. 14.14.2). An axe-head with a much-burred poll, length 230mm, weight 1900g. The cutting edge is 78mm long and not bevelled. The poll measures 53mm × 33mm behind the burr. The eye is circular and there is no evidence of the hafting. There are fine hammer marks and coarser forging marks preserved on both sides of the blade and there is a shallow and uneven possible weld-seam about midway along one side of the blade. [Layer **331**]

413 (Fig. 14.14.3). An axe-head with a slightly burred poll, length 235mm, weight 1900g. The cutting edge is 75mm long. The poll measures 57mm × 27mm behind the burr. The eye is rounded-rectangular and retains traces of the hafting of Rosaceae, sub-family Pomoideae. On one side of the blade there are fine hammer marks towards the cutting edge and there is a possible weld-seam alongside the eye. [Layer **192**]

Files

364 (Figs 4.15.1 and 4.16). A complete file or 'float', length 329mm, with a decorated antler handle (see Stead, below). The blade is single-sided, rectangular in section and slightly tapering. The cut length is 166mm and there are 61 markedly raked ridges, the spacing of which varies between 3 per 10mm and 4 per 10mm. Some ridges have nicked edges, possibly through damage in use. The tang is offset, oval in section on the bend and originally 40mm extended into the handle. The shoulders are well formed and one bears traces of an incised arc on the edge. This file is in excellent condition, preserving surface detail such as tool-marks from manufacture and wear-marks from use. [Layer **194**]

The metal structure of this file (see analysis, below) and the coarse spacing of the teeth would make it suitable only for working soft materials and it was most likely a woodworking file or carpenter's float. There are very few files of similar form from Iron Age contexts and none as elaborate or as well preserved as this one. A shorter coarse-cut file with straight tang comes from a third to first centuries BC context at Danebury, Hants. (Sellwood 1984b: 354, fig. 7.12, 2.54) and a file fragment from first century BC occupation comes from Bredon Hill (Hencken 1938: 83, fig. 10.10). A longer, two-sided file was found at La Tène (Vouga 1923: 112–14, pl. xliv, no. 21a & b). Examples with offset tangs are rarer but include one of Late Iron Age or early Roman date from Hod Hill, Dorset (Brailsford 1962: 14, fig. 13.G36), one from Tumulus de Celles, Cantal (Pagès-Allary *et al.* 1903: 393, fig. 10) and a short example probably of Late La Tène date from Heidetränk, west Germany (Müller-Karpe and Müller-Karpe 1977: 57, fig. 6.3).

The antler handle of file ***364***, 134mm long, is in excellent condition, well polished but slightly scratched through use. The proximal end, which is deep reddish brown in contrast to the lighter colour where the handle has been gripped, has a band of decoration defined by two grooves and crossed by three cracks. At the distal end, which is bound by a groove, the vesicular part of the tine is visible in a hollow 6–7mm deep and there is a well-worn V-shaped nick in the same plane as the working surface of the file.

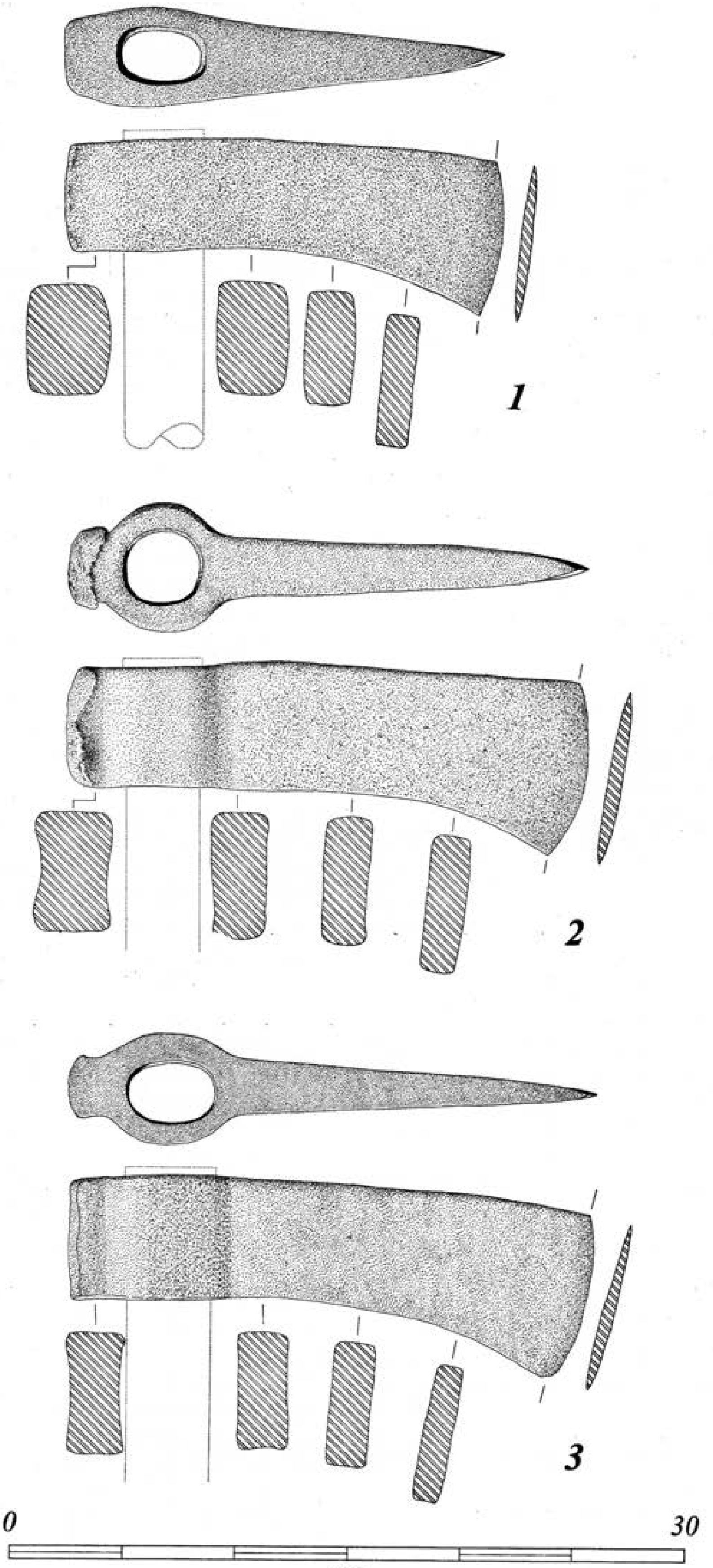


Fig. 4.14 *1–3. Woodworking tools: axe-heads* ***331, 383, 413*** *(M. Clark). $^1/_3$ size.*

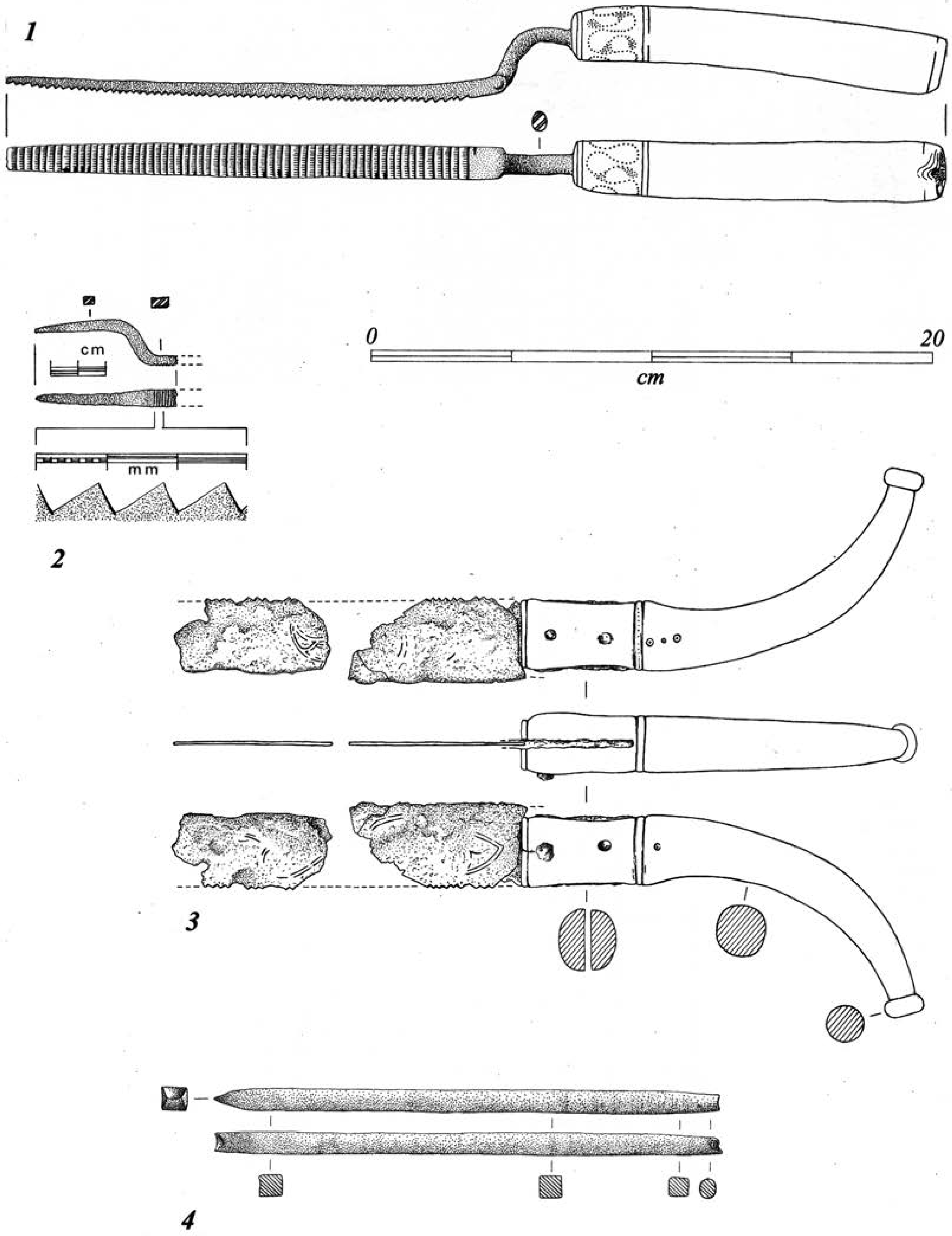


*Fig. 4.15 1–4. Miscellaneous woodworking tools **364**, **298**, **288/A**, **301** (M. Clark). ½ size.*

***Fig. 4.16** Decoration on the antler handle from file **364**, unwrapped. Photograph reproduced by kind permission of the British Museum.*

I.M. Stead *comments:*

The design in the decorative band has been pricked to create a dotted-line scroll with triangular and lobe shapes infilled with dots (one triangle is not infilled; Fig. 4.16). The motif is based on a wave-tendril composed of linked triangles each flowing into its neighbour from two corners and ending in a tendril from the third corner.

The Fiskerton design is elongated vertically and/or compressed horizontally; its tendrils are bulbous lobes and a couple of lines have been started and then abandoned. Compared with other Celtic wave-tendrils it flows awkwardly and looks muddled (*cf* Stead 1985b: fig. 19, where Fiskerton is illustrated with others). But it is important as one of the very few pieces that can be classified as 'Waldalgesheim Style' (La Tène I; *Stage II* following Stead 1996), albeit a very minor and provincial example. Its creator had seen an object decorated with a wave-tendril and that object might have been the recently identified Ratcliffe shield boss (Watkin *et al.* 1996, especially pp. 23–4 and fig. 3c). (This file ***364*** was described in an early report [Stead 1996: 25] as a rasp.)

298 (Fig. 4.15.2). A fragment of a single-sided file with an offset tang, length 50mm. There is a recent fracture across the rectangular-sectioned blade. The cutting face is 6mm wide. There are nine well-preserved ridges cut across the 8mm surviving length of the face and these are raked forwards and are worn. The tang is rectangular in section at the tip, circular in section on the bend. [Layer **194**]

The offset tang suggests that this was a tool for shaping wood, horn or other material where clearance was required during working. The relatively close spacing of the teeth (equivalent to 11 per 10mm) and the small size of the file suggest that it was for fine work or perhaps for finishing and smoothing. The condition of ***298*** did not permit metallographic examination. As noted above, files with offset tangs are not common in the Iron Age and there are no known close parallels for this one.

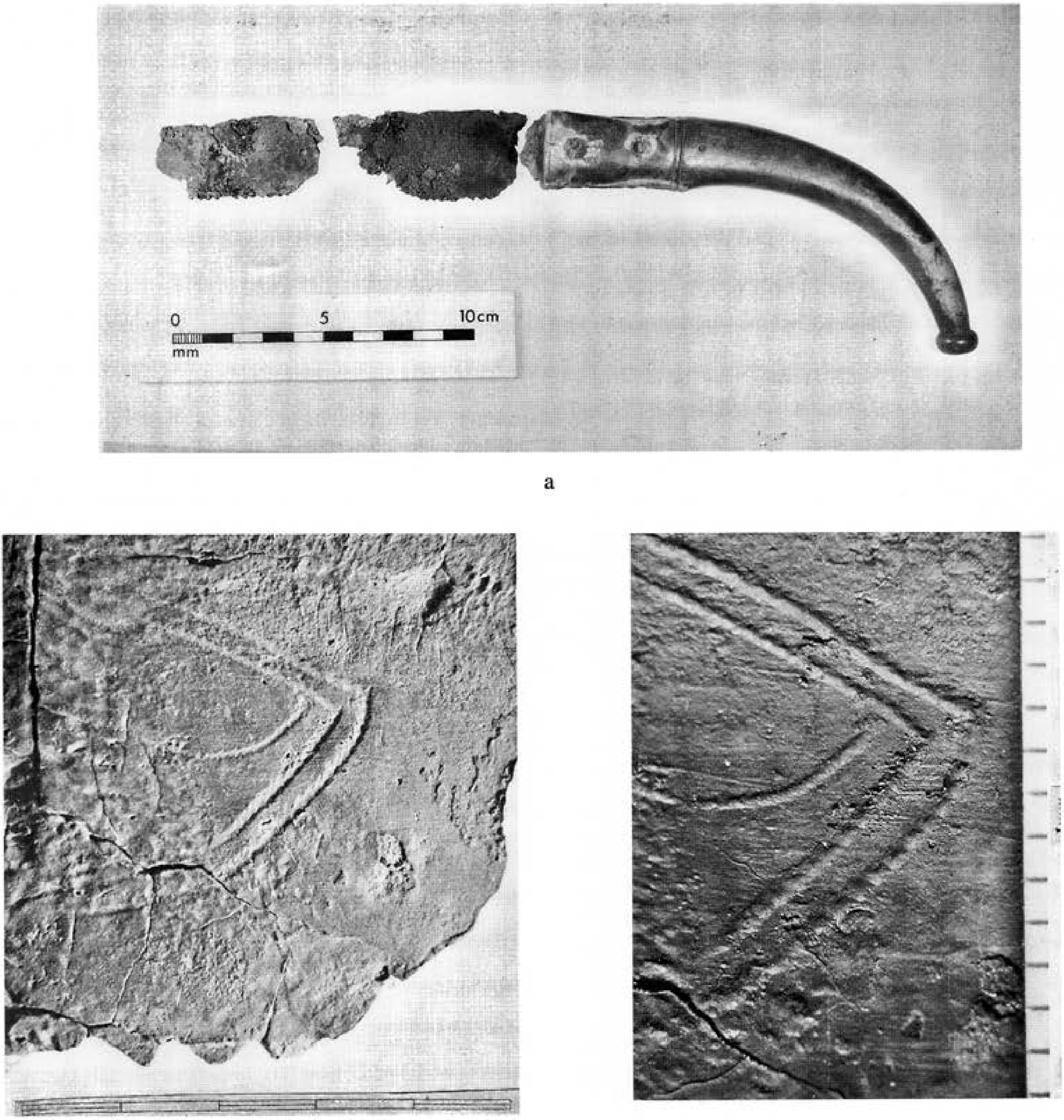
Miscellaneous woodworking tools

288/A. (Figs 4.15.3 and 4.17) Three lengths of an iron pull-saw, one of which, the tang, is in its antler handle. The saw teeth seem to start on the tang, midway between the two rivets. The antler handle is in excellent condition, robust and well polished. The handle is 158mm long and has a flattened terminal knob up to 14.5mm across; the tang has been inserted into a slit about 2mm wide and 41mm long and secured by two iron rivets about 20mm apart. Beyond the tang the handle has a grooved band and then four ring-and-dot motifs in line with the rivets - three on one side and one on the other. Within the grooved band on the side with the three ring-and-dot motifs there are 15 irregularly spaced, shallow, tiny, round notches. Found attached, by corrosion products, to possible poker ***288/B*** (Fig. 4.13.4). [Layer **194**]

I.M. Stead *comments:*

The two fragments of blade are arranged in Figure 4.17 as recorded in a preliminary X-radiograph: A, 62mm × 29mm, joined the tang and then there was a gap of about 10mm before B, 51mm × 27mm. Both fragments are about 1.5mm thick at the edges and the teeth are from 0.8mm to 1.3mm deep. Fragment A has three surviving teeth, two normal to the blade and the third pitched backwards towards the handle. Fragment B has 10 well-preserved teeth, six pitched backwards and the others normal, 3.5 per 10mm. None of the teeth are set. The blade tapers from 29mm near the handle to 25mm at the distal end of B.

Fragments A and B have been decorated on both sides



a

b

c

***Fig. 4.17** a) The iron pull-saw **288/A**; b) and c) detail of decoration on one side of the pull-saw blade (V. Fell).*

but unfortunately only a little survives and it is impossible to reconstruct the design. There are several double-lines, some definitely chased, including parts of two curved shapes infilled with curved lines.

The fragmentary decoration is quite consistent with La Tène art and in particular the motifs may be compared with some of those on the Wetwang bean-can (Dent 1985: pl. 21), Wetwang scabbards (Dent 1985) and the Bann scabbard-plates (Raftery 1983: 101–4, fig. 111). These analogies would perhaps suggest a date late in the third century BC. Saws of this form have been found at several Iron Age sites and there are good examples complete with handles from La Tène (Vouga 1923: 112, pl. xlv, 1 & 2) and Glastonbury (Bulleid and Gray 1917: 371, pl. lx, I.53). But a decorated saw-blade seems to be unique. Indeed it is most unusual for a blade of any sort to be decorated, a very few spearheads being the most obvious exceptions. A tool of this quality would never have been made from a reused piece of iron – and in any case the most likely ready-decorated candidate for reuse, a scabbard, would not be ornamented on both sides. Clearly there is an implication that this was a very special tool – it would have been well suited for cutting mistletoe, if a golden sickle were not readily available!

301 (Fig. 4.15.4). Part of a stemmed tool with a gouge-like tip, length 182mm. The stem is 8mm square in section and tapers in thickness over the terminal 15mm to form a marginally concave edge. There is a 3mm bevel on the inside of this edge, which was resharpened over the terminal 2mm. The distal, fractured end of the stem is tapered and rounded-rectangular in section. [Layer **194**]

This was possible a paring chisel or gouge for the finishing stages of woodworking. The distal end of the stem may have held a handle to facilitate use but it was probably a hand-propelled tool rather than a struck tool. The hardened edge (see analysis, below) supports a cutting function. Similar tools were found at La Tène (Vouga 1923: 111–12, pl. xliv) and Manching (Jacobi 1974: 37–8, figs 7, 8), as well as from Roman contexts in Britain (Manning 1985: 21–2).

283 (Not illustrated). A flat thick strip of iron, 130mm long, 43mm wide, 7mm at its thickest. It is squared at one end, with very short square shoulders, before a broad rectangular-sectioned 'tang' at the other end. It tapers in section towards the squared end – which could well be a sharp-edged blade. The end of the tang is broken. Presumably a tool, possibly the blade of a plane (suggested by Ralph Jackson). [Layer **31**]

Other ironwork

280 (Fig. 4.18.1). An iron linch-pin in three pieces, lengths 58mm (with ring), 48mm (centre) and 75mm (incomplete tip). The ring-headed linch-pin is relatively common in Britain and the perforation through the top of the shank is typical. Dated examples belong to the third to first centuries BC, *cf* Garton Station (Stead 1991: 44, fig. 36) and Llyn Cerrig Bach (Fox 1946: 78, no. 43, pls 2B & 38). [Layer **31**]

407 (Fig. 4.18.2). A small reaping hook, length 156mm, with a broad curving blade and a narrow tapering tang with an upturned end. The blade is thickened on the concave edge adjacent to the tang. The convex edge is set back for balance. It is intermediary between Rees' types IIa and IIb (Rees 1979: 457). Tanged examples of Iron Age and Roman date are listed by Rees (1979: 643–63). [Layer **195**]

216 (Fig. 4.18.3). A fragment of a broad, tapering blade, possibly from a cleaver. Surviving length 92mm, maximum width 63mm, thickness 4mm, totally corroded and voided. The edge is convex and the back may be slightly down-curved. [Layer **32**]

230 (Fig. 4.18.4). An incomplete bar, length 71mm, of unknown function. The cross-section is rectangular, becoming narrower and deeper towards an oval-sectioned constriction. Thereafter it expands to a plate-like extension, which has a recent fracture across the end. At the other end of the bar there is a fragment of iron strip attached by corrosion. There are traces of red iron corrosion products (?haematite) which suggest that the bar was burnt intensively. [Layer **195**]

210 (Fig. 4.18.5). A stud with a large circular head 23mm in diameter. Length (straight) 92mm, incomplete at the tip and bent at the top of the square-sectioned stem. [Layer **196**]

437 (Fig. 4.18.6). A nail, length 47mm. The rounded head has down-turned edges. The stem is rectangular in section. [Layer **31**]

311 (Fig. 4.18.7). An oak (*Quercus* sp.) handle, length 112mm, damaged and incomplete at both ends. Along the surface there are facets from manufacture and scratches from use. A small iron rod is attached by corrosion products; this may be the remains of an iron rivet although this is by no means certain. [Layer **32**]

Traces of wooden handles surviving in the eyes and sockets of several weapons (***149***, ***154***, ***218***, ***268***, ***391***, ***423***) and tools (***331***, ***403***, ***413***) are listed in Table 3.5 and discussed elsewhere in this volume (see Taylor, Chapter 3).

197 (Not illustrated). Three fragments of binding which do not join, lengths 48mm, 38mm and 35mm. One is partly bent and rolled over. [Layer **195**]

286 (Not illustrated). Two fragments of tapering, oval-sectioned rod or tube. The curved fragment is 85mm long and tapers from 18mm to 13mm (maximum dimensions). The straight fragment is 78mm long and tapers from 23mm to 20mm. Both pieces are incomplete at the ends. The iron is totally corroded and exfoliating and the presence of some silt and mineralized plant remains within the core suggests that it was not originally solid. Function unknown. [Layer **194**]

267 (Not illustrated). A fragment of rod, length 64mm, diameter 6mm, fractured across both ends. [Layer **26**]

293 (Not illustrated). A fragment of rod, 25mm long, tapering in diameter from 11mm to 8mm. Totally corroded and fractured across both ends. [Layer **31**]

299 (Not illustrated). A fragment of rod, 29mm long, rectangular section 6.4mm × 5.3mm. One end has an ancient fracture; the other has a recent break. [Layer **31**]

294 (Not illustrated). A tapering fragment of oval section, which forms half a ring of outside diameter *c.* 25mm. Totally corroded and incomplete at both ends. Attached to a piece of limestone. [Layer **31**]

269 (Not illustrated). A probable fragment of iron rod. [Layer **31**]

302 (Not illustrated). An unidentified iron lump. [Layer **31**]

372 (Not illustrated). Two amorphous iron lumps. [Layer **331**]

(See also 'The Roman metalwork' and 'The post-Roman metalwork', Chapter 6).

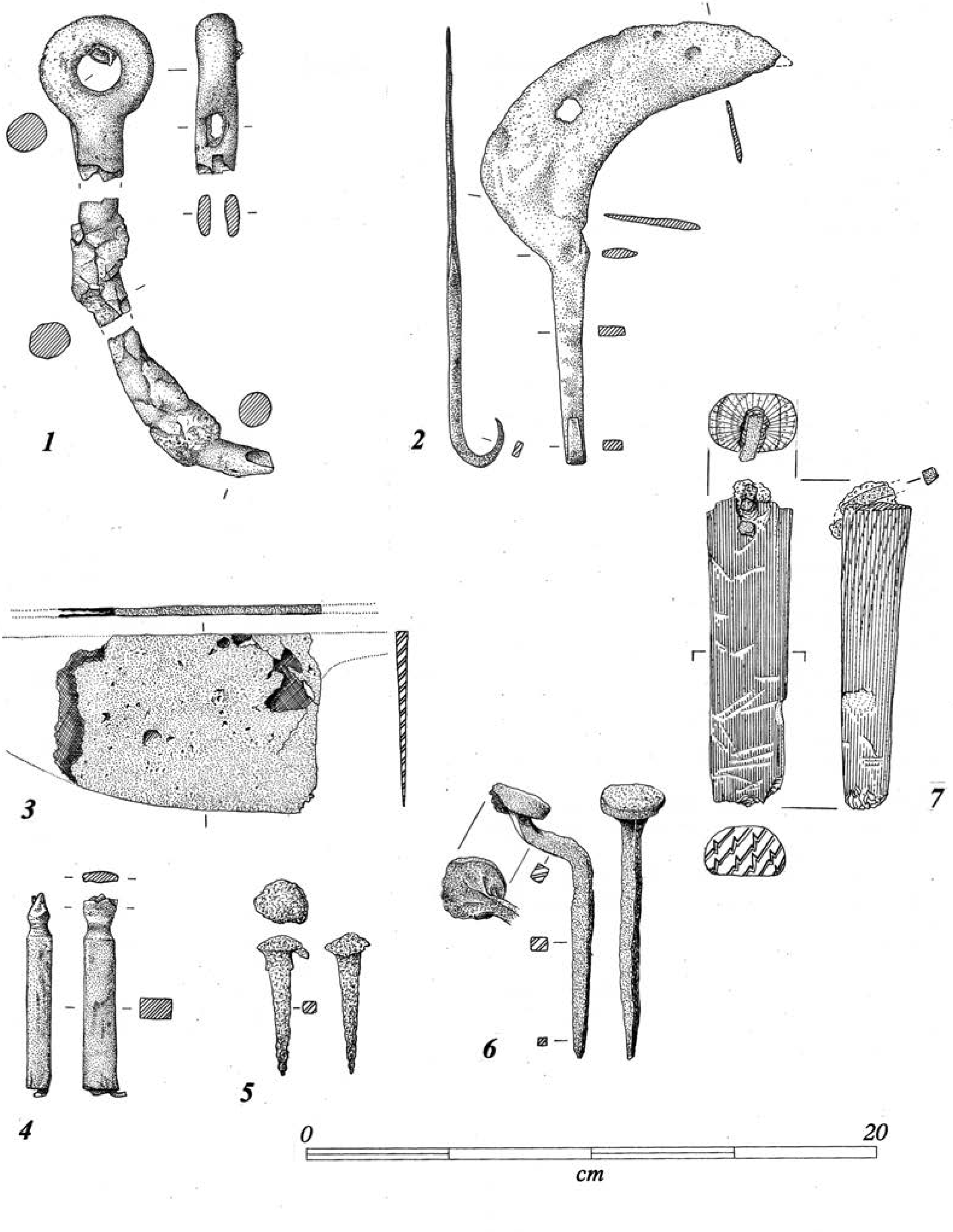


Fig. 4.18 *1–7. Other ironwork* ***280, 407, 216, 216, 230, 437, 210, 311*** *(M. Clark and D. Taylor). ½ size.*

THE CONDITION AND METALLOGRAPHIC EXAMINATION OF THE IRONWORK

By V. Fell

The condition of the ironwork varies considerably, presumably because of the differential settling of artefacts and the variable waterlogging and aeration of the deposits. Ironwork recovered from upper levels was severely corroded and often fragmentary with many objects partly voided, for example the medieval axe-head ***323*** (see Fell, Chapter 6). Artefacts recovered from lower levels, presumably more or less continuously waterlogged, were only superficially corroded, such as hammerhead ***403*** and the three Iron Age axe-heads (***331***, ***383*** and ***413***). Fine surface detail survives, for example tool-marks from manufacture on the three Iron Age axe-heads and the coarse-cut file ***364***. Even some of the more severely corroded items have well-preserved surface markings, for example files ***312*** and ***329*** with clearly defined ridges, and the fragments of saw blade ***288/A*** with intermittently preserved lines of decoration (Fig. 4.17).

Preliminary X-radiography often failed to reveal the identity of the ferrous artefacts because thick layers of mineralized plant remains confused the X-ray images. Removal of debris and obscuring corrosion layers, using mechanical methods at x20 magnification, clarified surface detail or enabled definition of the object's surface by additional X-radiography (Fig. 4.19). All of the objects were examined because of their obvious importance as a collection. However in certain cases, such as the swords, the objects' condition only permitted minimum investigation.

Iron sulphides (Fig. 4.20a), which serve as a marker of prior waterlogged and anoxic conditions, were determined on artefacts from various levels (Fell and Ward 1998). The wet conditions had also helped to preserve metallographic evidence, such as surface carburization in the outermost corrosion layers of the axe-heads (see analysis, below). Traces of wooden handles survived only within the eyes of tools recovered from the lower levels, or within sockets by mineralization, but not on the tanged implements (Table 3.5).

Metallographic examination of the ferrous tools

Nine tools from Area F were examined by metallography to investigate the technology employed in their manufacture. A small sample of metal was removed from those tools in suitable condition where metal survived in the area of interest, usually the working edge.

Methods

The tools were sampled at positions selected from the X-radiographs and which respected the fragility of the working edges. The samples were cut and mounted usually in longitudinal orientation unless otherwise stated. These were ground and polished according to standard metallographic techniques and examined in the unetched and etched conditions at magnifications up to x500. Initial etching was with 1% nital. Residual metal structures were commonly observed within the corroded layers surrounding the sections and within sampled flakes of corrosion products and their presence has contributed to the metallographic evidence. Where flakes of corrosion products alone were sampled, these were mounted and polished as for the sections and examined unetched. Hardness measurements are Vickers pyramidal hardness numbers (HV) obtained with 1kg or 5kg loads, or are averaged microhardness values with a 0.2kg load, or as stated. Phosphorus was estimated qualitatively only where it was suspected from the microstructure, using scanning electron microscopy with energy-dispersive X-ray analysis (detection limit 0.1%). Grain size (ASTM) was measured with an eyepiece graticule at x100 magnification. The results are summarized in Table 4.2.

Results

Hammerhead ***403*** (Figs 4.20b, c & d; 4.23.1)
Both faces were sampled and also flakes of corrosion products from the side of the hammerhead proximal to the eye. The rectangular face revealed martensite with a small amount of nodular pearlite and traces of bainite. There were several curved weld lines comprising finely dispersed non-metallic inclusions associated with light-etching segregation bands. The hardness range was 588–812 HV (5). A transverse sample through the flat face (behind the burr and 6mm from the extant surface) revealed a more heterogeneous structure of massed nodular pearlite (right in Fig. 4.23.1b) with some martensite, irresolvable pearlite and traces of grain-boundary ferrite and bainite. Grain size was variable and the microstructure suggested variation in carbon content and chemical composition. There were abundant glassy inclusions. The hardness range was 250–473 HV (5). The samples of corrosion products from near the eye revealed fine lamellae of cementite (white in Fig. 4.20d) within the corrosion matrix, which scanning electron microscopy confirmed to be residual pearlite.

Both faces of the hammer were made from medium-carbon steel and had been quenched. The eye was air-cooled which suggests that quenching was intentionally limited to the hammer faces, probably so that the eye was in a less brittle condition and more resilient to impact. The cross-pane was fairly uniform in composition and had been very successfully hardened. Weld lines were consistent with folding over of the metal to thicken and form the face. The other face was very uneven in composition and was less successfully hardened, which had presumably contributed to its burred condition.

Hammerhead ***332*** (Figs 4.20e & f; 4.21a, b, c, d; 4.23.2)
The X-radiograph suggests that metal survives near the faces but the central third of the hammerhead is severely corroded. Both faces were sampled and also flakes of corrosion products from within the eye and 40–50mm

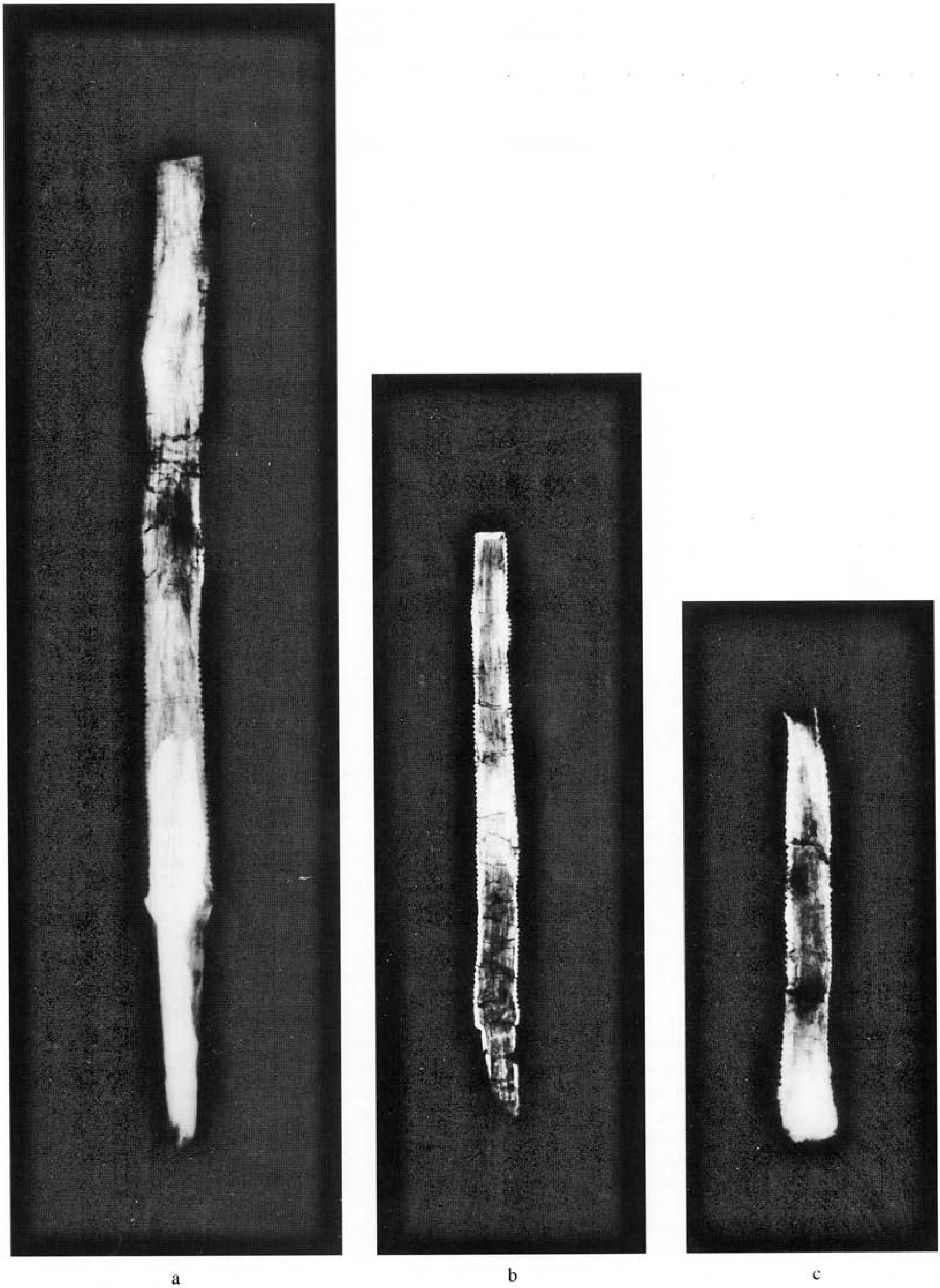


***Fig. 4.19** X-radiographs of files **312** (left), **329** (centre), **171** (right); after removal of mineralized debris and external corrosion layers.*

Table 4.2 Summary of metallography of ferrous tools.

Tool	*Sample Grain size*	*Structural phases & microhardness •*	*Macrohardness HV (kg)*	*Carbon content %*	*Phosphorus detected*	*ASTM*
Hammer 403	Rectangular face	M (834), $P^{\S}$, B	588–812 (5)	medium	—	3–4
	Burred flat face	$P^{\S}$, $P^{\dagger}$, M (630), F, B	250–473 (5)	medium	—	—
Hammer 332	Rectangular face	F (330), M, $P^{\dagger}$	201–369 (5)	very low	yes	2–7
	Ball face	F (283), M, $P^{\dagger}$	239–268 (5)	low	yes	5–7
File 312	Blade near tang	F (210), carbide	174–182 (1)	0 – low	yes	3–8
File 364	Mid blade	P + F (125–236)	104–208 (1)	low – > 0.8	—	6
?Anvil 384	Head	F (116)	105 (1)	0	no	2–3
	Tip	F (174)	165 (1)	0	no	2–4
Axe 331	Cutting edge	F (158), P (258*)	132–141 (5)	<0.1; 0.6*	—	5–6
Axe 383	Cutting edge	F + P (156–173)	137–155 (5)	0.2 – 0.4	—	5–7
Axe 413	Cutting edge	F + P (137; 235*)	—	<0.1 – 0.2; 0.8*	—	6
Gouge 301	Stem	P (221)	189–215 (1)	~0.8	—	7
	Tip	P, $P^{\dagger}$ (321), carbide	272–286 (1)	> 0.8	—	6–7

• Structural phases in order of dominance, and microhardness HV (0.2); * Measured at metal surface
B, bainite; F, ferrite; M, martensite; P, pearlite; $P^{\dagger}$, irresolvable pearlite; $P^{\S}$, nodular pearlite, —, not measured.

back from each face. The rectangular face revealed a banded structure of pure ferrite alternating with low-carbon iron (Fig. 4.20e), plus alignments of non-metallic inclusions. Grains in the ferrite bands were generally large and phosphorus was detected. There were abundant Neumann lines, indicative of cold work (Fig. 4.20f). The carburized bands comprised ferrite with small amounts of a lathy constituent, hardness 420 HV (0.05), visible as grain-boundary spikes (Figs 4.20f and 4.21a) or rounded forms (Fig. 4.21b). This was probably martensite formed after partial austenitization. A dark etching constituent was probably pearlite. Grains at the hammer face were much distorted and hardness values were considerably higher here, consistent with work hardening through use (Fig. 4.23.2a).

A transverse sample through the ball face, 5mm from the tip, revealed constituents similar to those seen in the other face but without the intense banding (Fig. 4.21c). Phosphorus was detected despite the greater part of the specimen being very small-grained. There was a higher proportion of the dark-etching constituent, which scanning electron microscopy confirmed to be pearlite. The light-etching, spiky constituent was probably martensite. There were no deformed grains. The samples of flakes of corrosion products taken from the eye and well back from the faces revealed residual cementite from pearlite dispersed within the corrosion matrix (Fig. 4.21d).

Both faces of the hammerhead had been quenched although there was insufficient carbon in the iron to produce uniform and well-hardened steel. Evidence of pearlite away from the faces suggests that the quenching was applied selectively to each face, but the rest of the hammerhead was left in the softer and more resilient air-cooled condition. The banding at the rectangular face was probably the result of pile-forging an unevenly carburized bloom, with phosphoric iron causing segregation of the carbon. There was abundant metallurgical evidence of work hardening of this face but the ball face showed no evidence of heavy use - indications which are apparent in the overall physical appearance of the hammer faces.

File 312 (Figs 4.19; 4.23.3)

The radiograph (Fig. 4.19) suggests that metal survives only at the tang and the proximal part of the blade. A transverse sample was taken from the most substantial position of the blade, 3mm from the tang junction (second ridge), incorporating one cutting face and parts of two plain sides (Fig. 4.23.3). The specimen revealed irregular zones of large-grained ferrite in which phosphorus was detected, plus carburized zones of smaller grained ferrite with spheroidized cementite. Grains were equiaxed. There were abundant duplex non-metallic inclusions.

The file was made from an heterogeneous bloom containing both phosphoric iron and carburized iron. Forging was poor and there seems to have been no attempt to use good quality metal at the tang end of the file at least. The file was finally heated to a moderately high temperature, which had caused the constituents to spheroidize. This may

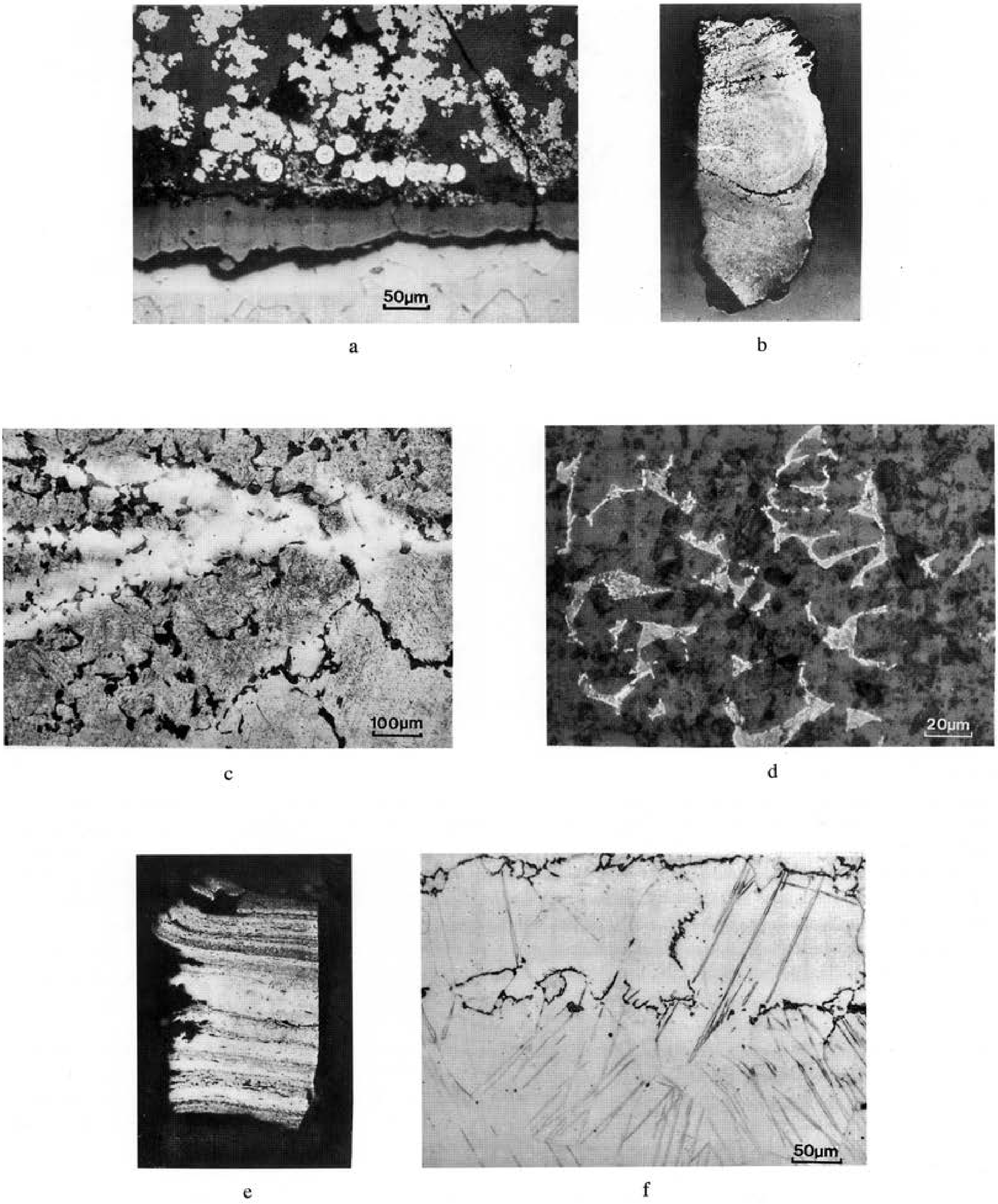


*Fig. 4.20 Metallographic examination of axe-head **331** and hammerheads **403** and **332**.*

a) ***331*** outer corrosion layer (top half) with iron sulphides (light), inner corrosion layer (lower centre), plain iron (lower). Nital etch.

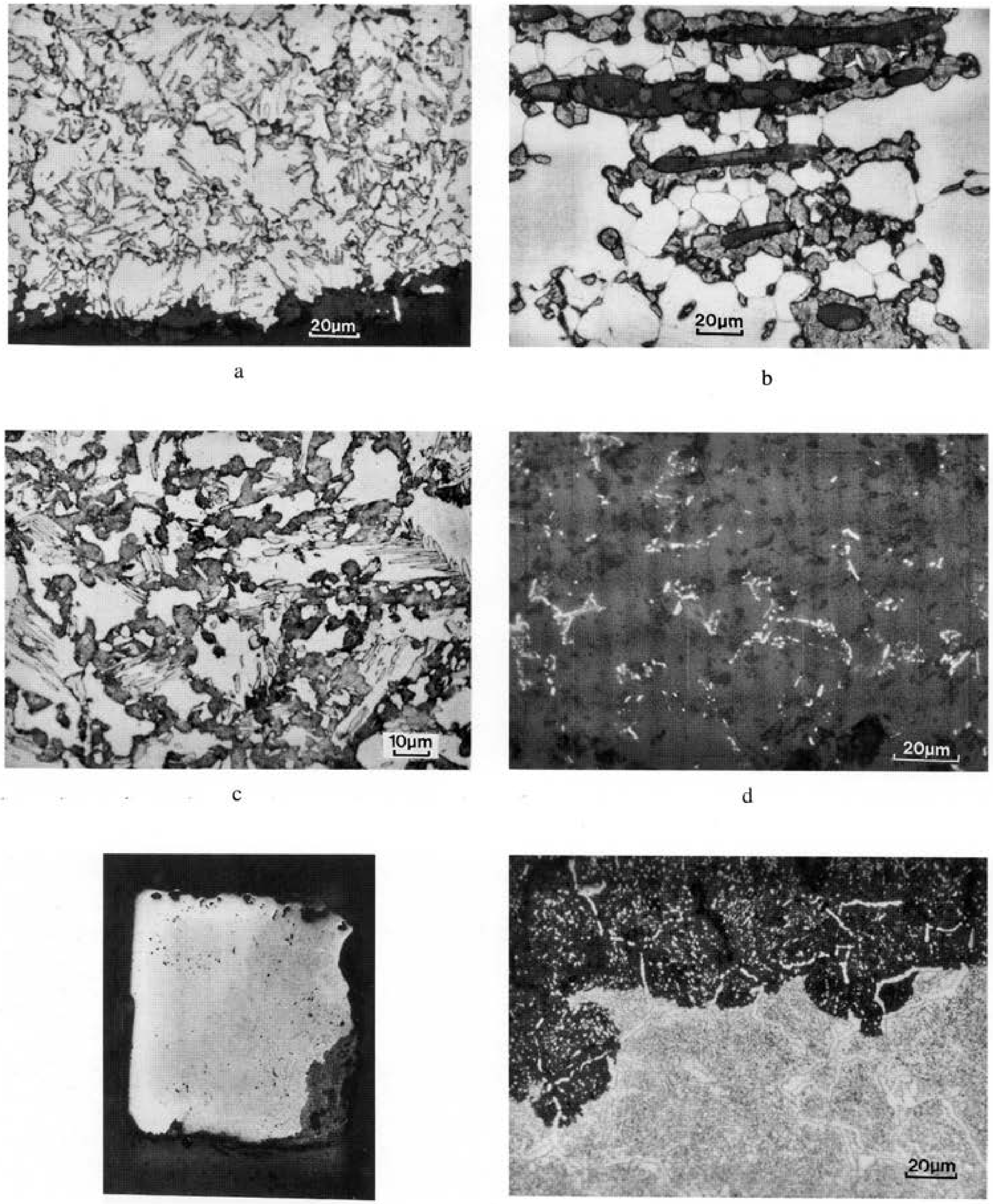
b) ***403*** rectangular face: whole section x5. Hammer face at left. Martensite, with pearlite (dark) and segregation lines (light). Nital.

c) ***403*** rectangular face detail: martensite matrix with grain-boundary pearlite (dark) and segregation lines (light). Nital.

d) ***403*** eye region: cementite from pearlite (light) preserved within corrosion products (dark).

e) ***332*** rectangular face: whole specimen x8. Hammer face at left. Banded structure of ferrite (light) and low-carbon iron (dark). Nital.

f) ***332*** rectangular face detail at centre, showing ferrite with fine intersecting Neumann lines, and spiky grain-boundary martensite (across top half of image). Nital.



a b c d e f

Fig. 4.21 Metallographic examination of hammerhead 332 and file 364.

a) ***332*** rectangular face: carburized band at lower edge. Ferrite (white), spiky martensite (grey). Nital.

b) ***332*** rectangular face: carburized band. Ferrite (white), martensite (mottled, grey) outlining the duplex slag inclusions (dark). Nital.

c) ***332*** ball face: Ferrite (white), spiky martensite (pale), pearlite (dark). Nital.

d) ***332*** corrosion products at 40mm from rectangular face: relic cementite from pearlite (white).

e) ***364***: whole section x8. Cutting face at top, low-carbon at left, hypereutectoid at right (darker etched). Nital.

f) ***364***: hypereutectoid region. Metal (lower), corrosion front across centre with relic cementite in the corrosion products (top). Nital.

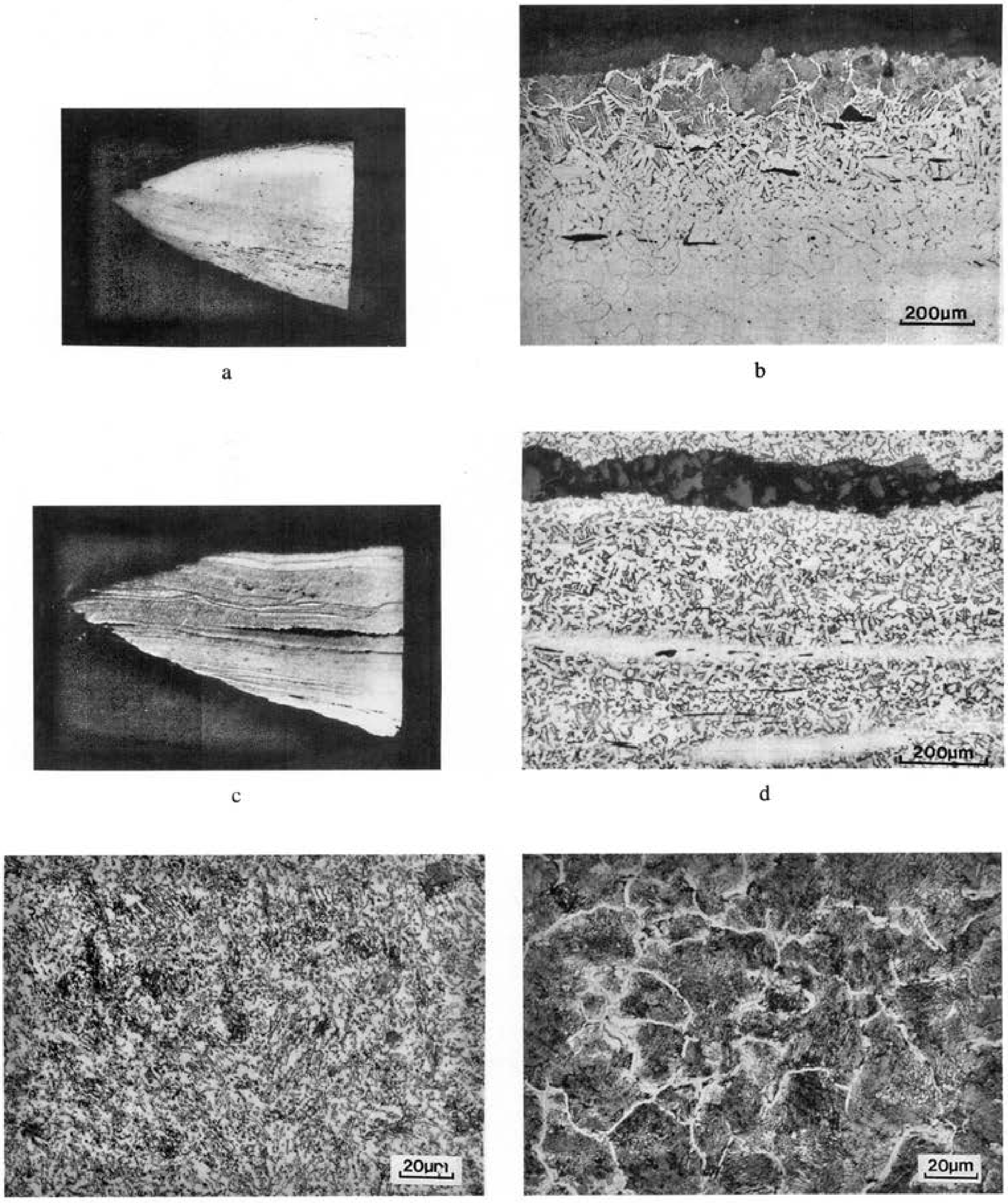


*Fig. 4.22 Metallographic examination of axe-heads **331** and **383**, and ?gouge **301**.*

a) ***331***: whole section x5. Cutting edge at left, carburized face at top. Nital
b) ***331***: carburized face. Pearlite at edge of metal (upper centre), above ferrite. Nital.
c) ***383***: whole section x5. Cutting edge at left. Nital
d) ***383***: centre. Pearlite, segregation (white) lines, broad slag stringer (top). Nital
e) ***301*** stem: pearlite which has spheroidized. Nital
f) ***301*** tip: fine pearlite (dark) with grain-boundary cementite (white). Picral + nital

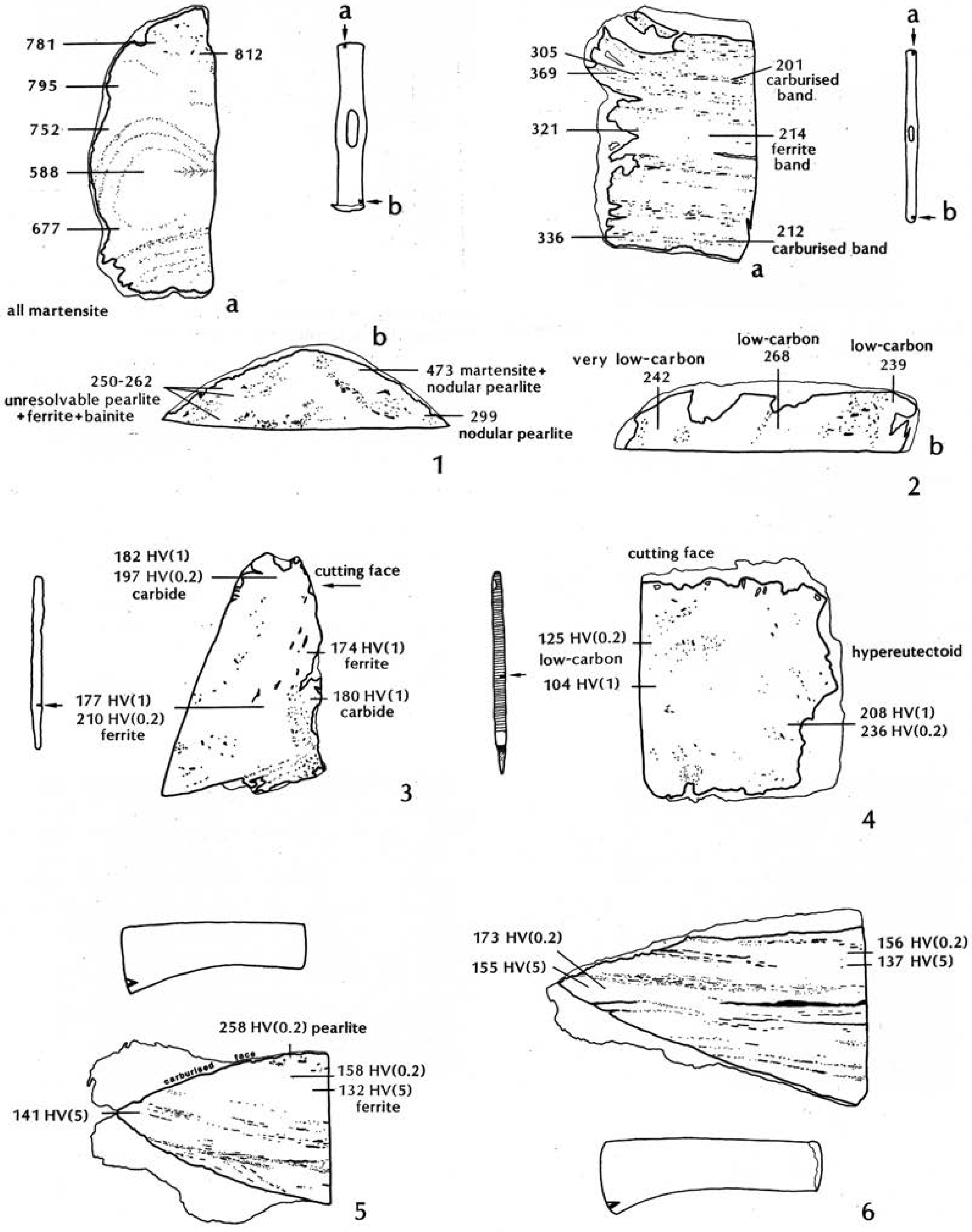


Fig. 4.23 Slag distribution and hardness.

1 Specimens from hammerhead ***403***: HV(5). a) rectangular face, x5; b) burred face, x5.
2 Specimens from hammerhead ***332***: HV(5). a) rectangular face, x8; b) ball face, x8.
3 Specimen from file ***312***: x5.
4 Specimen from file ***364***: x8.
5 Specimen from axe-head ***331***: x5
6 Specimen from axe-head ***383***: x5.

have occurred accidentally, subsequent to manufacture. No evidence survives for hardening of the file through quenching, or for surface carburization.

*File **364*** (Figs 4.21e & f; 4.23.4)
A transverse sample at mid-blade revealed a carbon concentration gradient across the specimen (and across the cutting face of the file, top in Fig. 4.23.4) from low-carbon towards the centre of the file blade to hypereutectoid (above 0.8% carbon) at the narrow plain edge of the file (top in Fig. 4.21e). The microstructure comprised coarse, partly coalesced pearlite. At the hypereutectoid region, cementite clearly delineated the grains and was persistent across the corrosion front (Figs 4.21f and 4.23.4). There was a small amount of clustered single-phase and duplex non-metallic inclusions.

The broad gradient in carbon concentration across the cutting face of the file suggests that the file was made from an unevenly carburized bloom. The coarsening of the pearlite may be the result of forging at moderate temperatures during the final stages of manufacture. There had been no attempt to harden the file by heat treatment. Although the hardness reached relatively high values in places, there were also soft areas of metal owing to the uneven carbon distribution. This combination of soft and hard areas may have been detrimental during use. The higher-carbon regions would be more brittle and this may have been the cause of the damage to some of the ridges of the file.

*Bench Anvil (?) **384*** (Fig. 4.24.7)
Two samples were taken, a transverse sample 5mm from the tool tip and a longitudinal sample through the edge of the head. Both specimens revealed equiaxed ferrite. Phosphorus was not detected although there were a few Neumann lines at the head. The sample from the tip was severely corroded and contained abundant multi-phased inclusions whereas the sample from the head was almost inclusion-free. Hardness at the head was 105 HV (1); at the tip, 165 HV (1).

The presence of Neumann lines at the head is evidence of some cold work, either from manufacture or through use of the tool. But the hardness is not very high, particularly at the head. The results are therefore inconclusive and do not assist in attribution of purpose of the tool other than indicating a low level of technical sophistication in its manufacture.

*Axe-head **331*** (Figs 4.20a; 4.22a & b; 4.23.5)
A sample through the rear of the cutting edge revealed equiaxed ferrite with traces of grain-boundary cementite and coarse pearlite. There was a carbon concentration gradient at the metal surface on one side of the axe-head comprising a narrow zone of fine pearlite and Widmanstätten ferrite (Fig. 4.22b). Within the immediate corrosion layers were residues of pearlite of similar concentration to the adjacent metal. There was no evidence of enhanced carburization on the opposite side of the axe-head. Weld lines, visible as light-etching lines with associated inclusion particles, were aligned longitudinally showing the direction of forging.

The axe-head was made from an iron bloom containing very little carbon, pile-forged and fairly well homogenized. The carbon gradient at the metal surface suggests that the axe-head had been surface carburized on one side at least. This may have been a deliberate attempt to harden the cutting edge although it is conceivable that this occurred accidentally in a hearth. The absence of enhanced carburization on the opposite face may be a result of loss through corrosion. The axe-head was finally air-cooled without any attempt to harden by heat treatment.

*Axe-head **383*** (Figs 4.22c & d; 4.23.6)
A sample through the rear of the cutting edge revealed numerous weld lines comprising alignments of inclusion particles along light-etching lines, and indicating the longitudinal direction of forging. Towards the cutting edge the carbon composition was *c.* 0.4% which decreased to *c.* 0.2% away from the cutting edge. The microstructure comprised ferrite and pearlite. Within the corroded layers

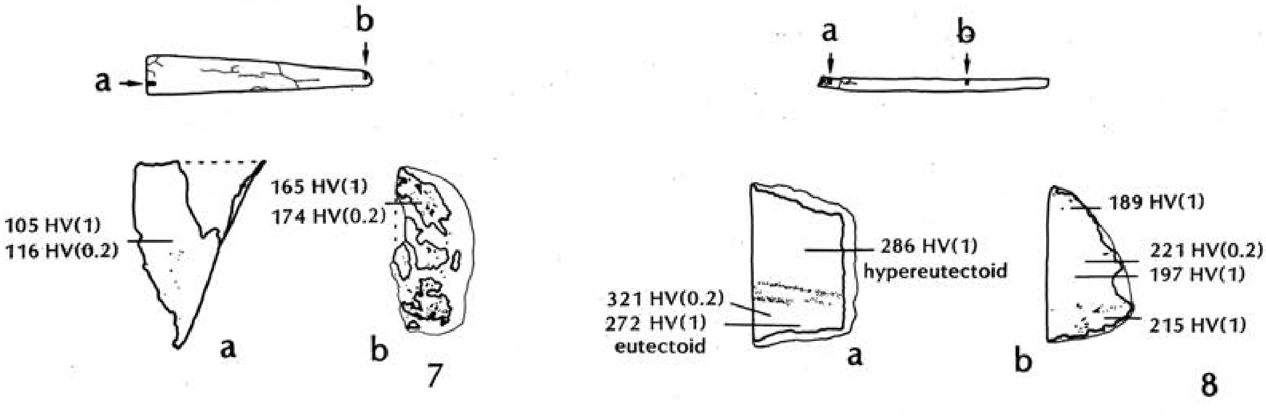


Fig. 4.24 *Slag distribution and hardness.*

7 Specimens from (?) bench anvil ***384***: a) head, x5; b) tip, x5.

8 Specimens from (?) gouge ***301***: a) tip, x8; b) stem, x8.

there was residual cementite from pearlite of similar distribution to that in the adjacent metal, plus some areas with higher concentrations of residual cementite.

The axe-head was made from a carburized bloom that was much piled and welded during forging. Unlike axe-heads ***331*** and ***413***, there was no direct evidence of enhanced carburization in the metal at the surface of the axe-head, although the corrosion layers do seem to show higher concentrations of residual cementite. Alteration and loss through corrosion is always possible and therefore there remains a chance that this axe-head was also originally surface carburized. The axe-head was finally air-cooled without any attempt to harden by heat treatment.

*Axe-head **413*** (Figs 4.25; 4.26)

The axe-head was sampled and analysed by J.D.A. Miller, J.B. Johnson and J. Cooper (formerly of the Corrosion Protection Centre, UMIST, Manchester) to determine the metal structure (summarized below) and also to analyse the corrosion products to investigate the possible reasons for the excellent state of preservation of the axe-head (see below).

A sample through the cutting edge revealed an almost pure iron matrix with some grain-boundary cementite and pearlite. There was a small amount of non-metallic inclusions including both dual-phase and single-phase glassy particles (Fig. 4.26). There was a gradient in carbon concentration at the metal surface on one side of the axe-head, comprising a narrow zone of fine pearlite (Fig. 4.25a). The other side of the axe-head revealed cementite of similar high concentration in the corroded layer adjacent to the metal although the metal itself did not reveal enhanced carbon levels (Fig. 4.25b). This suggests that both sides of the axe-head were carburized at their surfaces near the cutting edge of the axe.

Analysis of corrosion layers by X-ray diffraction suggests that a stable surface layer of ferrous carbonate was formed in association with calcium iron silicate

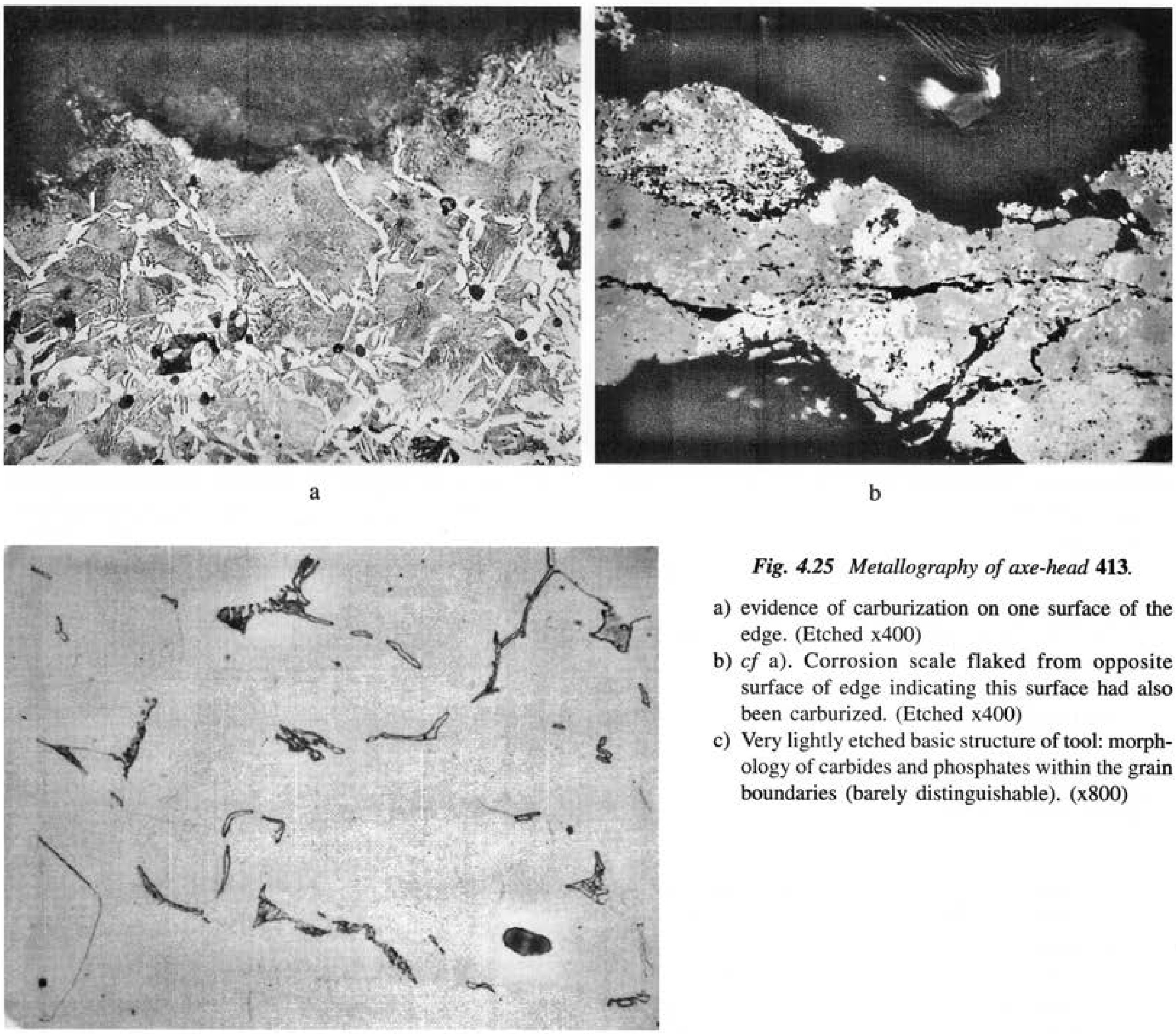
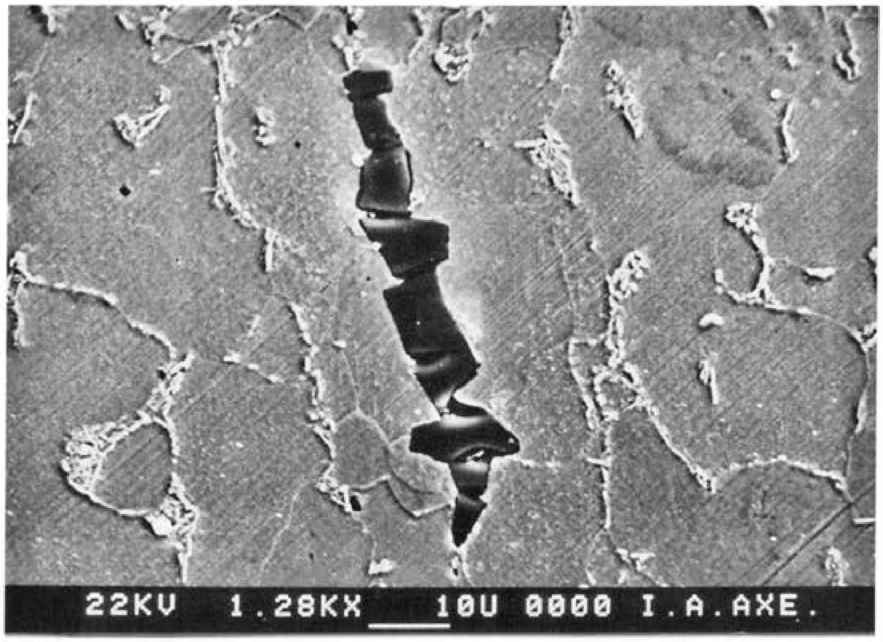


Fig. 4.25 Metallography of axe-head **413**.

a) evidence of carburization on one surface of the edge. (Etched x400)
b) *cf* a). Corrosion scale flaked from opposite surface of edge indicating this surface had also been carburized. (Etched x400)
c) Very lightly etched basic structure of tool: morphology of carbides and phosphates within the grain boundaries (barely distinguishable). (x800)



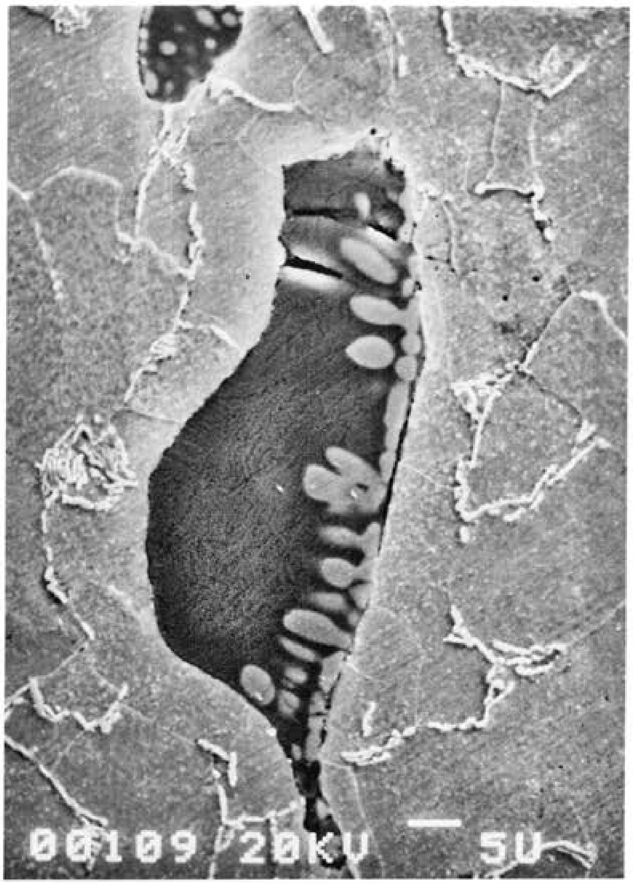
a

hydroxides (Table 4.3). Factors that probably favoured their formation and thus the preservation of the axe-head were absence of aggressive ions species, probable low or absent oxygen partial pressure, and near neutral pH.

*Gouge **301*** (Figs 4.22e & f; 4.24.8)
The X-radiograph suggests that metal survives only in one short portion of the stem and within the gouge-like tip. Transverse samples were taken 10mm from the tool tip and across a corner of the stem 120mm from the tip. Both specimens revealed high-carbon steel of approximately eutectoid (0.8% carbon) composition, which was small-grained and almost inclusion-free. The stem comprised fine pearlite, hardness 215 HV (1), which in places had spheroidized (Fig. 4.22e). The specimen from near the tool tip was of eutectoid composition at the edges, with a central hypereutectoid zone. Pearlite was very fine or was irresolvable, hardness 286 HV (1); within the cementite network it was marginally coarser (Fig. 4.22f).

The tool was made from very good quality high-carbon steel but was not quenched. The tip was rapidly cooled and produced a reasonably hard edge, which would have performed well in a cutting function. The stem was not so carefully treated since its coarser structure had probably resulted from hot forging. This suggests that the cutting edge of the tool may have been selectively heat-treated by reheating the tip and then rapidly cooling it in air.

Discussion
Iron was made by the bloomery process during the Iron Age, a method that commonly produced heterogeneous blooms comprising regions of carbon-free ferritic iron, phosphoric iron if phosphorus was present in the ore, or steel (an iron-carbon alloy) if furnace conditions were suitable. Phosphoric iron can be hardened by cold working although it tends to be rather brittle. Carbon confers



b

***Fig. 4.26** Metallography of axe-head **413**.*

a) Scanning electron micrograph of single-phase glassy, typically fractured, siliceous inclusion. (x1100)
b) Scanning electron micrograph of two-phase siliceous inclusion; lighter second phase is essentially iron with a little silicon. (x1400)

strength and hardness to the iron, which can be quench-hardened by plunging the hot metal into a cool liquid to yield harder though brittle steel. Tempering the metal by gentle heating will then alleviate the brittleness and further enhance the properties. Depending on precise function of a tool, the qualities sought may include strength, toughness, hardness and the ability to maintain a working edge.

Examination of the Fiskerton tools has shown a variety of compositions (Table 4.2). Only one tool was made from purely ferritic iron (***384***); others comprised low levels of carbon or unevenly distributed carbon, but in two tools (***301*** and ***364***) the carbon levels reached hypereutectoid composition (*c.* 0.8% carbon) in the areas examined. One of these, ***301***, was carefully made from high-carbon steel to give a very successfully hardened edge. Regions of phosphoric iron were detected in file ***312*** and hammerhead ***332***. In struck tools, such as hammers, the presence of phosphorus can be detrimental under impact. However, ***332*** does not seem to have suffered much damage apart from slight burring of the rectangular face. The tools comprising medium- and high-carbon steels (***301***, ***364***, ***403***) are very likely to have been made from specially selected blooms or steely portions of blooms. Steel was probably not commonly produced in the Iron Age nor necessarily easily selected out from the blooms except by experienced smelters. Notable in the tools with homogeneous high-carbon steel is the relative scarcity of non-metallic inclusions, which is probably a consequence of furnace conditions during smelting producing relatively slag-free steel.

The non-metallic inclusions arise mainly from residues of smelting slag and trapped hammerscale from smithing processes such as welding and pile-forging (the folding over and welding of the metal). One of the Fiskerton tools contains large amounts of inclusions and was not well homogenized (***312***). Others were more thoroughly homogenized by pile-forging resulting in alignments of inclusions, some of which are associated with chemical enrichments visible as light-etching ('white') lines (***331***, ***383***, ***403***, ***413***), or banded structures of segregated constituents (***332***). These alignments indicate the direction of forging the metal and thus means of fabricating working edges such as hammer faces (notably in ***403***).

The two hammers were quenched at both of their faces although only ***403*** had sufficient carbon in its structure to produce a well-hardened tool. Quenching seems to have been selectively and intentionally applied to the faces of both hammerheads, presumably to maintain toughness and resilience at the eyes – which might otherwise fracture under impact. Other Iron Age hammers from Britain which have been examined for metal structure have shown that steels were commonly used for these tools and that a high proportion (eight of 12 others in total) was quench-hardened at one face at least (Fell 1998). The Fiskerton hammers are probably the earliest ones known so far from Britain to be quench-hardened. On the Continent, hammers have also been found to be well carburized and quenched, although complex technologies such as welded-in steel components are rare, and are not yet known from Iron Age Britain.

The three Iron Age axe-heads were examined at their cutting edges. These were well forged from low-carbon iron and there is evidence of surface carburization in ***331*** and ***413***, and possibly in ***383***. This enhanced carburization, perhaps originally a few millimetres in thickness, would have conferred greater strength and hardness to the cutting edges. Nevertheless, axe-heads primarily require strength and toughness rather than extreme hardness. Surface carburization is seldom reported in early artefacts and the Fiskerton axe-heads are the only ones so far known from Britain in which evidence has survived. None of the Fiskerton axe-heads had been quench-hardened, which is consistent with other Iron Age axe-heads from Britain that have been investigated (Fell and Salter 1998).

Two files were examined. The coarse-cut file ***364*** was made from an unevenly carburized bloom. This was air-cooled, which is similar treatment as for other coarse- and medium-cut files, for example two from Danebury (Salter 1984: 435, fiche 13:C4, table 122) and one from Hunsbury (Ehrenreich 1985: 214, HNY68a). It seems that the softer and less brittle condition was preferred for these coarser cut files, possibly because heat treatments could not be closely controlled and extreme hardness was not important. The more finely cut metalworking files, however, could be expected to be quench-hardened and there are several examples of these from the Later Iron Age, for instance from the Glastonbury and Meare lake villages and from Gussage All Saints (Fell 1997). It is therefore surprising that ***312*** is in the soft annealed condition, although the area examined near the tang may not be typical of the whole tool. Furthermore, it is always possible that the files were originally surface-carburized but the evidence has not survived in the two examined despite the waterlogged conditions at Fiskerton supplying favourable conditions.

The tools from Fiskerton clearly show that Iron Age smiths could sometimes control the compositions of their metals and their working conditions to achieve tools of good quality. Although the tools examined are not complex in construction (for example there are no welded-in components or welded-on edges), they demonstrate that metalworkers could select and work steels to a reasonable level and employ heat treatments selectively. However, tempering was not applied to the two quench-hardened tools, possibly because the process was not understood and also because extreme hardness was not necessarily a desirable property for all tools.

DETAILED SCIENTIFIC EXAMINATION OF AXE-HEAD *413*

By the late Leo Biek, J.B. Johnson, the late J. Cooper and J.D.A. Miller

Results of the exhaustive investigations are summarized in Table 4.3. Detailed information is available in the archive.

Table 4.3 *Summary results of the examination of axe-head* ***413****.*

X-ray diffraction analysis		
Present on	Surface (away from edge) thin, hard, brown coating	In soil within 3mm from surface black/dk brown powder
	Iron carbonate	
	Calcium carbonate Calcium sulphate (water-insoluble) Calcium iron silicate hydroxides	
		Iron oxide hydroxides
Absent	Iron oxides Iron hydroxides Iron phosphates Chlorides Nitrates	
Optical Spectroscopy		
	Body near shafthole	
	Carbon ca 0.3%	
	Phosphorus 0.2%	
	Manganese 0.05%	
	Sulphur 0.025%	
	(Silicon) < 0.01%	
Hardness		
	Surfaces all round cutting edge 170–210 VPN	
	Maximum at actual edge 180–223 VPN No heat treatment.	

Metallographic examination

The results of the metallographic examination are summarized above and in Figs 4.25 and 4.26.

Microbiological examination

By the late Leo Biek and J.D.A. Miller

Cursory examination of site conditions on 7th September 1981 suggested that they were extremely variable over short distances. Samples of soil closely associated with well-preserved iron objects were investigated in the laboratory for microbial activity in the usual way. Axe-head ***413*** was found in layer **192**.

The very low activity found is normally considered to be non-aggressive in this context; one needs to allow for much variation in time as well as in space. It is clear, however, that objects found well preserved had been buried under conditions that were essentially stable and anaerobic – here, basically equivalent to permanent waterlogging.

It has been known for some time that the exclusion of air by static water is, in itself, far from protective. On the contrary, in the virtually ubiquitous presence of sulphates it normally provides ideal conditions for the virulent attack by sulphate-reducing bacteria (*Desulphovibrio desulphuricans*) which manifests itself in very severe and rapid corrosion. This is accompanied by characteristic blackening and the smell of 'rotten eggs', both due to the production of sulphides.

In archaeological deposits such conditions are only encountered rarely. Various attempts have been made to explain the unexpectedly good preservation of metalwork from wet deposits. In general it would seem that the inhibiting factor is related to the presence of organic debris (such as wood) next to the iron objects probably because such material not only tends to maintain reducing conditions but also contains specific anti-microbial substances such as polyphenols.

At Fiskerton such conditions had clearly obtained, and had prevailed for the whole period – interrupted, if at all, only for very short breaks that were evidently bridged by buffering equilibria – in the places, usually at lower levels, where iron objects had been well preserved. Elsewhere, it is equally clear that essentially similar objects could become completely corroded, presumably in the absence of a water seal, although it is interesting to note the smoothness of the corrosion process, *i.e.* not very much typically distortive aerobic activity. The presence of iron carbonate (siderite) and complex calcium iron silicates is likely to be significant.

5 THE OTHER IRON AGE ARTEFACTS

THE IRON AGE POTTERY

By S. Elsdon and D. Knight

Introduction

A total of 177 Iron Age sherds (4.891kg) from a minimum of 24 vessels was recovered from beneath the uppermost layer of horizontal timbers (**32**) within the double row of posts. A draft report was completed by SE in 1982, together with an archive catalogue grouping sherds which probably derived from the same vessel. For each vessel details are provided of its context, sherd number and weight, fabric, form and surface treatment, together with the finds numbers attributed during excavation to individual sherds or groups of joining sherds. Seven vessels have been illustrated (Figs 5.1 and 5.2). The draft report was revised jointly by SE and DK in December 1999 and January 2000 but the original archive catalogue remains unaltered.

Spatial and stratigraphic distribution

The great majority of sherds (133 in total) derived from two virtually complete pots (Figs 5.1.1 and 5.1.2) which were stratified in layer **26**, with four of the sherds from one of the pots being found immediately above, in the limestone rubble layer **31**. A single sherd from this pot was also found in a layer (**313**) adjacent to **26**, together with three sherds from the other pot. The attribution of sherds to layer **31** could have resulted from the protrusion of the vessels through **26** or from scouring of **26** prior to deposition of **31** (or possibly from accidental over-digging of **31**).

These two pots had been placed next to each other, in an upright position, beneath horizontal timbers in Area E, and appear to have been deliberately placed at this location. Each vessel is represented by a collection of mainly large and unabraded sherds, of identical fabric, many joining and in a remarkably fresh condition (but displaying in some cases extensive post-depositional iron staining). It seems likely that the pots were complete when placed beneath the timbers but were crushed and spread slightly as the trackway sank gradually into the underlying sediments. The deliberate placement of these pots may signify votive deposition, as is argued for the large volume of Iron Age metalwork which was deposited around the causeway posts.

The remaining Iron Age sherds (Fig. 5.2) were retrieved from a variety of peat and silt layers, in some cases mixed with Romano-British pottery and other finds (see Chapters 1 and 6). Only four sherds were found in layers **194** and **195** compared with 61 Romano-British sherds from layers **194**, **192** and **195**. (There were no Iron Age sherds from **192** which lay between **194** and **195**.) There were a further 11 sherds from layer **313**, six from **26**, seven from **32** and 16 from **31** (compared with 139 Romano-British sherds in these same deposits), giving a total of 44 Iron Age sherds, apart from the large number of sherds from the two jars described above. This mixing of Iron Age and Romano-British artefacts, which was evident even in the deepest artefact-bearing layers, implies extensive vertical and lateral displacement of finds through the soft silts and muds which extended across the site, and hence limits further discussion of the spatial and stratigraphic distribution of Iron Age sherds.

Fabrics

Sherds were examined at x10 and x30 magnification to establish the kinds of inclusion that survived within the clay matrix. Resources were not available for petrological work, and the following fabric descriptions are necessarily limited in their scope.

The vessels were manufactured from a fine shelly fabric, characterized generally by common (20–29%) to very common (30–39%) plate-like shell inclusions. The inclusions are moderately well sorted, averaging 1–2mm in diameter (occasional fragments up to 5mm), suggesting that the shell had been pounded for use as temper. Much of the shell has dissolved subsequent to deposition, creating in many sherds a light vesicular fabric. Sparse rounded quartz inclusions up to *c.* 2mm may also be observed in some sherds. The fabric is uniformly soft, and displays an irregular or hackly fracture. The surfaces are generally mottled, ranging from buff through dark to light brown, grey and black; cores, by contrast, are usually dark grey or black, occasionally with orange internal or external margins.

All of the raw materials could have been obtained locally, within a radius of <5km from the causeway.

Suitable potting clays could probably have been obtained from the Oxford clays, the nearest source of which is located north of the Witham beneath the modern village of Fiskerton, while fossil shell could have been obtained from a variety of Jurassic limestone sources immediately west of the site (Usher *et al.* 1888; Geological Survey of Great Britain, 1:50,000 sheet 83: Lincoln). No other inclusions that necessarily derive from a non-local source were observed within the clay matrix.

Methods of manufacture

All vessels appear to have been modelled by hand. Horizontal fractures may be observed around the base of some vessels, suggesting that the wall had been attached to a preformed base. The wall itself could have been manufactured by slab or coil techniques. The variable surface colours which have been noted above indicate irregular firing, presumably in a bonfire.

Form and surface treatment

The most outstanding discoveries are the two virtually complete jars which were found together beneath horizontal timbers (Fig. 5.1). These are exceptionally large, with internal diameters at the mouth of between 0.50 and 0.60m and between 0.60 and 0.75m tall. Both vessels are also characterized by extraordinarily thin walls, up to only 5mm thick. Each jar has a flat base, slightly pinched out around the circumference, a pronounced rounded girth, a high everted neck with single or multiple internal U-shaped channels and a simple flattened direct rim. The larger of the two jars is embellished externally by a narrow cordon around the girth and by a pair of closely spaced cordons around the base of the widely flaring neck. The interior of the neck preserves two wide U-shaped channels, creating a corrugated internal profile which is echoed by slight undulations on the outer face. The wide internal channels may represent a seating for lids, manufactured perhaps from an organic material, but no evidence for these has survived. The smaller jar is plainer, with no embellishment of the exterior and only one U-shaped channel on the inner side of the flaring neck.

Two other vessels are distinguished by high everted necks with one or two wide U-shaped internal channels. One of these (Fig. 5.2.5) compares closely with Vessel 1, although the lip on this vessel is rounded rather than flattened. The other fragment preserves an internally bevelled rim above a wide U-shaped channel and, around the base of the neck, a narrow external cordon (Fig. 5.2.3). One other everted-neck vessel was provided with an internally channelled rim and a narrow cordon around the neck (Fig. 5.2.4). Another rim sherd of identifiable form comprises part of a vessel with a slightly everted neck, gently corrugated beneath the rim, and a flattened rim, pinched out externally (Fig. 5.2.6). Another vessel, possibly of ovoid or related form, is represented by a small flattened rim sherd, pinched out slightly externally (Fig. 5.2.7).

Direct dating evidence

The stratigraphic location of sherds from Vessels 1 and 2 above layer **192/502** dates them to later than 375/4 BC, a rare fixed point in the first millennium BC ceramic sequence of the East Midlands. Large quantities of La Tène metalwork were also recovered from the layers in association with the timber post rows. These artefacts would overlap the proposed date range of the vessels but unfortunately none of the metalwork was found in direct association with pottery. Layer **32**, above the pots, is later than 359–317 BC but this does not necessarily mean that the pots were deposited before 359–317 BC.

Typological parallels

The typological affinities of these two vessels and most of the other prehistoric pottery from the site lie with material of the Late Bronze Age/Early Iron Age (LBA/EIA) ceramic tradition, spanning in this region the period from the ninth to fifth/fourth centuries BC (defined in Knight 2002: 119–42).

High everted and internally channelled necks, pronounced rounded girths and thin walls are well-known components of LBA/EIA ceramic assemblages from the East Midlands. Close parallels for these highly distinctive vessels from Fiskerton may be found at a small number of sites distributed widely over the Nene, Trent and Welland basins, most notably at Gretton, Northants. (Jackson and Knight 1985), but also at sites as widely dispersed as Maxey (May 1981: 47, fig. 7: vessel 1, pit I), Fengate (Pryor 1974: figs 21.20, 22.10) and Rectory Farm, Cambs. (Elsdon 1996: fig. D.4c), Buddon Wood, Leics. (Elsdon 1996: fig. D.1) and Gamston, Notts. (Knight 1992: fig. 23.53). Such neck forms are, however, far from common, and Fiskerton remains the only site where body profiles may also be reconstructed.

Pronounced rounded girths, by contrast, are common attributes of LBA/EIA vessels - as may be demonstrated by the range of vessel forms which characterize typical East Midlands LBA/EIA assemblages such as Gretton (Jackson and Knight 1985: figs 6–9) or Fengate (Hawkes and Fell 1943). In addition, a significant proportion of these and other LBA/EIA vessel types are distinguished by remarkably thin walls (*c.* 3–5mm thick). Similarly thin walls also characterize some of the post Deverel-Rimbury plainwares which precede the LBA/EIA ceramic tradition in this region (Barrett 1980), including the nearby site at Washingborough Fen (Coles *et al.* 1979), but these appear to have fallen from the repertoire of potters working within the succeeding Earlier La Tène ceramic tradition (Knight 2002).

Some of the closest parallels for the Fiskerton vessels have been recorded in the remarkable LBA/EIA ceramic assemblages which were retrieved from a pair of possible trackway ditches at Gretton although unfortunately only the neck profiles of these vessels could be determined (Jackson and Knight 1985: figs 6–9; ditches A and B). Two pottery-rich layers in ditch A yielded neck fragments

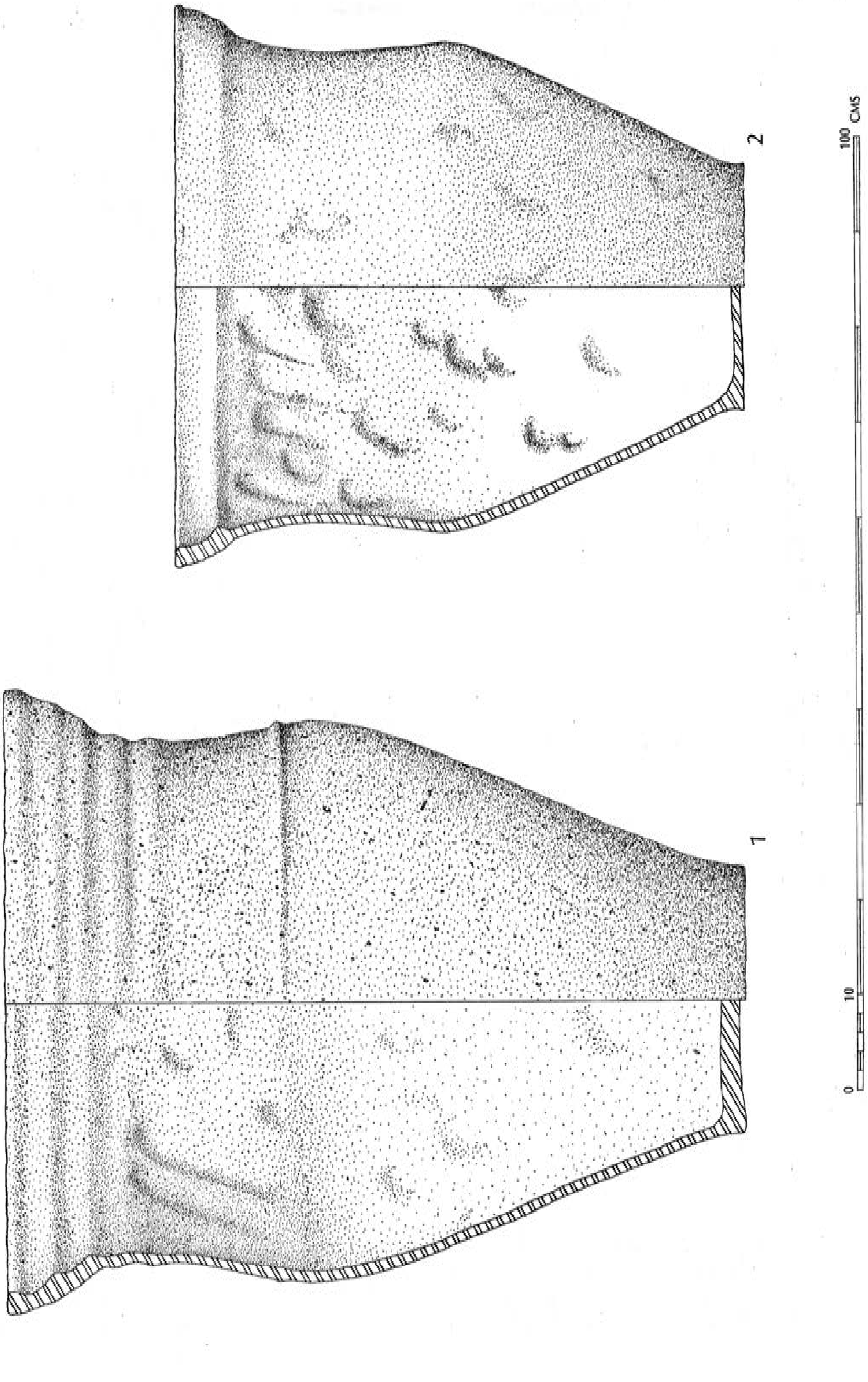


Fig. 5.1 *Iron Age pottery (M. Clark) ⅙ size.*

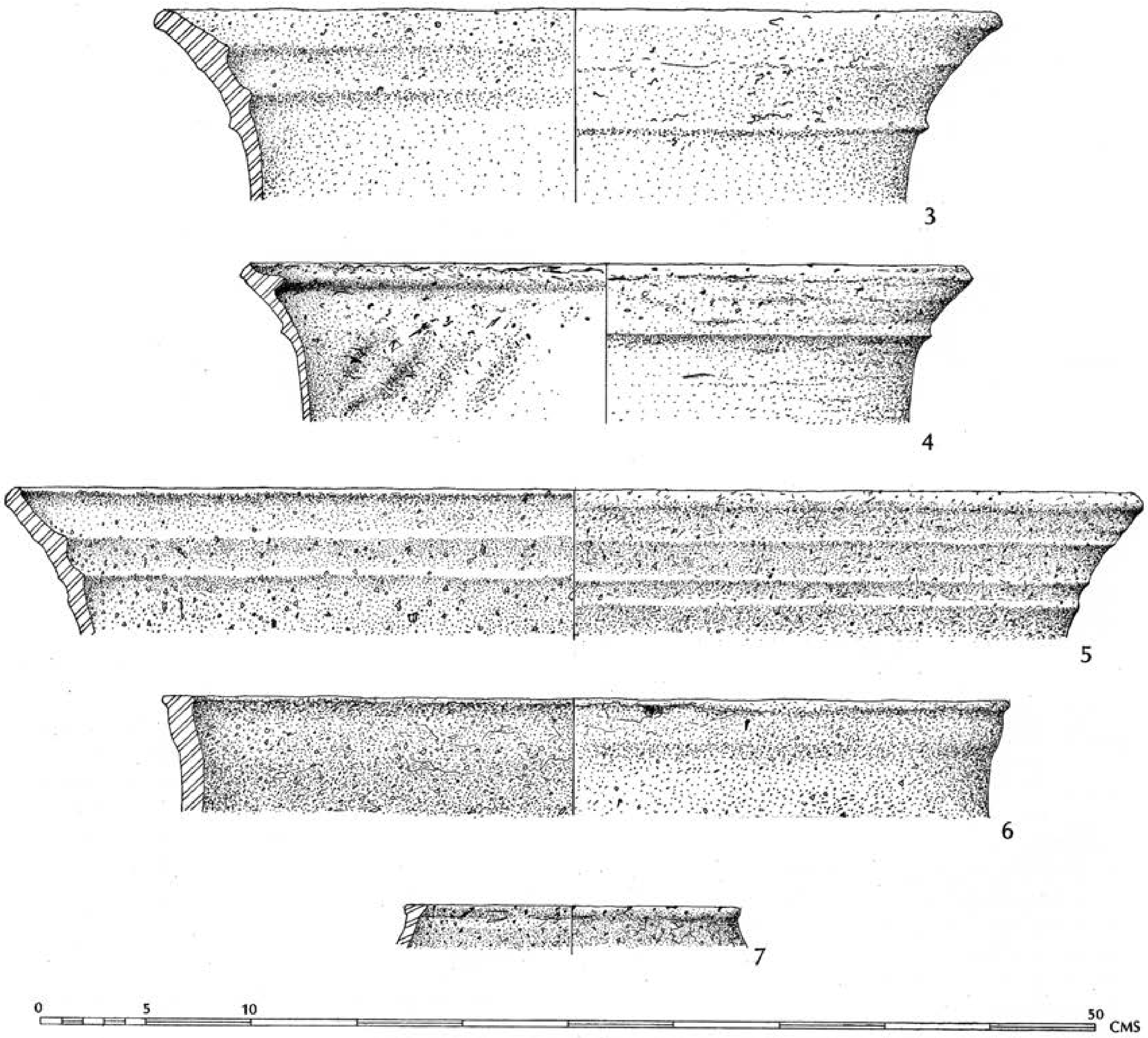


Fig. 5.2 Iron Age pottery (M. Clark) ⅓ size.

inviting comparison with the Fiskerton vessels and a plain iron ring-headed pin was recovered from the lower layer (*ibid.*: fig. 10.7) - a long-lived artefact type which, in view of its suggested development from Hallstatt C/D swan's neck pins (O'Connor 1980: 257), may provide a Hallstatt D *terminus post quem* for this deposit (*i.e.* from no earlier than the late seventh century BC).

The pin was associated with a large assemblage of mainly unabraded pottery which seems to have been dumped after the accumulation of *c.* 0.30m of silt (Jackson and Knight 1985: figs 7.26–43, 8.44–62). This included a rich variety of carinated, round-shouldered and ovoid forms, some with extensive finger ornament, and several everted-neck sherds with internal corrugations reminiscent of the pottery from Fiskerton (*ibid.*: fig. 8.55–58). The upper layer yielded a similar range of forms, together with fragments of several open bowls or lids (*ibid.*: fig. 6). Most significantly, the assemblage contained two internally channelled rims recalling most closely Vessel 4 from Fiskerton (*ibid.*: fig. 6.21–22), plus one everted neck fragment with a pair of shallow internal channels (*ibid.*: fig. 6.24).

The other ditch at Gretton yielded a large group of sherds which were generally smaller and more abraded than those from ditch A and although the material also appears to have been deliberately deposited, it may have been exposed longer to trampling or weathering prior to deposition. The pottery in the bottom artefact-bearing layer was deposited above a noticeably greater thickness of silt (*c.* 0.50m) than was recorded in ditch A and, if it is accepted that the ditches had been in contemporary use, may date from later in the sequence. The assemblage compares broadly with that from ditch A although extensive finger ornament seems to be less well represented. The two upper layers of ditch B contained larger numbers of ovoid vessels but noticeably smaller proportions of carinated and round-shouldered vessels than ditch A and yielded an interesting collection of everted-neck fragments with single or multiple internal channels (*ibid.*: figs 8.65, 69–73; 9.83–86).

The most striking parallel with the Fiskerton vessels is provided by a sherd from a potentially very large vessel with a high flaring neck, two pronounced internal channels and a cordon around the neck angle (*ibid.*: fig. 8.65), but there seems little reason to doubt a general affinity between the other channelled rims from Gretton and the generally more elaborate forms from Fiskerton. The changed proportion of carinated and round-shouldered vessels to ovoid forms in ditch B invites closer comparison with Later Iron Age assemblages from the East Midlands and it has been suggested that the assemblages from ditches A and B could represent a transition from the LBA/EIA to Earlier La Tène ceramic traditions (*ibid.*: 82; *cf* Knight 2002). On current evidence, this would support a date range in the fifth/fourth centuries BC, broadly contemporary with La Tène I (see Table 4.1).

Radiocarbon dates for Gretton were obtained from charcoal in the bottom of layer 3 (ditch A), and the base of layer 4 (ditch B), in both cases in direct association with pottery. All the charcoal, unfortunately, was from mature timbers which could have been felled many years before deposition. The samples from ditch A yielded dates of 2410±80 bp (Har-3015) and 2390±60 bp (Har-2760), and those from ditch B produced dates of 2240±70 bp (Har-3014) and 2210±70 bp (Har-2761). Calibration at 2 sigma yielded date ranges of 800–250, 770–370, 410–100 and 400–60 cal BC respectively, preventing all but the broadest dating (calibration employing OxCal v2.17; after Stuiver and Pearson 1993; Pearson and Stuiver 1993).

One other site, at Padholme Road, Fengate, has yielded typologically related everted-rim vessels in a datable context, in this case two rims from the fill of a pit yielding substantial quantities of scored pottery and preserving a collapsed wattlework lining dated to 2300±46 bp (GaK-4198; 410–200 cal BC at 2 sigma; Pryor 1974: 22–9; 1984: 154). One of the rims preserved random scoring on the outer face – a style of pottery currently dated from no earlier than the fifth/fourth centuries BC (*cf* Elsdon 1992). The association with scored pottery, combined with the radiocarbon determination, would support the suggestion that such vessels may have continued in use well into the later phases of the LBA/EIA ceramic tradition, contemporary with La Tène I (see Table 4.1). It suggests that this pit group, in common with the pottery from Gretton, should be viewed as a transitional assemblage incorporating elements of the long-lived LBA/EIA and Earlier La Tène ceramic traditions.

Conclusions

The key interest of the site, from the ceramic viewpoint, is the discovery in layer **26** and beneath of sherds from two nearly complete round-shouldered jars with high everted internally channelled necks. These display a range of diagnostic LBA/EIA traits combined in vessel forms of exceptional size which are currently without exact parallel. No traces may be observed of use wear or of deposits acquired during use, and in view of their special character we might speculate whether the pots were specially made with ceremonial deposition in mind. Whatever the precise circumstances of their deposition, their stratigraphic location provides persuasive evidence of deliberate placement after 375/4 BC. This *terminus post quem* provides a crucial fixed point in the Iron Age ceramic sequence of the East Midlands, and the discovery has important implications for the dating of typologically related pottery from Gretton, Fengate and elsewhere in central England.

Catalogue of illustrated vessels (Figs 5.1 and 5.2)

All vessels are handmade and shell-tempered (as described above). Details are recorded below of sherd number and weight, vessel form, surface treatment, condition, firing/colour, context and find numbers allocated during excavation.

1. 81 sherds (1.981 kg) from nearly complete jar with thin walls (5mm), high everted neck, pronounced rounded girth and flat base, pinched out slightly externally. Flattened rim, pinched out internally; two wide shallow channels around the inside of the neck, two closely spaced external cordons around the base of the neck and external cordon above the girth (cordons apparently pinched out from the vessel wall). Numerous shallow and mainly vertical finger impressions, formed during manufacture, visible on inner face. Outer surface smoothed. Mainly unabraded. Mottled surfaces ranging from buff to light/dark grey and light/dark brown; dark grey core. Stratified beneath horizontal timbers (context **26**: find nos. ***225***, ***267***, ***270***, ***273–275***, ***282***, ***340*** and ***347***; context **313**: find no. ***408***, 3 joining base sherds).

2. 52 sherds (1.401kg) from large thin-walled (5mm) jar, three-quarters complete, in a fine fabric indistinguishable from that of Vessel 1. Irregular profile with pronounced rounded girth and high everted neck. Flattened rim with single wide shallow internal channel. Extensive shallow finger impressions around interior, formed during manufacture; smoothed outer face. Mainly unabraded. Mottled surfaces buff, dark/light grey and dark/light brown; core dark grey with external and internal orange margins. Stratified beneath horizontal timbers (context **26**: find nos. ***267***, ***273***, ***274***, ***282***, ***347*** and context **313**: find no. ***408***; context **31** [above **26**]: find nos. ***211***, 3 sherds and ***234***, 1 sherd).

3. Cordoned body sherd and two rim sherds (332g), none joining, probably from one vessel with smoothed but

uneven surfaces and comparatively thick (8mm) walls. High everted neck, internally bevelled rim surmounting a wide U-shaped channel, and low pointed external neck cordon, pinched out from vessel wall. Unabraded. Mottled surfaces dark brown to dark grey; black core. Interior preserves patches of orange iron staining (context **32**: find no. ***256*** and context **194**: find nos. ***307*** and ***334***).

4. Rim sherd from large thin-walled (4mm) jar (64g). High everted neck with internally channelled rim. Internal finger impressions around neck. Smoothed exterior. Unabraded. Mottled light/dark brown surfaces; dark grey core. Context **26**: find no. *272*. A body sherd (43g) with a low pointed external cordon, from context **31** (find no. ***238***), may possibly derive from the same vessel.

5. Two non-joining rim sherds (101g), probably from a vessel with comparatively thick walls (7mm) and a high everted neck. Rounded rim with two wide shallow channels around the interior of the neck. Two low external cordons around the neck and shallow groove below the rim. Smoothed surfaces. Unabraded. Mottled buff to dark brown exterior, dark brown interior; dark grey core (contexts **26**: find no. ***93*** and **331**: find no. ***365***).

6. Single rim sherd (82g) from comparatively thick-walled (11mm) vessel. Flattened rim, slightly pinched out externally. Light to mid-brown and red mottled surfaces; grey core. Unabraded (context **26**: find no. ***115***).

7. Small rim sherd (5g) from vessel of uncertain diameter (walls 6mm thick). Angle uncertain but probably from a vessel of ovoid or related form. Rim flattened and pinched out slightly externally. Smoothed surfaces. Mottled mid- to light brown exterior; dark brown interior; core dark grey. Unabraded (unstratified: find no. ***435***).

THE BONE AND ANTLER ARTEFACTS: THEIR MANUFACTURE AND USE

By S.L. Olsen

Introduction

Fiskerton has produced a collection of very well preserved bone artefacts that contribute significantly to understanding some of the activities that took place along the causeway. Fifty-five of the 57 bone artefacts examined by this author were tools of the form often classified as 'gouges' (Cunnington 1923: 82–8). However, the results of this work and the contexts of similar tools in Denmark have led to a different interpretation of these objects. Typically associated with the Iron Age in Britain and Denmark, many of these artefacts have been found in deposits of weapons in watery situations. The fact that some from other sites retain evidence of hafting to wooden shafts supports the idea that they were used as spearheads. Similar accumulations of these and other weapons have been found at Hjortspring and Krogsbølle, Denmark. The latter was a causeway similar to that at Fiskerton.

Two other types of bone artefact – a possible rib knife and a bi-pointed needle – as well as a worked antler tine are described below. Antler handles attached to file ***364*** and saw ***288*** have been discussed in the analysis of iron tools (see Stead, Chapter 4).

Methodology

The bone and antler artefacts were studied by examining gross and tip morphology, manufacturing traces and wear (Fig. 5.3). Experimental replication of manufacturing traces, using a range of stone and metal tools, was conducted to increase reliability in the interpretation of surface alterations. Microscopic features were observed with the assistance of a stereo-microscope at magnifications of x10 – x40. Surfaces of a selected sample were then replicated with polyvinylsiloxane impression material and examined with a scanning electron microscope at magnifications of x10 – x200. The aim of the analysis of microscopic traces was not only to reconstruct manufacturing processes but also the possible functions of tools in the Fiskerton assemblage.

Miscellaneous worked bone other than the 'spearheads'

1. ***88*** *'Rib-knife'* (not illustrated). A single cattle rib was chopped transversely with a metal knife or cleaver. The chopmark does not penetrate completely through the outer layer of bone; instead, the rib was snapped along the cut. The inner surface of the rib has broken out and does not, therefore, retain any manufacturing marks. The rib may have been sectioned as a result of meat processing or might possibly be a fragment of an artefact similar to 'rib-knives' found at All Cannings Cross (Cunnington 1923: 81, pl. 7) and Eldon's Seat (Cunliffe and Phillipson 1968: 225, pl. vb). These have had one surface removed in the area of the 'blade' by cutting transversely near the middle of the rib and prying off the inner or outer layer of bone on one side. The whole circumference of the rib was left intact on the handles of these tools. Their broadly pointed tips and edges were shaped during manufacture until smooth. The Fiskerton specimen may be a fragment of a handle of a rib knife. [Layer **26**]

2. ***305*** *Bi-pointed needle* (Fig. 5.4.2). This artefact is a slender splinter of bone which has been scraped down to a fine point at both ends and drilled in the centre. The scraping appears to have been done with a metal tool and the perforation's walls are parallel-sided. Polish is widespread over the object's surface and polish also extends down over the rim of the perforation on both sides, unlike the rivet holes of the other tools. This suggests that a thread or cord was drawn through the perforation.

Needles of this type have been found in Iron Age contexts at Glastonbury (Bulleid and Gray 1917: 410–12), All Cannings Cross (Cunnington 1923: 74–7, pl. 6),

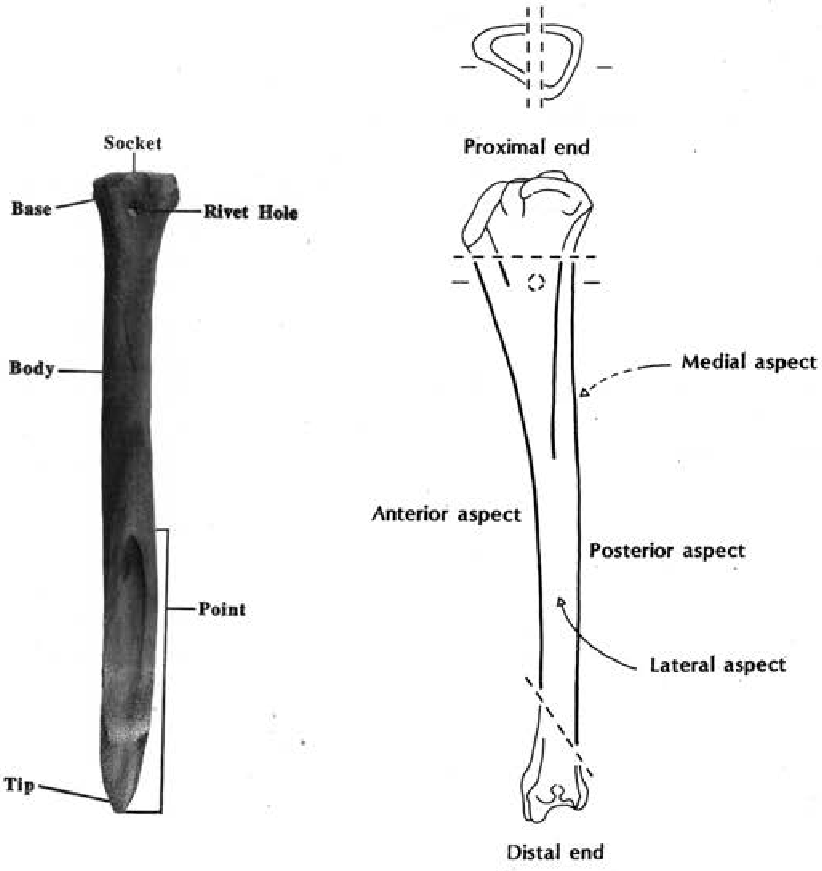


Fig. 5.3 *Front view of a bone spearhead, showing terminology adopted for this report.*

Maiden Castle (Wheeler 1943: 307–8, pl. 35, fig. 105) and Danebury (Sellwood 1984a: 380–2, fig. 7.32). The eyes of needles from this period seem to vary in their placement anywhere from the base to mid-shaft without discrimination. Whether a centred eye on a bi-pointed needle had a specific function is not known at present. One advantage is that it can be easily reversed and pulled back out of the fabric. [Layer **26**]

3. *333 Worked antler tine* (Fig. 5.4.3). The tine of a red deer has been sawn off the main beam and has had part of its surface worked with an adze or large gouge in order to remove the natural pearling. A piece of antler worked experimentally with an adze showed the same kind of surface traces as those on the archaeological piece: concave linear facets with parallel striations inside. The tip and much of the body of the tine are highly polished. Polish may form on antler tines during the life of the deer once the velvet has been shed (Olsen 1989), but in this case the polish extends over the whittled area. Unfortunately the polish does not provide an answer as to the exact function of this implement but it helps to demonstrate that it was more than a mere off-cut or unfinished object.

Many sawn antler tines were found at Glastonbury (Bulleid and Gray 1917: 474–6, pls 66–8) but they do not appear to have been worked with an adze. A tine from the Early Bronze Age site at West Row, Suffolk (Mildenhall 165) has been chopped off the beam and its surface filed and adzed (Olsen 1988: 349, fig. 12; Olsen 1994: 150). Like the tine from Fiskerton, its tip bears a light polish. [Layer **194**]

'Gouges' or 'spearheads'

Of special interest is the large number of bone artefacts of a particular type, the function of which has been the subject of much conjecture. The dominant bone artefact at Fiskerton is an enigmatic type known most commonly in the literature as a 'gouge' but these artefacts have received numerous labels over the past century (Figs 5.4–5.9). The range of functions for this type of object may never be fully understood but this chapter explores different avenues with the aim of resolving this dilemma in part. Functional classification is hampered by the probability that tools of basically similar gross morphology served different purposes in different contexts. This author cannot speak to the function of the examples given from other sites in most cases. Although the artefacts from Fiskerton are believed to have served as spearheads, tools of similar morphology at other sites may have had completely different functions. Figure 5.3 illustrates the terminology adopted for this report in describing the artefacts and Table 5.1 summarizes their features and identification.

Table 5.1 The bone 'spearheads'. Summary of features and identification, based on data prepared by S. Olsen, M. Harman and M. Clark. Collated by M. Clark.

Illus. No.	Find no.	Context	length (mm)	point length(mm)	no of holes	neck groove contin/ discont	head marks	neck marks	shaft marks	point marks	head surface removed	neck surface removed	shaft surface removed	point surface removed	head polish	neck polish	shaft polish	point polish	species	bone	left/ right	point prox/ distal
5.4.1	144	26			0														cattle	radius	L	D
4	123	26	?	?	0								*						sheep			
5	172	194	141	70	0	*						*	*				B		sheep	tibia	L	P
6	119	26	?	?	?					F,S	?			F			*	?	sheep	tibia	L	P
7	126	26	?	?	2						trim		B	*			B	?	sheep	tibia	L	P
8	136	26	170	80	2				F, S	B			*	*			*	*	sheep	tibia	L	P
5.5.9	147	194	162	72	4	Discont				B	trim			F, S			*	*	sheep	tibia	L	P
10	159	196	141	42	2				F, B	B	trim		F	F			F, B	*	sheep	tibia	L	P
11	187	192	172	62	2		S	B,S	F	F,B	trim	*	F	F,B	F		B	F	sheep	tibia	L	P
12	191	192	174	51	2	Discont	F	F		B	trim			*			F,B	F	sheep	tibia	L	P
13	297	31	168	52	2					B	trim		F	F			B	F,B	sheep	tibia	L	P
14	321	31	109	29	?		F	F			?		F	F					sheep	tibia	L	P
15	344	313	175	53	4						?			F			F,B	F	sheep	tibia	L	P
16	350	313	158	52	2			S	S,B	S,B				F,S			F,S	S	sheep	tibia	L	P
17	379	313	170	66	2	*		S,B		B	*			F			*	*	sheep	tibia	L	P
18	424	31	168	45	4					S,B				F			B	B	sheep	tibia	L	P
5.6.19	446	32	142	49	2									F			F	F	sheep	tibia	L	P
20	444	32	172	55	1	Discont					trim			F			F,S	*	sheep	tibia	L	P
21	117,440	26,32	155	65	2	Discont					trim			B				F	sheep	tibia	R	P
22	152	194	170	64	2						trim			F			B	*	sheep	tibia	R	P
23	154	26	162	55	2	multiple		F	F, B	B	trim	*	*	*			*	*	sheep	tibia	R	P
24	167	194	148	59	2	Discont			F	B	trim			F			F, B	F, B	sheep	tibia	R	P
25	178	192	152	59	2	Discont				B				F			F,B	F	sheep	tibia	R	P
26	186/257	32	153	59	2	*		B	F,S,B	B	?	*	*	*		*	B	F,B	sheep	tibia	R	P
27	228	31	162	53	2	Discont		F	*	S,B	trim			F,S			B	B	sheep	tibia	R	P
28	258,303	31,32	172	50	2	Discont			B	S,B	?			F			F,B	F,B	sheep	tibia	R	P
5.7.29	378	313	157	45	2				F	S	?	*	*	*			B	B	sheep	tibia	R	P
30	382	topsoil	117	45	2	*				B	trim		F	F			B	F,B	sheep	tibia	R	P
31	400	331	153	38				S	S		?		*	*			F,B	*	sheep	tibia	R	P
32	442	32	?	?	2			F	F,B	?	trim	F		?	*		*	?	sheep	tibia	R	P
33	445	32	155	58	2	*			*		trim			F			*	*	sheep	tibia	R	P
34	86,277	26,31	160	45	2				F,S,B	B	trim		*	*			B		sheep	tibia	L	D

35	166	192	137	30	?			B	B					F			B	F	sheep	tibia	L	D
36	281	31	155	29	2				S,B	F,B	trim		shaft	F		S	F,B	F,B	sheep	tibia	L	D
37	291	31	175	77	2			F	F		?			F	*		F,B	F	sheep	tibia	R	P
38	128	26	?	30	?	?	?	?						F, L, R	?	?	B	F, L, R	sheep	tibia	R	D
5.8.39	153	194	125	37	2									*			F, B	*	sheep	tibia	R	P
40	163	3	?	72	?				F	B			B, S	*			B	F	sheep	tibia	R	P
41	164	25	164	37	2						trim			F		F	B,S	*	sheep	tibia	L	D
42	137	194	?	?	?					?			?	?		*	?	?	sheep	tibia	?	P
43	160	196	?	34	?	?			S		?	?	?	S			S	F,S	sheep	tibia	?	P
44	414	?	?	?	2				?	?							*	?	sheep	tibia	?	P
45	427	590	119	30	2									F			?	F	sheep	tibia	?	?
46	131, 295	26,194	120	55	2	Discont	F	F	B		trim	F, B, S	F, B	F, B			F, B	S	pig	tibia	L	P
47	190,207	32,3	114	70	2			F	F,B	F,B	?	*	*	*		F	B	*	pig	tibia	R	P
48	209	32	121	59	2			S	S	B				F,B		S	F,S	F,B	pig	tibia	L	P
49	69,76,99	26	116	54	2	Discont					*	*	*	*			B		sheep	metacarpal	R	D
5.9.50	360	26	116	21	2				S					F,S	*		B	B	sheep	metacarpal	L	D
51	174	32	116	46	2		F	F	*	B	trim	*	*	*	*	*	B	*	sheep	metatarsal	L	D
52	145,151	194	164	53	2								F	F			F	*	roe deer	metatarsal	L	D
53	443	32	158	37	2			F,B	F,B	B	trim	*	*	*	S	S	S,B	*	roe deer	metatarsal	L	D
54	289	194	132	36	2		B	B	B	B	?		F,B	F,B			B	B	sheep	radius	L	P
55	185	26	?	41	?									*				*	sheep	long bone	?	?
56	215	32	?	75	?		?	?	?		?	?	?	*	?	?	?	F	sheep	long bone	?	?
57	343	26	?	?	?									F,S				F	sheep	long bone	?	?

Key: * = present, F = front, B = back, S = side, L = left, R= right

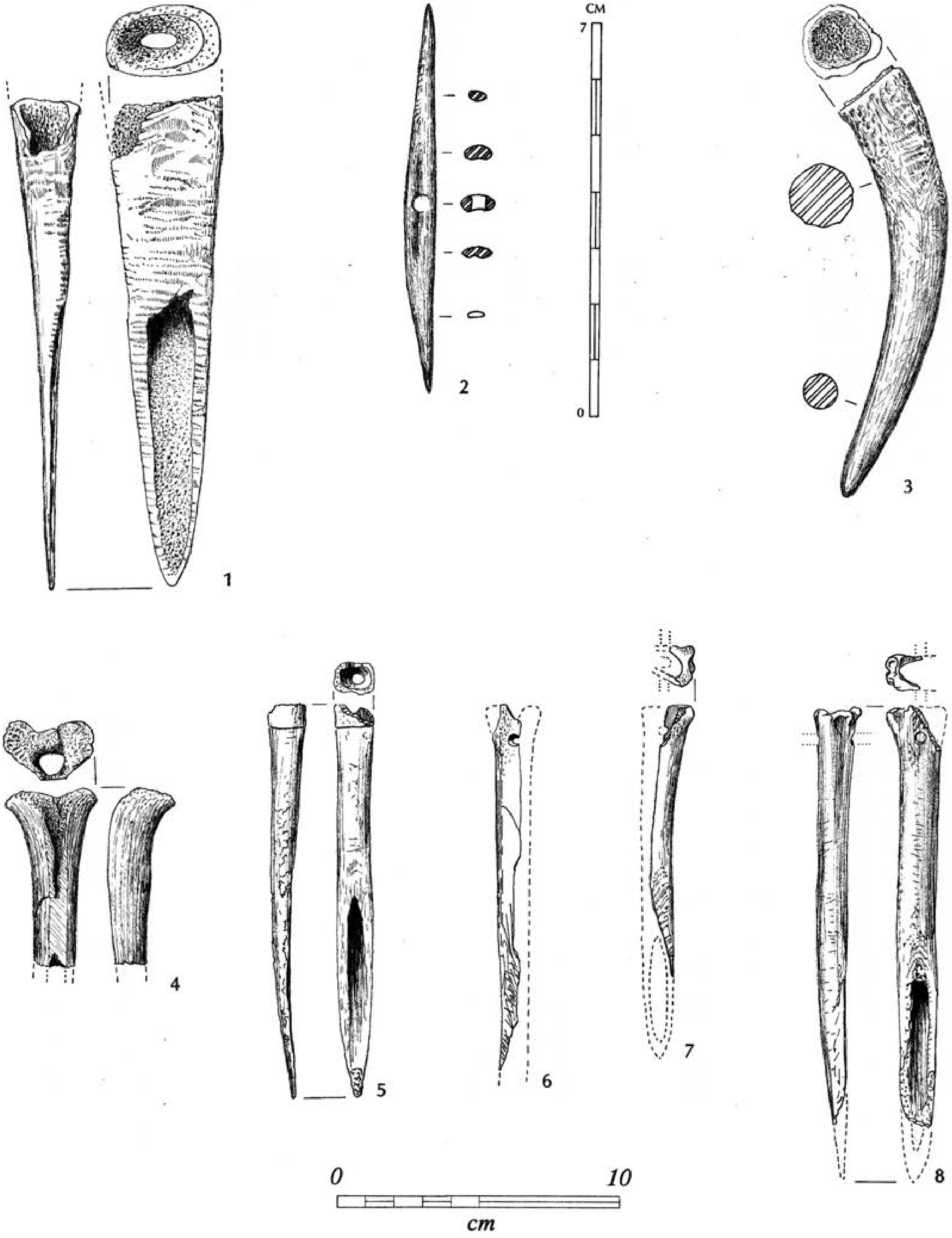


Fig. 5.4 *1. Cattle radius spearhead **144**; 2 bone needle **305**; 3 worked antler **333**; 4–8, bone spearheads **123**, **172**, **119**, **126**, **136**, otherwise known as 'gouges'. (M. Clark) ½ size except 2 actual size.*

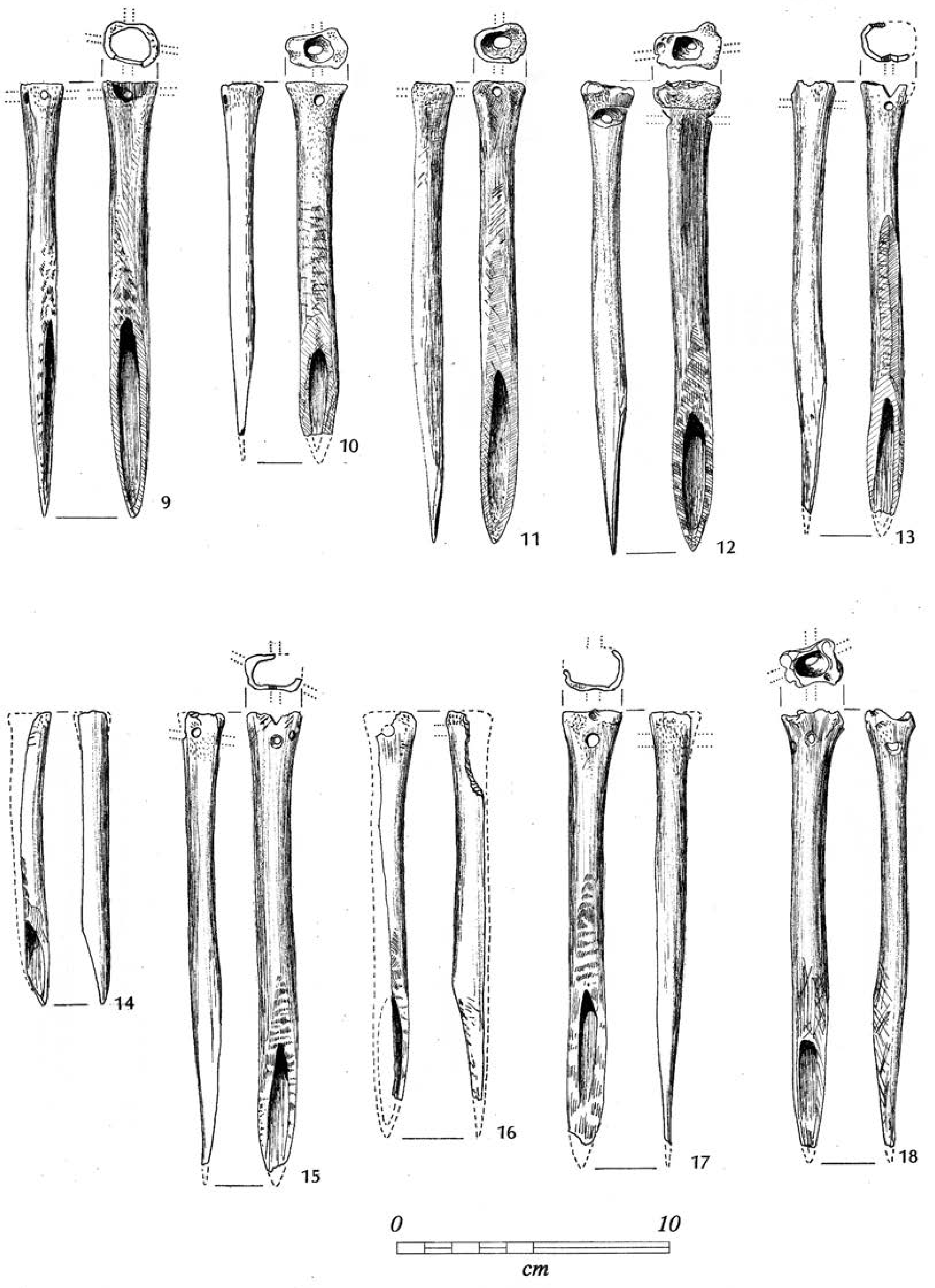


Fig. 5.5 9–18. Bone spearheads *117, 159, 187, 191, 297, 321, 344, 350, 379, 424*, otherwise known as 'gouges'. (M. Clark) ½ size.

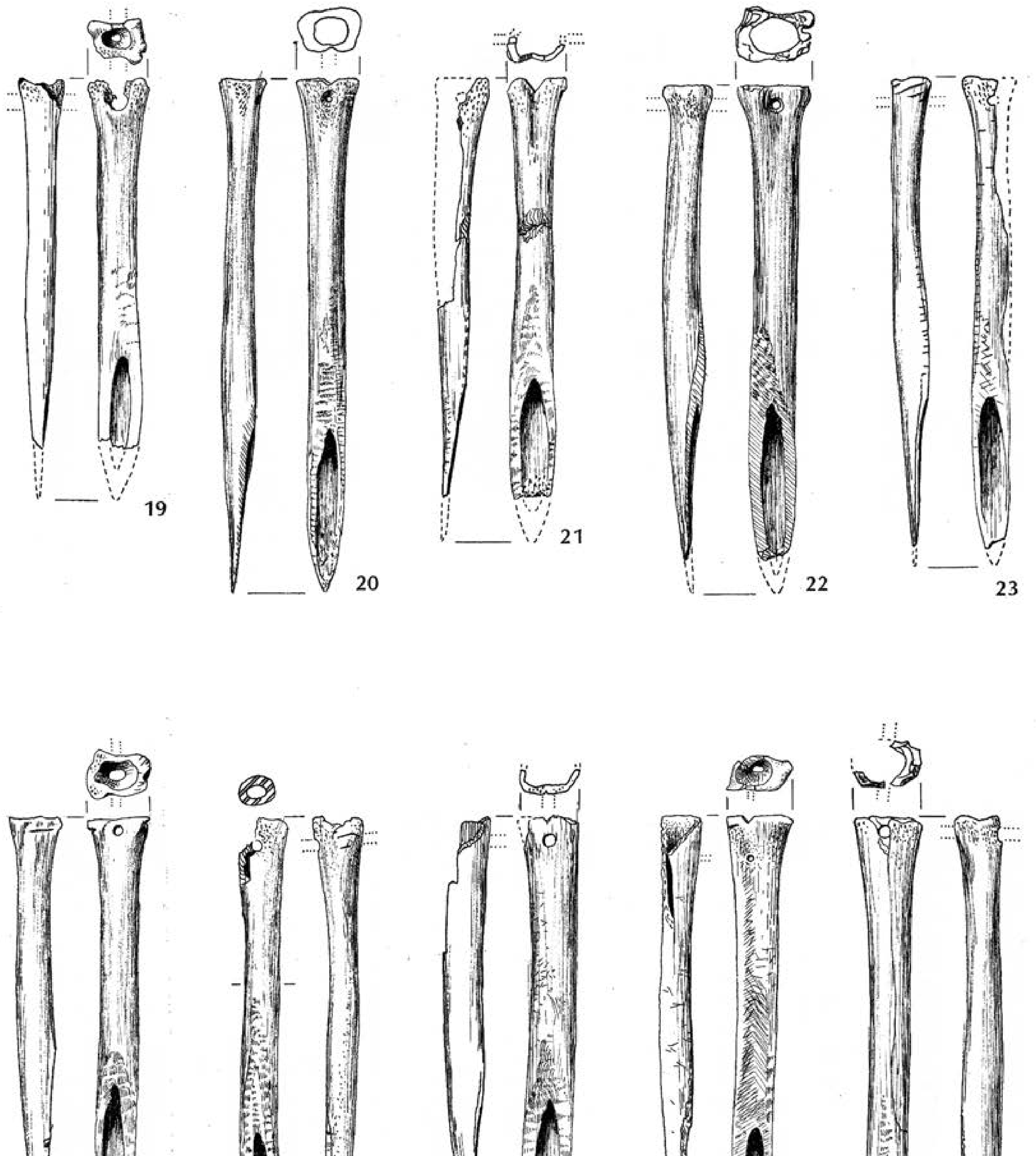


*Fig. 5.6 19–28. Bone spearheads **446, 444, 117, 152, 154, 167, 178, 186, 228, 258**, otherwise known as 'gouges'. (M. Clark) ½ size.*

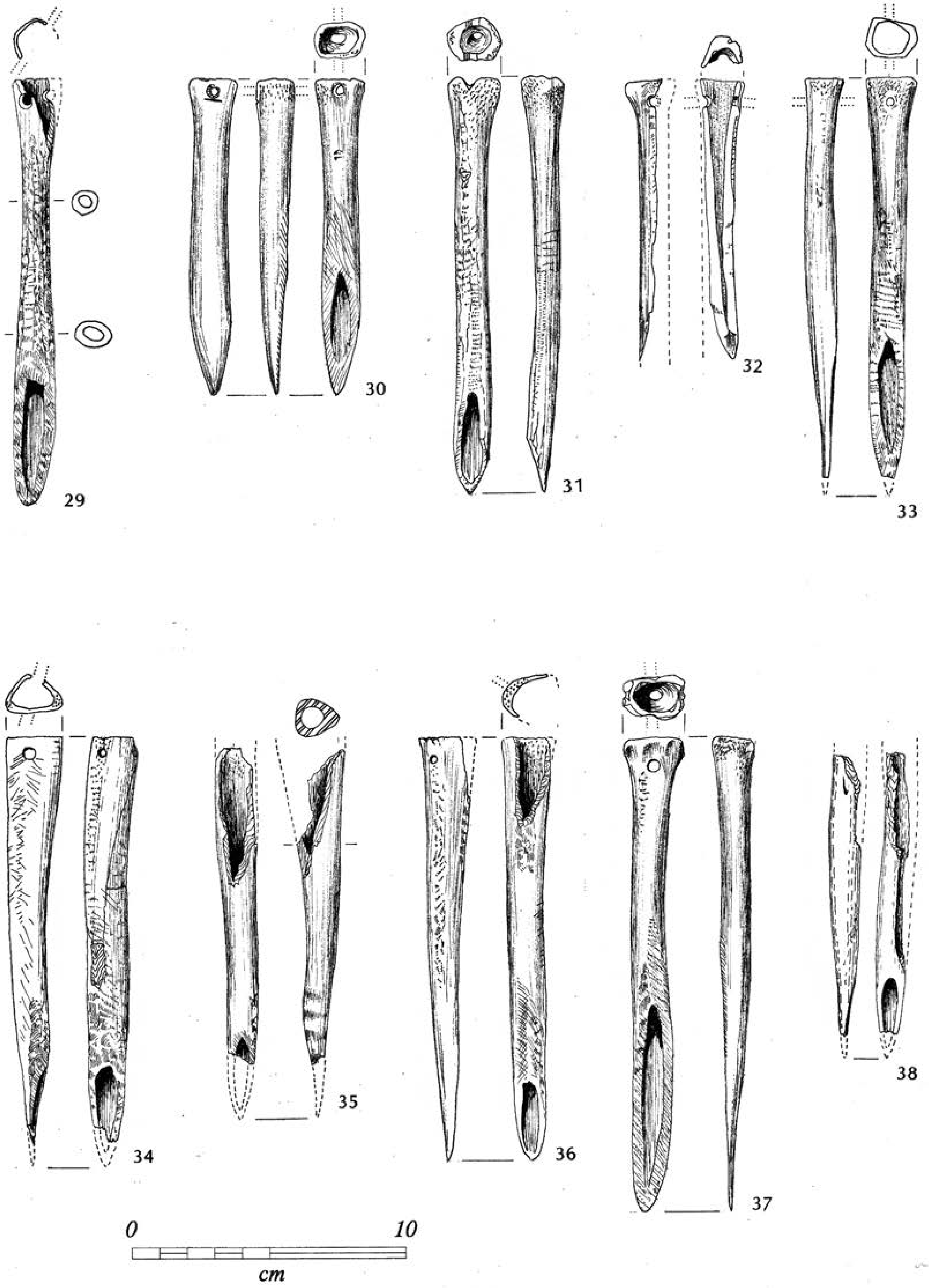


Fig. 5.7 29–38. *Bone spearheads* **378, 382, 400, 442, 445, 86, 166, 281, 291, 128**, *otherwise known as 'gouges'. (M. Clark) ½ size.*

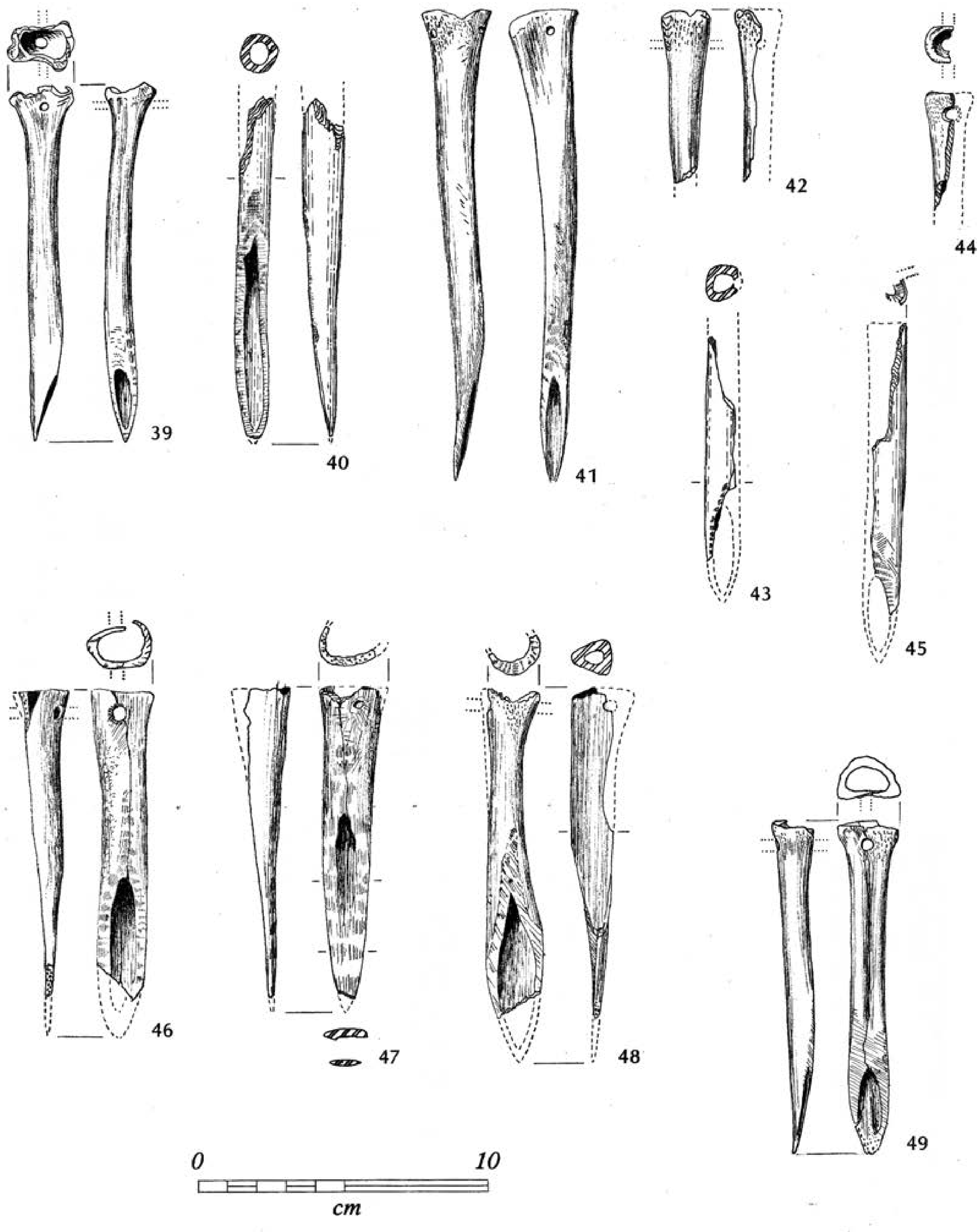


*Fig. 5.8 39–49. Bone spearheads **153, 163, 164, 137, 160, 414, 427, 131, 190, 209, 69** otherwise known as 'gouges'. (M. Clark) ½ size.*

Fig. 5.9 *50–57. Bone spearheads* ***360, 174, 145, 443, 289, 185, 215, 343****, otherwise known as 'gouges'. (M. Clark) ½ size.*

Temporal distribution

There is little question that the hey-day of instruments of this morphology was the Iron Age but they have been recovered from both earlier and later contexts. Bronze Age examples have been found at Upton Lovell, Wilts. (Cunnington 1923: 85) and Grimes Graves, Norfolk (Legge 1992: 45). In Denmark, they persisted to Late Roman times (Roes 1963: 35; Brøndsted 1940: 216, Kjaer 1901: 47). They lasted even longer in Ireland where they have been discovered at the stone fort of Cahercommaun, Co. Meath, and at Lagore Crannog, Co. Clare, both of which were occupied during the Christian Irish Period around the end of the eighth until the tenth century AD (Hencken 1938: 3, 62; Roes 1963: 35–6).

Geographical distribution

In Great Britain, these implements have been found at Glastonbury, Meare and Wookey Hole, Somerset (Bulleid and Gray 1917: 419–21); Danebury, Hants. (Sellwood 1984a: 382–7); All Cannings Cross, Hanging Langford Camp, Wilsford Pits, Wilsford Down, Lidbury and Upton Lovell, Wilts. (Cunnington 1923: 82–8); Maiden Castle (Wheeler 1943: 303–7; Sharples 1991a: fig. 87, no. 12) and Gussage All Saints (Wainwright 1979), Dorset; Grimthorpe (Mortimer 1905: 151), Rudston and Garton Station (Stead 1991), East Yorks.; Grimes Graves (Cunnington 1923: 86; Legge 1992: 45, 51, fig. 23) and Hockwold-cum-Wilton (Lawson 1979), Norfolk; Dragonby, Lincs. (Taylor and May 1996); Borness Cave, Scotland (Bulleid and Gray 1917: 421); Foshigarry and Bac Mhic Connain, North Uist (Beveridge 1930; 1931) and at several other sites.

Emma Clarke (2001) has also noted them from Howe, Orkney (Ballin-Smith 1994); Lochlee and Lochspouts crannogs (Munro 1882) and Kinkell Cave (Wace 1915), Scotland; Close ny Chollagh, Isle of Man (Gelling 1958); Gough's Cave (Parry 1928; Balch 1948), Ham Hill (Gray 1926) and Kingsdown Camp (Gray 1930), Somerset; Cold Kitchen Hill (Goddard 1893) and Potterne (Lawson 2000), Wilts.; Ashville trading estate, Oxon (Parrington 1978); Maumbury Rings (Gray 1910), Chalbury Camp (Whitley 1943) and Eldon's Seat (Cunliffe and Phillipson 1968), Dorset; Winnall Down (Fasham 1985) and Swallowcliffe Down (Clay 1925), Hants. An unsocketed bone spearhead, supposedly fashioned from a horse bone, was found in the late nineteenth century in 'moorish soil' at Stixwould on the Witham, 'near the bridge which crosses [a sewer] on the Lincoln road', and compares well with one from the Thames (Franks 1860; Banks 1893: 235–6).

As noted above, these bone artefacts were also found in late sites in Ireland, such as Lagore Crannog and Cahercommaun. Other examples from Ireland include ones from the Dunbell Raths, County Kilkenny, and Strokestown Crannogs, County Roscommon (Hencken 1938: 62). At Derrymaquirk, County Roscommon, in a burial dating to *c.* 750–200 BC a hollowed-out antler point was found with a young woman and the skull of a two-year old (van der Sanden 1996: 96). As well as being found at Danish sites such as Hjortspring and Krogsbølle (Becker 1948), they also occur in Frisian terp-mounds (settlement mounds) of uncertain dates in the northern Netherlands (Roes 1963).

Frequencies

The collection of these implements from Fiskerton (55 in total) is amongst the largest known. In Britain, All Cannings Cross produced an impressive 123 (Cunnington 1923), while Maiden Castle follows with 70 (Wheeler 1943), Glastonbury with 65 (Bulleid and Gray 1917), Meare with 41 (Bulleid and Gray 1917), Danebury with 38 (Sellwood 1984a), and Swallowcliffe Down with 18 (Clay 1925). The Danish site of Hjortspring yielded a respectable 31 (Becker 1948).

Morphology

Despite variation in overall size within the group, all of the Fiskerton spearheads are of the same basic type. Each implement is made from a long bone that has had one articular end completely removed and the body bevelled down to a tip. Forty-one of the spearheads were made from the tibiae of sheep or goats. The remainder include seven from other sheep/goat bones (Figs 5.8.49, 5.9.50–51 and 54–57), three pig tibiae (Fig. 5.8.46–48), two roe deer metatarsals (Fig. 5.9.52–53), one cow radius (Fig. 5.4.1) and one too fragmentary to identify (Fig. 5.4.4).

The tips vary from pointed to somewhat rounded and are usually lenticular in cross-section. The bases are modified by a socket that runs from the end through the body, parallel to the long axis of the tool. This socket was designed to hold the tang of a wooden shaft. The wooden shaft was secured in place typically by rivets or pins set in smaller holes perforating the body of the spearhead and, presumably, the tang. Tools of similar gross morphology from other sites often lack the socket and rivet holes, indicating that they were not hafted and therefore served as something other than a spearhead.

Manufacture

Given that only one unfinished piece (***123***, Fig. 5.4.4) was identified in the assemblage and that it was fragmentary, it is generally not possible to reconstruct the order in which the various manufacturing stages were performed. However, surface traces do reveal something of the kinds of tools used to make the objects. Studies show that bone artefacts from British Early Bronze Age sites such as West Row Fen (Mildenhall 165; Olsen 1994) were made predominantly with stone tools, whilst those from Late Bronze Age sites such as Runnymede show a combination of both stone and metal bone-working implements (Olsen 1988). By the time the Fiskerton causeway was built, manufacturing marks on bone artefacts indicate that they were made almost exclusively with metal tools. The bone implements in the Fiskerton collection show traces of having been worked with metal axes, files, saws, drills, chisels, knives or scrapers, and possibly adzes.

Length

The lengths of the spearheads vary between 109–175mm, with the pig tibiae and sheep metatarsals being the smallest. The only group with a sample size great enough to perform a meaningful metric analysis consisted of those made on sheep/goat tibiae (41 in total). Complete measurements could be obtained on 33 of the 41. Their average total length is 155mm and the average length of the point (measured from where the bevel exposes the marrow cavity down to the tip) is 52mm.

Base

The bases of the tools were trimmed by sawing or more rarely by chopping to remove part or all of the articular surface. Sometimes small cut marks are visible on the body around the base, indicating that the bone was turned several times between sawing strokes or chopping blows. The base was then smoothed by grinding or filing (Fig. 5.10) to remove the rough chopping or saw marks and irregularities in the remaining articular surface. In a few cases the surface was merely ground or filed without first cutting the end off. One specimen (***172***, Fig. 5.4.5) has an incised line around the body just above the base.

There is a definite preference for the distal end of the bone to serve as the base. Thirty-nine out of 50 (78%) identifiable tools fall in this category, including all three pig tibiae. In 11 cases (22%), the base is at the proximal end, including both roe deer examples and the cow radius. Five tools could not be assigned to either category because they were too fragmentary.

At Maiden Castle, tibia tools dating to the Early Iron Age were generally made with the distal ends as the bases (Wheeler 1943: 303–4; Crowfoot 1945). About 50 with distal bases were reported from there. Of these, 33 (66%) were associated with Early Iron Age pottery and eight (16%) with Middle Iron Age pottery. On the other hand, 20 with proximal bases were collected at Maiden Castle. Of these, four (20%) were linked to Early Iron Age pottery and 16 (80%) with Middle Iron Age pottery. All but one of those from All Cannings Cross were made with distal bases. At Meare lake village, implements with the distal end of the tibia as the base numbered at least 23 individual specimens, while 18 had proximal bases (Gray 1966: 310). At Danebury, 12 of the tools made from tibiae of sheep or goats retained distal bases, while seven kept the proximal end (Sellwood 1984a: 382).

The style of implement that uses the distal base is the most prevalent overall in the archaeological record of the British Isles but those with proximal bases increase in frequency in the Middle Iron Age. In addition to those cited above, 'gouges' with distal bases either predominate or are the only type present at the following sites: Ham Hill, Maumbury Rings, Cold Kitchen Hill, Swallowcliffe Down, Burwell Fen, Yarnton, Elsfield, Wilsford Pits, Wilsford Down and Lidbury Camp (Cunnington 1923). Rotherley produced one with the proximal end as the base (*ibid.*).

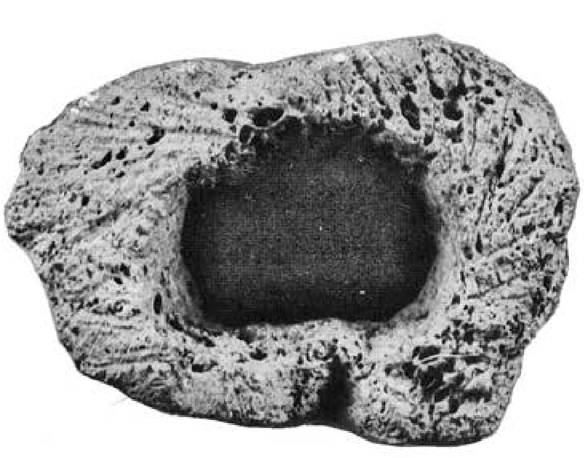


Fig. 5.10 *File marks on the base of one of the bone spearheads. Note how the changes in direction of the file marks show that the spearhead was rotated during the process.*

Socket

All of the implements from Fiskerton have a cylindrical hole in the base that enters the marrow cavity through the articular surface and appears to be a socket for hafting a wooden shaft or handle to the bone component. A piece of wood found in the socket of a similar tool from Glastonbury (Bulleid and Gray 1917: 419–20, fig. 149) may be the remains of such a shaft. Similar tools or weapons were found at Hjortspring, Denmark, with the tangs of the wooden shafts still in their sockets in many cases (Becker 1948; Roes 1963: 34). It was not possible to determine the full length of these shafts, however, because they had rotted away a little farther down. Other examples were found at Krogsbølle, Denmark (Kjaer 1901: figs 27, 28).

The sockets in the Fiskerton tools were probably initially opened when the articular surface was cut off. Otherwise they may have been started by drilling through the base. They were then widened by reaming out the cancellous tissue near the articular end until the opening met the marrow cavity, forming a continuous hollow channel from the base to the bevel. The sockets vary in size from 10mm to 18mm in diameter, with one 31mm in diameter. The reaming tool was probably a metal blade resembling a penknife. This is evidenced by the fine concentric striations and occasional longitudinal cut marks where the blade's edge dug into the bone too deeply. None of the wooden shafts was preserved at Fiskerton, despite the fact that organic remains were generally well preserved on the site. Although the size and diameter of the tangs may be inferred from the sizes of the sockets, the lengths of the entire shafts cannot be surmised, so it cannot be absolutely discerned whether they were short handles or something much longer, such as spear shafts.

The use of basal sockets in bone tools as a means of hafting them onto wooden shafts dates at least to the Neolithic in Britain. Sockets were found in the bases of digging tools made from a proximal radius and distal tibiae of cattle from the Neolithic mine shafts of Grimes Graves, Norfolk (Legge 1992: figs 32, 33). This hafting technique continues for a variety of bone tools in the Bronze Age deposits at the same site, including ones made from sheep tibiae and metapodials and resembling the tools from Fiskerton (Legge 1992: 45, 51, fig. 23).

Rivet holes

Within the Fiskerton collection, holes between 3–5 mm in diameter were normally drilled through the body near the base so that rivets or pins could be inserted to secure the connection between the wooden shaft's tang and the body of the bone implement. A wide range of comparable socketed metal tools with rivet holes are known already from the Bronze Age (Evans 1881: 200–7, figs 239–244) and continue into the Iron Age and later. A bone tool from a Bronze Age mineshaft at Grimes Graves had a small (4 mm) rivet hole drilled in its body on one side just below the base (Legge 1992: 45, fig. 23: BM 17).

A number of these tools from the Iron Age have retained traces of the pins that held the wooden tang in position. They demonstrate that there was no set material from which the pins could be made: pins of bone, wood and iron have all been recovered. Part of an iron pin was found in the socket of one of these tools from All Cannings Cross (Cunnington 1923: 86). An iron and a bone rivet were found with two of these implements at Wookey Hole, Somerset (Cunnington 1923: 86–7). At Hanging Langford Camp, Wilts., a bone rivet was still *in situ* in the rivet hole of one of these implements (Cunnington 1923: 86–7). Swallowcliffe Down (Crowfoot 1945: 157) and Grimthorpe (Mortimer 1905: 151) each produced a rivet in one of their specimens. That from Grimthorpe was made of wood. Unfortunately, no rivets were found in the Fiskerton assemblage.

In most of the tools from Fiskerton, paired rivet holes are located in opposition to one another on the anterior and posterior surfaces of the bone but sometimes they are positioned medio-laterally.

- Twenty of the intact tools have rivet holes in both the anterior and posterior surfaces. Seven fragmentary ones have holes in the anterior surface, while two have them in the posterior, but it was impossible to determine if they were originally drilled on both sides because the tools are incomplete.
- Two tools (***378*** and ***427***, Figs 5.7.29 and 5.8.45) have two holes positioned diagonally between the anterior/posterior and medio/lateral sides. A third tool (***281***, Fig. 5.7.36) also has a hole in this position but is broken so the presumed second hole is absent.
- Six tools have rivet holes on both the medial and lateral sides; one fragmentary one retains a hole on the medial and another on the lateral side.
- In three examples (***147***, ***344*** and ***424***, Fig. 5.5.9, .15 and .18) holes were drilled both antero-posteriorly and medio-laterally. In two of these cases, the two pairs of holes are offset slightly, possibly so that the rivet or pin passing through the medio-lateral holes did not collide with the one passing through the anterior and posterior surfaces. In the third example (***147***, Fig. 5.5.9), all four holes are in the same transverse plane. Either the perforations were not all intended for rivets or, more likely, one pair replaced the other when a repair was performed.
- One tool ***444*** (Fig. 5.6.20) has only one rivet hole and ***172*** and ***400*** (Figs 5.4.5 and 5.7.31) have none. Fragmentary tool ***123*** (Fig. 5.4.4) also has no rivet holes but appears to have been unfinished.
- Nine tools are too fragmentary to determine how many rivet holes they may have had.

The tool made from a cow radius has no rivet holes in the body (***144***, Figs 5.4.1 and 5.11). In this case, the wooden shaft's tang must have been secured by friction alone or, more likely, with the aid of an adhesive. Numerous

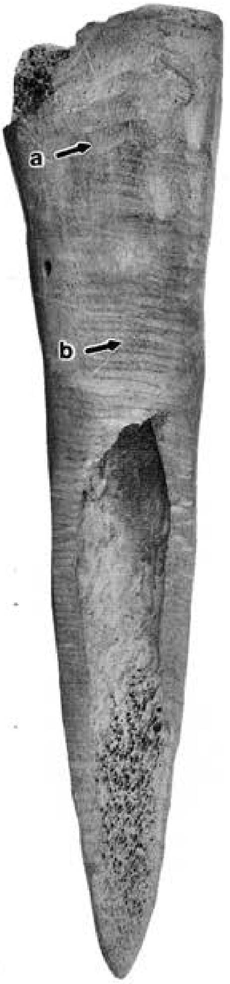


Fig. 5.11 *Cow radius (**144**) spearhead. a. Chisel marks. b. Scraper marks.*

examples of Iron Age metal and bone points found in Danish sites were hafted by means of a tang in a socket that lacked rivets (Kjaer 1901: figs 18–23). In some cases, such as at Hjortspring, the resin adhesive holding the bone point onto the wooden shaft is still preserved in the tool's socket (Rosenberg 1937: 45; Roes 1963: 34).

The appearance of the walls of the rivet holes in the Fiskerton tools indicates that they were most probably made with a metal drill. Stone drills generally leave a conical hole if drilled from one side or a biconical one if drilled from both sides. Rarely are the walls parallel unless the hole has been reamed after it was made. Deep and unevenly spaced concentric striae occur along the wall of the perforation made by a stone drill and sometimes around the lip of the hole. With a metal drill, the striae are shallow or absent and the walls of the perforation are much straighter. The cross-section of the perforation made with a metal drill may be either conical, if the sides of the bit are tapered (Fig. 5.12), or parallel, if the bit has parallel sides. The lip of the hole made by a metal drill bit is typically crisp and sharp and may show an uplifted fringe of bone debris around it. With a stone drill, the debris is usually scraped off around the lip by the drill's tapering margin or shoulder. The smooth, regular inner surfaces of the rivet holes in the Fiskerton tools bear the characteristics of holes made with a metal drill.

Four basic forms of rivet holes may be classified on the basis of the perforation profiles. The first and most common type was made with a parallel-sided drill of small diameter (Fig. 5.13a). The sides of the perforations made in this manner are straight and perpendicular to the outer surface of the bone. In some cases, the parallel-sided drill bit perforated one side and continued across the socket hole and perforated the second side, indicating that the drill had a long, narrow shaft.

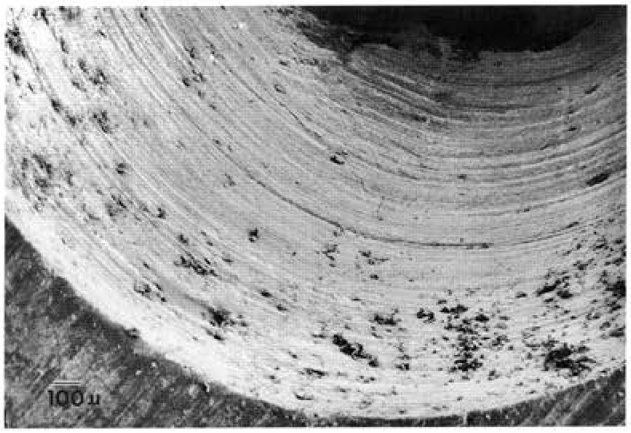


Fig. 5.12 *Experimentally drilled hole in bone, made with a spade-like steel drill bit.*

The second drilling method used a spade-like drill bit and created a perforation with sloping sides (Fig. 5.12). An experimental drill bit, made by flattening a nail, was used to recreate these conical perforations. It was about the same size and shape as one found on the site at Fiskerton (***430***, Fig. 6.3.2) and produced a hole in bone very similar to those in the archaeological specimens when attached to a modern hand-cranked drill.

The third type of perforation (Fig. 5.13b) appears to have been made in a two-step process. Holes in this category are parallel-sided at the bottom but the upper part of the walls slope outward as in the conical perforations. This kind of hole would have served to countersink the rivet or pin so that its head would be flush with the outer surface of the tool's body. There are two possibilities for the manufacturing stages of countersinking on these tools. One possibility is that the tool was partially drilled

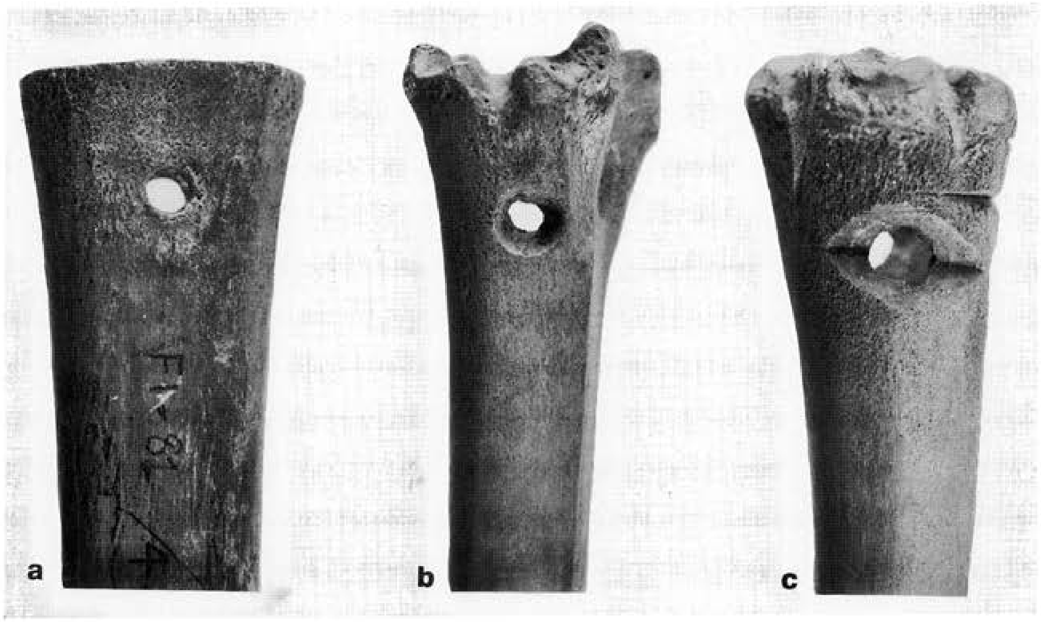


Fig. 5.13 *Examples of three perforating techniques used to make rivet holes in bone spearheads at Fiskerton: a. hole made with a parallel-sided metal drill bit; b. counter-sunk hole made with metal tools; c. hole chopped with a metal axe.*

with a conical drill and the bottom of the drilled pit was punched out with a smaller graver or parallel-sided drill. Alternatively, the hole could have been made with a parallel-sided metal drill bit first, with the outer rim then widened with a more conical drill or reamed out. At least seven of the tools have countersunk holes.

A fourth type of hole, represented by only one example (***191***, Fig. 5.13c), was made by chopping a V-shaped opening in the body and reaming out a circular hole in the centre of the cut.

Body

The main body of these implements generally received very little modification during manufacture. In some cases the manufacturing marks formed in shaping the point and tip extend partially up the body above the bevel or on the back. It is not unusual for a general, evenly distributed polish to be present on the bodies of these implements.

Point

The functional end of each tool was made from the dense bone of the diaphysis minus the articular end. Evidence for the method employed to remove the end has been obliterated by subsequent manufacturing stages. The only unfinished piece (***123***, Fig. 5.4.4) provides some information about the sequence of manufacturing, however. It shows that, in at least one case, the bevel of the point was begun by scraping down the body on one side before the articular end was removed. Retaining the articular end while one surface of the body was being planed down would have provided a grip during manufacture and kept the tool strong through the process of making the bevel. Later the articulation was removed, probably by snapping it off after the bevel had thinned the body at that end considerably.

Tool marks on many of the specimens indicate that the point was shaped and finished in long continuous strokes. Bevelling of the point could be accomplished by scraping, filing or a combination of the two. The back (the surface opposite the bevel) was also usually scraped or filed lightly to thin the tip further.

The manufacturing marks on the bevel, back, and tip of these tools are relatively diagnostic and show that they were made with a narrow metal tool such as a chisel, a wider blade such as a knife or cabinet scraper, or a file. The metal chisel has left long, narrow facets containing multiple longitudinal striations (Figs 5.11 and 5.14), which sometimes angle off owing to slippage along the bone's curved surface. When the chisel was pushed across the surface with sufficient force, transverse undulating ridges, or chattermarks, were formed. Metal tools often leave characteristic striation patterns that can be repeated over the bone artefact's surface from one stroke to the next. Like rifling striae on a bullet caused by the barrel of a gun, these recurrent striation patterns indicate that a particular tool was used over and over. In theory, it is possible to trace an individual metal instrument from one bone object to another. This repetition can be seen on the cow radius, where a chisel made multiple whittling strokes over the surface near the base (Fig. 5.15). The knife or scraping tool produces much wider facets with straighter striations and less evidence for slippage. Deep chattermarks can be found where a metal scraper has been used, as in Figs 5.11 and 5.16. Files also create long facets but contain within them very fine, diagonal striations and no chattermarks.

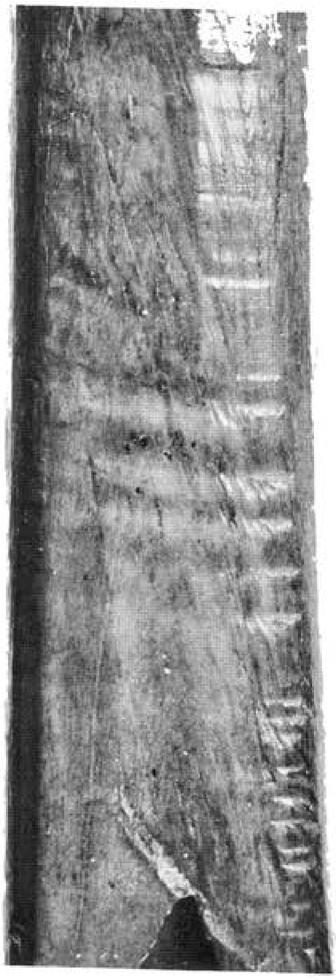


Fig. 5.14 *Narrow chisel facets on a bone spearhead made from a sheep or goat tibia.*

Tip

The tips of the Fiskerton tools are generally pointed but with a relatively large angle of convergence of the two edges. The range for the angle of convergence on 16 intact tips is from 31–74° and the average is 45°. The typical cross-section is lenticular to rectangular. More than half (58%) of the tools are damaged at the tip but there is usually enough of the point left to see that the shapes of the broken specimens conform well with those that are intact.

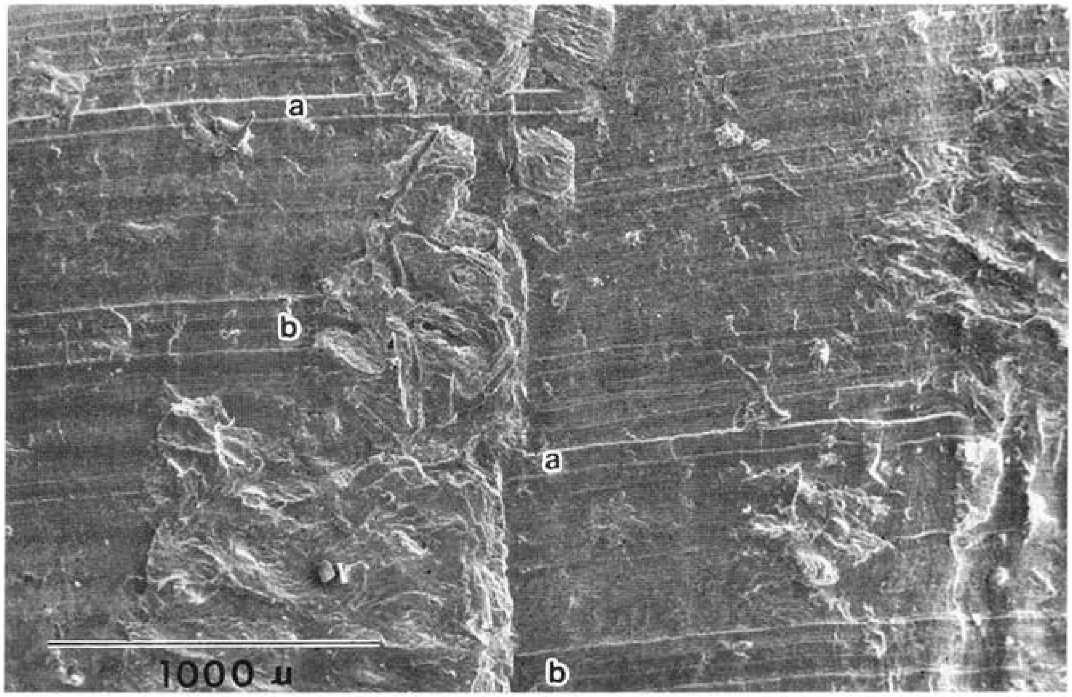


***Fig. 5.15** Scanning electron micrograph of chisel marks on the cow radius (**144**) spearhead. a. and b. show identifiable sets of striations that are repeated over the tool's surface, indicating that one chisel was used for multiple strokes.*

***Fig. 5.16** Close-up of the cow radius spearhead showing pronounced chattermarks made by a broad metal blade, like that on a cabinet scraper.*

Function

In the present study the overall shape, tip morphology, polish distribution, tip damage, context, and associations with other artefacts were considered in determining the function of the Fiskerton artefacts. One thing that is certain is that tools of this general shape from different contexts, sites, periods, and localities probably served a myriad of functions, so combining them together as one type can create serious problems. Unfortunately, conclusions about their functions are extremely difficult to make and some of the drawbacks are outlined below. Based on gross morphology, however, it is possible to reject many of the functions attributed to artefacts of this general shape and style.

Several authors have presented their views on the function of such artefacts but it is unlikely that any consensus can ever be reached. The variety of terms used to describe these tools is an indication of the confusion that still exists. Since their first discovery various functional labels have been suggested, including gouge, chisel, spoon, spear or lance head, skewer, hide scraper, weaving shuttle and pin. Cunnington (1923: 85) mentions that they resemble 'apple scoops' but she is here probably referring to an article unfamiliar to modern readers: an apple-scoop was 'an instrument made of bone or ivory for eating apples' (O.E.D.), presumably known to Cunnington writing in the early part of the twentieth century.

Tip morphology is a critical element in the functional reconstruction of these bone tools. If these objects were spoons or scoops they would probably have had more of a bowl at the functional end. If chisels, the tips would have been squared off and sharpened along the edge. In any case a chisel of bone would have been much less effective than one of iron or stone.

Although these tools are often described as gouges, there is little to support this conjecture. Firstly, a gouge would have had a chisel edge rather than a pointed tip. Gouges are merely chisels with a curved blade, rather than a flat one. Secondly, the wear at the tip and on the body is not in accordance with the use of these implements as gouges. Experimental bone gouges used on wood develop a rounded facet along the working edge (Olsen 1984: 180). Chips are often driven off the back and a high polish and longitudinal striae can be seen on the use facet. None of these characteristics are visible on the tools from Fiskerton. The thinness of the tip renders the tool unsuitable for levering or for using with excessive torsional force against rigid materials like wood.

A hide-scraper would also have a broad, sharp edge, although its corners would probably be rounded to prevent damage to the hides. Most hide-scrapers are made from a stronger bone, such as the humerus of a red deer or cow, and are not pointed since this would have punctured the hide.

The point at the tip of these tools immediately presents the possibility that they were awls, used in sewing leather or making coiled baskets. It is probably true that some similar-looking tools from other sites fulfilled this function. When compared to the tools from Fiskerton, however, most awls have a finer tip with a round cross-section and use polish focused at the tip (Olsen 1984: 207). Many of the implements from Fiskerton and elsewhere have stout tips and on most the polish continues well up the body. Coarser coiled baskets used for such items as beehives and skeps can be made with larger awls that show strong similarities to the tools found at Fiskerton. This manufacturing technique, known as 'lip work', consists of making baskets with large, untwisted coils of straw bound with bramble, split cane, or similar flexible plant material (Staniforth 1981: 12–16).

Lip-work awls have a hollow tip and body into which the binding fiber is slipped so that it can be threaded through the lower coil when attaching the uppermost coil to it. The hollow in the awl acts as a rigid sleeve that guides and protects the flexible binding when the awl is shoved into the thick coil. This hollow shape is reminiscent of the Fiskerton tools and could explain why the polish passes farther up the body than is normally the case for awls with more delicate tips. No extension of the handle is needed on lip-work awls, however, so the socket and rivet holes would be superfluous. Roes (1963: 36–7, pl. xxvii, 6–8) assigns this function to tools found in Frisian terp-mounds, in the Netherlands, which lack a socket or rivet holes. She witnessed a craftworker at the Openlucht Museum at Arnhem making straw beehives with one of these implements, known in Dutch as a 'spleutskeker' (split-sticker). It is logical that pointed bone tools that lacked sockets and handles were sometimes used as spleutskekers, or lip-work awls. It is much less likely that those from Fiskerton, all of which have sockets, were used in this manner.

It has been suggested that these implements were used as sword-beaters or pin-beaters for packing the weft down while weaving textiles (Crowfoot 1945). The sword-beater is a wide, flat, elongated wooden or bone blade that is used to beat all or a large section of the weft simultaneously by sliding the beater horizontally into the warp shed (Barber 1991: 274). In comparison to a flat wooden 'sword' or a long, flat bone such as a rib, the cylindrical morphology of a sheep's tibia is poorly suited to this function and a tibia's length is not especially great for a sword-beater. A sword-beater could benefit from having a long wooden handle attached, but the thickness of these weaving instruments and the bulkiness of the bases of the Fiskerton tools make it unlikely that this was the function of the Fiskerton implements. As Cunnington (1923: 85) points out, the roughness of the bases could also have snagged the thread. Countersinking the rivets would help somewhat but most of the pin and rivet holes were not countersunk at Fiskerton.

A pin-beater, or pick, can be used to pack the weft down, just like a weaver's comb except that it has only one tooth (Brown and McGowen 1992: 17). Even though this seems inefficient compared to a multi-toothed comb or a sword-beater, pin-beaters have been used consistently in many regions of the world. The morphology of the tip and body of a pin-beater is often similar to that of an awl but the tip can also be thin and flat, *i.e.* lenticular, in cross-section. The shape of the Fiskerton implements is not inconsistent with use as pin-beaters and the wear up the body is more in line with this function than with typical awls, in which only the tip is normally used. Because just the tip and part of the body of a pin-beater are stuck between pairs of individual warp threads, a rough, untrimmed base would not come in contact with the shed and snag the warp threads. A handle, however, would not have been necessary or even helpful on a pin-beater because it would have moved the hand too far away from the cloth being woven. Those examples from other sites that have no socket or rivet holes may be good candidates for pin-beaters, if their tips are suitable. Bone pin-beaters often develop a wear groove running transversely near the tip. The tip morphology, polish distribution and wear on all examples of this type of implement should be examined closely before lumping together all tools of similar gross morphology, with and without wooden shafts.

The frequency of tip damage (58% in the Fiskerton assemblage) is an important aid in identifying the function of these tools. Much of the breakage can be attributed to post-depositional activities such as trampling but polish over the ends of broken tips of a few artefacts from Fiskerton and Danebury (Sellwood 1984a: 385) seems to indicate that they were broken during use. What appears to be polish is more likely due to compression caused by impact against a hard surface at a high velocity. Such compression polish was noted by this author (writing as S. Arndt) in experiments in which antler arrowpoints were shot into cattle scapulae (Arndt and Newcomer 1986: pl. 23). Because tip damage is common on the artefacts from Fiskerton and is mentioned by other authors, it is important to investigate this further. Weaving tools and hide-working tools should not display a high frequency of tip damage (except perhaps that which occurs post-depositionally) because they are not used on resistant surfaces or with great force. Breakage should not normally have occurred during weaving, unless the tool was accidentally dropped. A roughly broken tip would have been greatly improved by a few minutes' work with a file or scraping tool and would have prevented snagging of the textile. Resharpening of broken tips is not readily visible on the Fiskerton tools, however.

Polishes on bone are not in themselves diagnostic of the contact materials that have formed them. In fact, it is often difficult to distinguish intentional manufacturing polishes, applied to smooth the surface of the object or to make it more attractive, from use polish. However, polish distribution can sometimes help in the interpretation of its formation, with the more even, widespread polishes often indicating manufacture rather than use. If manufacturing polish is absent, then the distribution and degree of development of the polish may provide information about the way in which the tool was held and the duration of its use. The Fiskerton tools have polish distributed on the tip, the bevel, the back and sometimes well up the body. It is usually fairly light and only partially obscures the more distinct manufacturing traces. Although this polish could have been formed by use, it is also possible that it was made during manufacture or by sliding the implement in and out of a sheath or quiver.

The addition of a wooden shaft or handle to extend the length of the tool could have served several functions. It would have increased the leverage of the tool but in this case the tip morphology precludes any heavy-duty functions requiring great force. The extent of polish up the body of most of these tools may indicate that the tool's function involved more than just the tip. A short wooden handle would have helped to expose more of the body of the tool by moving the user's hand away from the functional part of the implement. The preferred alternative in the Fiskerton case, which is supported by finds in Denmark (Becker 1948; Kjaer 1901; Rosenberg 1937), is that the wooden part of the tool was a long shaft and that the function of the bone implement was as a spearpoint.

There are probably even more plausible functions for these objects other than those presented by archaeologists to date. The fact is that the gross morphology, tip morphology, polish distribution, and hafting of a wooden handle or shaft do not point to any single efficient use for all of these tools throughout the Iron Age. This explains why these objects have been assigned so many conflicting functional names. It is very likely that more than one function existed and that the implements are being collapsed into one category more on the basis of shared manufacturing features and superficial gross morphology rather than a single, unified purpose.

Pointed bone implements had a multitude of functions from the Upper Palaeolithic onwards but what ties so many of these Iron Age artefacts together is that a large number of them are made of sheep or goat tibiae with a socket in the base and holes for pins or rivets to hold the tang of a wooden shaft in place. This hafting technique had already been applied to bone tools, albeit rarely, in the Neolithic and rose in prevalence in the Bronze Age. This is probably because the riveted socket-and-tang was ideally suited to metal tools and caught on quickly. Its common use in metal tool hafting then apparently increased its application to bone tools. Although this seems backward to us, there is no reason why manufacturing methods should not gain popularity in a more recently acquired medium and then be retro-fitted to an older, more familiar one. Hafting methods were constantly being revised. It is natural that the technique, as it was used on a regular basis for metal spearheads, would then increase in popularity with the cheaper, more readily available bone ones.

Whereas metal tools and weapons were normally superior to those of bone, the availability of finished metal objects must have been rather low initially. Substitutions of bone and stone must have been common in the tool kits of the less affluent members of society and for ritual disposal.

Context

The best hope for discovering the function of these tools lies in finding some in an archaeological context that provides clues to their use. Unfortunately, there are few published descriptions of precise contexts of these finds in special features or having repeated associations with other artefacts. The following accounts of where certain examples of these artefacts have been found helps shed light on at least two probable functions.

One of the strongest arguments for at least some of these tools being used in weaving is the close association between them and both loom weights and the remains of a loom in a pit at Swallowcliffe Down (Clay 1925; Crowfoot 1945).

In Barrow B on the Grimthorpe Estate, Pocklington, East Yorkshire, the body of a young man was found with a total of 16 of these implements (Mortimer 1905). About half of them were placed over the top of the body, while the others were found distributed below and around the body. These implements were thought to have been used to pin together a wrapper, perhaps of hide, that covered the flexed body. They were made of sheep or goat tibiae and had a socket in the base and two to four rivet or pin holes. One of the holes still retained a wooden peg inside. Mortimer did not consider the use of these tools as 'skewers' to be their primary function and it is equally plausible that they were weapons put in the burial to accompany the man into the afterlife.

The collection of these implements from Hjortspring, Denmark, provides perhaps the strongest support for the argument that some served as lance- or spearheads.

Hjortspring is one of the largest and best-known weapon deposits from the Late Iron Age and dates to the La Tène period (*c.* fourth-second century BC) based on its swords and shields (Roes 1963: 34). Located on the island of Als in a small bog nestled in the hills near Hjortspring Kobbel (Rosenberg 1937), this site has been interpreted as a sacrificial offering of the spoils of war to the gods by the victors at the site of an important battle. The triumphant are thought to have been the local inhabitants who defeated an attack by some undetermined foreign troops attempting to land on the island.

The Hjortspring bog deposit contained a rowing-boat or war-canoe, a steering oar, shields, 138 iron-tipped spears, 31 bone and antler 'spearheads' resembling the Fiskerton implements, and other weapons. Along with the military equipment were more mundane objects, including bowls, boxes and smithing tools (Glob 1969: 185). Sixty-three of the spearheads, including some of those with bone tips, still had their wooden shafts preserved. Those lacking rivet holes had the wooden tang secured with resin (Rosenberg 1937: 45).

Krogsbølle is another accumulation of spears and swords in a Danish bog, of similar age to Hjortspring (Becker 1948). The site is north of the town of Odensen. Like Fiskerton, it was a wooden causeway through a bog. To the side along one part of the road lay a scattering of weapons. At other points along the road individual spears were stuck vertically, point down, between the cobblestones covering the wooden trackway. Krogsbølle produced six single-edged swords, 24 iron spearpoints, and 19 bone spearpoints. Most of the bone spearpoints had sockets to attach wooden spear shafts and are made of sheep or goat tibiae, with only one made from a metapodial.

It is less clear than at Hjortspring whether the weapon deposits at Krogsbølle mark a war memorial or ritual sacrifice on hallowed ground but the close association between the bone implements and iron swords and spearpoints cannot be denied. Glob (1969) finds parallels between it and Hjortspring and believes both to be offerings to the god of war. It is also possible that many of the weapons were left at the scene of an actual battle at Krogsbølle either because it was too dangerous to gather them or because there was little time to do more at the battle-ground than collect the bodies of the injured or deceased.

Bulleid and Gray (1917) referred to one of these bone objects from the Late Iron Age settlement of Glastonbury as a lancehead. Several other archaeologists over the years have called these either spear- or lanceheads and they are frequently labelled as such in museum exhibits. Wheeler (1943) took exception, however, believing that no socket amongst his 70 examples from Maiden Castle was wide enough to receive a tang of a thickness adequate for the hafting of a wooden shaft durable enough for the point to be used as a thrusting weapon. Wheeler's argument is not a strong one, given that the sockets in the iron spearheads at Hjortspring are about the same diameter as those in the bone points from the same site (Roes 1963: 36). Given the defensive nature of Maiden Castle, the bulk of these objects may well have been spearheads.

The site of Dragonby, Lincs., contained a combination of these implements with and without a socket and with and without rivet holes (Taylor and May 1996). Their morphology, wear and context help to point out that more than one function may apply. Tip polish and transverse wear grooves were reported on some of those that lacked a socket and rivet holes (Taylor and May 1996: 352, fig. 14.4, nos. 47–48). Given their wear, it is very likely that this group served as pin-beaters. Other examples without sockets or rivet holes may have been used as either awls or pin-beaters. Only two specimens, one having a socket and the other a trimmed base and rivet hole, were probably spearheads. The first (Taylor and May 1996: 352, fig. 14.4, no. 53) was found in a layer of decomposed turf underlying cobbles in Money Field, associated with Romano-British pottery. The second (Taylor and May 1996: 352, fig. 14.4, no. 55), made from a sheep metatarsal, was recovered from a fourth century palisade trench, a likely location for a spearhead.

The significant number of weapons and war-related artefacts deposited along the Fiskerton causeway may help confirm that the bone artefacts, all of which had sockets for wooden shafts, were spearheads. The Iron Age metal artefacts found at Fiskerton generally fall into three major categories: those tools useful for metalworking, those used in woodworking and those associated with warfare (swords, spearheads and a possible shield mount). The close analogies between the war-related ritual deposits at Hjortspring and the parallels with the Krogsbølle causeway deposits strengthen the argument that the Fiskerton bone implements were spearheads.

The Hjortspring and Krogsbølle cases provide useful clues to aid in the interpretation of Fiskerton. The Hjortspring site is most likely a ritual deposit, whereas the Krogsbølle artefacts are not so concentrated and clearly defined in their context. According to Merrifield (1987: 24), 'The practice of depositing valuables, particularly weapons, in watery places extends far back into the Bronze Age' in Britain. He draws attention to five bone skeuomorphs of metal daggers dating to the Early Bronze Age (*c.* 1500–1400 BC) brought up from the River Thames (*ibid.*: 24–5, fig. 3). Merrifield states: 'It is difficult to account for these copies, two of which are represented in their sheaths, except on the assumption that they were made as votive substitutes for metal weapons which were too valuable to be sacrificed. Substitutes of this kind have always been considered legitimate in ritual; for the gods and the dead need only the essence or "soul" of the offering, so the sacrificer can often avoid real economic loss.' (*ibid.*: 25). He presents a number of Bronze Age through to Roman examples. This may have relevance not only for the large quantity of bone spearheads found at Fiskerton but also for the absence of wooden spear shafts (or even their tangs in sockets) and rivets associated with them. Perhaps these bone projectiles were merely votive substitutes that were never used in battle, and were not even hafted onto shafts.

Their deposition may have been simply symbolic of the offering of fully functional weapons.

On the other hand, as at Krogsbølle, the distribution of the bone spearpoints at Fiskerton does not form a tight concentration. This implies that, if they are ritual offerings, individuals were making separate deposits from time to time, much as passers-by independently throw coins in a fountain. Or is there another explanation? One possible cause for the dispersal of the points might be that they represent remnants of an actual battle scene in which the weapons were left where they dropped. This could explain the high percentage of broken tips on the spearheads, indicating that they were actually employed according to their designated function and not merely as votive objects. The absence of their wooden shafts would then be explicable by conditions of preservation rather than because they were never hafted. The final interpretation must be based on examination of the site as a whole, however, rather than the bone spearpoints alone and Parker Pearson gives a very convincing argument for their deposition as votive items (see Chapter 10).

Conclusions

Much can be learned about the ways in which Iron Age bone and antler artefacts were made by examining their gross morphology and the manufacturing traces on the surfaces of these objects. Equally important is the information that these bone tools provide about certain types of stone and metal tools. Finding their traces on bone artefacts enlightens the archaeologist about the kinds of tasks for which the stone and metal implements were utilized. At Fiskerton it seems clear that bone was worked primarily with metal rather than stone tools. In some cases the existence of a certain type of metal tool may be indicated by manufacturing traces on bone artefacts when the actual metal implement itself has not been recovered at the site. At Fiskerton, however, metal tools were found which correspond well with the manufacturing traces on the bone objects.

The various functions of the bone tools are generally more difficult to determine than the manufacturing processes employed to make them. Tool design and use wear traces can provide clues to the function of some artefacts but may be ambiguous for others. The context of certain tool types and their associations with other objects can also be critical for identifying their function. In the case of the spearheads from Fiskerton, their morphology and use wear help to reduce the number of possibilities and eliminate some functions altogether. Their contexts in other sites – Hjortspring in particular – substantiate the interpretations presented here. Better preservation of adhesives, rivets and wooden shafts at localities such as Hjortspring and Krogsbølle also provide clues about hafting technology and aid in the interpretation of these enigmatic tools.

One very important point that has emerged in this study is that similarities in gross morphology alone may not be enough to collate tools from many sites and time periods into one functional role. Tools that were made in a form similar to the spearheads from Fiskerton, but which were not hafted onto a wooden shaft, must have served entirely different functions. It is important, therefore, to examine tools at any site using as many different kinds of evidence as possible, incorporating morphology (gross and tip), use wear and context as keys to their function.

THE AMBER AND JET ARTEFACTS

By M. Parker Pearson

The jet ring

349. (Fig. 5.17.1) A finely polished jet ring of uneven diameter, externally 40mm by 42mm across, and 10mm across its circular section. It was found in layer **26**, immediately to the west of the eastern post row in Area E. In the absence of X-ray fluorescence spectrometry analysis it cannot be confirmed as Whitby jet, though it appears not to be made of cannel coal, shale or lignite nor is it likely to be Kimmeridge jet given its location.

The jet ring is similar to one from a La Tène I burial at Kirkburn in East Yorkshire (Grave K6; Stead 1991: 92–4) although the latter was shaped for suspension, probably as an ear-ring, worn on the left side by a 17–25 year old woman buried with a newborn child. A shale ring of similar dimensions was found in another Iron Age grave at Burton Fleming in the area at the feet of a poorly preserved and unsexed probable sub-adult wearing copper alloy beads, a bracelet and a La Tène I brooch, accompanied by an unadorned probable female (Grave BF61; Stead 1991: 92, 218–19). From other bracelet associations in Arras culture burials (Stead 1991: 90–1), this central burial in BF61 was most likely a female, wearing the shale ring as a toe-ring. Rings of similar size are known from Iron Age settlements, in shale at Meare East (Coles 1987: K4, K11, K34) and in jet at Glastonbury (Bulleid and Gray 1911: 261, fig. 55).

Similar jet rings from Roman contexts at Silchester (Lawson 1976: 256, no. 59), a fourth century AD burial at Trentholme Drive, York (Wenham 1968: 99, fig. 40.8) and in the Yorkshire Museum interpreted as a hair-ring (Allason-Jones 1996: 46) indicate that the Fiskerton specimen may belong to either the Iron Age or the Roman period. The attribution of magical and healing properties to jet in the Roman period suggests that it may have been considered as more than decorative (Allason-Jones 1996: 15; Sheridan and Davis 1998: 148).

The amber beads

122. (Fig. 5.17.2) A fine amber bead, 18mm in diameter and 12.5mm thick. Its centre, 10mm in diameter, is ringed by a 'dog-tooth' arrangement of ten 1–1.5mm deep grooves, bevelled at both ends. It was found in layer **26** in Area B.

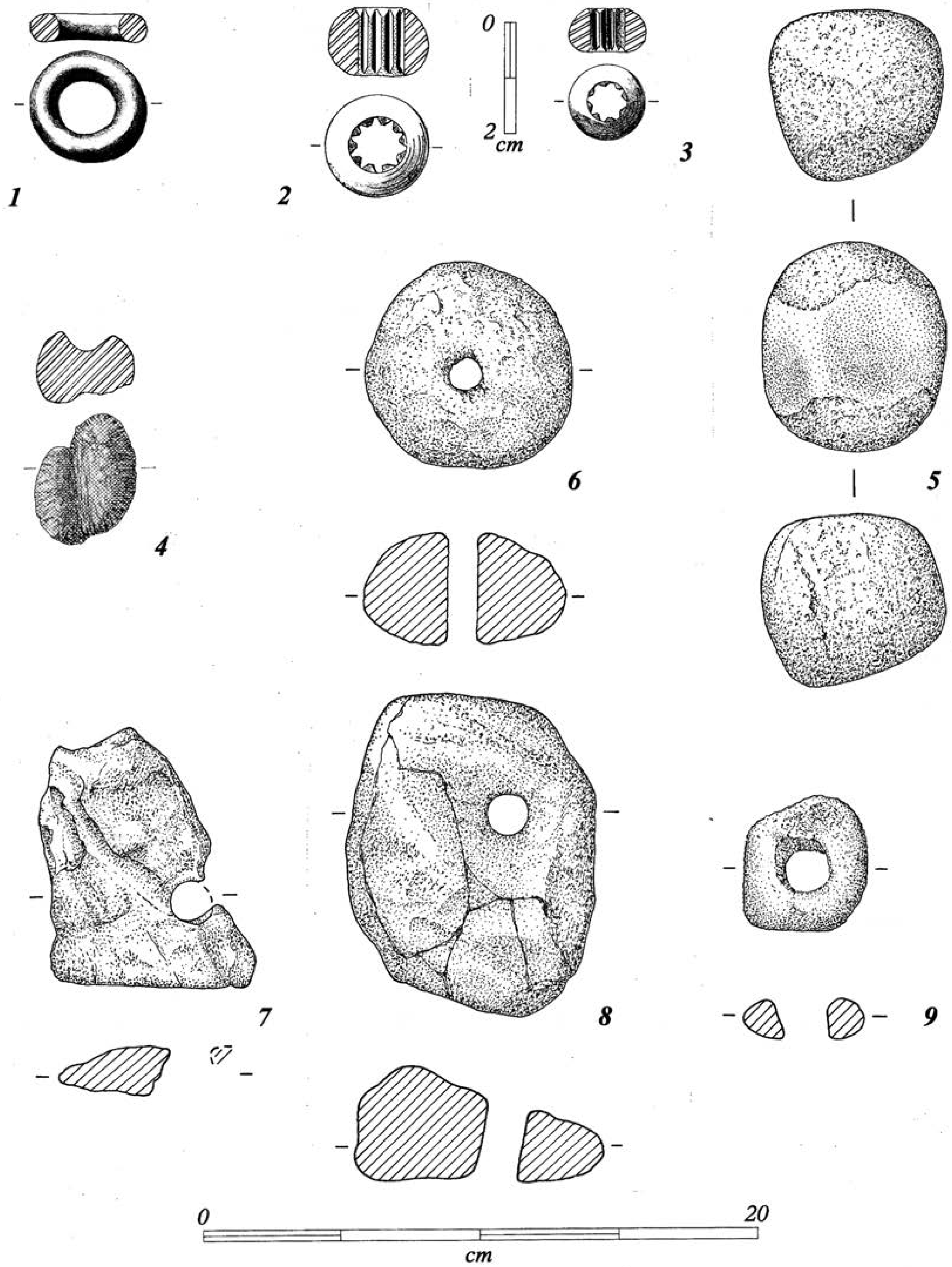


*Fig. 5.17 1. Jet ring **349** (½ size); 2–3 amber beads, **122** and **168**, actual size (M. Clark); 4 marcasite nodule **236**; 5 hammer stone **357**; 6–9 stone weights **65**, **339** and surface finds (D. Taylor) ½ size.*

168. (Fig. 5.17.3) A fine amber bead, 14mm in diameter and 8mm thick. Its centre, 7mm in diameter, is ringed by a 'dog-tooth' arrangement of eight 1mm deep grooves, bevelled at both ends. It was found in layer **32** in Area E.

The two amber beads are so far unmatched elsewhere: their unusual faceting makes them very different from the doughnut-shaped amber beads from other British Iron Age sites (Beck and Shennan 1991: 105–7). The latter occur in settlement contexts at Glastonbury and Meare (Coles 1987; Coles and Minnitt 1995), in Early Iron Age burials at Wetwang Slack, Danes Graves, Arras and Kirkburn in East Yorkshire (Stead 1979; 1991: 93), and in Late Iron Age burials at Stanfordbury, Herts. (Stead 1967: 56), Welwyn Garden City, Herts. (Stead 1967), and Birdlip, Glos. (Bellows 1880–81). Where an individual's age and sex can be determined, such as Wetwang burial 250, Kirkburn 6 (Stead 1991: 93) and Birdlip, amber beads are associated with adult women. The two Fiskerton beads are listed by Beck and Shennan but are described incorrectly as flattened globular beads, their type 3 (1991: 158, fig. 11.5:6). These were not among the amber artefacts that they analysed spectroscopically. A Roman date for these beads cannot be ruled out. As with the Iron Age comparisons, there is nothing similar to their internal fluting from Roman assemblages.

It is possible that the Fiskerton beads were not suspended, either from the ear or from the neck, since their fluted centres are suggestive of their having been mounted on similarly shaped armatures to hold them in place. For the European Early Iron Age amber is thought to have been associated with élites, found in graves with goods that are characteristically (but not exclusively) female in their associations (Beck and Shennan 1991: 135–7).

THE WORKED STONE

By M. Parker Pearson and V. Fell

236 (Fig. 5.17.4). A smoothed nodule of marcasite with a deep longitudinal groove. Length 42mm, width 37mm, thickness 27mm, fractured on the rear. There are fine striations running along the groove: some are straight and parallel to the length of the groove, others are slightly curved or discontinuous. It was found in layer **195** in Area B.

357 (Fig. 5.17.5). A quartzite hammer stone (length 70mm, width 62mm, thickness 60mm) with a sub-rectangular section and heavily worn at both ends. It was found within the post rows, just to the east of the main west row in the north part of layer **313** in Area E. An unmodified pebble of the same material was found in an unstratified context.

65 (Fig. 5.17.6). A small but complete limestone weight (76mm × 72mm, 39mm thick) with a 12mm-diameter hole drilled through its centre. It was found in layer **3**.

339 (Fig. 5.17.7). Part of a limestone weight (95mm × 72mm, 39mm thick) with no evident original surfaces surviving. It is broken through the drilled hole which is 18mm in diameter and was probably located towards one end of the weight. It was found in the west-central area of layer **313** in Area E.

Unstratified surface find (Fig. 5.17.8). A complete but subsequently broken limestone weight (115mm × 87mm, 46mm thick) with a 13mm-diameter hole (25mm long) drilled towards the thinner end of the weight.

Unstratified surface find (Fig. 5.17.9). A complete limestone weight (54mm × 45mm, 18mm thick) with a 17mm-diameter hole drilled through its centre.

404 (Not illustrated). A poorly struck flake (25mm × 25mm) of grey-brown flint, found in layer **313** in Area F.

Worked nodules of marcasite, or pyrites, some with a groove, have been recorded from prehistoric contexts where they are often associated with flint fabricators and it has been suggested that they were strike-a-lights (Evans 1897: 313–18). The limestone weights are most likely net weights for fishing, given the riverside context of the site. They may well have been made on the spot from suitable pieces of the limestone rubble dumped in layer **31**. Three of the four net weights are likely to be post-Roman in date and the fourth may be either Iron Age or Roman. The only other stonework, other than the broken limestone spread (layer **31**) and the whetstones (see Parker Pearson, Chapter 6) consisted of a piece of angular burnt limestone in layer **194** and a lump of quartz in layer **313**.

6 THE ROMAN AND MEDIEVAL ARTEFACTS

THE ROMAN POTTERY

By M. Darling and N. Field

A total of 209 fragments of Roman pottery were recovered from the excavation, of which six were unstratified, with a further seven fragments from fieldwalking, together representing a minimum of 27 different vessels. The majority of the Roman pottery (139 sherds) was found in layers **31** (11), **32** (90) and **26** (38). Sixty-four pieces were found at lower levels, in **194** (14) and **331** (3), and in **192** (20) and **195** (27).

Illustrated (Fig. 6.1)

1. A folded beaker with a cornice rim in Nene Valley colour-coated ware, cream fabric. (***50*, *56*, *57*, *91*, *124*, *125*, *129*, *306*, *441***). [Layers **26**, **31**, **32**, **192**]

2. An everted rim native-tradition cooking pot; vesicular originally shell-gritted fabric. Burnt and in poor condition. (***253*, *263***). [Layers **31**, **32**]

3. A jar with everted rim and high relief nodular rustication in grey fabric; knife-trimmed basal zone with a moulded foot base, burnt and sooted. This comprised 21 sherds mainly from the bottom half of the vessel with three small rim sherds, found in Area B west of the causeway within an area of 7m by 4m. Sherds were found at depths varying between 0.69m and 1.44m below the ground surface; the two base sherds (***314***) – the largest and heaviest – were found deep in the peat in layer **195**, ostensibly dating to the Iron Age. Their adjoining sherds (***25*** and ***58***) were found 0.70m higher up in layer **32** and were 2.90m and 2.60m away, respectively. (***25*, *31*, *35*, *38*, *43*, *55*, *58*, *59*, *60*, *88*, *176*, *181*, *196*, *111*, *112*, *214*, *241*, *314***). [Layers **26**, **31**, **32**, **192**, **195**]

Five body sherds in grey fabric with the same type of rustication. It lay mainly south of the main cluster and, on the basis of fabric and finish, could belong to a second vessel. (***4*, *20*, *49*, *53*, *120***). [Layers **26**, **32**]

4. A jar base in grey fabric; moulded foot base. (***150***). [Layer **192**]

5. A large wheel-made jar in grey fabric, with an everted moulded rim with a possible slight lid-seating, and a groove-demarcated zone on the shoulder decorated with a scored wavy line. Heavily sooted. Sandy with sparse calcareous inclusions. The 20 sherds were found in Area B, west of the causeway, in two main clusters about 2.50m apart, the highest at 0.65m and the deepest at 1.19m. The base sherds were found together as were the rim and upper body sherds; two joining pieces were found within 0.60m of each other but one (***219***) was 0.37m below the other (***52***). (***15*, *46*, *52*, *155*, *158*, *198*, *219*** (2), ***223*** (5), ***224*** (4), ***233*, *380*, *438***). [Layers **32**, **192**, **195**]

6. A Black Burnished type cooking pot, hand-made brown-grey fabric with acute lattice decoration. It was found in three layers in Area F, in exactly the same location but at varying depths between 0.72m and 1.13m below the ground surface. (***105*, *173*, *175*, *193*, *239* + *178*, *179*, *180*, *185***). [Layers **26**, **31**, **192**]

7. A grooved-rim dish in the same BB-type grey fabric with black surfaces. Hand-made, with burnished pointed intersecting arc decoration. Three sherds found in two locations in Area F, 2.30m apart, well to the east of the post rows. (***371*, *373***). [Layer **331**]

8. A flat-rimmed bowl in similar BB-type grey fabric with black surfaces. Hand-made, with the same intersecting arc decoration, and scribble on the underside. The sherds were clustered together but varied in depth by 0.50m, between 0.62m (***39***) and 1.12m (***213***). A stray sherd was found *c.* 7.80m northeast of the rest of the vessel. (***39*, *45*, *109*, *127*, *156*, *213*, *279*, *284***). [Area F, Layers **26**, **32**, **192**, **195**]

9. A dales ware shell-gritted jar. No trace of sooting; possibly some limescale internally. This consisted of 29 sherds very closely clustered together in Area B. Location of its sherds varied in depth between 0.56m (***7*** and ***8***) and 0.80m (***54***) but the majority were close together. (***5*, *6*, *7*, *8*, *12*, *13*, *19*, *20*, *21*, *22*, *24*, *26*, *27*, *32*, *33*, *34*, *40*, *41*, *42*, *44*, *54*, *130***). [Layers **26**, **32**]

10. A dales ware shell-gritted jar; internal limescale deposit. This was found to the north of the other jar Vessel 9. The sherds were 2.75m apart and one was 0.29m deeper than the other. (***37*, *113***). [Layers **26**, **32**]

Unillustrated vessels

Nene Valley colour-coated ware joining bodysherds probably from a box form. Cream fabric; light red-brown external colour-coat. Third century. (*78*, *79*). [Layer **32**]

Cream body sherd of flagon-type fabric from a closed form. (*72*). [Layer **32**]

Fine light cream-brown fabric body sherd from a closed form; well-smoothed exterior. (*82*). [Layer **26**]

Small body sherd in sandy oxidized red-brown fabric, from a closed form. (*276*). [Layer **31**]

BB-type hand-made base from a larger cooking pot with part of lower wall; surfaces eroded, decoration unknown. Similar fabric to that of other BB-type vessels. Second century? (***157***, ***162***, ***165***, ***183***, ***217***, ***242***). [Layers **192**, **195**]

Grey wheel-thrown body sherd with groove-demarcated zone of crude latticing with a possible further burnish-decorated zone above/below, probably from a large jar. (*71*). [Layer **26**]

Grey wheel-thrown plain base with burnished basal zone and part of crude lattice decoration above. (*97*). [Layer **26**]

Grey body sherd, burnished exterior, from a closed form. (*250*). [Area G, layer **31**]

Grey plain base fragment and non-joining body sherd. (*261*, *316*). [Layer **31**]

Grey fragments from a base with internal burnishing, from an open form. More likely to be of second century date than much later. (*17*). [Layer **32**]

Fairly fine fabric body sherd, heavily burnt but probably originally grey, with common mica inclusions. Likely to be from a closed form. (***189***). [Layer **32**]

17 fragments of a large jar base and wall, in hand-made shell-gritted fabric, now vesicular. (***317***, ***318***, ***319***, ***326***). [Layer **31**]

Dark grey fairly coarse hand-made body sherd with shell inclusions. Probably a Later Iron Age type of cooking pot. (*52*). [Layer **32**]

Dark grey thin-walled hard body sherd with sparse shell inclusions, not certainly hand-made. (***108***). [Layer **26**]

Two fragments of dark grey shell-gritted fabric, not certainly hand-made. (*28*). [Layer **32**]

Body sherd in shell-gritted fabric, hand-made, burnt externally. Possibly from a dales ware jar. (*61*). [Layer **32**]

Two base fragments in wheel-made shell-gritted fabric, with string-marks on the underside, and internal burnishing, from an open form. Open forms in shell-gritted fabrics are more common in the Later Roman period, in the later third century and especially in the fourth century. (***83***). [Layer **32**]

Discussion

The Iron Age-tradition shell-gritted cooking pot Vessel 2 is a common type in the later first century, continuing from the Late Iron Age, and probably being made into the early part of the second century. This vessel is too fragmentary for closer dating.

The rusticated jar Vessel 3 is a common type in the area, and could be as early as the later first century, but the type continues into and well through the second century. The high relief rustication would suggest a later first to early second century date for this jar. The base of Vessel 4 is likely to be from a jar of similar date.

The larger jar Vessel 5 with scored wavy-line decoration is reminiscent of the jars produced at the Roxby kilns, Lincs. (Rigby and Stead 1976: fig. 65, types A & B). Although the precise rim moulding is not paralleled there, the scored wavy line and slight lid-seating suggest a similar date. Roxby also produced lug-handled larger jars and it is possible this could be a handled vessel. The date seems likely to be in the mid- to late second century.

The three Black Burnished vessels 6–8 have similar fabrics and all appear to be hand-made. They do not appear to be from Dorset and a more local source is probable. Hand-made copies of Dorset BB1 vessels are known from Lincoln in similar hand-made sandy fabrics (as at the Racecourse kiln, Corder 1950), and kilns at Rossington Bridge, Doncaster were making hand-made copies (Buckland *et al.* 1980: 158; 2001: 47–48). The dating seems most likely to be in the early third century; the earliest date would be mid-second century (*cf* Gillam 1976: 6, 37–40, 73).

The colour-coated beaker Vessel 1 from the Nene Valley is a relatively early folded type with a strongly curved-over rim. This type occurs in the products of the kilns at Park Farm, Stanground (Dannell *et al.* 1993), dated to the early third century.

Dales ware is unlikely to occur in this area much before the middle of the third century, on the basis of such jars stratified in dated deposits in Lincoln (Darling 1977: 29; 1984: 91). These two jars Vessels 9–10 represent the latest sherds in this deposit.

The pottery therefore ranges widely in date, from the later first century through to the mid-third century or later. The fragments from an open form in shell-gritted fabric (***83***, unillustrated) may extend the range into the fourth century.

It is of note that the earliest Roman pottery (Vessel 2) was found in the same deposit (layer **32**) as the latest (***83***, unillustrated), along with nine pieces of Roman tile and seven Iron Age pottery sherds.

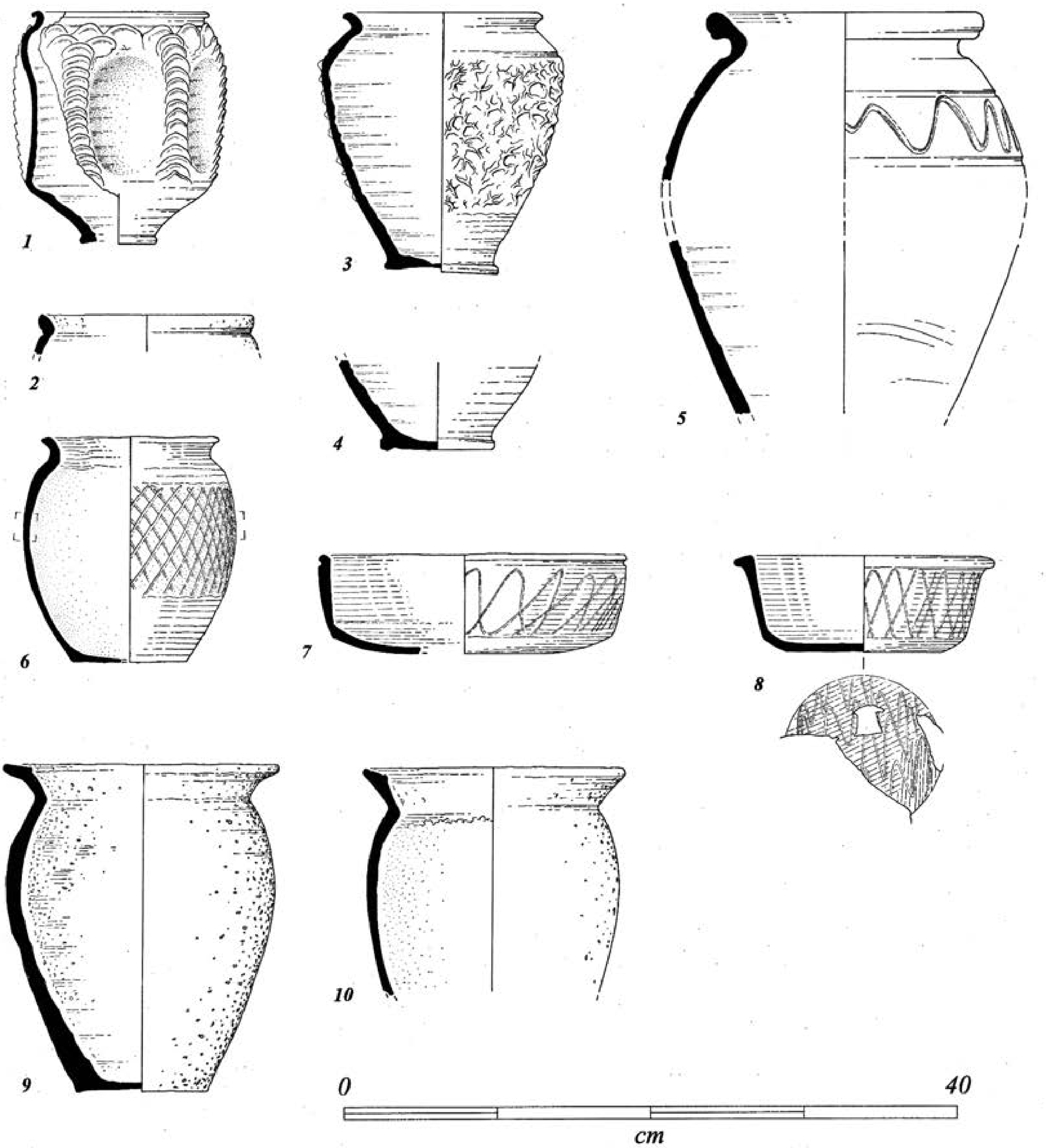


Fig. 6.1 The Roman pottery (D. Hopkins) ¼ size.

THE ROMAN TILE

By J. Young

A total of 26 fragments of tile were recovered from the excavation with a further three fragments from field-walking. Six pieces were identifiable as *tegulae*, five as *imbrices*, with two brick fragments and a single piece of box flue tile. The remainder were too small to categorize. Only one piece came from the flood deposit layer **3** with the majority being found in layers **26** (5), **31** (3) and **32** (9). Five pieces were found at lower levels, two each in **192** and **194**, and a single piece in **331**.

THE ROMAN METALWORK

By A.P. Fitzpatrick, A. Walster, A.B. Page, N. Field and J. Mann

Bronze bowls (metal detector finds)

Two Roman bronze bowls were metal detector finds from near the excavated area. They were found by Vernon Stuffins, one in 1981 and the other in 1984. Both are 'Irchester type' bowls, named after a bronze bowl hoard found at Irchester in Northamptonshire. These are characterized by an omphalos base, rounded body and inturned rim. In most cases, including both the Fiskerton examples, the bowls have been raised from a single sheet of metal. Because of the compression of the metal at the turn of the rim and base, bowls of this type are often cracked, either vertically at the rim or horizontally at the base (Gregory 1976b: 63-6, figs 1, 2).

1 (Fig. 6.2.1a & b). The bowl found in 1981 was from layer **3** in the unexcavated Area A immediately adjacent to the west side of the excavation Area B. It is 250mm in diameter (basal diameter 95mm) and 110mm tall. Its slightly inturned rim is triangular in section and its body thickness is 1mm, thickening to 3mm at the rim and tapering to 1.5–2mm at the junction of the body and the rim. The bowl appears to have been raised by hammering. It has none of the thin parallel grooves that would be evidence for late-finishing. The high copper content indicated by XRF analysis (*c.* 90% copper, slightly less than 10% tin, and a few percent lead) would have made the metal particularly suited to cold-working. The bowl was in poor condition when found and had been repaired in antiquity. The base has been soldered on and may be either a replacement or the original reattached. The vessel has also been repaired with patches on the inside of the rim which have been soldered on; a crack in the body of the vessel has also been repaired by soldering. A mat of aquatic vegetation was found in the bottom of the bowl, probably comprising several species of marsh plants.

2 (Fig. 6.2.2). The bowl discovered in 1984 was found 150m east of the 1981 excavation area, in the same field. It is slightly smaller than the other, being 201mm in diameter and 110mm tall. It was in good repair with only one small hole near its rim.

The distribution of Irchester bowls is restricted to Britain (Kennett 1968; 1969). Whilst occurring as single finds, these bowls are more commonly found in hoards of Late Roman or possibly later date, often with several other vessels of the same type (Gregory 1976a; 1976b; Kennett 1969). As Gregory has pointed out, the likely date range for their manufacture and deposition is between the third and sixth centuries AD, though most favour a Late Roman rather than post-Roman date (Gregory 1976b: 78).

Copper alloy bracelet (metal detector find, May 1980)

(Fig. 6.3.1) The find consists of about one-third of a ribbed bronze bracelet of a fairly crude type, bent back on itself. This was found by Vernon Stuffins in May 1980 in the same place as the Iron Age sword and other finds. Surviving length 65mm.

Copper alloy ring (metal detector find, May 1980)

(Not illustrated). Ring, external diameter 27mm, internal diameter 15mm, convex cross-section. Very corroded.

Roman coin

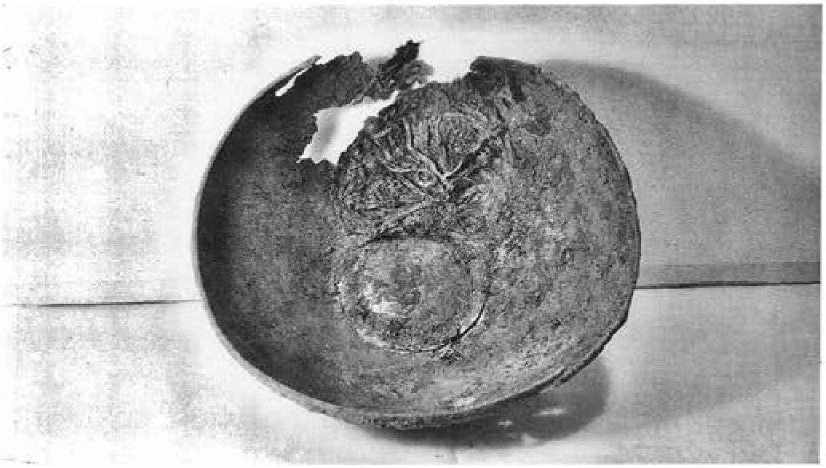
199 (Not illustrated). A very worn *sestertius* of Trajan (AD 98–117) identified by Stephen Castle. This was found in layer **32** in Area E, just to the west of the causeway.

Ironwork from contexts 1, 3 and unstratified

430 (Fig. 6.3.2). A spoon bit or possibly a spoon auger, surviving length 95mm. The very tip of the nose has corroded away and the distal end is also incomplete. The stem is circular in cross-section and it is clearly delineated from the tapering square-sectioned tang or bit head. Spoon bits and spoon augers are common from the Roman period onwards and spoon augers are known from Late Iron Age contexts (Manning 1985: 27–8). Unstratified (spoil).

442 (Fig. 6.3.3). An incomplete bar, length 73mm, possibly a hook. One end is oval in section and sharply curved through 90 degrees; the terminal is flat and probably complete although there is a chance that is was fractured in antiquity. The other end is rectangular in section and tapering with a recent break across the end. There are traces of red iron corrosion products on the surface (?haematite) suggesting intense burning. Unstratified from Area B.

443 (Not illustrated). An L-shaped nail, length 45mm. The curved stem is rectangular in section.



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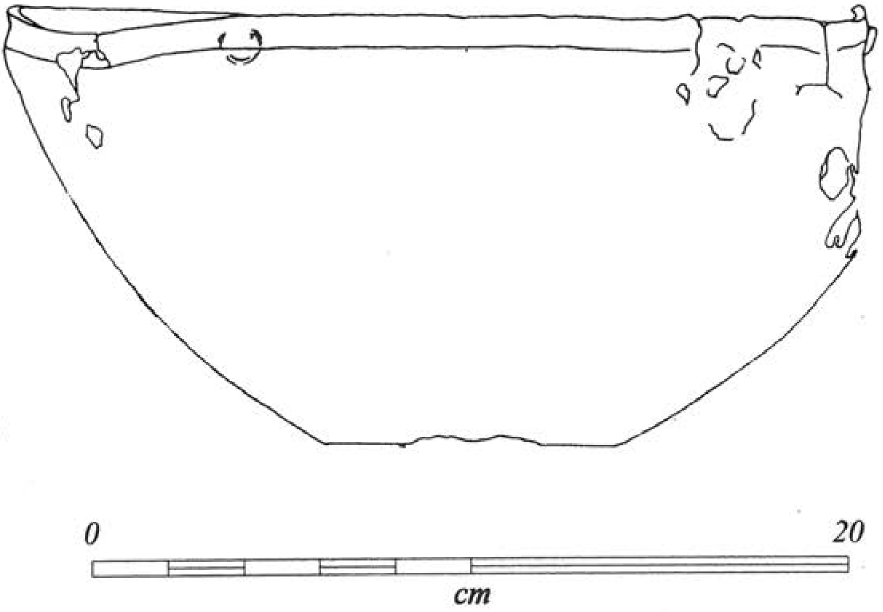

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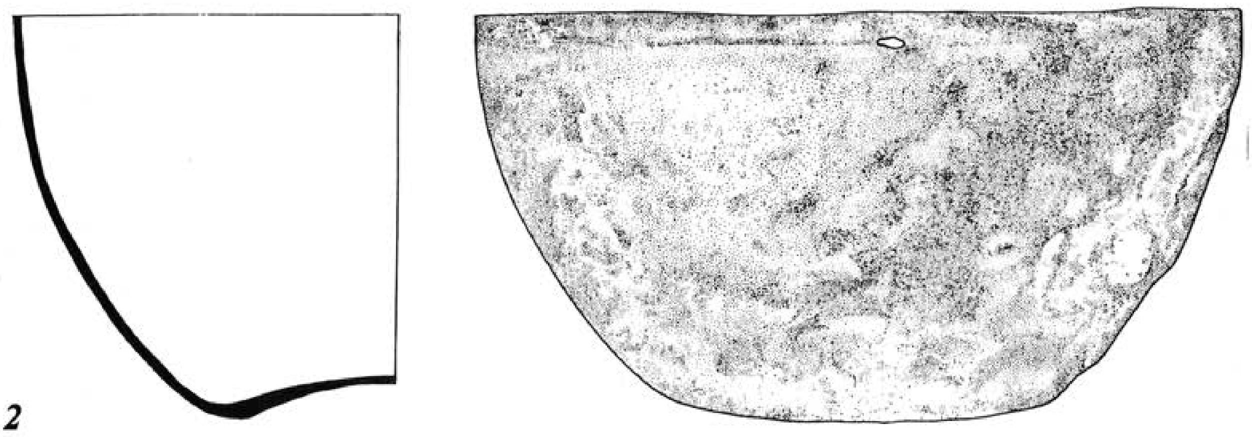

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Fig. 6.2 The Roman bowls. 1a and 1b, from Area A, found in 1981 (A. Walster); 2, from east of the excavations, found in 1984 (M. Clark). 1b and 2 ½ size.

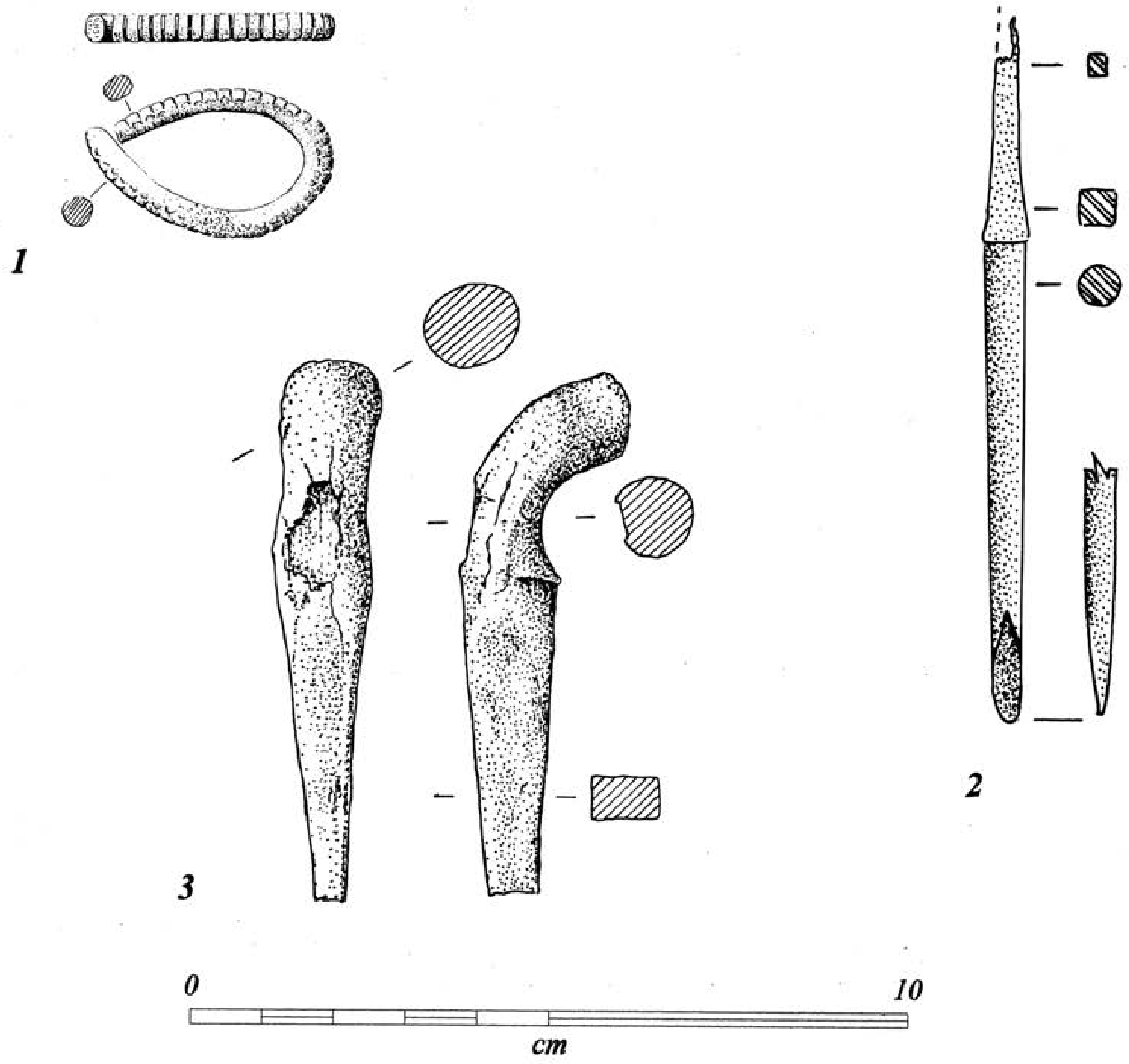

Fig. 6.3 Unstratified Roman metalwork. 1 copper alloy bracelet and 2 **430** *(M. Clark); 3* **442** *(D. Taylor), actual size.*

60 (Not illustrated). A fragment of rod, length 107mm, diameter 11mm, curved at one end and extensively corroded.

66 (Not illustrated). A fragment of rod, length 25mm, tapering from 5mm diameter at one end, becoming sub-rectangular at about mid-point.

A linch-pin (metal detector find, June 1980; not illustrated). This is a piece of corroded iron with a long square-sectioned piece hammered up at the base and topped by a broad flat-sectioned plate not unlike a mason's bolster in shape.

THE ROMAN WHETSTONES

By M. Parker Pearson

Four whetstones were found at Fiskerton. Having been dropped into the mud vertically, two of them had sunk to near the bottom of the stratigraphic sequence, well below artefacts of earlier date. The petrological identification of these whetstones was carried out by D.T. Moore.

227 (Fig. 6.4.1). A very large rectangular-sectioned whetstone (328mm × 33mm × 31mm) with grooves along each edge of one of the two narrow (31mm) sides. Although the ends of the bar are rough and unworked, on the two wide sides (33mm) there are incised lines, one on each side, to mark the point for breakage at one end.

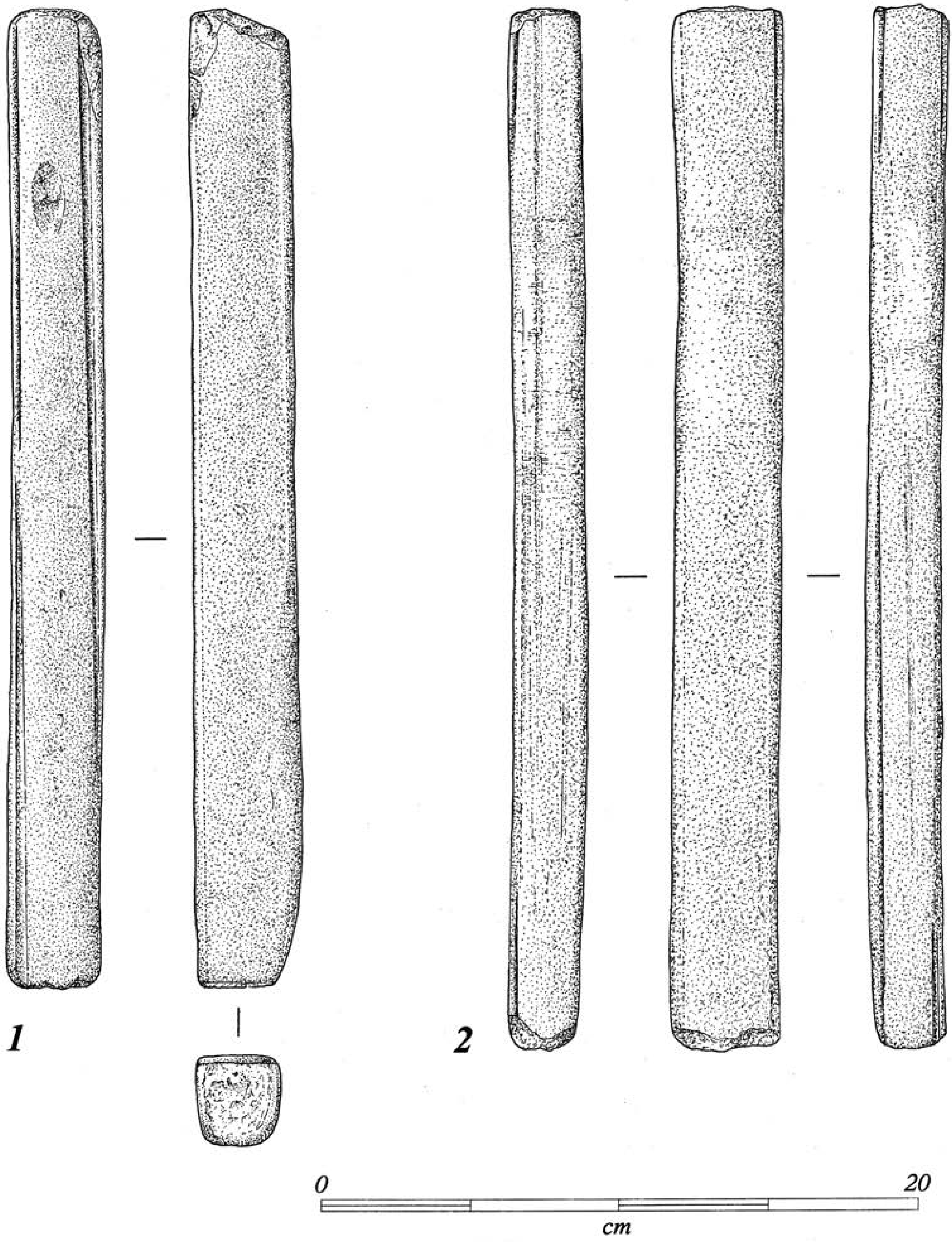

*Fig. 6.4 Roman whetstones **227**, **246** (D. Taylor) ½ size.*

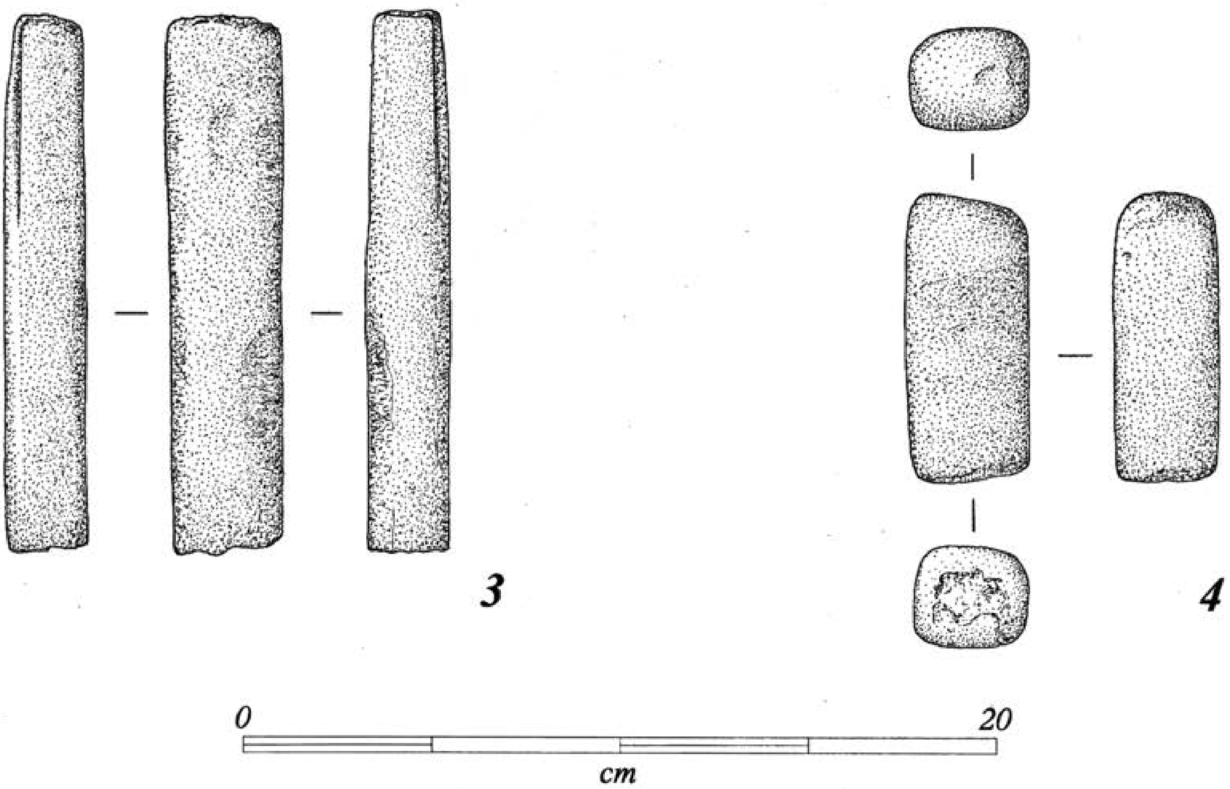

***Fig. 6.5** Roman whetstones **345**, **431** (D. Taylor) ½ size.*

These marker lines indicate that this end of the whetstone is complete and that the unfinished roughness is a deliberate feature of manufacture. The similar dimensions of *246* also indicate that these whetstones are complete. This whetstone has been used fairly heavily though the grooves are largely unworn. It was found in the reed peat deposits **195** overlying layer **332** in Area B.

246 (Fig. 6.4.2). A very large rectangular-sectioned whetstone (350mm × 37–35mm × 27–25mm) with grooves along three of the four edges. Its ends are rough and unworked but the whetstone is probably complete (see above). It is slightly curved from regular use of one side. It was found in the reed peat deposits **195** overlying layer **332** in Area B.

345 (Fig. 6.5.3). A small rectangular-sectioned whetstone (141mm × 29mm × 18mm) which is probably incomplete, having an obvious break at one end. The other end is rough but appears to be its original end. There are worn grooves along the two edges of the wide (29mm) side. It was found in layer **331** in Area F.

431 (Fig. 6.5.4). A small but chunky rectangular-sectioned whetstone (76mm × 32mm × 27mm) which has been heavily used so that its formerly rough ends have been worn smooth. It may originally have been detached from a long bar like *227* and *246*. A petrological thin section was taken from this specimen. It was found in layer **31** between the causeway posts within the baulk between Areas B and E.

According to D.T. Moore, the mineralogical composition of the whetstones is limestone with ostracods, containing quartz and glauconite. This is consistent with Kentish ragstone from the Hythe beds of the Greensand of Kent. This material has been recognized as an important source of Roman whetstones since Peacock's analysis of the material from Fishbourne, West Sussex, when he noted that it indicated an industry with a considerable distribution of its products from York and Lincolnshire to Gloucestershire and Warwickshire (Peacock 1971).

Subsequently the industry has been studied in more detail in terms of the petrology of these products (Moore 1977; 1983: 287–9). Recent research indicates that these Kentish rag whetstones had a wide distribution throughout southern Britain during most of the Roman period, identified petrologically at Colchester (Crummy 1983: 111–13) and Chelmsford (Wickenden 1988: 114–16), Essex; Bignor, West Sussex (Cartwright 1995: 174–6; the whetstone [no. 15] is identified as a '?pestle'); Braughing, Herts. (Trow and Middleton 1988: 89); Alcester, Warks. (Webb with Crossing 1996); Uley, Glos. (Roe 1993: 197-9); Ilchester, Somerset (Moore 1982: 224); Droitwich, Worcs. (Roe 1993: 197) and London (Rhodes 1986). Petrological analysis of one of the whetstones from the large hoard at Wroxeter, Shropshire, indicates that it too derives from Kentish ragstone rather than from a Buckinghamshire source as had been previously thought (Rhodes 1986: 241–3; Atkinson 1942: 129–30).

The Fiskerton whetstones are, in terms of both their

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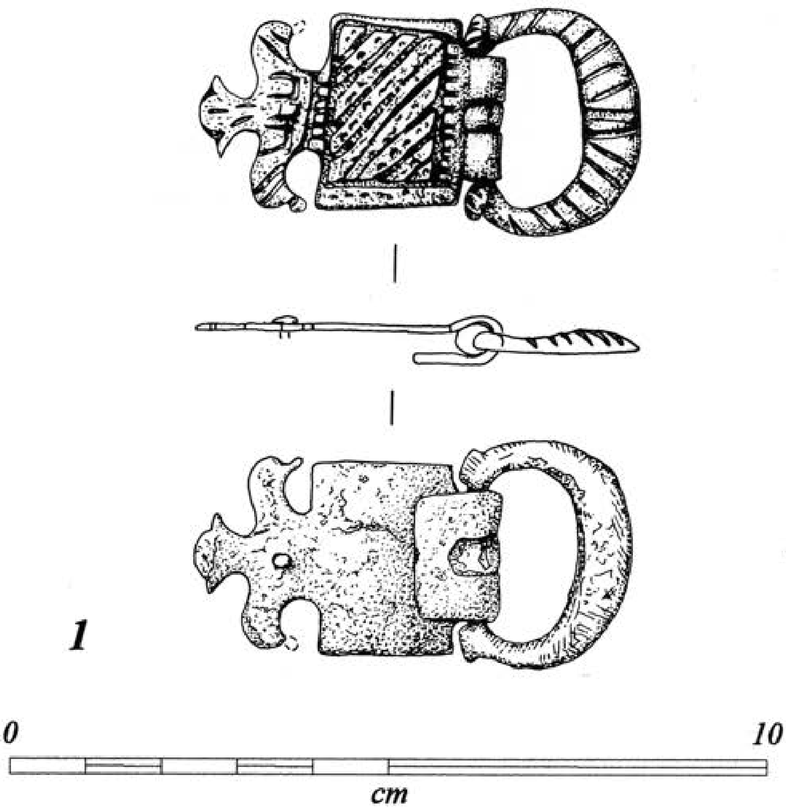

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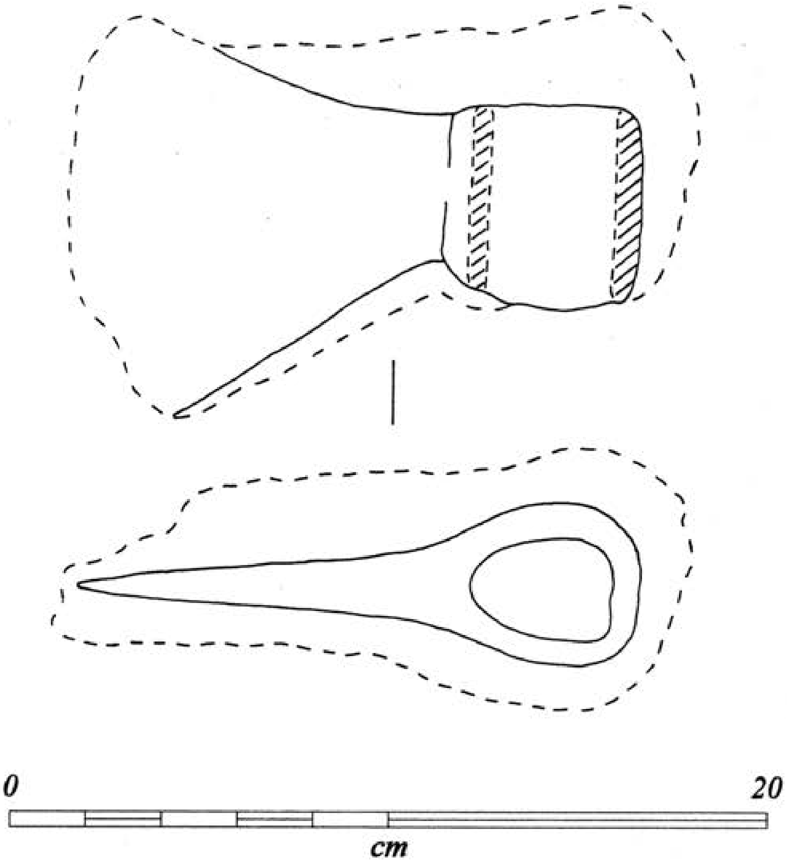


Fig. 6.6 The post-Roman metalwork. 1 copper alloy buckle ***182*** *(M. Clark) actual size; 2 iron axe* ***323*** *outline from X-ray plate (D. Taylor) ½ size.*

lengths and thicknesses, at the top end of the range for Roman Britain. The Wroxeter hoard, dating to the second century AD, consists of about a hundred complete whetstones, measuring on average *c.* 290mm × *c.* 20mm × *c.* 20mm (Atkinson 1942: 129–30). Reference is also made to a complete Roman whetstone found in King William Street, London (Atkinson 1942: 130). One of the Kentish ragstone whetstones from New Fresh Wharf in London is also complete, measuring 293mm × 30mm (Rhodes 1986: 241–3, no. 15.1). Comparison can also be made with the two unsourced rectangular-sectioned whetstones from Grave 11 in the pagan Saxon cemetery at Uncleby in Yorkshire, where the smaller one is 305mm and the larger is 462mm long (Bruce-Mitford 1978: 362–4).

Roman whetstones of Kentish ragstone may have been distributed in the form of these long bars to be broken down, deliberately or accidentally, into smaller lumps. The long bars may have been suitable for sharpening large scythe blades or even swords. There is no evidence whether their role extended beyond their use as an ordinary tool in the Roman period but, in the Germanic period, whetstones could symbolize power, justice, avenging wrath, warfare and the sacredness of oaths and compacts (Simpson 1979).

THE POST-ROMAN POTTERY AND TILE

By J. Young

Forty-nine sherds were recovered from the excavation and a further 42 sherds from fieldwalking in the field to the north. The material ranges in date from the late Saxon to the early modern period and includes both local and regional imported wares. All but one piece from the excavations came from the topsoil (context **1**). This assemblage comprises a single medieval sherd together with late post-medieval and early modern pottery. A single grey ware sherd from layer **31** is probably an unusual Roman vessel but has attributes typical of ninth century Lincoln Sandy ware vessels.

The fieldwalking collection from the field to the north is of a different character with at least 11 sherds belonging to the Saxon period and possibly another 14 sherds being of pre-Conquest date. The presence of a sherd from a pale-bodied Lincoln Sandy ware jar indicates that occupation started before the early tenth century. The medieval sherds include pottery from Lincoln and Nottingham dating to the thirteenth, fourteenth and fifteenth centuries.

Thirty-three pieces of medieval tile were found in the excavation areas from the topsoil (**1**) and flood deposit **3**. It is largely undiagnostic although at least one glazed tile fragment, from layer **3** in Area F, belongs to the thirteenth century.

THE POST-ROMAN METALWORK

The medieval buckle

By A.R. Goodall

182 (Fig. 6.6.1). A copper alloy buckle and plate. The buckle is D-shaped with incised decoration on the bow, very like an example from Wharram, North Yorkshire (Goodall in Hurst 1979: 109, fig. 55:4) dated to the late fifteenth or early sixteenth centuries. The plate can be paralleled by a casual find from Suffolk, now in the Ashmolean Museum (1927 – 6253), which has a similar 'fretwork' end and a decoration of diagonal lines within a border. The ends of both examples are simply bent around the buckle and traces of an iron rivet secure it to the belt. Together with the pottery and the axe-head (*323*) this is one of the few medieval finds from the whole site and was recovered in layer **25**.

The medieval ironwork

By V. Fell

323 (Fig. 6.6.2). An axe-head of medieval form, with a flared blade and lugged eye. Length *c.* 140mm, width of cutting edge *c.* 105mm. It has completely corroded and is preserved as a cast of the original surface, the dimensions being derived from X-radiographs. It was found in layer **31** in Area G.

2 (Not illustrated). A fragment of plate or blade, length 100mm, width 42mm, thickness 10mm. Post-medieval? [Topsoil]

7 THE HUMAN AND ANIMAL BONES

THE HUMAN BONES

By A.T. Chamberlain

Three fragments of human bone were found, a skull fragment in layer **192** in Area B, a tibia fragment in layer **32** in Area B, and a femur in the machine trench.

Parietal bone from layer 192

The specimen *212* is a left parietal bone from an adult individual (Fig. 7.1). The bone is complete apart from a triangular portion *c.* 20mm on a side, which is missing from the medial border of the parietal bone about 20mm anterior to lambda. Staining of the broken edges here suggests that the fragment was missing prior to excavation of the bone. There is also minor post-excavation damage at the anterior end of the squamous suture, and some superficial scratches on the external surface of the bone which are the result of careless curatorial storage or handling.

The parietal bone is large and thick, spanning 114mm along the bregma-lambda chord and measuring 7mm and 6mm in thickness near bregma and lambda respectively. It is difficult to attribute sex to an isolated parietal bone but there is some mounding of the outer table at the postero-lateral corner, extending from the parietal notch to asterion, which is suggestive of the presence of a supramastoid crest. This feature, combined with the large dimensions, indicates that the bone may be from a male individual.

Age at death is equally difficult to ascertain but two features of the parietal bone indicate that this specimen is likely to be from a younger adult, in all probability less than 45 years of age. Firstly, the cranial sutures show no sign of fusion, a condition that indicates an average age at death of less than 30 years and a maximum age of 45 to 50 years. Secondly, there are no signs of Pacchionian depressions (pits for arachnoid granulations) along the parasagittal region of the endocranial surface. As with

Fig. 7.1 The human skull fragment in situ (N. Field).

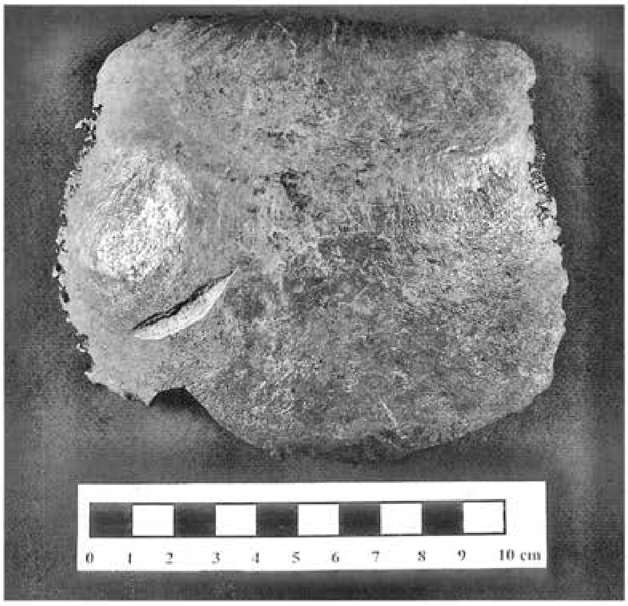


Fig. 7.2 The chop-mark on the human skull fragment.

cranial suture fusion, Pacchionian depressions are a sign of advancing age and their absence in this specimen favours the attribution of a younger age at death.

On the posteromedial quarter of the external surface of the parietal bone there is a crescent-shaped chop-mark measuring 32mm long by 5mm wide (Fig. 7.2). The chop-mark is orientated in an anterolateral-posteromedial direction, and appears to have resulted from a blow with a sharp-edged instrument directed from right to left across the cranial vault in a posterolateral direction. The instrument has incised the outer table of the skull to a depth of about 1.5mm. Examination under a low-powered microscope reveals that the blow had insufficient force to fully penetrate the outer table of the skull, as midway into the depth of the cut the plane of the incision changes to a more horizontal inclination before terminating at a ragged lateral margin where the sliver of incised bone has separated from the rest of the bone, presumably as the instrument was withdrawn from the skull. In a modern forensic setting such a blow would be typical of a wound inflicted by a sharp-edged thin-bladed weapon such as a machete. In an Iron Age or Roman context this is most likely to have been a sword-wound and not an axe-wound. The injury is unlikely to have resulted in death or even unconsciousness (C. Milroy, pers. comm.). There is no sign of infection or remodelling of the bone at the site of the injury, which could therefore have been inflicted either peri-mortem or post-mortem.

Signs of deliberate wounding have been detected on a number of burials in Britain dating to the Late Iron Age (Dent 1983; 1990) and cranial and other injuries are encountered on some prehistoric bog bodies of similar date (Stead *et al.* 1986; Turner and Scaife 1995). Of particular note is an injury similar in location and morphology reported from Danes Graves in East Yorkshire. Here an adult of 35 to 40 years had 'a distinct cut on the left parietal bone, 1½ inches long and $^1/_{10}$ of an inch deep' (Mortimer 1911, cited in Dent 1983). Another analogous find is a burial from Acklam in North Yorkshire, accompanied by a bent sword, with multiple sword cuts around the back of the skull (Dent 1990: pl. 2). A similar sword cutmark, but to the right parietal bone, has been noted on the Late Iron Age skull of an adult male from the riverine offering site at Kessel in the Netherlands (Schegget 1999: 228, fig. 8A). The four complete skulls from outside the palisade at Glastonbury lake village had all (one probably) suffered injury inflicted with a blade such as a sword at or around the time of death (Coles and Minnitt 1995: 174).

Tibia fragment from layer 32

The specimen ***450*** is a fragment of the lower part of a human adult left tibia, preserving part of the interosseous border together with a 15mm-wide part of the medial surface and a 10mm-wide part of the posterior surface. Although the fragment exhibits no diagnostic landmarks, the shape, cortical thickness and pattern of trabeculation on the endosteal surface are typically human, and the bone has no obvious correlates among medium-sized domestic or wild fauna. The fragment is 110mm long between splintered transverse breaks which are located (proximally) at the level of midshaft and (distally) at a point three-quarters of the way down the tibial shaft. The longitudinal borders of the fragment are cleanly split, indicating that the bone was broken while fresh. On the posterior cortical surface, about halfway along the fragment, there is a shallow horizontal groove with rounded cross-section, which may be a tooth mark.

Femur from machine trench

This is the diaphyseal portion of a right-side adult femur which has been broken distally about 30mm above the femoral condyles and proximally through the femoral neck and along a line between the greater and lesser trochanters. These breaks occurred at or after the time of death but the spiral pattern of fracturing at the distal end shows that the strength of the collagen component of the bone was largely intact when the breakage occurred. The bone is robust and has a particularly strongly marked linea aspera. A very approximate estimate of the original length of the intact femur is 440 to 460mm, with a slightly higher probability of the bone belonging to a male individual and with estimated living stature of 1.65 to 1.70m. There is no evidence of pathology or post-mortem modification to the bone other than the breaks mentioned above. There is a dark brown peaty deposit adhering to the proximal end of the bone, whereas the distal end is coated in an iron-rich silty matrix, indicating the specimen's original position in the site stratigraphy.

THE RADIOCARBON DATES FOR THE HUMAN BONES

By P. Marshall

Samples from the skull ***212*** and the tibia ***450*** were dated to 2201±39 bp (OxA-9070) and 2290±50 bp (OxA-9182) respectively (Table 7.1). The results are conventional radiocarbon ages (Stuiver and Polach 1977), and are quoted in accordance with the international standard known as the Trondheim convention (Stuiver and Kra 1986). The samples were processed according to methods outlined in Bronk Ramsey *et al.* (2000) and Bronk Ramsey and Hedges (1997).

The calibrated date ranges for the samples are 390–160 BC for the skull and 410–200 BC for the femur. They have been calculated using the maximum intercept method of Stuiver and Reimer (1986), and are quoted in the form recommended by Mook (1986) with end points rounded outwards to 10 years. The probability distributions have been calculated using OxCal (v2.18) (Bronk Ramsey 1995) and the usual probability method (Stuiver and Reimer 1993). The results have been calibrated using data from Stuiver *et al.* (1998).

The two measurements (OxA-9070 and OxA-9182) are not statistically different (T'=2.0; υ=1; T'(5%)=3.8; Ward and Wilson 1978) and so both bones could be of the same actual date.

The $d^{13}C$ values of –19.4‰ and –20.7‰ suggest that there was not a significant marine component in the diet that might affect the radiocarbon dating (Chisholm *et al.* 1982). The $d^{15}N$ values agree with this view of a largely terrestrial diet (Schoeninger *et al.* 1983). The C:N ratio suggests that bone preservation was sufficiently good to have confidence in the radiocarbon determinations (Masters 1987).

THE MAMMALIAN AND BIRD BONES

By J. Mulville with J.A. Baker, the late D. Bramwell and M. Harman

All mammal and bird bone was retrieved by hand. Mammal bone was identified using the reference collection at the University of Sheffield. Initial identification and reporting on the mammal and bird bone was undertaken by MH and DB respectively, with JAB examining the bone pathologies. All material (other than the small finds and that which was unstratified and from layer **3**) was subsequently re-examined by JM.

No bones of goats were identified and all diagnostic features of the ovicaprid remains were those of sheep, according to Boessneck's criteria for distinguishing sheep and goat (1969). As a result the term 'sheep' has been used to describe all ovicaprid fragments. Those fragments that could not be identified to species level were classified as 'cattle-size' or 'sheep-size' for ribs and vertebrae. Fragments were recorded using a zoning method following Serjeantson (1991), zones being recorded when over 50% was present. Ribs were only recorded when the head was present and vertebrae (except axis and atlas) only when over 50% of the centrum was present.

The total number of fragments (NISP) was calculated for all species. As the recording method indicates the zones present on each bone, the minimum number of each element present (MNE) could be calculated. Tooth wear stages of the domestic species were recorded for dP4s, P4s and permanent molars of the domestic species using Grant (1982) and grouped into age stages following the methods of Halstead (1985), Payne (1973) and O'Connor (1988). The red deer was aged by comparison with data published by Jensen (1996). The fusion stage of post-cranial bones was recorded and related to age ranges taken from Getty (1975).

For all identified bones gnawing and butchery marks were recorded. Butchery marks were described as 'chop' or 'cut' marks. Burning on bones was recorded as either 'burnt' where at least part of the bone had acquired a black/brown colour or 'calcined' where the bone had been subjected to a high temperature and had become white in colour with a chalky consistency.

Table 7.1 *The radiocarbon dates for the human bones.*

Laboratory Number	Sample Number	Radiocarbon Age (BP)	$d\ ^{13}C$ (‰)	$d\ ^{15}N$ (‰)	C/N ratio	Calibrated date range (95% confidence)
OxA-9070	SF 212	2201±39	-19.4	+9.9	3.4	390–160 cal BC
OxA-9182	SF 450	2290±50	-20.7	+9.1	3.5	410–200 cal BC

Results

166 fragments of bone were identified and recorded (Table 7.2). The dating evidence available from the site suggests that most of the bone must be regarded as Iron Age or Romano-British in date but cannot be attributed to a more closely defined period in the absence of radiocarbon dates on the animal remains themselves.

Only one fragment of bone exhibited canid gnawing. This is unusual within archaeological assemblages, as for most sites a larger proportion of bone is gnawed. The lack of gnawing suggests a rapid transfer of the material from use to burial within archaeological deposits. Butchery marks were noted on 18% of the bones, with cut marks (10%) slightly more common than chop marks (8%).

Mammalian species identified were cattle, sheep, pig, horse, red deer and beaver, the majority of which are commonly found on sites of this period. Although beavers are generally rare on Iron Age and later sites (Yalden 1999) they are recorded at Mickelmoor Hill, Norfolk (Clark and Fell 1953) and Haddenham, Cambs. (Evans and Serjeantson 1988). There are no records of beavers on Romano-British sites in the region although there are a number of later Saxon records, for example at Spong Hill, Norfolk (Bond 1994) and Sutton Hoo (Bruce-Mitford 1975).

The bird bones are all from waterfowl, probably all wild birds, although it is possible that a goose bone (from layer **3**) and a few of the duck bones may be from domestic birds. Scoter, merganser and goldeneye are winter visitors to the area to this day. The presence of a range of waterfowl emphasizes the former wetland location of the site.

Relative proportions

In terms of the number of fragments identified to species, there were slightly more sheep than cattle with a smaller proportion of pigs and very few bones of horse, red deer and beaver. The minimum numbers of individuals (MNI) calculation indicates that the remains could have derived from as few as two cattle, two sheep, three pigs and a single horse, red deer and beaver (Table 7.2). During the initial identification of the mammal bone MH identified a dog skull and an additional horse mandible but unfortunately these specimens were not located during the analysis by JM. As a result these specimens cannot be included in any quantification although the presence of a single dog can be assumed from the recorded skull.

Bones present derive from all parts of the body (Table 7.3): the head, upper and lower front and rear limbs, ribs and vertebrae. Ribs and vertebrae were not present in quantities consistent with the number of animals recovered.

A cattle skull with its atlas vertebra in place (***116***) was found in layer **194** in Area F. Other cattle skull elements present were the horncore, nasal bone and the hyoid. A few upper limb bones were recovered, with fragments of radius, pelvis and femur present. Metacarpals were uncommon but there were a number of metatarsals. The number of toes was small.

At least two sheep skulls were present, identified from their horncores. Other parts of the head were present, including the mandibles of two individuals. There was evidence of removal of the skull, with knife cuts running across an occipital. Sheep showed an emphasis on prime meat-bearing bones, with elements of the upper limbs predominant. As with the cattle, few phalanges were recovered.

The mandibles of a juvenile female pig and of two older individuals were identified. No other head bones were recorded. There were a few ribs and vertebrae, and a number of limb bones though no metapodia or toes were present. Ageing information suggests that the three different main domestic species were killed at different rates. In calculating the percentage of unfused longbones, cattle were found to have the least unfused bone and pig the most (Table 7.4).

Dental evidence is available for sheep, pig and red deer (Table 7.5). The sheep and pig jaws are from younger animals, whilst the red deer jaw comes from an adult animal of about five years. The ageing information reveals few very young animals in the assemblage. This may be a product of preservation or recovery although the juvenile pig jaw suggests that young bone is preserved. This may indicate a preference for the disposal of older animals at the site.

Articulating bone

A number of articulating bones were recovered from Fiskerton. In common with some of the joining sherds of

***Table 7.2** The relative abundance of mammalian species.*

	Sheep/Goat	Cattle	Pig	Horse	Red Deer	Beaver	Cattle-sized	Sheep-sized	Total
NISP	55	49	24	1	3	4	16	14	166
%id	68%	60%	30%	1%	4%	5%			
MNI	2	2	3	1	1	1			

NISP = number of identified specimens

% id = percentage of identified species

MNI = minimum number of individuals

Table 7.3 The relative abundance of mammalian elements.

	Sheep/Goat	Cattle	Pig	Horse	Red Deer	Beaver	Cattle-sized	Sheep-sized	Total
Horncore	2	1	-	-	-	-	-	-	3
Zygomatic	1	-	-	-	-	-	-	-	1
Occip	1	-	-	-	-	-	-	-	1
Nasal	-	3	-	-	-	-	-	-	3
Mandible	3	-	3	-	2	-	-	-	8
Hyoid	-	2	-	-	-	-	-	-	2
Scapula	2	-	-	-	-	-	-	-	2
Humerus	2	-	1	-	-	1	-	-	4
Radius	3	2	1	-	-	-	-	-	6
Ulna	-	-	2	-	-	1	-	-	3
Carpal	-	5	-	-	-	-	-	-	5
Metacarpal	1	1	-	-	-	-	-	-	2
Pelvis	2	2	2	-	-	-	-	-	6
Femur	6	3	4	-	-	-	-	-	13
Tibia	4	-	5	-	-	-	-	-	9
Fibula	-	-	1	-	-	-	-	-	1
Astragalus	1	-	-	-	-	-	-	-	1
Nav. cuboid	-	2	-	-	-	-	-	-	2
Tarsal	1	1	-	-	-	-	-	-	2
Metatarsal	1	5	-	-	-	-	-	-	6
Phalanx 1	2	5	-	-	1	-	-	-	8
Phalanx 2	-	3	-	-	-	-	-	-	3
Phalanx 3	-	4	-	-	-	-	-	-	4
Rib	12	4	4	-	-	-	10	7	37
Cervical Vertebra	3	-	-	-	-	-	-	-	3
Thoracic Vertebra	2	2	1	-	-	-	5	5	15
Lumbar Vertebra	4	1	-	-	-	-	1	2	8
Sacrum	1	2	-	1	-	-	-	-	4
Caudal Vertebra	1	1	-	-	-	2	-	-	4
Total	55	49	24	1	3	4	16	14	166

Table 7.4 The mammalian fusion data.

Cattle

	Unfused	Fused
Radius P.		1
Metatarsal D.	1	2
Femur P.		1
Radius D.		1
	1	5
Total % Unfused	17	

Sheep

	Unfused	Fused
Radius P.		1
Tibia D.	1	1
Metatarsal	1	
Radius D.		1
Femur D.	1	1
Tibia P.	2	
	56	

Pig

	Unfused	Fused
Humerus D.		1
Tibia D.	3	1
Ulna P.	1	
Radius D.	1	
Femur P	2	
Tibia P.	4	
	85	

Table 7.5 The mammalian dentition data.

	Area	Context	dp4	P4	M1	M2	M3	Age
Sheep	F	26		f	g	abs		>6–12 months
Sheep	E	195		h	g	g	<d	2-3 years
Pig	F	31		a	//			Juvenile*
Pig	F	26			f	a	C	Immature
Pig	E	3		d	g	e	a	Subadult
Red Deer	E	503		f	j	h	g	Adult
Red Deer	E	31		f	j	h	g	Adult

Roman pottery, articulating bones were sometimes found in different contexts and other parts of the site. The complete lower mandible of an adult red deer was recovered with its right mandible in layer **503** and its left in layer **31**.

The beaver humerus and ulna articulated and were found in the same context – layer **195** in Area B – as was one of the caudal vertebrae. A second vertebra which probably came from the same individual was found in Area G. Both vertebrae were a similar size with identical butchery, consisting of chop marks down the lateral side.

The only other example of articulating bone was a pig humerus and ulna. Both of these derived from a single context, layer **31** in Area E. These showed filleting marks on the midshaft of the humerus.

Butchery

Butchery marks present indicate the cutting of cattle throats, removal of their horncores and disarticulation at the hock joint to remove the metatarsal. Sheep scapulae had been cut and chopped and a humerus showed disarticulation marks around the distal joint. Many vertebrae had been split on the mid-line indicating halving of the carcass and many of the rib fragments had cut ends. As mentioned above, the beaver was also butchered with the two caudal vertebrae chopped along one side.

Worked bone

The worked bone and antler assemblage represents the remains of a minimum of 16 sheep, two pigs and a single cow, red deer and roe deer. The latter is of particular interest as it does not appear in the unworked assemblage. The most abundant species and element in the worked bone assemblage is that of sheep tibia, with 41 such artefacts in total considered by Olsen to be spearpoints (see Olsen, Chapter 5).

Beaver

Beavers can provide food, fur and incisors for tools (Crader 1997). In addition to providing meat, the beaver tail provides an important source of fat. Beavers store fat in their tails in winter months and the butchery noted on the caudal vertebrae may be the result of removing the tail fat. There is, however, another possibility, since the glands that produce castoreum, a valuable oil, are located around the base of the tail. When extracted and dried, this oil can be used as medicine or to make bait for other terrestrial fur species (Charles 1997) and it is possible that the butchery of the caudal vertebrae is associated with removal of these valuable oil-producing glands.

Bird bone

The bird species present – all of them waterfowl – may reflect the use of the wetlands for food procurement. Yet it is interesting to note that the bird bones derive mainly from the wings (Table 7.6) and could indicate an emphasis on the exploitation of waterfowl as a source of feathers. As Serjeantson notes for the contemporaneous assemblage at Haddenham in the Cambridgeshire fens, 'the use of and/or trade in feathers as ornaments for display or ceremony may well have been the most valuable product of the big birds' (Evans and Serjeantson 1988). At Haddenham these larger birds were pelican and swan, the latter being found at Fiskerton along with heron.

Pathological bone

Two bones from the flood deposit (layer **3**) sealing the site showed evidence of pathology. A rib fragment, possibly from a sheep, has a small spur of new bone which represents a focus of periostitis of unknown cause. A cattle astragalus shows considerable deposits of irregular new bone on the lateral and medial aspects, particularly associated with the distal end, suggesting a sprain-type

Table 7.6 *The avian elements.*

	Heron	**Mute Swan**	**Mallard**	**Common scoter**	**Merganser**	**Tufted/ Goldeneye**	**Coot**
Coracoid	L						
Humerus	L	R	R	L		R	L&R
Radius						R	
Ulna					L	R	
Tibiotarsus		L		L			L
Carpometacarpus							L&R
Tarsometatarsus							L&R
Scapula							R
Vertebra	Present						

L= left R= right

injury. There is pitting of the tibial articular facet indicating abnormal articular cartilage and the two lesions could well be related.

Conclusion

This faunal assemblage is of interest as it has been recovered from the same contexts as the deliberately placed metal and other artefacts. As a result we can assume that the animal bones do not represent the detritus from rubbish clearance. This is supported by the absence of gnawing, indicating that the bones were swiftly deposited with the other finds. The age structure and body parts hint at the remains of good quality meat. The lack of articulating bone and the butchery marks are consistent with filleting, suggesting that limbs and body parts were disposed of after division of the carcasses and removal of meat for consumption. Even the articulating pig forelimb joint showed evidence of removal of the meat. We can therefore interpret the deposited material as being the remains of meals that were immediately accorded a rapid burial, along with the other artefacts.

There is a suggestion that wild mammals were treated differently to domesticates. Apart from the jaws, the only other parts of deer found on the site were worked antler and metapodia. These bones are not prime meat elements and may indicate a different disposal pattern for deer. The beaver, on the other hand, was articulated but the scattered remains of a single individual do not suggest the routine treatment of a food animal.

In comparison to other sites this small assemblage reflects the range and uses of fauna found in Iron Age wetland contexts elsewhere in Britain (Gray 1966: 408–10; Coles and Minnitt 1995: 194–5). It also compares closely in both size and range to the Early Iron Age assemblage from Washingborough, just upstream of Fiskerton (Coles *et al.* 1979: 6). As at Haddenham, there is an emphasis on domestic species for food with some specialized exploitation of beavers and birds (Evans and Serjeantson 1988). Despite the small sample size, there is a slightly wider range of species present at Fiskerton than at Haddenham and the specialized worked bone assemblage is highly unusual. It should be noted that both sites, set in similar environments, show exploitation of beavers for fur/fat and of waterfowl for feathers.

The analysis of this assemblage is hampered by its small size and the contextual complexity of the site. As noted above, the lack of articulated bone does not suggest the giving of joints of meat as 'gifts to the gods' but rather the deposition of the remnants of meals. However, the mixing of contexts and dispersal of conjoining material across the site means that the identification and recovery of articulated bone is difficult, and articulated bone groups may be missed. Indeed, the separation of articulating bones – often some metres apart – is perplexing. Some of the bones are small and could easily have been moved by the waters of this reed bed. Others, however, such as the red deer left and right mandibles are heavy and a reasonable force would have been needed to displace this material. Was the material deliberately scattered prior to deposition or were powerful post-depositional forces at work? Until further work is undertaken at the site these fundamental questions have to remain unanswered.

THE FISH BONES

By A.K.G. Jones

Fish remains were recovered from sieving and sorting of one sample, at a depth of 0.50m (soil horizon *2c*, a mixed deposit of silts, shell and peat) within the soil column taken for plant and insect remains. The identifications were eel (*Anguilla anguilla*), perch family (probably *Perca fluviatilis*) and carp family (Cyprinidae) with a few fragments being unidentified (Table 7.7).

The identified fish can all live in fresh water and are likely to represent the local fish fauna. There is no evidence that the remains were deposited by human action and they probably form a natural death assemblage. The bones may have been washed into the sediments during flooding or, perhaps more likely, deposited by piscivorous animals such as herons or otters.

Table 7.7 *The fish remains.*

Eel	*Anguilla anguilla*	1 basioccipital
Perch family	probably perch *Perca fluviatilis*	6 scales
Carp family	Cyprinidae	1 dentary
Carp family	Cyprinidae	2 precaudal vertebrae (from fishes of *c.* 100mm total length and *c.* 150mm total length)
Unidentified		Various fragments

8 THE FISKERTON CAUSEWAY

THE CONSTRUCTION AND APPEARANCE OF THE CAUSEWAY

By M. Parker Pearson and N. Field

Excavations on the Later Bronze Age timber 'alignment' at Flag Fen have dispelled early ideas that it might once have supported a structure raised high above the water level like a long wooden bridge or seaside pier. Instead, its trackway surface consisted of pegged-down planks, just above the water line, laid on top of a 150mm-thick layer of roundwood which rested on trimmed horizontal tree-trunks lying directly on the mud and staked into position between the large vertically-driven posts (Pryor 1998: 130–3; 2001). In assessing the Fiskerton structure, the evidence from Flag Fen and from other Bronze and Iron Age timber causeways such as those at Eton Rowing Lake must influence our interpretation.

A 'trackway' or a 'raised walkway'?

The results of Jennifer Hillam's dendrochronological analysis of the oak timbers from the Fiskerton causeway were a revelation in the 1980s. Her dating work demonstrates that the two lines of clustered posts were constructed during at least ten separate episodes of building and rebuilding, creating a rectangular arrangement of posts set up in two north-south rows about 2.40m apart, with the posts within any one phase placed between 2m and 3.50m apart along the north-south axis.

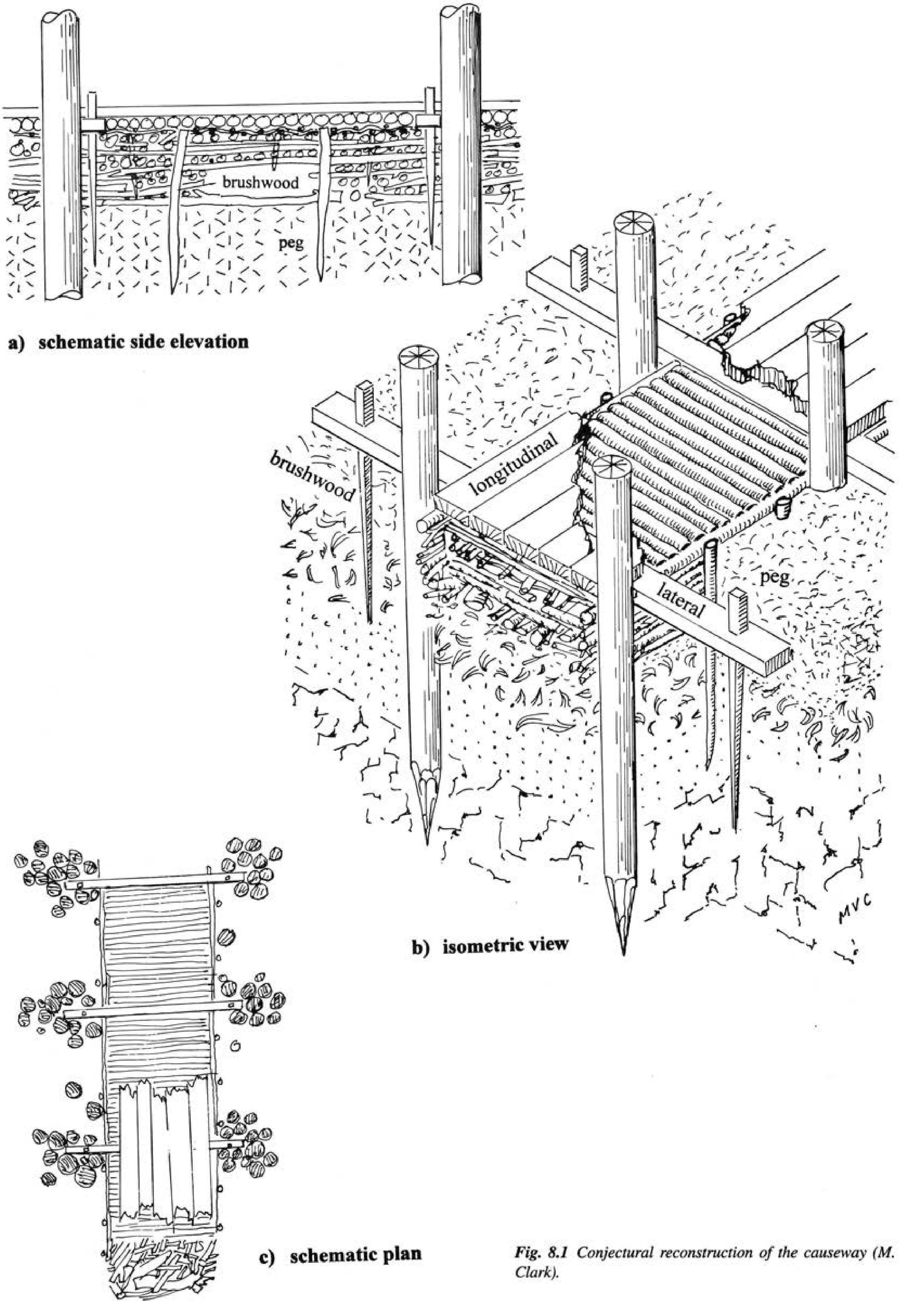
This form of construction is not wholly dissimilar to the box-ramparts of Iron Age hillforts of the same period. It is superficially similar to the Flag Fen timber alignment, of Later Bronze Age date, except that Flag Fen has a third, central line of posts and widens out into five rows of posts (see Chapter 11; Pryor 1998: fig. 64). In this respect, the third, western row at Fiskerton, apparently contemporary with the causeway post rows, might be comparable to the increasing number of rows in Flag Fen's deepening channel.

The Fiskerton structure was also entirely different from the bridges of La Tène and its surrounds, which were built with short transverse rows (5m–8m apart) – rather than long alignments – of timbers driven in vertically with outliers angled to provide extra solidity for the timber walkway (Schwab 1992: figs 3, 4). Fiskerton lacks any angled posts and there is no trace of any crossbeams or supports which might have given the structure increased rigidity.

The depth to which the Fiskerton posts were inserted into the marshy sediments is not known except that, on the evidence of the single post removed by a mechanical excavator, they may have been driven as deep as 4m. Since the extracted post's top was eroded, we cannot say how much longer than its surviving 5m length it once was. Of course, the initial depth to which it was driven may have been much shallower than its final depth: if it was load-bearing during the causeway's use it may have sunk gradually deeper into the sediments under the weight of any timber superstructure and human traffic. In addition, an incalculable amount of peat shrinkage and erosion has taken place, making it impossible to determine where the Iron Age ground surface would have been.

The Fiskerton causeway was possibly first marked by a deposit of twigs (context **421/467**), set in a curving line west of the two post rows, partly associated with pegs driven into layer **332**. Rows of wattling (**635/636**) also lay on a similar alignment. These flimsy deposits may have been laid as an ephemeral trackway (which would have been damp or even submerged) to provide secure footing either as a fording route from the north bank of the swamp or as a working surface to erect the causeway posts and build a trackway or raised walkway. The vertical posts of the causeway may have been driven in from the surface of the thick reed peat layer **195**: at this level there is the first indication of significant construction activities, in the form of stakes, pegs and wedges. At least some of the posts were probably set in place at this time and others – felled in 375/4 BC, 81 years after the first posts – were later erected prior to the deposition of **502**, a silt layer which is separated from **195** by a brushwood layer **503/507**. Other posts may have been driven in from an even higher layer.

The brushwood layer **503/507** may have been part of the construction, the brushwood being pegged into the surface of the marshy sediments to provide a firmer footing (Fig. 8.1). The later brushwood layer (**194/331/313**), lying on top of the silt layers **192** and **502**, coincided with the densest clustering of posts. It may have been laid to stabilize the surrounding peats, preventing scouring



a) schematic side elevation

b) isometric view

c) schematic plan

Fig. 8.1 Conjectural reconstruction of the causeway (M. Clark).

during flooding episodes, but again is most likely a construction surface. Layer **192** had a thick timber and twig mat, secured into the mud with pegs.

The sequence of construction of the major phase of the timber causeway can be interpreted as:

- a *series of upright posts*
- between whose phases were laid several *beds of brushwood*
- with *a 'trackway' surface of logs and planks*
- whose *main horizontal timbers may have been pegged and anchored between the uprights.*

The causeway may thus have been a trackway constructed directly on the surface of the wet, marshy peat. This trackway's surface may have been visible above the water of the swamp for all but the winter months of the year (Fig. 8.1).

However, this interpretation is not entirely free from difficulties:

i. Not one of the horizontal timbers or notched planks was found pegged down, although several had mortises and jointing.
ii. New uprights were added regularly to the post rows. This growing forest of posts at each side of the trackway would have hampered any repairs to its surface. The posts would have restricted any attempts to lay new horizontal logs and planking to be secured between the uprights.

An alternative hypothesis is that, at certain times in its use, the causeway was a raised walkway constructed on the uprights which acted like stilts:

A. The substantial depth to which the posts seem to have been driven into the sediments indicates that the uprights could have supported such a raised walkway without angled supports or cross-beams. Indeed, if the posts were to serve simply as containments of a low-level, ground-surface trackway rather than as load-bearers of a raised walkway, why sink them in so deep?
B. Repairs may have been necessary not only to replace rotten timbers or to make good flood damage but also to re-establish an acceptable height above the water level after the trackway had begun to sink as a result of the uprights being pressed further downwards during the trackway's use.

The location of many weapons and other finds directly within the zone of the timber uprights (Plates 8–14) can be interpreted as supporting evidence for either hypothesis. One can envisage these artefacts' deposition as *either* dropped through the timbers of the raised walkway *or* pressed into the soft ground and mud below the ground-surface trackway.

Our own preferred interpretation of the causeway's primary form is as a trackway lying directly on the marsh peats. This is because of the small quantities of worked logs and planks. The causeway may well have led to a sandbank or area of high ground within a braided system of channels, as suggested by Wilkinson (1987). However, a field evaluation in 2001 on the side of the South Delph revealed no trace of the post rows where the ground rises up to a sand island. Thus the causeway may have terminated as a jetty, somewhere under the current river channel.

From three layers above the reed peats (**195** *etc*), in contexts **194**, **313** and **331**, there is evidence for rebuilding phases of the causeway, with trimmed logs and notched planks lying around. Similar quantities of planks and logs are found in the two layers above (**26** and the lower part of **32**). Above these is the layer of limestone rubble (**31**) which appears to have been tipped in the area of the timber uprights to form a hardcore surface which might conceivably have been submerged at certain times of year. The construction of this limestone roadway on top of the layers containing planks and logs suggests that the timber causeway had fallen into disrepair. The scattered worked timbers may indicate the collapse of a raised walkway but they could equally have been laid on the ground surface.

The quantities of Iron Age items in layer **32** (which lies beneath and above the rubble and is dated to after 359–317 BC; see Chapter 1) indicate that many of these objects were deposited on top of the layers containing displaced timbers from a ruined or dismantled wooden structure. This would indicate that many of the major finds were deposited at the time or after the last posts of the causeway were erected. This was certainly the case for the excavated swords and many of the spearheads but the uncertain contexts of Vernon Stuffins' finds (the bronze and coral handle fittings and the 'Museum sword', the only swords datable to La Tène I [*c.* 475–250 BC]) rule out any consideration of their relationship to the causeway's history. The rubble layer **31** contains some of the Iron Age metalwork, which seems to have been deposited amongst the stones.

The causeway posts were felled in the second half of the fifth century BC and throughout the fourth century BC, whereas much (if not most) of the Iron Age metalwork was probably deposited in the third century BC on the basis of typological affinities. In fact, none of it can be definitely dated any earlier on the basis of its context owing to the problems of downward movement through the soft deposits. The only early pieces are the late fourth/early third century BC file with Waldalgesheim decoration on its antler handle (*364*), the fifth-fourth century BC decorated sword handle (a Stuffins find), and the fifth-third century BC sword blade (the 'Museum sword').

We may thus be looking at the causeway's use and rebuilding and the deposition of artefacts as largely separate and successive events, with many of the artefacts of both Iron Age and Roman date being deposited onto and into layers **32** and **31**. These uppermost silt and stone layers may have remained exposed at the marshy riverside for centuries. Artefacts found in the layers below can be considered to have reached these depths by settling downwards through the soft sediments after deposition at the level of layers **32** and **31**. Layer **26**, immediately beneath these two layers, was full of worked timbers and may just be the remains from a penultimate dismantling of the timber post structure. It may be that many of the horizontal timbers of a hypothetical raised walkway were not only taken down but also taken away, leaving a residue of worked pieces in layer **26**. This was followed by a similar episode of collapse or dismantling during the deposition of the lower part of layer **32**. The limestone rubble (**31**) above this may thus have been a final surfacing, deposited at some time after the raised wooden walkway had been taken down. Thereafter, worked timbers are scarce in the upper part of layer **32** and layer **25**.

The chronological mismatch between the posts' felling dates and the probable dates of most of the deposited Iron Age artefacts is particularly interesting because it raises the possibility that the post structure was not built for the purpose of votive deposition but, after more than a century of use, became increasingly a place of pilgrimage to carry out such activities. It is interesting in this context that so much of Flag Fen's metalwork dates to the Late Bronze Age when most of its posts were felled in the Middle Bronze Age and earlier part of the Late Bronze Age (Pryor 2001; Coombs 2001). It may well be that crossing-places like Fiskerton became associated with memories and traditions of special events which made the causeway a setting for votive deposition. Other causeways which have produced little or no metalwork, such as Caldicot in Wales (Nayling and Caseldine 1997; see Chapter 11), may never have acquired the special significance that was bestowed on Fiskerton.

LUNAR ECLIPSES, SAROS CYCLES AND THE CONSTRUCTION OF THE CAUSEWAY

By A.T. Chamberlain

This section presents evidence for a novel hypothesis concerning the timing of construction episodes of the Fiskerton causeway's post rows. It is proposed that felling of oak trees and preparation of timbers for emplacement in the post rows coincided with observable and unusually spectacular astronomical events, namely total eclipses of the Moon.

The idea that timber felling at Fiskerton might be related to an astronomical cycle originates from the observation by Jenny Hillam that there appear to be regular intervals of 16–18 years between successive episodes of felling of the timbers used in major additions to or rebuilding of the causeway (see Chapter 3). As the timbers appear not to have been seasoned and were probably utilized within one year of felling, any cyclicity in felling is likely to relate directly to periodic refurbishment and/or usage of the timber causeway

High-precision dendrochronological dating of the upright posts of the causeway shows that major episodes of felling for the causeway posts coincide - in both year and season - with total lunar eclipses in the fifth and fourth centuries BC that occurred around the winter solstice and were observable in central Lincolnshire. This evidence is controversial on two counts:

- it implies a degree of knowledge about long-period regularities in astronomical phenomena that is not usually characteristic of pre-literate societies;
- it challenges assumptions about the centrality of solar movements and alignments in the design, construction and use of prehistoric ritual monuments.

Eclipses and the Saros cycle

In its orbit around the Earth, the Moon occasionally passes directly in front of the Sun, causing a *solar eclipse*. It also occasionally passes through the Earth's shadow, generating a *lunar eclipse*. Eclipses are described as *partial* or *total*, depending on whether part or the whole of the disc of the celestial body is obscured at the observer's viewing point. Total eclipses are both less common and much more spectacular than partial eclipses and, as a consequence, are more often noted in early astronomical records. The geometry of the Earth/Moon/Sun system ensures that while solar eclipses are observable only from limited regions of the Earth (defined by the narrow 'track' of the Moon's shadow as it passes across the surface of the Earth), eclipses of the Moon are observable from the entire night-side of the Earth. Thus lunar eclipses can be monitored from a fixed location, whereas to record solar eclipses the observer must either travel to a point located on each eclipse track or they must rely on records made by other observers stationed at different points on the earth's surface.

Eclipses are governed by the geometry of the orbit of the Moon around the Earth and the orbit of the Earth-Moon system around the Sun. The plane of the Moon's orbit around the Earth and the plane of the Earth's orbit around the Sun (the 'ecliptic') are set at an angle of about 5° to one another (Fig. 8.2). Each month the Moon's orbital path passes through the Earth's orbital plane at just two points in space, which are labelled the descending and ascending nodes. The Moon spends most of its time either above or below the Earth's orbital plane and takes just a few hours to cross the nodes.

Eclipses are relatively rare because they require that two momentary events take place simultaneously: (A) the Moon must be at one of its nodes and thus momentarily in the Earth's orbital plane, and (B) at the same moment the node must be precisely aligned with the centres of the Earth and the Sun. The latter condition (alignment of the nodes with the Earth-Sun axis) occurs briefly just twice each year as the Earth orbits the Sun, and it is the infrequency of the conjunction of these two brief circumstances that ensures that eclipses are rare events. For most

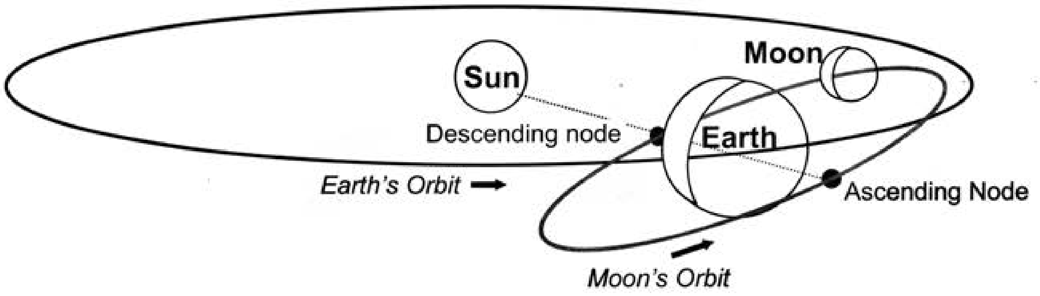


***Fig. 8.2** Schematic diagram of the alignment of the Sun, the Earth and the orbital nodes of the Moon during an eclipse season (not to scale). The Moon can eclipse the Sun at its descending node, and will be eclipsed by the Earth's shadow at its ascending node.*

of the year the nodes are not aligned with the Sun and at these times an eclipse cannot take place. Even when the nodes are briefly aligned with the Sun it is unlikely that the Moon will be in the correct position for an eclipse to take place. In effect, eclipses will only take place when New or Full Moon coincides exactly with an alignment of the nodes.

Though rare, eclipses are governed by extremely regular astronomical movements and, given a mathematical model of the solar system, it is possible to calculate the exact dates and times of all past and future eclipses, both solar and lunar. The calculation requires knowledge of the timing of three separate cycles:

- the annual cycle of the Earth's orbit around the Sun
- the monthly cycle of the Moon's orbit around the Earth
- the movement of the position of the 'nodes' around the Earth which is the slowest cycle, taking nearly 19 years to complete

Each of these cyclical movements has a fixed period, and it is the periodicity of the three cycles that generates regularities in the dates when solar and lunar eclipses occur. By coincidence, the time taken for the Moon to make 242 passages through one of the nodes is almost exactly equal to 223 lunar months (a lunar month is the period between successive Full Moons). This means that if the Moon is in the correct geometric position to cause an eclipse, the same alignment of the Sun, Earth and Moon will repeat itself after a period of 223 lunar months. This period amounts to 18 years 11 days and 8 hours and is known as the *Saros* (after the Babylonian word *Saru*, meaning repetition).

All eclipses (whether partial or total, lunar or solar) fall into families, or 'Saros series', whose members are separated by the length of a Saros. In each Saros series the eclipses are of the same type and duration, but the successive eclipses occur at a later time of day and each is slightly later in the solar year than the previous eclipse occurrence. For example, in 2003 there were separate total lunar eclipses on 16 May and 9 November, both eclipses occurring in the early hours of the morning as observed from Britain. These eclipses belong to separate Saros series, and the previous events in their respective series were also observable in Britain as they occurred in the evening on 4 May 1985 and on 28 October 1985.

Over a long time span of many centuries the types of lunar eclipse that occur in a Saros series gradually change. Initially each Saros series produces only partial eclipses, then for about 500 years the eclipses in the series are total eclipses, after which the series reverts to partial eclipses once more. These changes occur because the Moon's passage through the nodes is not exactly synchronised with the length of the lunar month.

Using the Saros to predict eclipses

Although each Saros series generates one eclipse every 18 and a bit years, there are many separate Saros series running concurrently and therefore eclipses occur more frequently than once every 18 years. For instance, from a given observation point a total lunar eclipse can be seen about once every two years, but these eclipses will belong to different Saros series and thus will appear to take place at irregular intervals. The Saros provides a key to lunar eclipse prediction because although it requires decades of observations to detect eclipses belonging to the same Saros series the successive eclipses in a Saros series have similar properties:

- they occur at approximately the *same time of year* (with a time lag of 11 days per Saros);
- they are of similar duration and manner, so that the pattern and timing of the phase and luminosity changes that occur during the eclipse are repeated at each successive event;
- after three Saros (*i.e.* every 54 years and one month) the eclipse occurs at the same time of night and at the same position in the sky

Lunar eclipses only occur when the Moon is full, so if the observer possesses an accurate calendar that records each occurrence of a full moon over several decades, it is possible to keep track of successive lunar eclipses and with knowledge of the Saros it is then possible to allocate each observed eclipse to its appropriate Saros series.

However, in a given Saros series the Moon is not visible on every occasion when it is eclipsed – even assuming clear skies for observing celestial bodies, the eclipse may occur in the daytime before the Moon has risen or after it has set. At some total lunar eclipse events the Moon may be near the horizon and thus only visible to the observer during part of the period when it is eclipsed. During a total lunar eclipse the Moon spends up to two hours in partial eclipse before and after the middle of the phase of totality while the Earth's shadow gradually conceals and then reveals the Moon. The complete eclipse, including both its partial and total phases, can last for nearly four hours, so even if the Moon is hidden from the observer during the midpoint of the eclipse the beginning or end of the eclipse, when the Moon is partially obscured, may nonetheless be visible.

As a rule, lunar eclipses are much easier to observe during the months of winter, because in this season the nights are longer and the full moon rises earlier and sets later, and therefore it is visible for a greater proportion of each 24-hour period. In effect, during the winter the observer spends more time facing away from the Sun, and is thus better positioned to observe any lunar eclipses that may occur. In Britain, if a lunar eclipse occurs near the winter solstice, it is likely to be observable because the Moon is visible for about 16 hours every day at this time of year. At latitudes to the north of Britain the visibility of the winter Moon is even greater and inside the Arctic Circle every midwinter lunar eclipse is visible, weather permitting.

Could the Saros have been used to predict lunar eclipses in Iron Age Britain?

Inspection of a database catalogue of lunar eclipses in the fifth and fourth centuries BC (Espenak 1998) revealed two Saros families of total lunar eclipses which coincided with some of the years of timber felling (Figs 8.3 and 8.4). At the time of the earliest date of construction at Fiskerton, in the winter/spring of 457/456 BC, these Saros series (Saros 46 and Saros 47) were generating eclipses near the midwinter solstice, and the eclipses would therefore have been highly visible in northern latitudes.

At the time of the initial erection of the causeway posts at Fiskerton the Saros 46 and 47 series were 'mature' series that generated total eclipses of relatively long duration, with the phase of totality in each eclipse lasting for up to 100 minutes. Between 500 BC and 300 BC 11 total eclipses occurred in the Saros 46 series, of which five eclipses were visible at Fiskerton in their total phase, five were visible in their partial phase and the remaining eclipse was not observable in Britain: interestingly, the non-observable eclipse was the last one of the series and occurred after the last confirmed felling date at Fiskerton.

Thus Saros 46 was highly effective in correctly predicting an observable eclipse (*i.e.* visible in either its total or partial phases) for ten consecutive 18-year cycles from 494 BC to 331 BC. After this date Saros 46 lost its effectiveness as a predictor of total eclipses, as the phase of totality of the eclipses in this series diminished and after 300 BC only partial eclipses occurred in the Saros 46 series.

Saros 47 was also an effective predictor of total eclipses during this period, yielding eight eclipses in which the total phase was visible and a single eclipse visible briefly in its partial phase in 410 BC, leaving three of its 12 occurrences without an observable eclipse in Britain. Like Saros 46, Saros 47 also became less effective as a predictor of observable eclipses towards the end of this time span, as the eclipse in 302 BC occurred during daylight hours in Britain. After 300 BC Saros 47 only predicts one more total eclipse at Fiskerton, in 284 BC; thereafter only partial eclipses occur in this Saros series.

Both Saros 46 and Saros 47 were of considerable antiquity when the site at Fiskerton first came into use. Saros 46 started to generate partial lunar eclipses in 944 BC and was generating total lunar eclipses beginning in 800 BC. Saros 47 followed this pattern less than a century later, generating partial eclipses from 861 BC and total eclipses after 735 BC.

However, when both Saros series started to generate total lunar eclipses in the eighth century BC the eclipses occurred in midsummer and were therefore difficult to observe from Britain. The full length of a Saros cycle is 18 years and 11 days, so the date of an eclipse does not stay the same throughout a Saros series: the 'time lag' of 11 days gradually shifts the occurrence of an eclipse to a later date in the year. After 500 BC the total eclipses in the Saros 46 and 47 series were occurring around the time of the winter solstice.

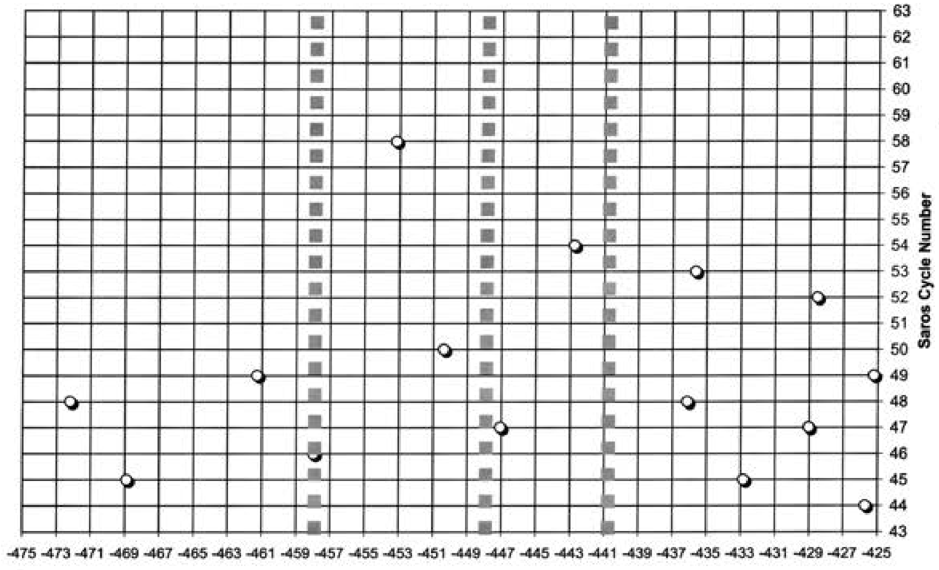
At the time of the felling of the first causeway post at Fiskerton in 457/456 BC, Saros 46 and 47 were the *only* series useful for predicting midwinter total eclipses. Saros 45 was already by then generating eclipses in mid-February and Saros 48 was generating eclipses in late October. Saros 48 generated its first observable December eclipse in 382 BC but there is no evidence at Fiskerton that this or subsequent events in the Saros 48 series were recognized and marked by timber felling activities.

Evidence for observing Saros eclipse series at Fiskerton in the Iron Age

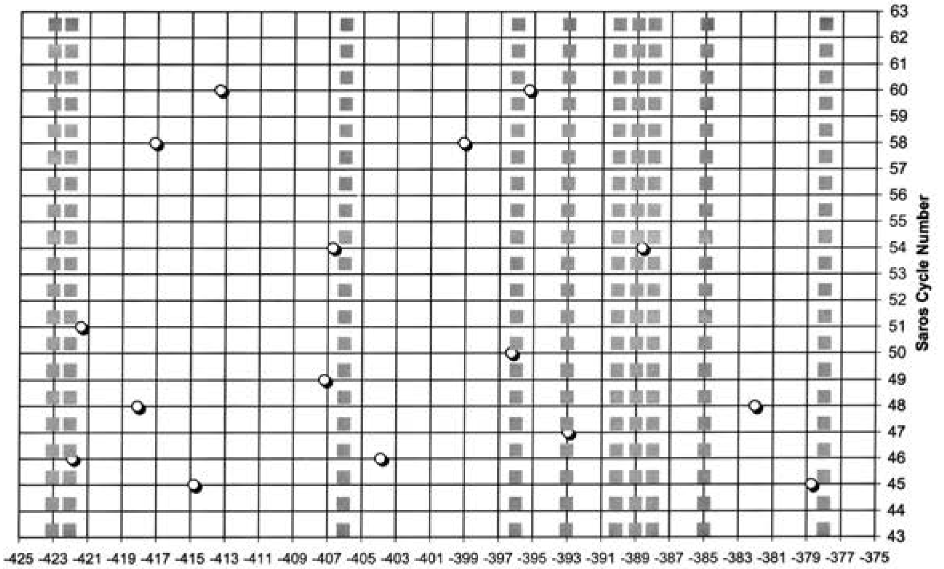
The first felling date for a causeway post is winter/spring 457/456 BC, about one year after a total lunar eclipse on 12 January 457 BC in the Saros 46 series. This eclipse was certainly visible at Fiskerton – assuming clear skies – as it occurred at 1:35 am with the Moon 56° above the horizon at the middle of the eclipse.

The second episode of felling at Fiskerton, represented by dates on four timbers, took place after an interval of ten years in winter/spring 447/446 BC. The dendrochronological dates coincide exactly with a Saros 47 total lunar eclipse that occurred on 10 December 447 BC. The eclipse occurred at 9.29 p.m. and, again assuming clear skies, would have been highly visible with the Moon 48° above the horizon.

a. Total lunar eclipses visible at Fiskerton 475 to 425 BC.



b. Total lunar eclipses visible at Fiskerton 425 to 375 BC.



c. Total lunar eclipses visible at Fiskerton 375 to 325 BC.

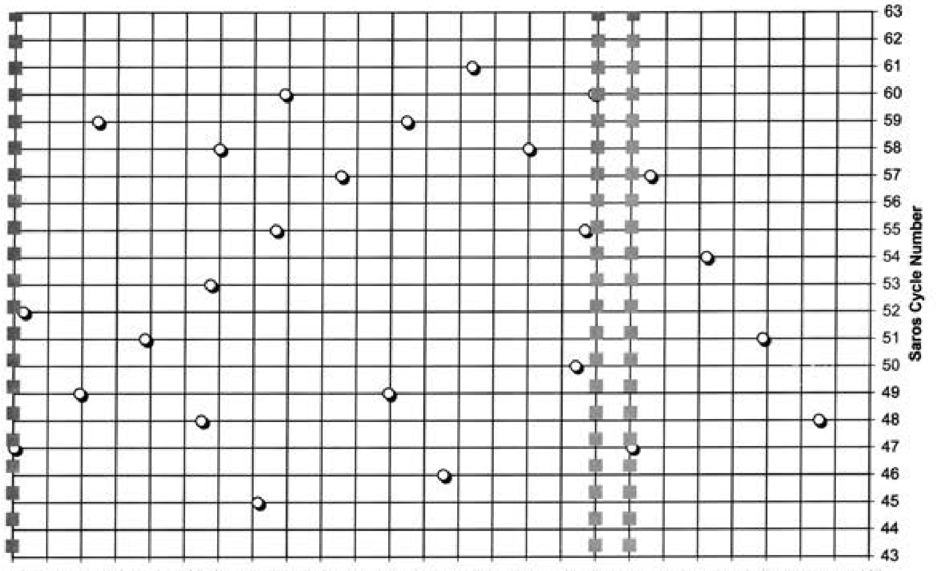
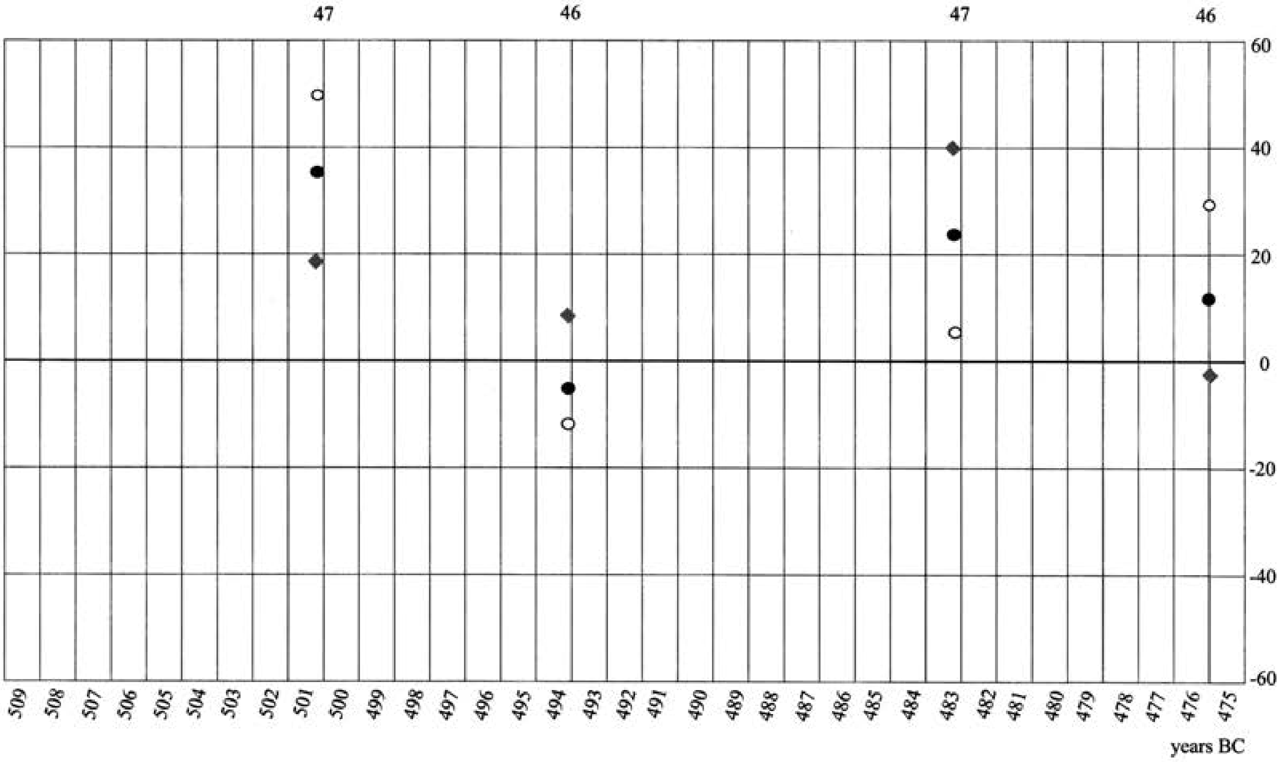


***Fig. 8.3** a, b and c Total lunar eclipses visible at Fiskerton in the fifth and fourth centuries BC, arranged according to their Saros series number. Vertical gridlines are at biannual intervals and are centred on midwinter. Bold lines indicate dates of timber felling. Eclipse predictions are from Espenak (1998).*



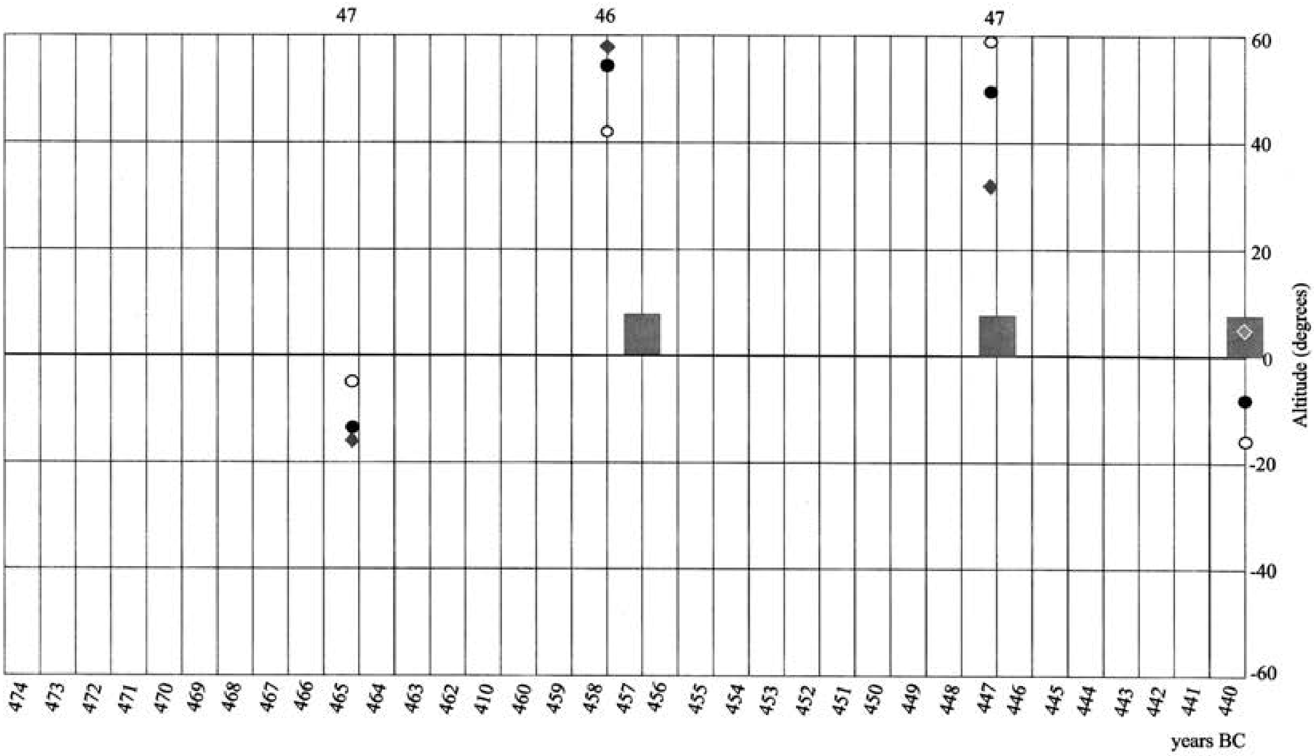


Fig. 8.4a *Total lunar eclipses in Saros series 46 and 47 and timber felling dates at Fiskerton (■). For each eclipse the altitudes of the Moon have been calculated for the time of entering partial eclipse (◆), the midpoint of total eclipse (●) and the time of leaving partial eclipse (○). The horizon is assumed to be at zero degrees altitude relative to the observer. Calculations are based on eclipse data in Espenak (1998).*

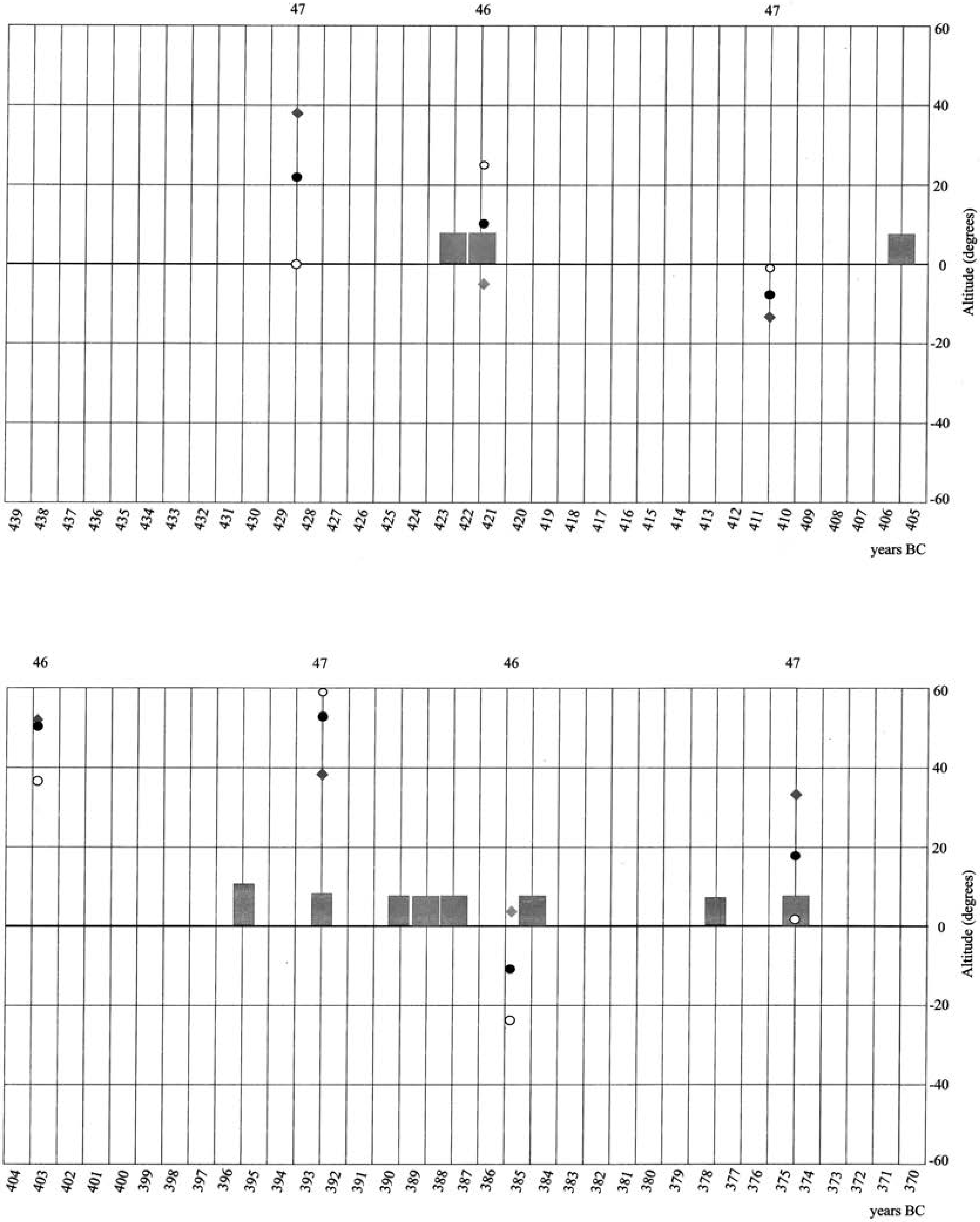


***Fig. 8.4b** Total lunar eclipses in Saros series 46 and 47 and timber felling dates at Fiskerton (■). For each eclipse the altitudes of the Moon have been calculated for the time of entering partial eclipse (◆), the midpoint of total eclipse (●) and the time of leaving partial eclipse (○). The horizon is assumed to be at zero degrees altitude relative to the observer. Calculations are based on eclipse data in Espenak (1998).*

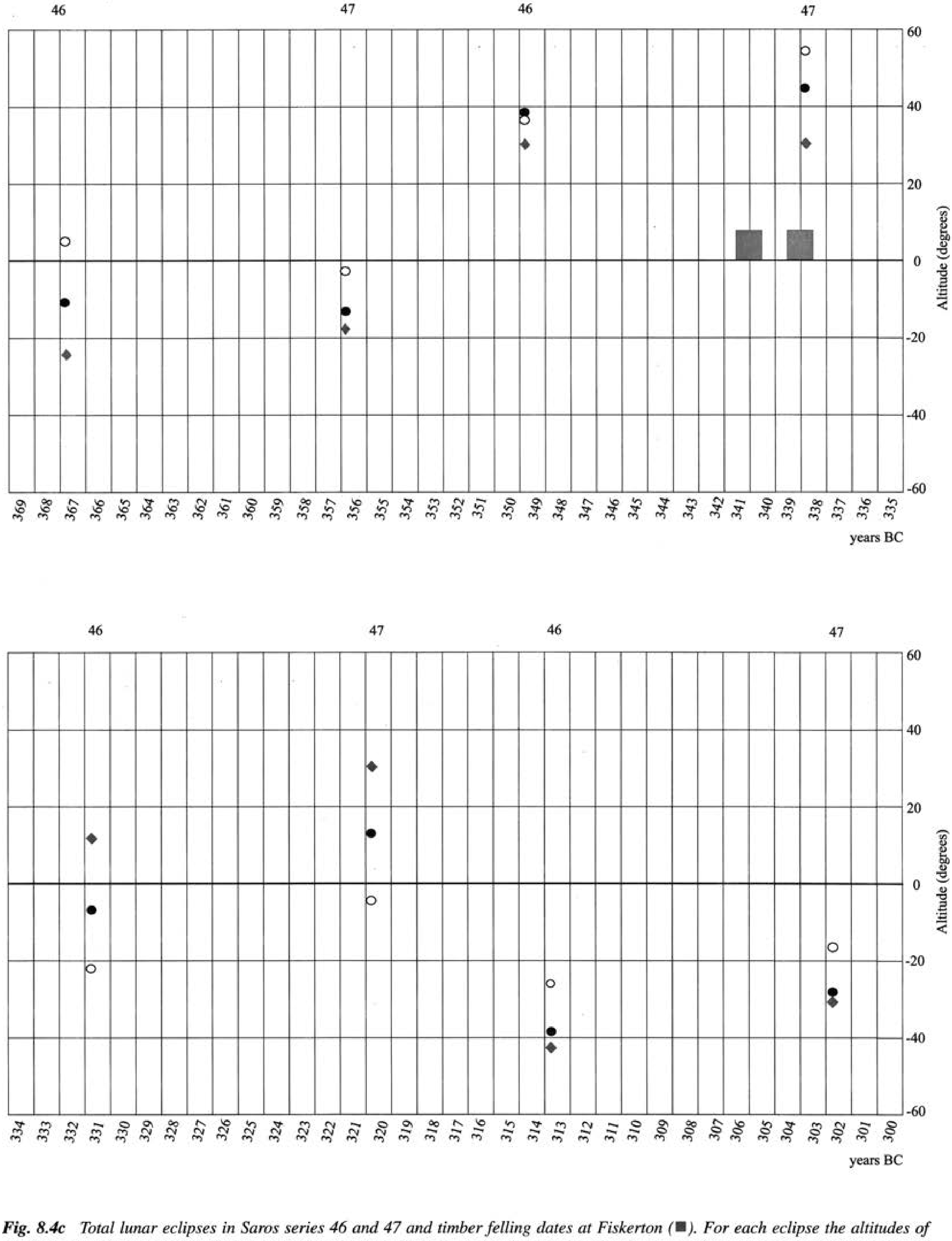


Fig. 8.4c *Total lunar eclipses in Saros series 46 and 47 and timber felling dates at Fiskerton (■). For each eclipse the altitudes of the Moon have been calculated for the time of entering partial eclipse (◆), the midpoint of total eclipse (●) and the time of leaving partial eclipse (○). The horizon is assumed to be at zero degrees altitude relative to the observer. Calculations are based on eclipse data in Espenak (1998).*

The third episode of felling, represented by a single timber dated 440/439 BC, coincides exactly with the next cycle of Saros 46, which generated a total lunar eclipse on 22 January 439 BC. However, this eclipse was barely visible from Fiskerton as the Moon only entered partiality when 4° above the horizon at 7:47 am, about half an hour before Moonset.

The next cycle of Saros 47 produced a visible total lunar eclipse on 21 December 429 BC but this is not accompanied by any datable evidence for timber felling at Fiskerton. However the next cycle of Saros 46 produced a visible total lunar eclipse in the early evening of 2 February 421 BC, with the Moon rising just before entering totality. This event coincides with a group of timbers felled in the winter/spring of 422/421 BC (together with a single timber felled one year earlier in the winter of 423/422 BC). Subsequent felling episodes at Fiskerton are less closely correlated with the Saros 46 and 47 lunar eclipses but additional exact matches with visible total lunar eclipses in the Saros 47 series occur in the winters of 393/392 BC, 375/374 BC and in 339/338 BC.

***Table 8.1** Episodes of felling for oak timbers at Fiskerton with absolute dendrochronological dates.*

Causeway Post Numbers	**Felling Dates (Winter/Spring, yrs. BC)**
94, 127, 253, 201, 573	457 / 456
126, 140, 147, 263	447 / 446
128	440 / 439
148	423 / 422
104, 117, 129, 566	422 / 421
49,97,108,116,122,131,137, 143,149,157,255,335,342	406 / 405
124	396 / 395
343	393 / 392
47	390 / 389
333	389 / 388
93, 110, 130, 249, 262	388 / 387
67, 217	385 / 384
346	378 / 377
6, 336	375 / 374
247	341 / 340
200	339 / 338

Testing the hypothesis and excluding coincidence

A total of 44 timbers from the 1981 excavation at Fiskerton were dated with acceptable confidence to a single year of felling (Table 8.1), and the resulting dates when aggregated show that felling took place in 16 different years between 457/456 BC and 339/338 BC (Fig. 8.4). Of these 16 felling years, two are centred exactly on the eclipses of Saros 46 and four are centred exactly on the eclipses of Saros 47. We will ignore, for the moment, the other felling dates that fall close to Saros 46/47 eclipse years, including the first phase of felling in 457/456 BC that took place in the winter following a Saros 46 eclipse in January 457 BC.[1]

What are the chances that six out of 16 felling dates would fall exactly on Saros 46/47 eclipse years, under the null hypothesis that eclipse observations did not influence the felling dates? The felling dates span 118 years, during which time 13 eclipses occurred in the Saros 46 and 47 series. (One of these eclipses, in 356 BC, was not visible at Fiskerton but it is included in the calculations because we are testing for a significant correlation between timber felling and events that, according to our hypothesis, were anticipated in advance, rather than simply observed passively.)

The probability that at least six out of 16 randomly-chosen dates in the 118-year interval would coincide exactly with a Saros 46/47 eclipse date is p=0.0024, calculated using the hypergeometric probability distribution (Zar 1999: 523). If the non-observable eclipse of 356 BC is excluded, the probability of the association between the timber felling dates and the observable Saros 46/47 eclipses being due to chance is reduced to p=0.0014.

The test of the significance of association can be repeated while confining the analysis to the single eclipse series Saros 47. Here there are four exact matches between eclipse dates and felling dates, while a total of seven eclipses occur in the Saros 47 series during the 118-year interval. The probability that out of 16 felling dates, four or more would coincide exactly with a Saros 47 eclipse date is p=0.00637

During the use of the causeway many more total lunar eclipses occur, although these are in different Saros series and most of them take place outside the midwinter season (Saros 48 and 58 are the only other Saros series that generate midwinter lunar eclipses during this period). The correlation of timber felling dates with these other eclipses is poor – there are 39 observable total eclipses between 457 BC and 338 BC that belong to Saros series other than series 46 and 47, but only three of the 16 felling dates match these eclipse dates to within six months. A random choice of 16 felling dates would be expected to provide five matches with these 39 eclipses, so there is no evidence in the Fiskerton data that any of the eclipses in the other Saros series were marked by timber felling.

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[1] These calculations do not include the unpublished 2001 samples from the southern extension of the causeway. The new results from the 2001 excavation provide three additional accurate timber felling dates, 439 BC, 431 BC and 401 BC (Ian Tyers pers. comm.), none of which match any eclipses. The effect on the probability calculation is that, when these three extra dates are included, 6 out of a total of 19 timber felling dates now match the Saros 46 and 47 eclipses. The probability of this occurring by chance is p = 0.0067, *i.e.* the odds are still better than 1 in 100 that there is a real association between timber felling and eclipses in the Saros 46 and 47 series. The new dates do not support the theory by coinciding with more eclipses, but neither do they refute it, as the overall association is still statistically significant – more data are needed to test the theory properly.

SOCIAL IMPLICATIONS OF LUNAR ECLIPSE MEASUREMENT FOR CALENDRICAL KNOWLEDGE AND ARCHAEOASTRONOMY

By A.T. Chamberlain and M. Parker Pearson

The incorporation of cardinal and solsticial alignments into the axial geometry of built structures has until now constituted the most robust form of evidence for cosmological knowledge in prehistoric communities. The observation and marking of seasonality in the directions of rising and setting of celestial bodies provides one of the necessary pre-conditions for constructing a celestial calendar but, as Gibson (1998: 77) has noted, proving that monuments *could* have been used for calendrical functions does not prove that they actually *were*. This point of logic exposes a major weakness in some of the more adventurous arguments advanced by earlier proponents of archaeoastronomy.

Recent publications on this topic (Ruggles 1999; see also Ruggles and Barclay 2000) have expressed considerable reservations about the use of architectural geometry to infer the existence of astronomical calendars in prehistoric Britain. This measured scepticism is commendable and it places the burden of scientific proof squarely on the shoulders of anyone who seeks to infer knowledge of astronomical cycles from alignments amongst static archaeological remains. In this analysis we have eschewed all evidence relating to the spatial arrangement and alignment of the timbers at Fiskerton, which must to some degree have related to the alignment of the river, and have focused instead exclusively on the temporal patterning in the felling dates.

Archaeological and literary evidence for interest in the moon

In his study of lunar symbols on certain anthropomorphic-hilted short swords Andrew Fitzpatrick has recently explored interest in the movement of the moon amongst European Iron Age societies (Fitzpatrick 1996). He interprets the crescents, full circles and triskeles (three legs radiating from a common centre) on their blades as different stages in the moon's waxing and waning, and supports his argument for the Iron Age measurement of time in 'nights' by referring to the Coligny calendar and later Gallo-Latin calendars which he considers to have derived ultimately from an indigenous calendrical system (1996: 389).

Only one such sword with astral signs has ever been found in Britain, three miles northeast of Fiskerton from the Barlings Eau, a tributary of the River Witham. It was recorded by Sir Joseph Banks as a dagger with a gold crescent on one side of its blade (1893: 233) but has since been lost. Another Iron Age dagger recovered from the Witham during the nineteenth century (and also now lost) was an anthropoid-handled short sword (Plate 15b; see Chapter 9). Fitzpatrick suggests that these swords were specialized blades appropriate for use in religious divination and augury by ritual specialists. Given the swords' wide geographical span from Ireland to Hungary, he is rightly sceptical of interpreting such people as the *druides* of Roman texts (1996: 387–9).

There are a few related and unequivocal references by Classical writers to 'barbarian' knowledge of the movements of the moon (see Fitzpatrick 1996: 387–8; Webster 1999; Ross 1999: 33–40). Caesar notes that the Gauls 'reckon periods of time not in days but in nights' (*De Bello Gallico* VI, 18) and that the druids 'hold many discussions as touching the stars and their movements, the size of the universe and the earth' (*De Bello Gallico* VI, 14). Later on, in the mid-first century AD, Pomponius Mela remarks that these druids 'profess to know the size and shape of the world, the movements of the heavens and of the stars and the will of the gods' (*De Situ Orbis* III, 2, 18–19; cited in Fitzpatrick 1996: 388). Pliny the Elder, also writing in the first century AD about Gaul, provides most detail about lunar observances in his digression on mistletoe, although his somewhat garbled account is almost certainly based on second-hand sources:

> *'Est autem id rarum admodum inventu et repertum magna religione petitur et ante omnia sexta luna (quae principia mensum annorumque his fecit) et saeculi post tricesimum annum, quia iam virium abunde habeat nec sit sui dimidia. Omnia sanantem appellantes suo vocabulo, sacrificio epulisque rite sub arbore conparatis duos admovent candidi coloris tauros quorum cornua tum primum vinciantur.'*
>
> 'Mistletoe is, however, rather seldom found on a hard-oak, and when it is discovered it is gathered with great ceremony, and particularly on the sixth day of the moon (which for these tribes constitutes the beginning of the months and the years) and after every thirty years of a new generation, because it is then rising in strength and not one half of its full size. Hailing the moon in a native word that means "healing all things", they prepare a ritual sacrifice and banquet beneath a tree and bring up two white bulls, whose horns are bound for the first time on this occasion.' (*Historia Naturalis* XVI, 250; trans. H. Rackham).

The nature of astronomical knowledge at Fiskerton

The dendrochronological dates are those of the felling of living trees and hence not directly of the causeway's construction and rebuilding with these timbers. It could be argued that it was this activity of felling which was timed in relation to the eclipses, and that the causeway's building/repair was merely an insignificant consequence of these tree-cutting episodes. This seems unlikely: the timbers do not appear to have been seasoned for a long period before use so the felling of trees and the erection of posts, although distinctly different events, were probably not widely separated in time. The use of the causeway for votive deposition also directs attention towards the posts' erection rather than the trees' felling.

Secondly, it might be considered that the correlation between felling/construction and lunar eclipses is due to a third factor, such as unusual high tides caused by the eclipse and requiring the causeway's repair. However, this can be dismissed because such moments are not in fact associated with strong tidal movements. The most plausible hypothesis is that the timing of repairs was triggered not by a pragmatic response to 'wear and tear' but by very particular movements in the heavens.

If the timing of felling and construction was linked to midwinter lunar eclipses, then the Fiskerton dendrochronological sequence offers us an unusual and rare window into the agency of the builders. Construction work on the causeway was not simply a behavioural response to a stimulus but a result of people interpreting – and acting within – a complex understanding of time and sequence.

Our interpretation must, however, be tempered by the knowledge that the sample of dendrochronologically responsive timbers is unlikely to have provided the full range of dates for all work undertaken at Fiskerton during the Iron Age. Apparent gaps in the sequence of construction work may be due to insufficient sampling rather than an indication of a real absence of activity around the causeway. This sampling problem, on the other hand, should provide a useful test for any further excavation at the site, and can perhaps be resolved by studies of other Iron Age causeways. The fact that the Flag Fen timber alignment shows no such chronological correlation with lunar movements suggests that perhaps this association was a phenomenon of Iron Age society and not before.

To recap the episodes of tree-felling for the Fiskerton causeway posts in relation to the Saros series of midwinter lunar eclipses:

- *ECLIPSE 1.* Jan 457 BC. Trees for the first dated posts were felled a year after the eclipse. **Felling after the eclipse.**
- *ECLIPSE 2.* Dec 447 BC. The causeway builders felled trees for posts at the time of the eclipse. **Felling at the eclipse.**
- *ECLIPSE 3.* Jan 439 BC. Trees felled at the time of the eclipse, even though only the partial phase of the eclipse was visible from Fiskerton. **Felling at the eclipse.**
- *ECLIPSE 4.* Dec 429 BC. None of the sampled posts matches the date of the eclipse.
- *ECLIPSE 5.* Feb 421 BC. Trees for posts were felled one year before the eclipse (one post) and at the time of the eclipse (four posts). **Felling before and at the eclipse.**
- *ECLIPSE 6.* Jan 410 BC. Eclipse was very briefly visible for a few minutes at Fiskerton during its partial phase; there are no posts for this date.
- *ECLIPSE 7.* Feb 403 BC. Trees were felled two years before the eclipse. **Felling before the eclipse.**
- *ECLIPSE 8.* Jan 392 BC. One dendrochronological samples matches the eclipse date. **Felling at the eclipse.**
- *ECLIPSE 9.* Feb 385 BC. Eclipse only visible in its partial phase, immediately before moonset. Trees were felled three and two years beforehand and one year after. **Felling before and after the eclipse.**
- *ECLIPSE 10.* Jan 374 BC. Has posts of the same date. **Felling at the eclipse.**
- *ECLIPSES 11, 12 AND 13* (367, 356 and 349 BC). No posts date to the time of the next three eclipses. One of them, Eclipse 11, was only visible in its partial phase and another, Eclipse 12, was not visible at all at Fiskerton.
- *ECLIPSE 14.* Feb 338 BC. Trees for causeway posts were felled two years before and at the time of Eclipse 14. **Felling before and at the eclipse.**
- *ECLIPSE 15.* Mar 331 BC. Not marked by timber felling at Fiskerton.
- *ECLIPSE 16.* Feb 320 BC. This was the last visible eclipse falling within the period of causeway construction. The last felling event cannot be dated more precisely than 321–291 BC. **Possibly before, at or after the eclipse.**

Prediction of eclipses or response to eclipses?

Since absence of felling evidence is not evidence of absence, we must exercise caution in interpreting these activities and not put too much stress on the significance of 'missing' felling episodes. Yet there are features in the trajectory of eclipses and felling which suggest a growing knowledge of the eclipse series, moving from their marking the event *after* its occurrence to their prediction *prior* to it.

The first felling for the causeway was after its eclipse event whilst the next two fellings coincided precisely with theirs. For the posts dated 423/422–422/421 and 406/405 BC, felling appears to predate each of their eclipses. The same is also true for subsequent felling periods (389/388–385/384 BC, 378/377–375/374 BC and 341/340–339/338 BC). It would seem that the generations of builders between 457/456 and 339/338 BC, over a period of some seven 18-year cycles, may have become more adept and confident in their predictions.

None of the eclipses that occurred with the Moon below the horizon (and therefore not visible at Fiskerton) have associated felling dates, however. We cannot expect the builders to have been able to predict whether eclipses would be visible or not. It is thus possible that timber may have been cut in advance and then not used if the eclipse did not show. The cessation of construction on the causeway, some time after 321 BC, may have been related to the failure thereafter of successive eclipses in these two Saros series to appear above the horizon.

An alternative interpretation of the association between timber felling and lunar eclipses is that the successive additions of posts to the causeway were in response to the serendipitous observation of lunar eclipses, rather than in anticipation of an accurately forecasted astronomical event. If this were the case it is then difficult to explain why timber felling only seems to have occurred at eclipses in two of the Saros series, given that eclipses in several other Saros series were also observable at the time that the monument was in use. Coupled with the fact that some of the low-visibility eclipses in the Saros 46 series appear to have been marked by timber felling, we believe that the lunar eclipses in these Saros series were forecasted rather than passively observed.

The evidence from Fiskerton suggests that there was in Iron Age Britain some understanding of the cyclical nature and periodicity of lunar eclipses. In order to use the Saros series as the basis for eclipse prediction it would have been necessary to employ an accurate calendar that recorded phases of the Moon over a period of several decades. There is epigraphic and literary evidence from the Gallo-Roman period that such calendars existed in late Celtic Europe (Fitzpatrick 1996), and by inference this calendrical knowledge may have been present in the La Tène period.

The most celebrated example from the Gallo-Roman period is the Coligny calendar, which was based on a five-year cycle of 62 months. The months are grouped into five periods of 12 months alternately of 29 and 30 days length, together with two intercalary months, each of 30 days length and spaced at 2½-year intervals. This is a highly effective lunar calendar as it keeps pace with the phases of the Moon with an average error of less than five hours per year (there are 1830 days in the Coligny calendar, compared to 1830.9 days in 62 lunar months). If used in conjunction with a numerical recording scheme, a calendar with this level of accuracy could easily be used for predicting lunar eclipses at intervals of 223 lunar months.

In conclusion, there is both material cultural and historical evidence to indicate that the movement of the moon was of significance for European Iron Age societies. The hypothesis that the Fiskerton causeway was constructed in relation to two midwinter lunar eclipse series is thus not entirely speculative: the evidence would seem to demonstrate that specialist knowledge of the moon's cycles was considerably more advanced than we, and the Romans, might have credited.

Finally, returning to the issue of architectural alignments in archaeoastronomy, we note that alignments orientated to the northeastern horizon (usually interpreted as the direction of the rising midsummer sun) also designate the rising point for the moon in years when lunar eclipses take place near the winter solstice. Re-examination of putative solar alignments in prehistoric monuments from a lunar eclipse perspective might be a profitable exercise.

Dendrochronological evidence from other prehistoric wooden tracks and causeways in Europe

There are very few Iron Age timber causeways and trackways with bark-edge dendrochronological dates, so it is not yet possible to determine whether the pattern of correlation between felling dates and midwinter lunar eclipses that we have detected at Fiskerton applies to any other sites. Relevant dendrochronological data from first millennium BC bridge and trackway sites in Europe (Table 8.2) include:

- For the timber causeway and platform at the Bronze Age site of *Flag Fen* in Cambridgeshire there are nine separate episodes of tree felling that can be dated to within a calendar year (K. Groves, pers. comm.). Comparing these dendrochronological dates to the lunar eclipse catalogues, four of the Flag Fen felling dates occur within six months of a lunar eclipse but the number of matches expected by chance is three. Furthermore the eclipses that occurred during timber felling years at Flag Fen took place in March, July, September and November. There is thus no evidence for felling and construction activity at Flag Fen coinciding with midwinter eclipses.
- At *Caldicot Castle* in Gwent (Monmouthshire) timbers from two parallel alignments have provided bark-edge dates that indicate episodes of felling in the winters of 998/997 BC and 990/989 BC (Nayling and Caseldine 1997). These link to a pair of Saros series (Saros 27 and 28) in which long-duration total lunar eclipses occur near the winter solstice. One such eclipse took place on 31 December 997 BC (Saros 28) and another on 12 February 989 BC (Saros 27). The first date indicates felling up to one year before the first eclipse, while the second date has an exact seasonal match with the 989 BC eclipse. Other timbers from Caldicot dated by dendrochronology lack bark edge and therefore cannot be matched against eclipses in these Saros series.
- *Les Mottes* (Switzerland) is dated to 350 BC (Schwab 1989). This date is interesting because in the early spring of the following year, 349 BC, a highly visible total eclipse occurred in the Saros 46 series. Thus Les Mottes is not only contemporary with the later stages of rebuild at Fiskerton but its construction may also relate to one of the Saros series which was also observed at Fiskerton.
- *Cornaux Les Sauges* (Switzerland) is dated to 150 BC (Schwab 1992). This date corresponds to a highly visible winter eclipse in the Saros 61 series, which occurred on 28 December 150 BC. However a subsequent timber-felling episode at Cornaux, which is imprecisely dated to between 120 and 116 BC, does not fall within an interval when winter lunar eclipses occurred.
- The *Corlea 1* trackway in Ireland has timbers felled in the winter of 148/147 BC (Raftery 1990; 1996; Baillie and Brown 1996). The Corlea 1 date does not coincide with a total lunar eclipse. The *Corlea 5* trackway (AD 560) coincides with a winter eclipse of Saros series 83.
- The *Dümmer See Bohlenweg VI* (43 BC; Hayen 1979 cited in Raftery 1996: 225–6) and *Rondet Bridge* (6 BC to AD 229; Schwab 1992). One of the three Dümmer See tracks (Germany) and three of the four constructional phases at Rondet bridge (Switzerland) show close matches with the Saros 61 and 62 eclipse series – some of the uncertainty here is due to lack of

Table 8.2 *Correlation of dendrochronological dates and lunar eclipses from other sites in Britain and Europe. (Data from Brindley & Lanting 1998 and Nayling & Caseldine 1997.)*

SITE	**Dendro Date**	**Eclipse Date**	**Saros Cycle**	**Match of Felling**
BRITAIN				
Caldicot	998/997 BC	31.12.997 BC	28	1 year prior
Caldicot	990/989 BC	12.02.989 BC	27	exact
IRELAND				
Timahoe (lower part)	1483 BC	–	–	–
Timahoe (upper part)	1384 BC	–	–	–
Derrynaskea 2	974 BC	19.10.974 BC	40	exact
Deraghan More	circa 168 BC	16.12.168 BC	61	approximate
Corlea 1	148/147 BC	–	–	–
Navan	95/94 BC	29.01.95 BC	61	1 year after
Corlea 5	AD 560	AD 19.11.560	83	exact
CONTINENTAL EUROPE				
Dümmer See Bohlenweg III	749/748 BC	–	–	–
Dümmer See Bohlenweg III	665 BC	–	–	–
Dümmer See Bohlenweg III	640 BC	–	–	–
Les Mottes	350 BC	16.03.349 BC	46	exact*
Cornaux Les Sauges	150 BC	28.12.150 BC	61	exact*
Rondet Bridge	6 BC	23.03.5 BC	61	exact*
Rondet Bridge	AD 7	AD 20.02.7	62	1 year after*
Rondet Bridge	AD 31	AD 14.04.32	61	?exact*
Dümmer See Bohlenweg VI	AD 43	AD 7.09.43	67	exact
Rondet Bridge	AD 229	–	–	–
Dümmer See Bohlenweg IV	AD 235	–	–	–

* assuming dendrochronological date is based on a *complete* last ring, indicating felling between late autumn and early spring (i.e. 'winter felled').

information about the season of felling for the timbers at these sites.

- The timber structure at *Navan* (winter of 95/94 BC; Baillie 1988; Baillie and Brown 1996) has a date that is also a close match with an eclipse in the Saros 61 series but is actually the winter after that eclipse.
- Of the Irish trackways at *Timahoe*, *Derrynaskea 2* and *Deraghan More* (Brindley and Lanting 1998), Deraghan More has an approximate dendrochronological date which may match an eclipse in the Saros 61 series but there is the same lack of information about the season of felling for the timbers. Derrynaskea 2 has an exact match with an eclipse in the Saros 40 series.

These data give a strong impression that several linked pairs of Saros series (27/28, 46/47 and 61/62) may have been used for predicting winter total lunar eclipses at different times during the first millennium BC. There is also evidence to suggest that Saros series 40, 67 and 83 may have been recognized, the later ones being relevant to timbers from Ireland dated to the first millennium AD. However, Fiskerton is the only site with sufficient dated timbers to provide a statistical test of the association between timber felling and eclipses, and more precisely dated series of timbers are required in order to provide an adequate test of our theory.

Conclusion

We had initially speculated that the observation of lunar eclipse series might have been a solely La Tène-period phenomenon but the evidence for felling dates from the Late Bronze Age causeway at Caldicot hints at a much greater antiquity for this practice. The current tree-ring evidence suggests that midwinter lunar eclipses were marked by timber felling in preparation for piled structures variously interpreted as post alignments, hards and bridges (with the exception of the circular structure at Navan), rather than horizontally laid or pegged trackways. The date range for this phenomenon appears to be start earlier than and extend beyond the La Tène period, perhaps extending from 997 BC to AD 43 in Britain and Europe or even as late as AD 560 in Ireland.

We propose that the Fiskerton timber causeway may have been gone out of use and fallen into disrepair towards the end of the fourth century BC, at the time when the Saros series 46 and 47 were no longer effective for predicting total lunar eclipses. However, votive deposition at Fiskerton continued long after the use-period of the timber causeway which constitutes the major structure at the site. It is therefore possible that other timber structures, perhaps at nearby locations along the River Witham, were used in conjunction with astronomical observations at earlier and later times in prehistory.

The Fiskerton felling dates have enabled us to propose some interpretations and hypotheses hitherto not considered by many archaeologists. Like the Roman colonialists before us, we have been reluctant to ascribe to the Iron Age people of Britain and Gaul too great a sophistication in knowledge and ability. The strength of correlation between felling dates and the midwinter lunar eclipses of Saros series 46 and 47 is hard to dismiss and, even for diehard sceptics, potentially has the benefit of being tested by future sampling in the field. The hypothesis concerning the significance of this correlation, although soundly based on the available evidence, is speculative and awaits substantiation through further sampling of the timbers at Fiskerton and at other La Tène-period votive sites in northern Europe.

There is potentially supporting evidence for the significance of lunar eclipses in certain aspects of La Tène art. It is possible that the astral symbols on the anthropomorphic-hilted short swords may relate to lunar eclipses rather than to phases of the moon, given the extreme shape of some of the crescents. Equally, the symbolism of the triskele – also apparent on one of these swords – could represent the 54-year threefold eclipse cycle of the moon, after which the eclipse returns to the same approximate position in the sky. Certainly within Britain, the context of La Tène art was a special one (see Chapter 10) and it clearly served more purpose than decoration alone.

It is important, moreover, to demonstrate that Iron Age ritual specialists were not merely astronomers of some ability but that such activities were embedded within social and mystical understandings of their world. This chapter has suggested how some of those articulations might have been brought into play, for example through the astral signs on swords and certain art motifs. The deposition of votive offerings off the Fiskerton causeway (including, possibly, human beings) seems to have been a major aspect of its use, and the link between its building and midwinter lunar eclipses gives rise to speculation that the deposition of the fifth-fourth century BC metalwork may have also been linked to construction and astronomical events.

9 FISKERTON IN ITS LOCAL AND REGIONAL SETTING

By M. Parker Pearson and N. Field

Fiskerton is located at the eastern edge of the north-south Jurassic limestone ridge which divides at Lincoln and Fiskerton into the Lincoln Edge to the north and the Lincoln Heath to the south (Boutwood 1998a). It is at Fiskerton that the River Witham leaves its narrow channel through the limestone dip slope and enters the low ground of the Jurassic clay, known as the Mid Clay Vale or the Lincoln Clay Vale, where it widens into a four mile-wide channel known as the Witham Fens. About three miles east of Fiskerton the Witham is joined from the north by the Barlings Eau (pronounced 'ee'), fed by many small streams in the Mid Clay Vale between the limestone of the Lincoln Edge to the west and the chalk of the Lincolnshire wolds to the east.

The region of Lincolnshire north of the Witham is known as Lindsey, defined by the Humber to its north, the Witham to its south, the Trent to the west and the North Sea to the east. In the first millennium BC Lindsey was effectively an island, as its name reveals ('the island of the pool'), bounded by these major water courses and the low-lying, presumably marshy land between Torksey and Lincoln to the southwest (May 1996: 642).

FINDS FROM THE RIVER WITHAM

Amongst British rivers the Witham has produced finds second only in quantity to the Thames (Fitzpatrick 1984). This is undoubtedly due to the programme of embanking and scouring the river below Lincoln in the eighteenth and nineteenth centuries, and the fortuitous presence and involvement of antiquarians such as Sir Joseph Banks, President of the Royal Society, living at Revesby Abbey near Boston and in a town house at Horncastle. His own account of the Witham finds, a manuscript written in *c.* 1800 and published long after his death (Banks 1893; 1896), records the rationale for collecting the material recovered in 1787 and 1788: 'To collect together these things became an object of considerable interest, though not very easy, as they were dispersed into a hundred hands, but to have suffered them to be dissipated and lost would have given room for censure on a country said already by some to resemble Boeotia, not in the richness of its pastures only, but in the talents of its natives. Once collected together they serve to elucidate the manners of our ancestors and to explain their writings.' (Banks 1893: 197).

Banks noted that the Witham between Lincoln and Tattershall had been 'for ages gradually depositing a mud endowed with all the powers of preservation'. By the late seventeenth century the river had become almost unnavigable and was no longer capable of dispersing the winter flood water (White 1979b: 2). The first period of the river's straightening, widening, scouring and embanking was between 1762 and 1770 (Grundy 1762; Birch 1968: 2–4; White 1979b; Wright 1982: 40–50). The river was scoured, widened and deepened between Chapel Hill (south of Tattershall) and Stamp End at Lincoln and locks were constructed at Kirkstead, Barlings and Stamp End. Many finds were made in 1768 and 1787–88.

The second period of works was in the early nineteenth century (Bower 1803) when new locks were built at Bardney and Stamp End and the old ones removed. The South Delph was extended from Lincoln to Horsley Deeps (near Bardney) and a new cut of the Witham was made between Horsley Deeps and Fiskerton. Finds were reported in 1816, 1826 and in 1848 during construction of the railway. Other finds were recovered during dredging in the twentieth century, notably in 1906 and 1936. In the last 50 years a variety of artefacts has been found during dyke cleaning and when ploughing areas formerly underwater.

In contrast to many of the iron finds from the 1981 Fiskerton excavations, most of the metalwork retrieved from these earlier dredgings was 'found nearly in a perfect state' (Banks 1893: 197), no doubt due to the anaerobic conditions in which these items lay. (Since the late eighteenth century there has been up to 2m of peat loss through shrinkage, owing to the drainage programmes.) Sir Joseph Banks noted that most of the finds lay on the hard soil of the river bottom, below the mud. From this he inferred erroneously that 'our Saxon ancestors kept the river in much better condition than their successors have since done'. The results of the Fiskerton excavations indicate that heavy artefacts such as weapons and large tools are likely to have sunk through the softer mud layers and eventually come to rest on more solid surfaces.

THE PALAEOLITHIC TO EARLIER NEOLITHIC LANDSCAPE

Although antiquarian and archaeological interest has been focused on the artefacts of the Iron Age, the River Witham and its valley have produced ample evidence of much earlier human activity in the area. The earliest find, from just east of Fiskerton (TF 065 717), is a Mousterian handaxe (*c.* 100,000–40,000 bp). Its fresh condition suggests the survival of undisturbed Middle Palaeolithic occupation layers although no other Palaeolithic material appears to have been recorded. Fieldwalking and excavations provide a clearer picture of subsequent occupation of this marshy area.

Late Mesolithic and Earlier Neolithic activity

This part of the Witham valley is known to have been inhabited and utilized during the Late Mesolithic on the basis of lithic scatters found in the area (Figs 9.1 and 9.2). Mesolithic flints were found on sands in Washingborough Fen (TF 0398 7138; Coles *et al.* 1979: 9) and recent work by the Washingborough Archaeology Group (W.A.G.) has identified a large scatter of possible microliths to the south of Washingborough, centred on TF 022 689, and two smaller ones, also on the limestone overlooking the valley, at TF 0203 7022 and TF 0435 7065.

The Witham valley east of Lincoln was densely occupied in the Neolithic: more than 40 flint and stone axes have been found within three or four kilometres of the river's margins at that time. The W.A.G. has recovered worked flint and debitage from the ploughed surfaces of 43 out of 45 fields walked around Washingborough (Vickers n.d.; Fig. 9.1). Most of this material is not closely datable but its large extent and occasional concentrations with diagnostic pieces indicate that the south bank of the Witham was extensively exploited during this period.

There are dense lithic concentrations particularly to the west of Washingborough village on the limestone scarp overlooking the valley. Major sites are located at:

- TF 0195 7002 (W.A.G. code: Field 14), including a leaf-shaped and a barbed-and-tanged arrowhead;
- TF 010 699 (Field 15), including a leaf-shaped arrowhead;
- TF 0435 7065 (Field 20, east of Washingborough), diagnostic worked flint including an arrowhead of the Neolithic or Early Bronze Age;
- TF 0165 6833 (Field 26), including a barbed-and-tanged arrowhead;
- TF 009 699 (Field 36) undated scatter;
- TF 010 701 (Fields 37 and 38) undated scatter;
- TF 0145 6940 (Field 40) undated scatter.

Off the limestone, lower densities of undated material were recovered from the floodplain of the Witham, to the north of the Washingborough village.

The presence of leaf-shaped arrowheads in two of the lithic scatters on the limestone around Washingborough is indicative of Earlier Neolithic activity. There are no monuments in the locality that can be dated to the Neolithic with certainty but an oblong cropmark on the limestone slope north of the Witham at Greetwell may be a long barrow (Fig. 9.2). Some of the communities using the Witham valley may have visited and used the long barrows of the wolds 15–20 miles away to the east.

There is a leaf-shaped arrowhead from Fiskerton parish (White 1977), along with a Group VI stone axe (White 1978). Neolithic axes have also been found south of the river in Heighington Fen (Cummins and Moore 1973: 219–55; Coles *et al.* 1979: 9) and to the east and west of Branston, where other flints such as leaf-shaped arrowheads have also been found. North of the river, there have been finds of two Neolithic axes from Reepham and one from Cherry Willingham, west of Fiskerton. In this area of Fiskerton, Washingborough and Heighington there is a noteworthy grouping of stone axes within former wetland settings in the Witham's valley bottom and its edges. A second concentration of axes can be noted in the Stixwould-Woodhall Spa area. The only excavations of structural evidence from this period are those at Tattershall Thorpe (Chowne *et al.* 1993), another area with dense distributions of stone axes.

Earlier Neolithic river finds

Although finds of Neolithic artefacts have been interpreted as casual losses, new understanding of stone axes as prime candidates for votive deposition in the Neolithic has altered this view (Bradley 1990). The lack of stone axe hoards and the absence of information on the contexts of these discoveries from the Witham valley, however, prevent their wholesale interpretation as votive deposits. Instead, a case for their intentional discard can only be made for those recovered in locations that would have been underwater in the Neolithic. This limitation reduces the numbers dramatically to:

- six axes and a flint knife in the Fiskerton-Washingborough-Heighington area;
- three axes between Horsington and Stixwould;
- possibly a saddle quern from Tattershall Ferry.

All of these are from what would have been the river's margins and it is notable that not one stone axe was reported as found during the dredging operations of the eighteenth and nineteenth centuries. Nonetheless, the number from watery contexts in the Fiskerton area suggests the possibility of deliberate deposition in this area during the Earlier Neolithic.

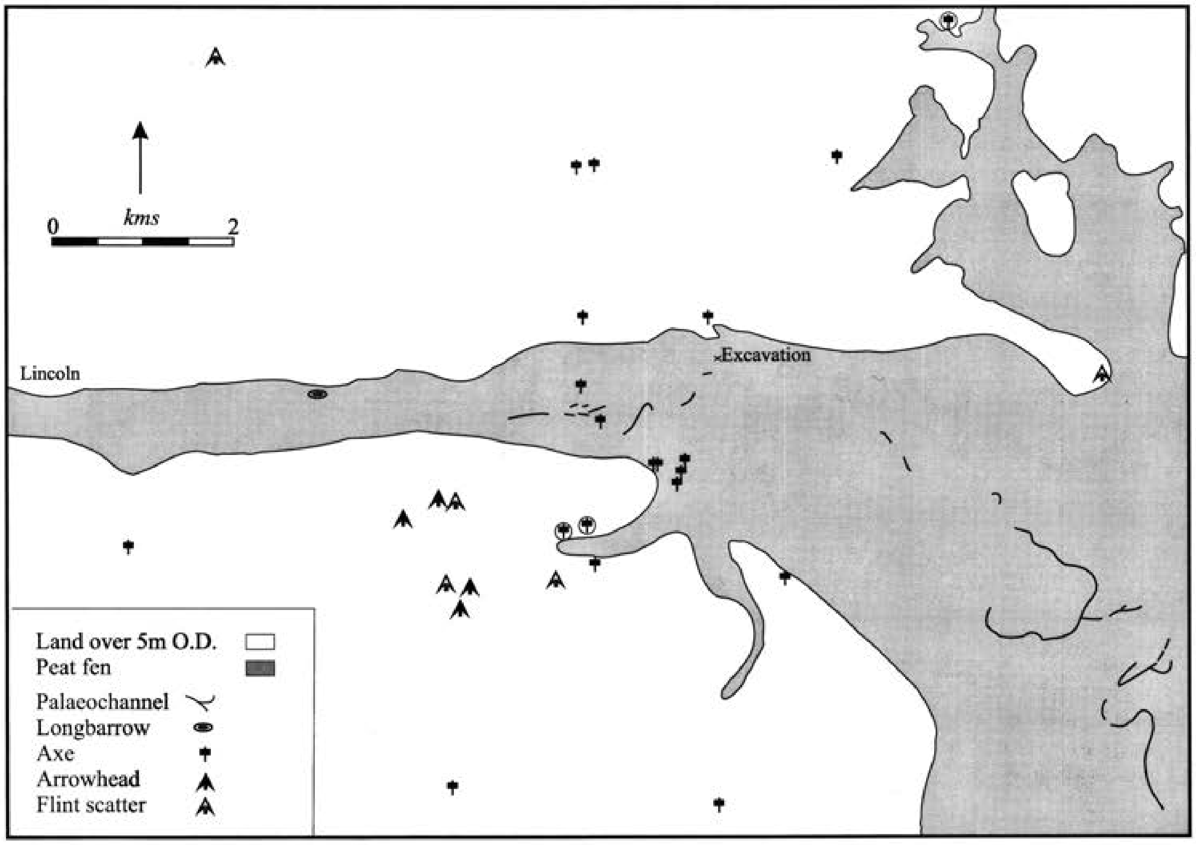

Fig. 9.1 *The Fiskerton area in the Earlier Neolithic (approximate findspots are marked by open symbols).*

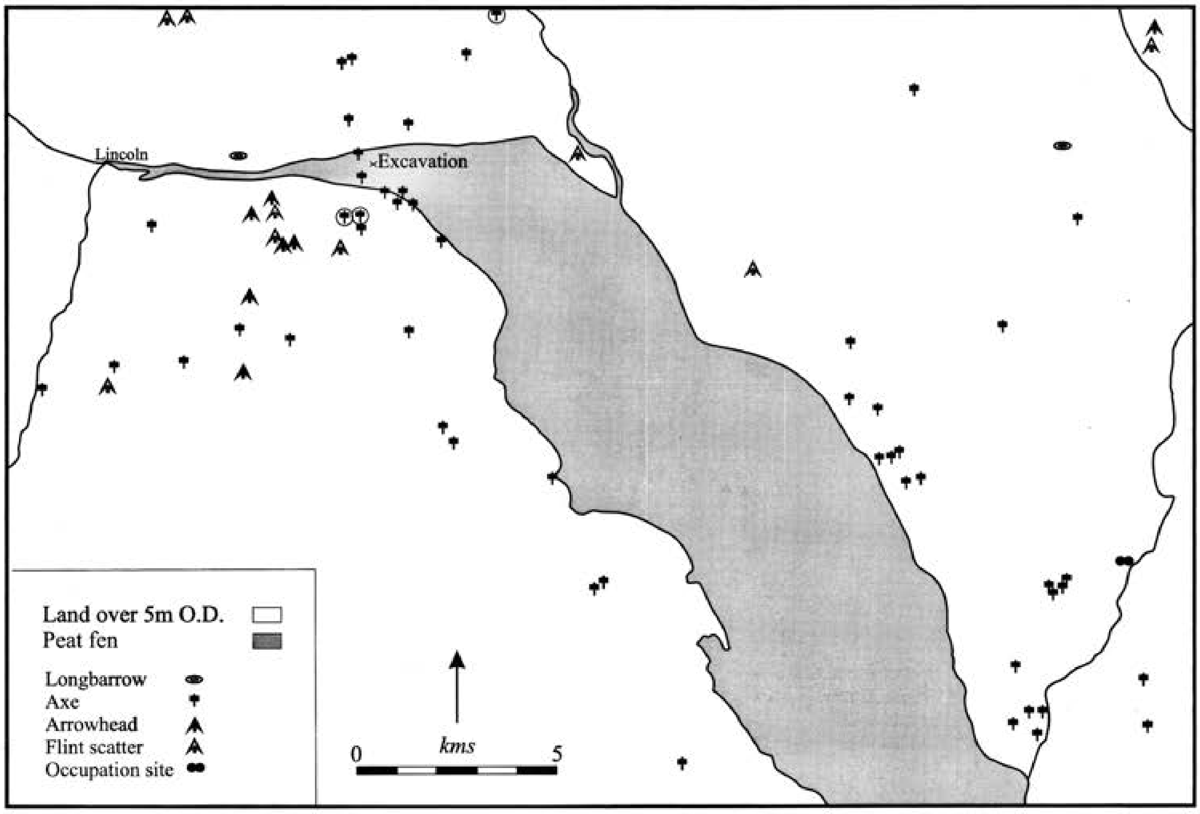

Fig. 9.2 *The Lower Witham region in the Earlier Neolithic (approximate findspots are marked by open symbols).*

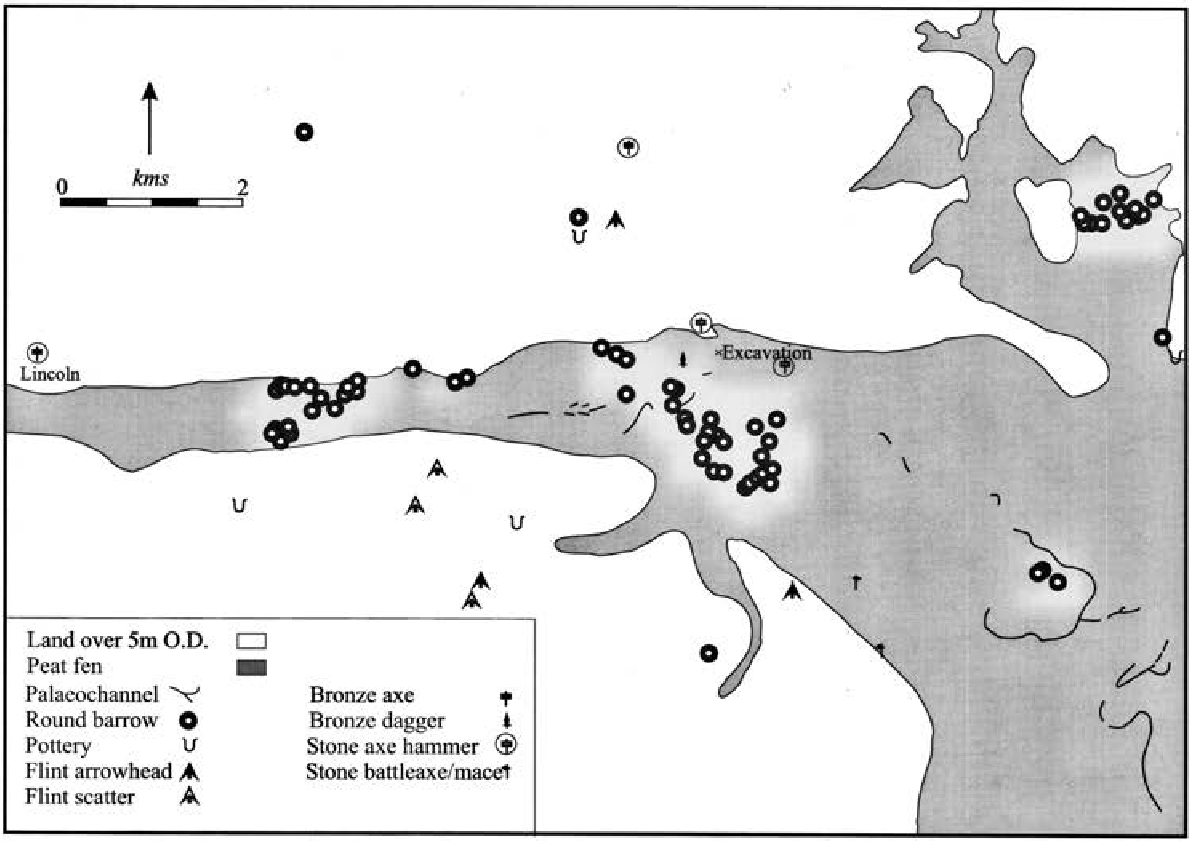

Fig. 9.3 The Lower Witham region in the Late Neolithic/Early Bronze Age and Middle Bronze Age (approximate findspots are marked by open symbols).

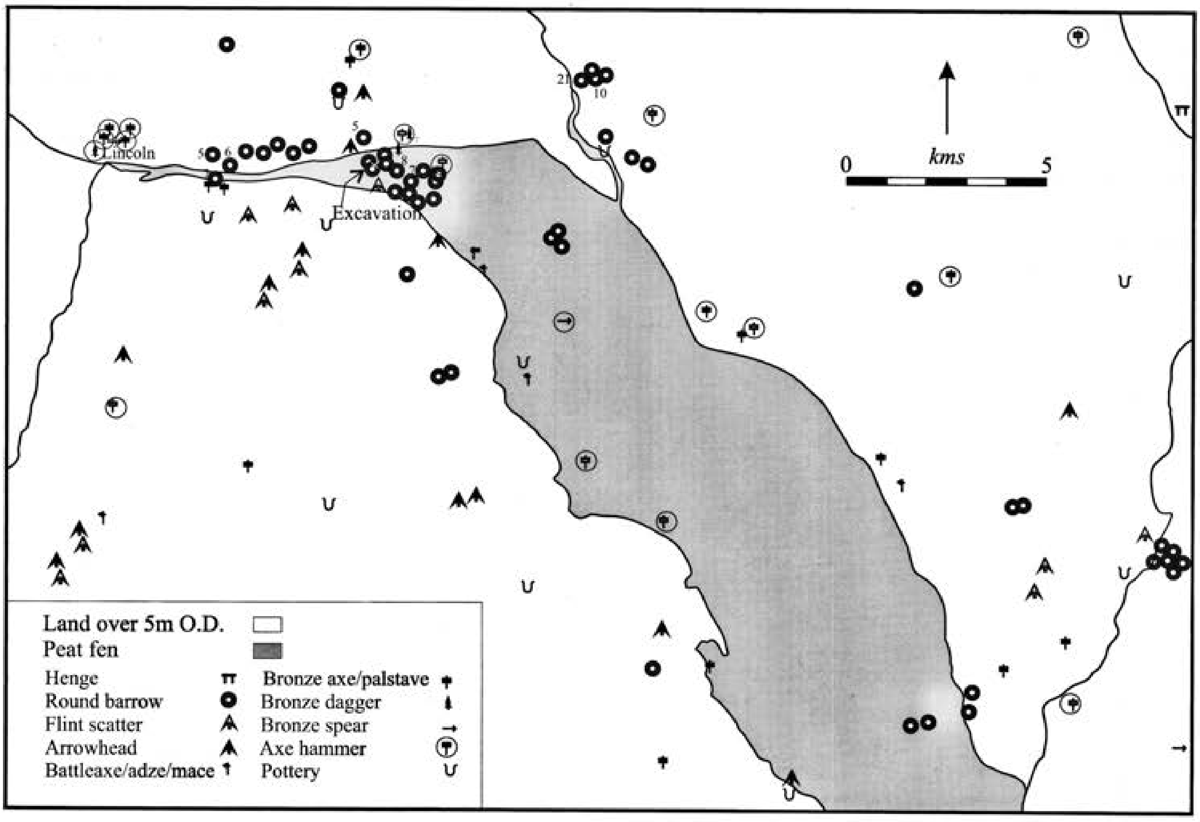

Fig. 9.4 The Fiskerton area in the Late Neolithic/Early Bronze Age (approximate findspots are marked by open symbols).

THE LATE NEOLITHIC AND EARLY BRONZE AGE LANDSCAPE

During the Early Bronze Age, the Fiskerton area became sandwiched between two large round barrow cemeteries, one centred in the Barlings-Stainfield area to the northeast and the other located on the floodplain of the south bank of the Witham to the east of Washingborough (Winton 1998: 59; Figs 9.3 and 9.4). A third group of round barrows lies three miles to the west, near Greetwell within the floodplain. Another major group lies further to the southeast in Billinghay and Coningsby. Within an increasingly deforested landscape these mounds would have come to dominate the low-lying and flat landscape on either side of the river.

The W.A.G.'s systematic surveys demonstrate that we should expect prehistoric flints to occur in similar densities along both banks of the Witham and in parts of its floodplain. During excavations in Fiskerton village a group of 18 worked flints were recovered during evaluations at Perrins Cottages, with seven worked flints found at Nelson Road (see Fig. 1.2 and Appendix, below; Palmer-Brown 1994; 1999).

In the drier areas, finds of a flat axe at Reepham and barbed-and-tanged arrowheads at Cherry Willingham, Branston, Branston Booths, and Heighington, and a beaker at Cherry Willingham are evidence of further activity in this landscape. The W.A.G. have recorded barbed-and-tanged arrowheads in lithic scatters at TF 024 690, TF 0195 7002 and TF 0165 6833. The fen margins were also places of deposition for three stone axe hammers around Fiskerton (tools of this type may have been used in the creation of timber piles and trackways across swampy ground) and a stone battle-axe and barbed-and-tanged arrowhead in Branston Booths fen.

Although some of the Neolithic stone axes may have been deposited in the Later Neolithic (as was a petit tranchet derivative flint arrowhead at Billinghay), it is with the bronze flat axes, dating to *c.* 2500–2000 BC, that datable river finds become more numerous (Table 9.1). The most prolific finds from the river for this period are, however, of stone. The battle-axes and macehead are types of artefact which often appear as grave goods and may have come from destroyed barrows. The axe hammers are rare finds from this period and these finds from the Witham valley are somewhat unusual, being less easily explained away as grave goods.

The distributions of Early Bronze Age finds are mostly adjacent, but not overlapping with, the large round barrow cemeteries at Washingborough, Barlings/Stainfield and Billinghay/Coningsby. The river finds mainly come from Lincoln, Fiskerton, Stixwould and Kirkstead on the north bank and Timberland, Blankney, Dunston, Nocton, and Potterhanworth Booths on the south. The regularity of their distribution every 3–4km along the river raises the possibility that these were crossing places and/or special locales. The Fiskerton and Lincoln areas are notable in being the only wetland settings in this part of the Witham in which Early Bronze Age bronze weapons have been found.

THE MIDDLE AND LATE BRONZE AGE LANDSCAPE

Palaeoenvironmental work shows that peat began to develop in the Witham valley from about 1000 BC, sealing the round barrow cemeteries and the associated landscape (Wilkinson 1987). There is little evidence for settlement during the Middle and Late Bronze Age, in contrast to the high density of bronzes deposited in the river at that time (Davey 1973). This is almost certainly a result of the difficulties in locating settlements of this period and the many bronzes from dry land on both sides of the Witham in this area point to a densely occupied or utilized landscape (Figs 9.5–9.7; Tables 9.2–9.3). Even if they

Table 9.1 *Late Neolithic and Early Bronze Age artefacts from the Witham valley. (Numbers in brackets after bronze finds refer to the catalogue numbers in Davey 1973)*

Stone Artefacts	**Metalwork (*c.* 2500–1600 BC)**
a *PTD arrowhead* from Billinghay *barbed-and-tanged arrowheads* from Branston, Branston Booths, Cherry Willingham, Heighington, and 3 scatters around Washingborough; a *macehead* from Kirkstead; a *shafthole hammer* from Fiskerton churchyard; two *shafthole hammers* from the Bain valley (to the east); five further *shafthole hammers* and *axe hammers*; *battle-axes* from the fens of Branston Booths, Potterhanworth Booths, Nocton and Timberland.	four *flat axes* (Reepham; three from the Witham (one at Lincoln): 3*, 7 and 8); two *flanged axes* from Stixwould and another unlocated (22); a *flanged axe* from Lincoln that may possibly be a river find (28); a *bronze dagger* found in the river at Fiskerton, about 300m west of the causeway; a *bronze dagger* from Lincoln (191) may also be a river find.

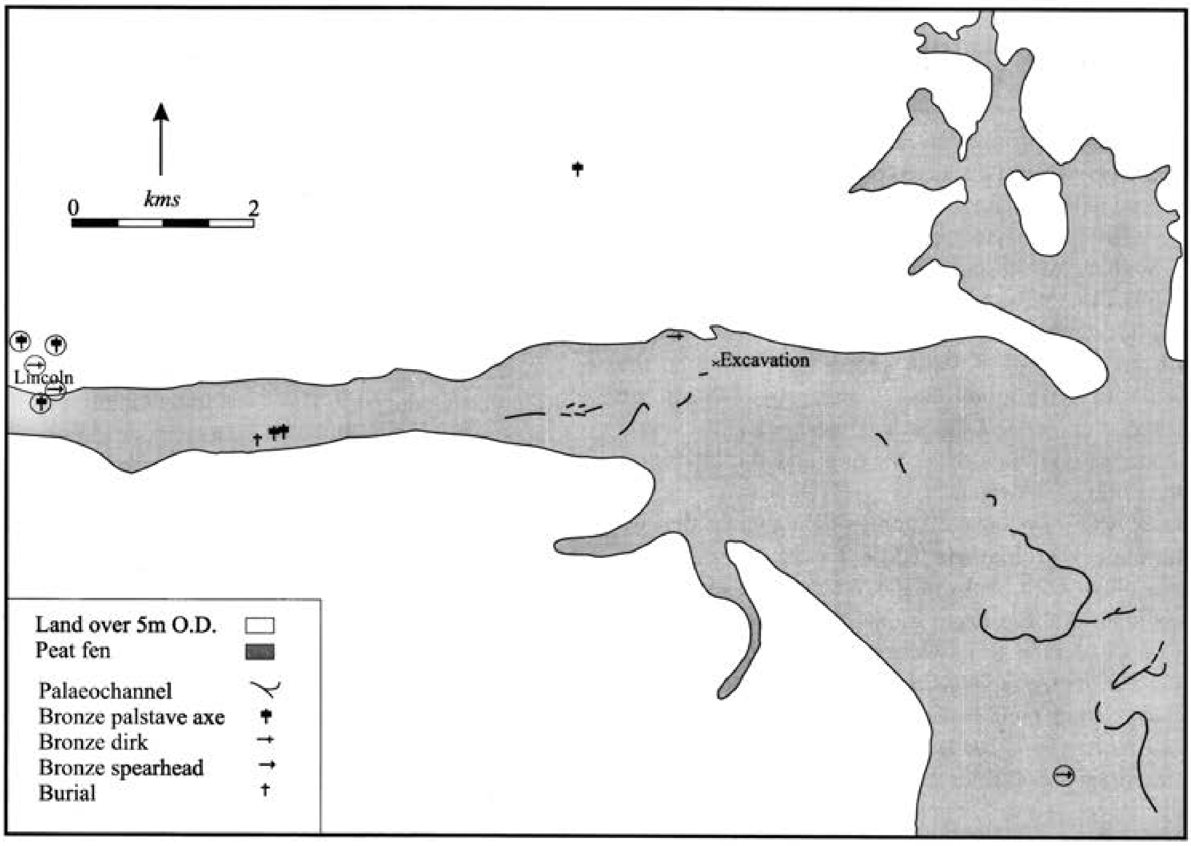

Fig. 9.5 The Fiskerton area in the Middle Bronze Age (approximate findspots are marked by open symbols).

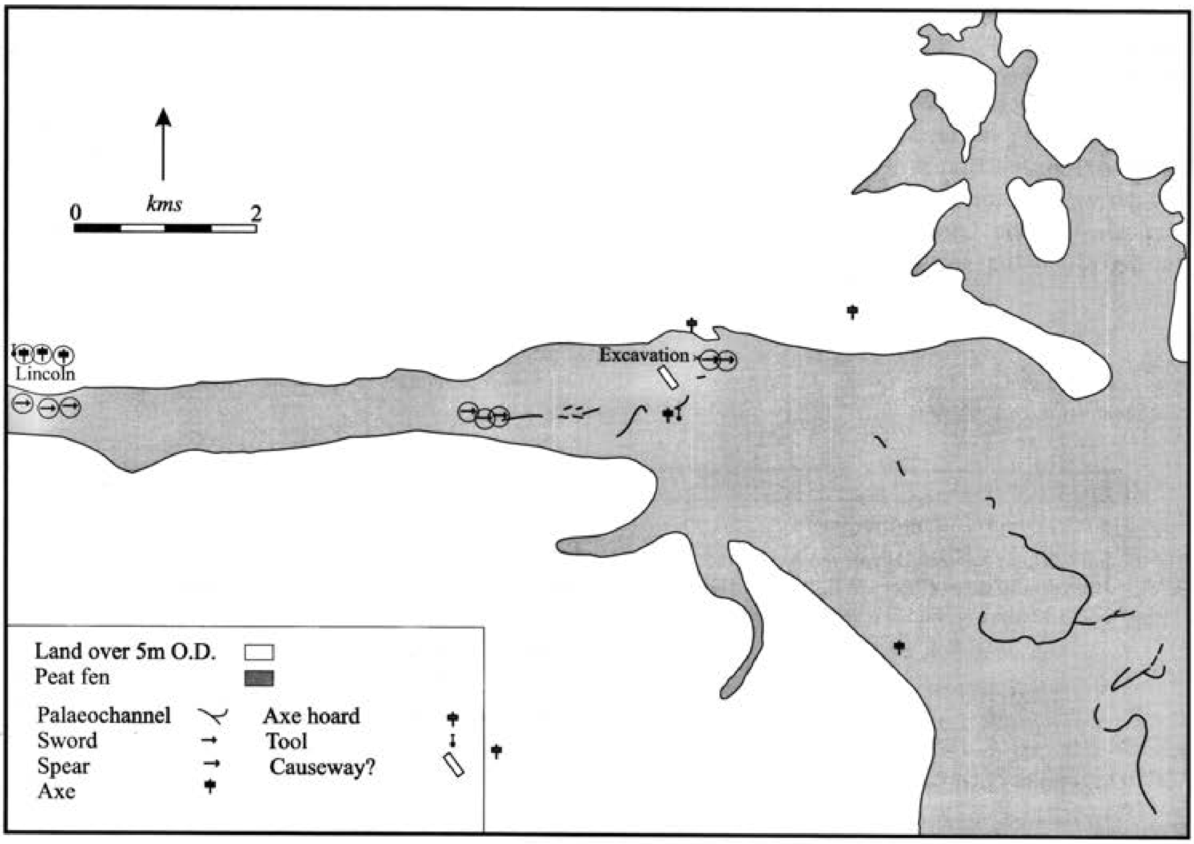

Fig. 9.6 The Fiskerton area in the Late Bronze Age (approximate findspots are marked by open symbols).

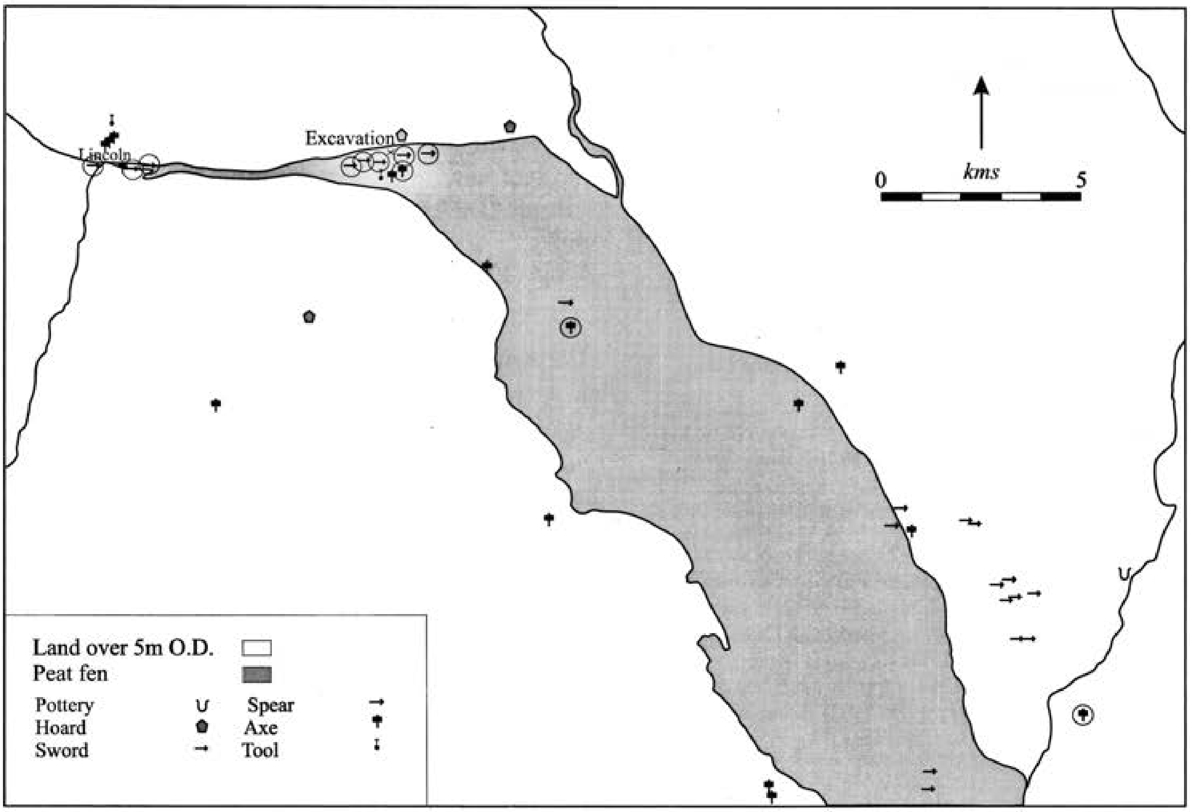

Fig. 9.7 The Lower Witham region in the Late Bronze Age (approximate findspots are marked by open symbols; log boats are not marked due to their potentially wide date range).

were deliberate depositions, some of them at least were probably placed within or close to settled areas.

Middle Bronze Age artefacts

Palstaves dominate the dryland and river finds in the Middle Bronze Age (*c.* 1600–1200 BC). The dirk from a formerly wet area at the river's margin directly south of Fiskerton church (Davey 192; TF 047 715) may indicate that in this period votive deposition was occurring just 300m west of where the Iron Age causeway would be built. Lincolnshire is well represented in finds of Middle Bronze Age rapiers especially in the north of the county, such as the hoard from Appleby. Similarly, the fenlands south of Boston have produced large numbers of rapiers and dirks (Thomas 1999). Yet none have been found in the Witham valley. This is all the more surprising given that swords are such common finds in the Witham in the succeeding millennium.

Late Bronze Age artefacts

Around 1830 a two-part bronze socketed axe mould and a hoard of four or five socketed axes (Washingborough 1 [Davey 216 and possibly 90 and 91]) were found while digging a dyke for enclosure allotments at Washingborough Fen on the south side of the river. Axes of the form produced by the mould have been found nearby in Branston and Fiskerton parishes (Davey 1973: 93–8).

***Table 9.2** Middle Bronze Age metalwork from the Witham valley.*

Palstaves	*Dry land finds:* Reepham; Nettleham; east of Nettleham (with *spearheads*); Southrey; Tattershall (81*); Lincoln sewage works (53); near Lincoln (67). *River finds:* Southrey Fen near Bardney (49); three from the Witham at Lincoln (73); two from Canwick
Dirks	Lincoln (191; unprovenanced); Fiskerton (192)
Spearheads	Lincoln (176, a basal-looped spearhead); near Lincoln (159, a side-looped spearhead); east of Nettleham (with *palstaves*)

The large numbers of socketed axes from Fiskerton probably belong to several hoards in waterlogged ground in the same vicinity (Whitwell 1967: 34). The Fiskerton 1 hoard (Davey 284–7) was found in 1890 in 'Church Piece' (TF 0480 7199), about 200m west of the northern end of the Iron Age causeway. Another socketed axe (Davey 109) was found in the same field as the Fiskerton 1 hoard and a second (Davey 119) came from close by. Another two (Davey 428–9) were found in a field near Fiskerton

Table 9.3 Late Bronze Age metalwork from the Witham valley.

Socketed axes	*HOARDS:* Fiskerton 1; Fiskerton 2; Washingborough 1 (including one *axe mould*); Branston (S of the river). *SINGLE AXES:* four around Fiskerton (possibly part of Fiskerton 1 hoard: 109*, 119, 428–9); the Witham in 1898 (431); the Witham at Lincoln (93); possibly two others from Lincoln (136 and 144); Langworth (on the Barlings Eau); Woodhall Spa; Stixwould. *S of the river* at Washingborough (139); Branston Booths fen; Potterhanworth; Potterhanworth fen; Branston; Billinghay; Metheringham
Spearheads	Two from the river near Fiskerton (236; the other was found in 1788 [Pearson 1796: 399; Banks 1896: 236]); one from the Witham (185); one from Potterhanworth fen
Swords and daggers	Washingborough 2 hoard of three swords (200); two complete Wilburton swords from Monks Leys, Lincoln (420, 421); a socketed dagger from Washingborough (208); a sword from Billinghay Dales near Tattershall (202, 14 miles southeast of Lincoln [May 1976: 107]); a dagger from the Witham at Lincoln (218);

Rectory and may also have belonged to the Fiskerton 1 hoard.[1]

The Fiskerton 2 hoard (Davey 288–90 and one other) was found around 1910, probably in the area of the stone cottages by the pits near Fiskerton Woods (TF 077 720). Other finds of socketed axes from Fiskerton have been reported and three came to light in 1994 (Palmer-Brown 1994).[2]

Whereas the single finds of socketed axes are evenly distributed along both sides of the Witham within the river and along its dry margins, Late Bronze Age weaponry has been recovered from predominantly wet or riverine contexts in three places – at Lincoln, between Fiskerton and Washingborough, and between Tattershall and Billinghay. There is a noteworthy concentration of sword finds in the Billinghay/Tattershall area although five findspots of swords in the Tattershall area are from dry land.

It is with the Late Bronze Age metalwork (*c.* 1300–750 BC) that striking concentrations are known from the river, mostly in the five-mile stretch between Lincoln and Fiskerton (Davey 1971; 1973).

The hoard of three Wilburton swords from Washingborough (Washingborough 2 [Davey 200]), probably located at TF 023 709; Davey 1973: 98) was found in the 1850s during building of the railway alongside the Witham. The swords are now lost. In 1972 a Wilburton sword, which was possibly one of the Washingborough 2 hoard, was in the possession of the Sibthorp family who own much of Washingborough parish (Davey 1973: 98; Marjoram 1973: 38; Coles *et al.* 1979: 9; LM [Lincoln Museum] 69.72).

Two complete Wilburton swords (one broken with its top half now lost) were found in 1906 at Monks Leys, Lincoln (Davey 420–1). A socketed dagger made from a broken sword came from Washingborough (Davey 208; White 1979b).

Washingborough Fen

Indications of activity in the Late Bronze Age-Early Iron Age are provided by the 'settlement' finds from Washingborough (Coles *et al.* 1979). When seeking a likely antecedent for the Fiskerton causeway and depositions, we may best look at these post settings and artefacts from Washingborough Fen on the south bank of the Witham (Figs 9.8 and 9.9). After the discovery in 1972 of an antler cheek-piece – a horse bridle fitting – along with pottery, wood and bone during drainage work on the river's south bank 730 metres west of the Fiskerton causeway, John and Bryony Coles excavated three small trenches in 1973 in the vicinity of a small pumping station (TF 0423 7138).

Their excavations showed that the finds had probably come from layers of silty peat within 40m of the present bank of the Witham (Coles *et al.* 1979) but no structures were present in the small trenches excavated. These layers were interpreted as forming in still water pool conditions, disturbed by an incursion of upstream debris – pottery, bone and wood – supposedly deriving from a settlement close-by to the southwest.

There were 113 animal bones, mostly of cattle (50%) but also of sheep, pig, horse, dog, red deer, pike, swan, duck and goose. The human bones consisted of a clavicle, a mandible and a fibula. Out of 59 identified pieces of wood, the majority were alder (23 pieces) and birch (18 pieces) with some hazel, oak and ash. There were two worked wooden points. The 59 prehistoric sherds were of types very different to the Fiskerton material and most closely comparable to post Deverel-Rimbury and earliest Iron Age styles (Elsdon 1994). Comparisons have been drawn with the EIA assemblage at Brigg (Hawkes 1946: fig. 3) and a pit group at Maxey (Coles *et al.* 1979: 8).

The antler cheek-piece is decorated with herringbone incisions and is possibly the finest known example of its kind (Britnell 1976). Cheek-pieces of this type are known from Late Bronze Age sites such as the Heathery Burn Cave, County Durham, and Runnymede, Surrey (Britton 1968; May 1976: 111; Longley 1980; Needham 1991: 149; Needham and Spence 1996: 190). The Runnymede waterfront site is dated to *c.* 900–790 cal BC (Needham 1991). The lowest layer with artefacts at Washingborough

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[1] There are reports of about 90 socketed axes from Church Piece (Jim Rylatt pers. comm.)

[2] The attribution of this provenance appears to be uncertain and it is possible that the Fiskerton 2 finds also came from Church Piece (David Stocker pers. comm.)

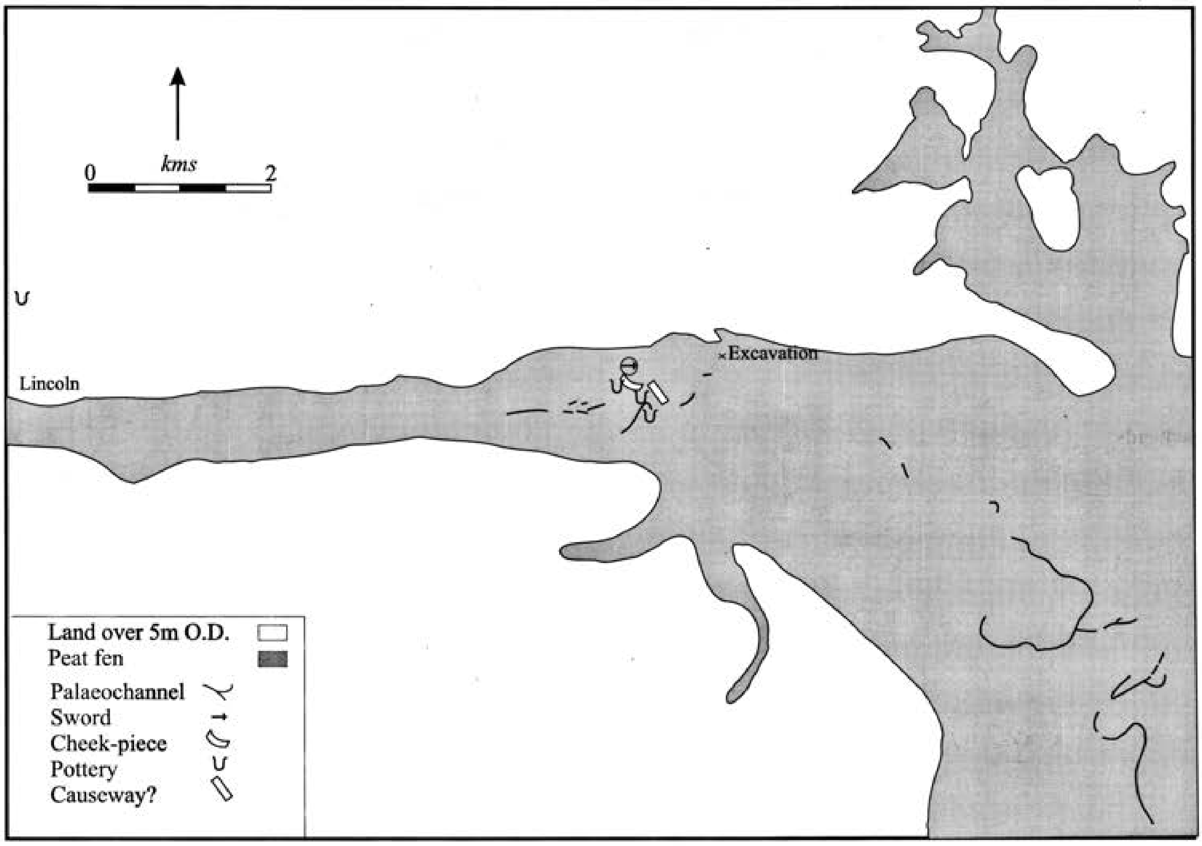

***Fig. 9.8** The Fiskerton area in the Early Iron Age (approximate findspots are marked by open symbols).*

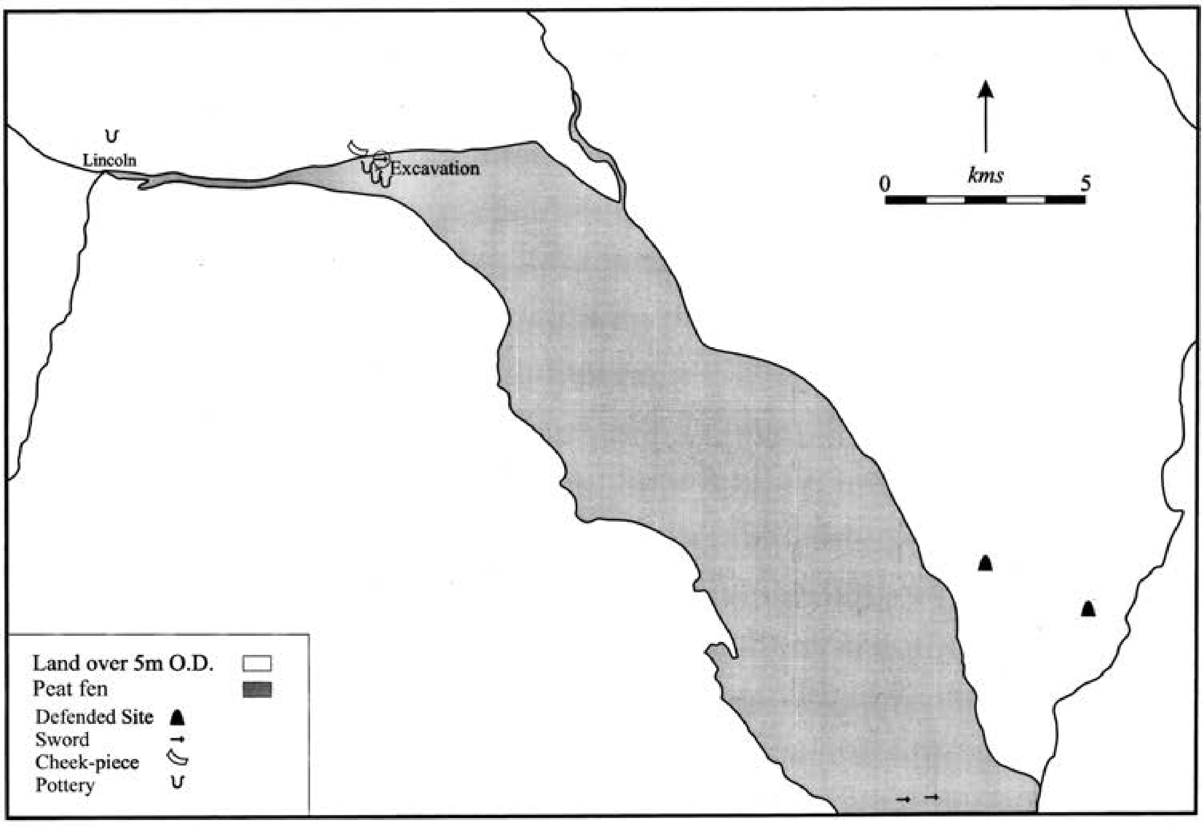

***Fig. 9.9** The Lower Witham region in the Early Iron Age (approximate findspots are marked by open symbols).*

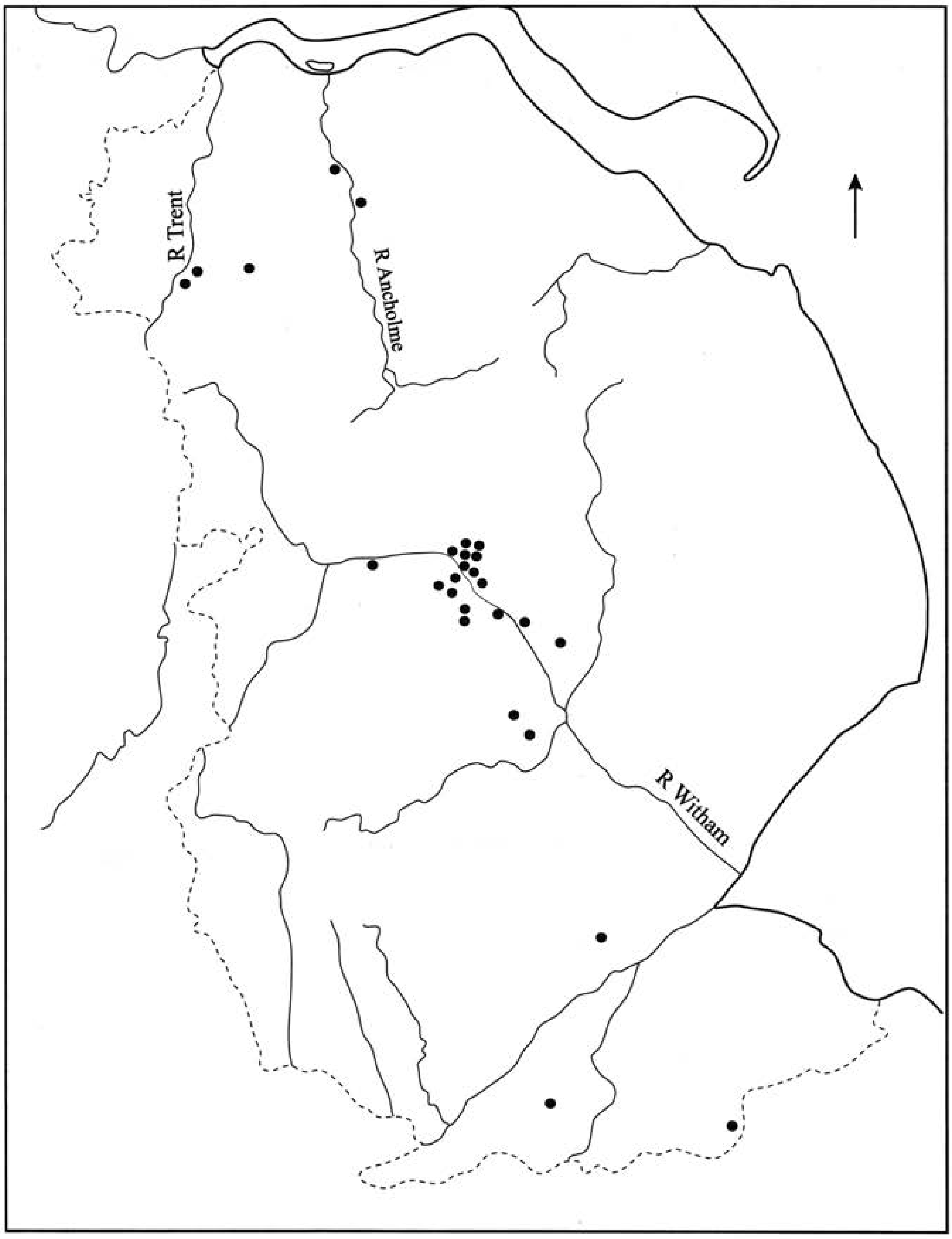

Fig. 9.10 Find spots of dug-out boats in Lincolnshire (from White 1979a). Most of those from the Witham have been found east of Fiskerton, where the channel widens.

(layer 9 in Trench 1) produced a radiocarbon determination of 2253±70 bp (Q-1163), calibrating to 640–170 BC at 2 sigma.

Log boats

There is an astonishing number of log boats from the Witham; 19 have been recorded, mostly from the area around Bardney (White 1979a). Another two were found on the Fiskerton causeway in 2001 (Rylatt and Palmer-Brown in progress). In contrast to many of the discoveries of worked stone and metalwork, the dug-out log boats from the Witham have all been found in these lower reaches of the river to the east of Fiskerton, with the exception of the two from Fiskerton and another from the parish, also known as the Short Ferry boat (Fig. 9.10). In 1949 a very large number of log boats, supposedly some 200, were recovered from the Witham around Fiskerton during drainage ditch digging and were burnt on the fire of the public house at Short Ferry, about a mile downstream from Fiskerton.

Only one log boat, the Fiskerton-Short Ferry boat (TF 089 712), has been dated, producing a radiocarbon date of 2796±100 bp (Q-79) calibrated to 1260–790 BC (McGrail 1978: 271–2). Associated pollen indicates its association with the earliest Sub-Atlantic phase, broadly the Late Bronze Age-Earliest Iron Age transition.

Unlike the metalwork, these boats may have moved considerable distances from the places where they were abandoned, carried downstream in winter floodwaters before coming to rest in the wide floodplain of the lower Witham. However, once sunken log boats lying in the sediments of a riverbed become saturated with water, they are extremely difficult to move. It is thus possible that their distribution is not entirely post-depositional and indicates different uses of the river upstream and downstream of Fiskerton during prehistory.

OTHER POSSIBLE CAUSEWAYS IN THE FISKERTON AREA

During ploughing in 1966 two parallel lines of posts were seen protruding through the peat, about 400m downstream to the east of the pumping station. In the area 200m downstream of the pumping station and 500m upstream from the Fiskerton causeway, Clive Green, Pauline Loven and the W.A.G. found 201 sherds of pottery, concentrated in an area 40m east-west by 70m north-south about 300m south of the South Delph of the Witham (W.A.G. code: Field 13). All but three (probably Roman) sherds are Late Bronze Age to Early Iron Age in date and about 34% are fine or medium-fine wares (Elsdon 1994). This high proportion is greater than that from the Coles' excavations (26%) but otherwise the two assemblages are identical and are dated typologically by Elsdon to the ninth-eighth centuries BC. The surface finds also included two human bones, a femur and a clavicle. In the adjacent field to the west (Field 31; TF 0435 7120) the W.A.G. found 61 Late Bronze Age/Early Iron Age sherds in a band running across the peaty soil northwest to southeast, between the sherd concentration in Field 13 and the area of the pumping station where the Coles carried out their excavations.

In hindsight, Washingborough is perhaps best understood as an Early Iron Age (*c.* 700–500 BC) precursor of the Fiskerton causeway, with the northwest/southeast spread of sherds representing the line of a buried causeway or trackway (Fig. 9.8). The absence of Early Iron Age metal finds from this locality may be explained by the overall scarcity of such material from watery deposits of this period (Fitzpatrick 1984: 179; Bradley 1990: 183–4). Yet a remarkable eighth century BC antennae-hilted bronze sword (Davey 199) of Hallstatt B2–B3 date, found in the river in Washingborough parish in 1826, may be a further item in this broadly Late Bronze Age-Early Iron Age set of deposits (Fig. 9.11). The exceptional quality of the antler cheek-piece would also accord with its status as a votive offering rather than as settlement waste.

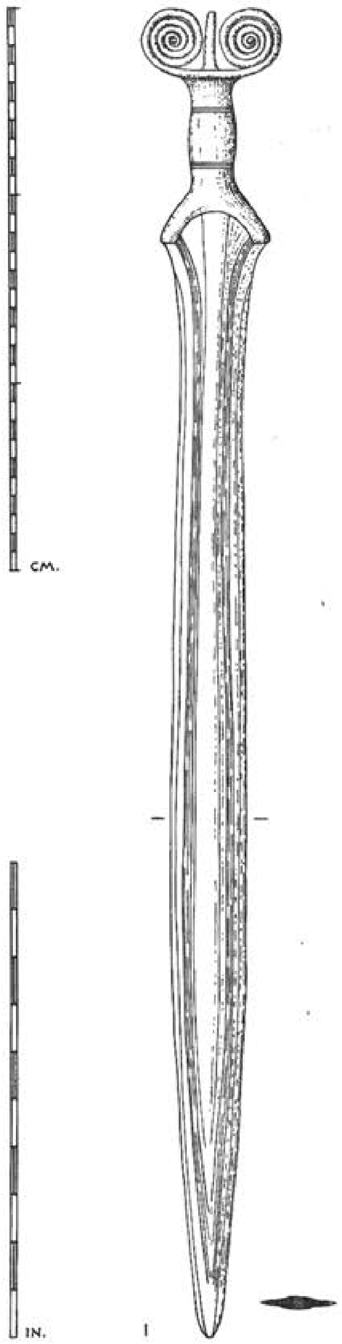

Fig. 9.11 *The bronze antennae-hilted sword from the Witham. (Reproduced, by kind permission, from drawing by J. May in May 1976. © History of Lincolnshire Committee.)*

Between the pumping station site and the Fiskerton causeway, about 400m upstream from the causeway, two parallel lines of posts were seen some years ago around TF 046 714 in a field on the south bank of the South Delph (N. Field, pers. comm.). In a broadly north-south line between here and Fiskerton church a number of Bronze Age finds have been made. These are, from south to north, an Early Bronze Age dagger, a Middle Bronze Age dirk, a hoard of Late Bronze Age socketed axes and a stone shafthole axe hammer. On the same alignment, to the south of the posts, was found the Washingborough socketed axe hoard. Two round barrows are thought to lie just to the west of this line on the north bank of the canalized river. A set of three Late Saxon linked pins also came from the area where the Early Bronze Age dagger was found (see below; White 1979c).

This alignment of timber posts thus suggests the presence of a third and earlier causeway (or a series of causeways) in use throughout the Bronze Age and predating the Washingborough site. The Roman and Anglo-Saxon items suggest that this area was subsequently reused for deposition, possibly involving the construction of one or more new causeways. The location of a Viking sword at Fiskerton, about 600m east of the Iron Age causeway, hints at the possibility of another causeway in this location (see below). There is a strong possibility that the Fiskerton-Washingborough crossing was a place of deposition from the Early Bronze Age through to the Viking period, marked by a succession of causeways running into the river.

ACTIVITY CONTEMPORARY WITH THE FISKERTON CAUSEWAY

There is little evidence for Iron Age settlement in the area at the time of the construction and use of the Fiskerton causeway, probably for the same reasons that Bronze Age settlements have been difficult to find (Figs 9.8–9.9, 9.12–9.13). There are limitations to the cropmark evidence owing to a lack of aerial photographic coverage caused by militarily restricted airspace around Scampton and Waddington and by poor visibility of cropmarks within the Jurassic clay soils of the Mid Clay Vale (Carter 1998; Boutwood 1998a; Winton 1998).

Despite this paucity of archaeological evidence for Iron Age activity in the locality, the evidence from Fiskerton does provide us with a picture of the site's immediate environment. Contrary to eighteenth century conditions, this part of the river was not tidal. If this was a braided river system, however, such freshwater conditions may have been restricted to the waters around the causeway rather than to a main river channel further south. The area around the site included grassland with some scrub, bordering on reed swamps with some open water and alder carr. Within this partially wooded environment the timber causeway and the Early Bronze Age barrows to its east and south would have been prominent features. The sequence at Fiskerton indicates a gradual drying-out of the area around the causeway, presumably into the Roman period. This may also have occurred on the south bank of the Witham as a result of the digging in the Roman period of the 36-mile long Car Dyke stretching from the Witham to Bourne, although the Witham section appears to have followed a pre-existing natural channel (Simmons 1979).

Iron Age settlements, enclosures and earthworks

Except for the much earlier barrows, there are few likely prehistoric cropmarks from these clay soils (Bewley 1998: fig. 2; Boutwood 1998b: fig. 6), other than two D-shaped enclosures and an enclosure complex (Winton 1998: figs 2.1.13, 2.1.14, 3.1). Other possible Iron Age settlements have been found on the eastern edge of the limestone scarp where it overlooks the river valley. They comprise a rectangular enclosure (Winton 1998: fig. 2.2.18) and an irregular enclosure (Winton 1998: fig. 2.3.4).

Small amounts of Early Iron Age pottery from Lincoln on the hilltop north of the river point to the probable existence of settlement here (Webster 1949; May 1996: 639). Middle and Late Iron Age settlements are likely at Greetwell (Armour-Chelu 1998) and Riseholme Lane, Nettleham (Palmer-Brown 1994), on the basis of pottery deposited at these locations in the ditches of the triple-ditched boundary (see below). The Iron Age settlement material from Brayford Pool in Lincoln dates to the end of the period (Jones 1993a: 2) and there is a Later Iron Age pottery scatter from south of the Witham at Nocton (Simmons 1980: fig. 28).

The Iron Age 'marsh forts'

At Tattershall Thorpe, near the junction of the Witham and the Bain, part of a bivallate Iron Age enclosure has been excavated (Chowne *et al.* 1986; Seager-Smith 1998). Its two rows of ditches and banks may have been constructed around the time of the Fiskerton causeway's construction. The waterlogged wood in these ditches consisted of willow and birch with some alder and hazel. Finds from the ditches included an oak 'mallet', an iron awl or chisel, fragments of leather and teeth of horse, cattle and sheep/goat. The beetle fauna indicate extensive stock raising, probably in the summer months.

Most of the pottery is of Middle to Late Iron Age date and includes the base of a possible fifth/third century BC La Tène I pedestalled jar which might be broadly contemporary with Fiskerton's initial period of use. Alternatively this jar base may belong to the Late Iron Age. The Scored Ware jars may date from the mid-third century to the first century BC/AD and a date towards the end of this sequence is preferred (Fitzpatrick and Hill in Seager-Smith 1998: 14). The radiocarbon dating programme for this site has been problematic but three dates – 780–200 BC (2350±90 bp [HAR-4315]) from wood in the primary ditch fill, 400–100 BC (2210±70 bp [HAR-8527]) from wood in the tertiary ditch fill, and 160 BC–AD 240 (1940±80 bp [HAR-8530]) from charcoal in a hearth – should broadly indicate the time span over which this site was used during the Iron Age. Roman and medieval sherds in the upper ditch fills indicate later use.

This defended enclosure was located close to the north bank of the Witham, where it joined the sea during the Iron Age, long before drainage turned this area into dry land. Aerial photography has revealed traces of what may be three more Iron Age 'marsh forts' along the north bank of the Witham. An almost identical but slightly smaller,

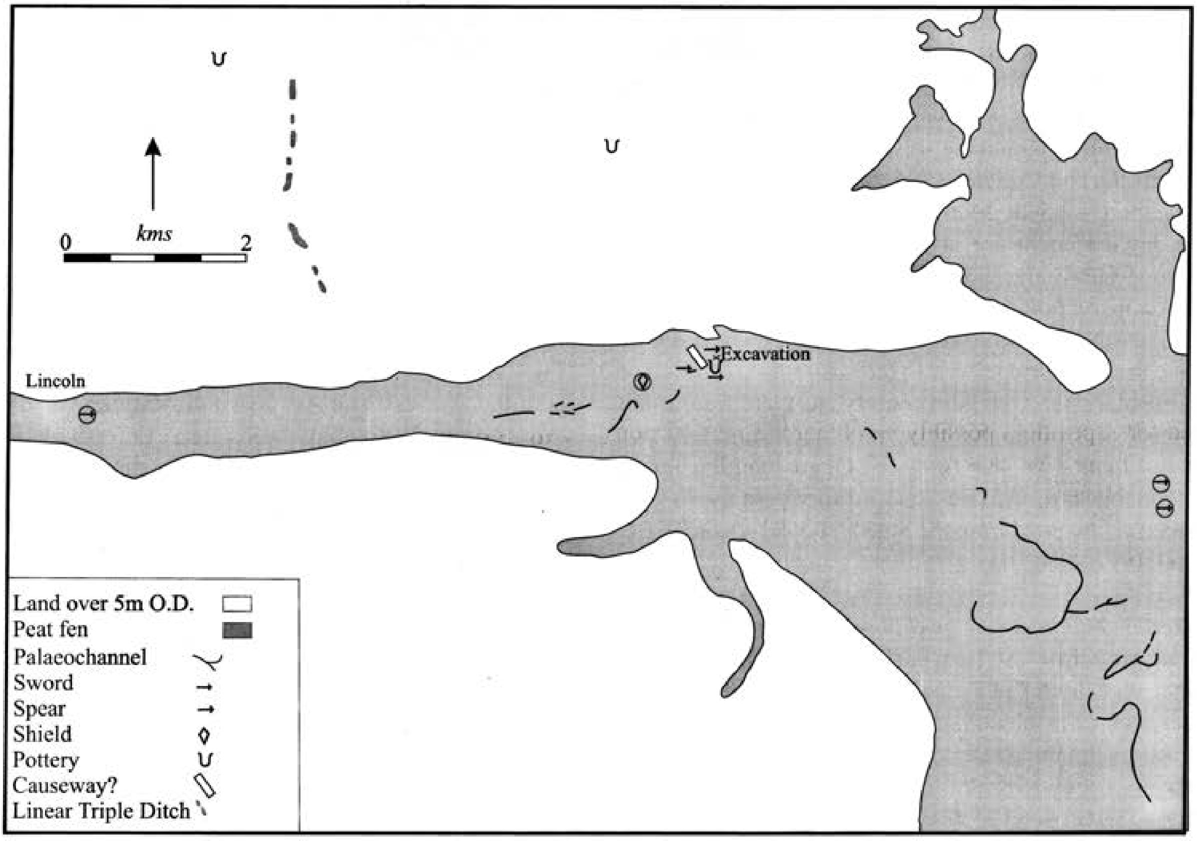

***Fig. 9.12** The Fiskerton area in the Middle Iron Age (approximate findspots are marked by open symbols).*

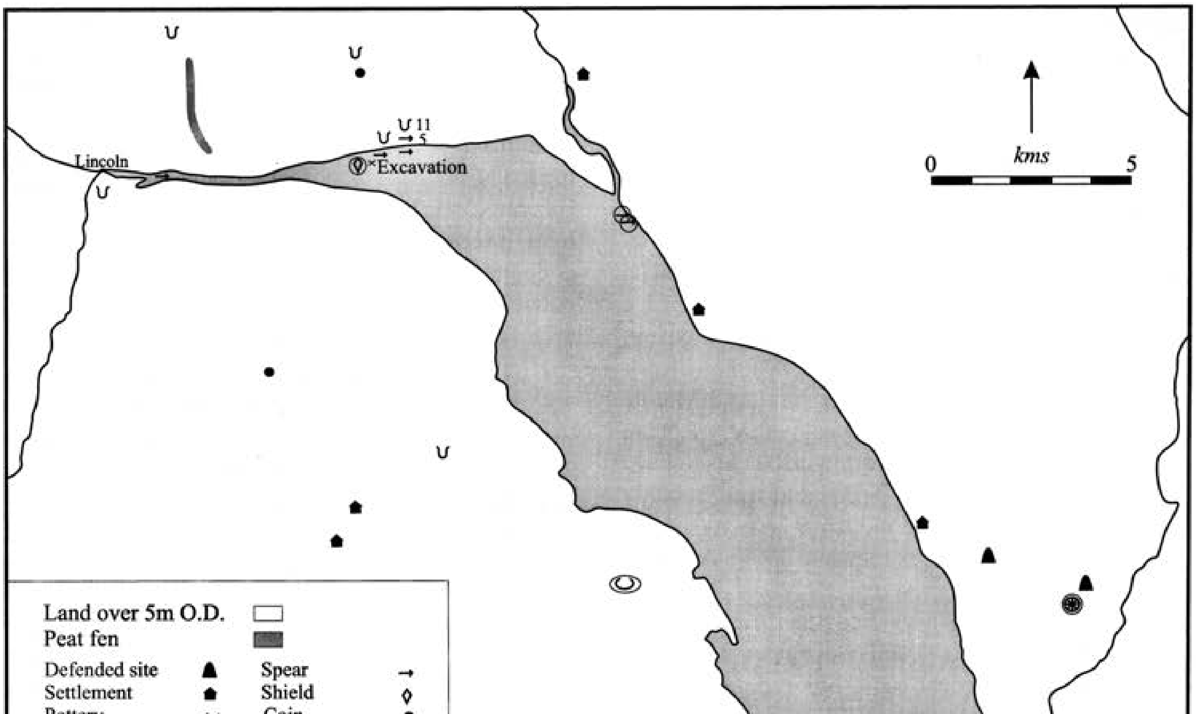

***Fig. 9.13** The Lower Witham region in the Middle and Late Iron Age (approximate findspots are marked by open symbols).*

oval double-ditched enclosure was recorded in 1942 on the site of the old airfield at Tattershall Thorpe, now quarried away, only 1.9km northwest of the excavated site. The second site, a D-shaped triple-ditched enclosure at Kirkstead, lies 3km to the west of the Tattershall Thorpe site (Griffiths and Collcutt 1994), and is now protected as a Scheduled Ancient Monument. A third example is a single-ditched enclosure at Stainfield, just 4km east of Fiskerton. The Stainfield example is less certainly Iron Age in construction than the other two.

All the other Lincolnshire 'hillforts' are located on the Jurassic limestone ridge well to the south of this stretch of the Witham. Around the third century BC there were small farmsteads at Billingborough in the Lincolnshire fens and early occupation of the Ancaster Quarry settlement in south Lincolnshire. At Old Sleaford there are traces of a palisaded enclosure during the fourth-second centuries BC (Elsdon 1997: 29–30).

The Nettleham-Greetwell multiple-ditched boundary

This linear triple-ditched earthwork is of a distinct regional type found in Leicestershire and Northamptonshire as well as in Lincolnshire (but not west of the Trent in Nottinghamshire). Its various recorded sections at Grange de Lings (SK 988 771), Nettleham, Nettleham Grebe and Greetwell (TF 003 734), visible as cropmarks, suggest that it was probably a continuous feature running for at least 5.7km, curving towards the northwest and perhaps forming a substantial and long-lasting boundary between the high Lincoln limestone to the west and the lower ground to the east (Everson 1979).

At Riseholme Lane, Nettleham (SK 997 756), it followed the line of a glacial channel (Palmer-Brown 1994). At Nettleham Glebe (TF 003 733) there was evidence for a nine-post rectangular structure between the west and eastern ditches at a point where the central ditch terminated (Field 1980) whilst at Greetwell (TF 007 724) all three ditches terminated against a watercourse (Armour-Chelu 1998).

Excavations at Riseholme Lane, Nettleham produced first to second century BC pottery from the ditch fills, suggesting the existence of a nearby Iron Age settlement, as well as third century AD Roman pottery (Palmer-Brown 1994). At Greetwell one of the ditches produced Middle Iron Age pottery and another Late Iron Age/Early Roman pottery. This section of the linear earthwork seems to have been maintained into the Roman period and was probably located close to buildings and industrial activity of the third to fourth centuries AD (Johnson 1994; Armour-Chelu 1998).

On the basis of these pottery finds this triple-ditched complex was thought to have been constructed during the Middle Iron Age but a recent radiocarbon date obtained from a ditch section at Bunker's Hill, just north of the excavations at Greetwell, produced an Early Iron Age date from a primary waterlogged fill (R. Trimble, pers. comm.). This accords with radiocarbon dates from the primary fills of a triple-ditched boundary system at Rectory Farm, West Deeping (Boutwood 1998b: 39). Because of Lincoln's urban extent, difficulties in cropmark recognition, and the lack of fieldwork on the limestone top we know very little about the prehistoric economic and social relationships that might have existed between the two regions divided by the earthwork.

Iron Age river finds

The Iron Age metalwork from the River Witham comes from a variety of locations between Lincoln and Tattershall (Figs 9.12 and 9.13). There are only three metal items from the Earliest Iron Age. Two are bronze Gündlingen swords from Billinghay Dales near Tattershall (Davey 422–3), of Hallstatt C date (seventh century BC). The third is the eighth century BC Hallstatt B2–B3 antennae-hilted bronze sword (199) from below Lincoln, probably in the immediate vicinity of Washingborough (Fig. 9.11; Coles *et al.* 1979: 9; it is comparable with one from the Thames; Smith 1925: fig. 84).

La Tène metalwork

Most of the Iron Age finds date from La Tène *Stages II* and *IV*, between the fourth and third centuries BC (see Table 4.1 and Chapter 10 for La Tène chronology). Two swords which can be provenanced as having come from the Witham have plain scabbards and decorated chapes of La Tène I (Petch 1957: 9) and La Tène II style (May 1976: 130). A La Tène II anthropoid-hilted dagger (Plate 15b) was found in 1787, probably near Fiskerton, but has not been seen since 1863 when it was drawn and described by Franks (Kemble 1863: 192, plate xxvi.2; Jope 1961: 339; May 1976: 130; White 1979b: 4; Stead 1996: 6, fig. 2). Its most enigmatic feature is a 'Lincoln imp' portrayed as the 'head' of the anthropoid hilt. Since there is no evidence that this one-legged imp has a history older than the medieval period – a stone representation can be seen in Lincoln Cathedral – there is a possibility that Franks either over-interpreted what he saw or, more likely, was deliberately misled by someone altering and recutting this part of the sword into the form of the imp after its discovery.

The famous Witham bronze shield (Plate 16), with its boar motif and central coral-studded boss, came from below Lincoln in 1826, probably from Stamp End lock (D. Stocker pers. comm.) rather than the immediate vicinity of Washingborough/Fiskerton (Coles *et al.* 1979: 9). Its La Tène *Stage IV* style dates it to the third century BC (Meyrick 1831; Fox 1958: 26–7; Megaw 1970: 149–50; Jope 1971; May 1976: 130–2; Stead 1996: 72–5, figs 3, 16, 79). The other artistic masterpiece from the Witham, also found below Lincoln in 1826, was a decorated scabbard-mount from a La Tène *Stage IV* sword with chape, dating to the third century BC (Plate 15a; Fig. 9.14; Kendrick 1939; Fox 1958: 25; Megaw 1970: 149; May 1976: 129–30; Stead 1996: 29–31; Alnwick Castle Museum 276).

The La Tène metalwork from the Witham also includes

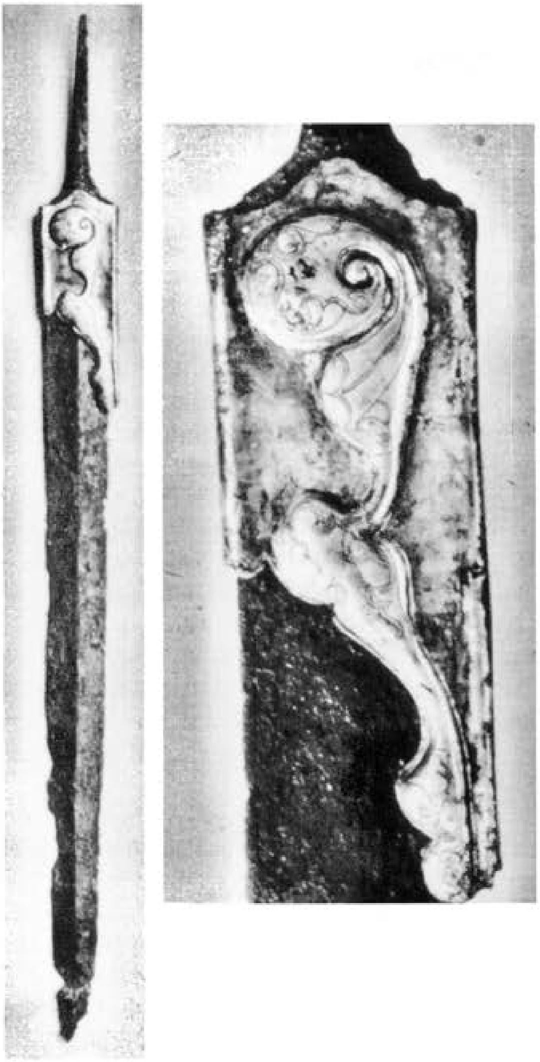

Fig. 9.14 *Iron Age sword with gilt bronze scabbard mount from the Witham near Lincoln. (Photograph, City and County Museum, Lincoln. Reproduced by kind permission.)*

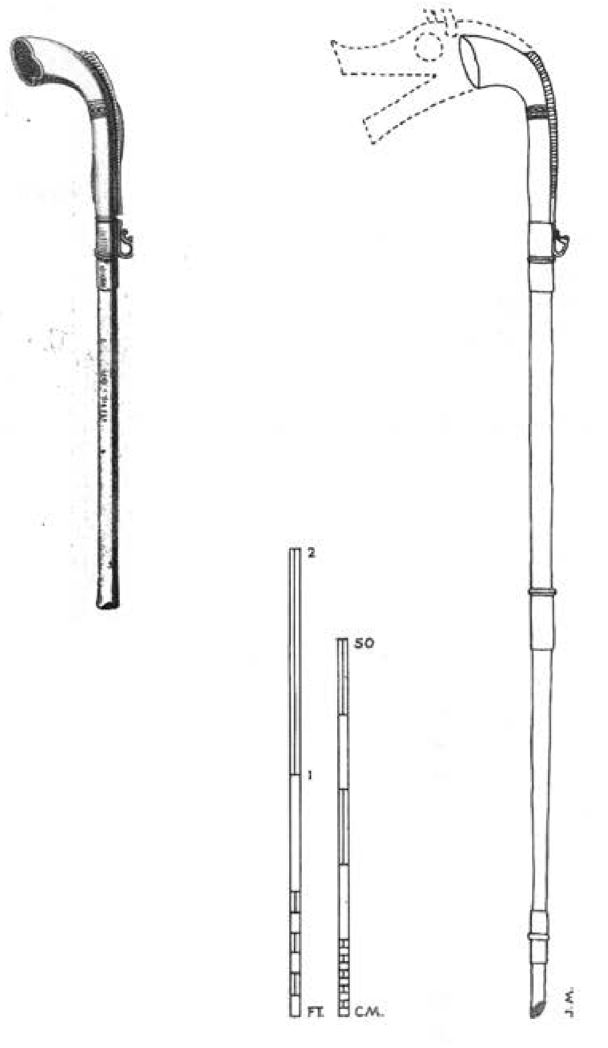

Fig. 9.15 *The Tattershall carnyx. (Reproduced from lithograph by O. Jewitt, after drawing by J. Kemble (Kemble 1863) not to scale; and, by kind permission, from drawing by J. May, with reconstruction of mouthpiece based on the Deskford carnyx (May 1976). © History of Lincolnshire Committee.)*

the famous Tattershall Ferry bronze *carnyx* or 'war trumpet' (Fig. 9.15; from the Greek descriptions of animal-headed trumpets used by the Keltoi [May 1976: 165] and illustrated on the Gundestrup cauldron). This was one of the most unusual metalwork finds from the Iron Age. Only two carnyces have ever been found in Britain, the other being from Deskford in eastern Scotland (Piggott 1959; Hunter 2000; 2001).

The findspot of the carnyx is uncertain: it is attributed to Tattershall Ferry, 15 miles from Lincoln (Banks 1896: 125; White 1979b: 5), but may possibly have come from the ferry crossing at Fiskerton. In 1958 Sir Cyril Fox reported that Fiskerton had an ancient ferry – 'Tattershall' – still nominally existent (Fox 1958: 31 n. 14; May 1976: 165–7). However, the carnyx's most likely provenance was Tattershall Ferry. It was found around 1768, 'with a variety of other things, many of them Roman' (Banks 1896: 125).

The Tattershall carnyx was found in two conjoining pieces, with the mouth/head and the other end missing (Pearson 1796; Banks 1896: 125–6; Evans 1881: 363; Fox 1958: 117; Piggott 1959: 19–24; May 1976: 167; White 1979b: 5; Stead 1996: 6). When conjoined, it was about 1.28m long. Its head would probably have been in the form of a boar, like Deskford and the three Gundestrup representations: the drawing from Sir Joseph Banks' collection shows a long crest and a looped finial which may, according to Andrew White, imitate the boar's curly tail but has also been described as a bird's head by Jeffrey May.

Unfortunately this instrument was melted down by a local antiquarian George Pearson in an early archaeological experiment in order to determine the strength of prehistoric metals (Pearson 1796; Coles 1979: 12–13). Pearson's metallographic analysis does at least tell us that the Tattershall carnyx was made of bronze and did not contain zinc which, as in the case of the Deskford carnyx, was not used until the Roman period (Dungworth 1996; Hunter 2000).

George Pearson was also responsible for destroying one of two La Tène swords in bronze scabbards found in 1788 in the Witham in Barlings Eau, close to Bardney Abbey and Short Ferry (Pearson 1796: 445–6; White 1979b: 4). The other somehow escaped Pearson and still survives: it has lost its chape and hilt but the scabbard, with a decorated top, is intact (Plate 16; Piggott 1950: 28; May 1976: 165–6; LM 9711.06).

Other Iron Age metalwork

Some Iron Age weaponry from the Witham is not closely datable. This includes a sword (Petch 1957: 9, no. 11; LM 344.14) and a sword with remains of its iron scabbard (LM 2–3.56). Their findspots are unknown but they are thought to have been among those found in 1826 below the lock in Lincoln (probably Stamp End lock; D. Stocker pers. comm.). Two iron swords in bronze scabbards from Washingborough were exhibited to the Royal Archaeological Institute's meeting in Lincoln in 1848 but have since been lost (Phillips 1934: 104; Piggott 1950: 28). The iron short sword with a gold crescent on one side was recorded by Banks as coming from the Barlings Eau (Banks 1893: 233). It too is, of course, now lost.

A gold torc is reported as having been found on the wide river floodplain at Linwood Hall, Martin, between Tattershall and Bardney but it too was melted down (Trollope 1872: 80; May 1976: 101). It may have been of Bronze Age date but could equally have been made and deposited in the second/first century BC, like those from Ulceby in the wolds or Snettisham in northwest Norfolk. The two gold torcs from Ulceby were found around 1847 in association with a torc-like gold rod, a gold bracelet and parts of three bronze and iron horse-bits (Cuming 1859; May 1976: 156–62).

Recent Iron Age metalwork finds from dry land in the Witham area include two pairs of decorated bronze linchpin terminals from Tattershall Thorpe (LM 23.92; Owen 1993). A find since lost is an Iron Age decorated bronze strap-union, possibly inlaid with red enamel, from Greetwell Roman villa (Moore 1975). There is relatively little Iron Age coinage: a very worn silver stater from the Washingborough area (Page 1987), a coin from Reepham and another from south of Branston.

Distribution of Iron Age metalwork

The distribution of Iron Age finds from the Witham is similar to that for Late Bronze Age weaponry, with the main findspots at Lincoln, at Washingborough and Fiskerton, and at Tattershall, augmented by locations at Bardney and possibly at Martin (Figs 9.12 and 9.13). These have been some of the main river crossings: in recent centuries a total of eight ferry routes are recorded (Birch 1968: 9–15). Perhaps these findspots are associated with Iron Age trackways, fords, causeways and ferry crossings.

Six iron swords may potentially have come from the Fiskerton site prior to 1980. Attribution of these finds to this area is strengthened by the fact that Cyril Fox was told locally that most of the nineteenth century finds came from the longitude of Fiskerton (Fox 1958: 31 n. 14).

The Roman landscape

Fiskerton lies four miles downstream from the large *colonia* city of *Lindum* (Lincoln). This was one of the largest towns of Roman Britain with extensive extra-mural settlement and cemeteries outside the walled upper and lower town (Jones 1993b). Another major construction of the Roman period is the Car Dyke, running from Lincoln along the southern edge of Witham Fen (Simmons 1979; Simmons and Cope-Faulkner 1997). Despite the existence of Ermine Street running north-south along the limestone ridge and of the Fosse Way terminating at Lincoln, there are few recorded substantial roadside settlements within five miles of the city, although there are villas at short distances from these roads, such as those at Burton, Welton and Nettleham. As mentioned above, this apparent lack of habitation may partly result from the restricted airspace over Lincoln's hinterland affecting aerial photography of cropmarks (Carter 1998).

Given such limitations in recovery, interpretation of the cropmarks must be tentative and provisional but salient aspects can be noted (Carter 1998). Firstly, the field boundaries show no evidence for a large-scale, concerted arrangement of land units like that found in the 'brickwork' field systems of Nottinghamshire and South Yorkshire (Winton 1998: 58). Secondly, the settlements to the south of Lincoln appear to be simple dispersed enclosures while those to the north are more complex in layout and sequence (Winton 1998: 64). The density of Roman pottery, coin and other artefact finds (Figs 9.16 and 9.17) suggests that rural settlements were closely spaced at about 1km or 1 mile apart in the areas east and southeast of Lincoln on both banks of the Witham (Simmons 1979: fig. 2; Bewley 1998: fig. 4; Jones 1998: fig. 1).

The Mid Clay Vale has produced little evidence of settlement in the Roman period but the limestone's lower dip slope on either side of the Witham has produced both cropmark and artefactual evidence of occupation in this period. Two miles north of Fiskerton, running southwest/northeast, is a Roman road linking Lincoln with the coast and the major settlement of Ulceby Cross (Jones 1998: 77–8; fig. 12). The presence of stone and tile indicates a substantial Roman settlement in the area immediately west of Fiskerton village (TF 0440 7212), which has produced a piece of third century mortaria (Field and George 1994: 46–7; Palmer-Brown 1994), and a second/fourth century Roman 'hard' was identified during excavations at Perrins Cottages within the village (TF 0485 7191; SMR no. 51467; see Appendix, below).

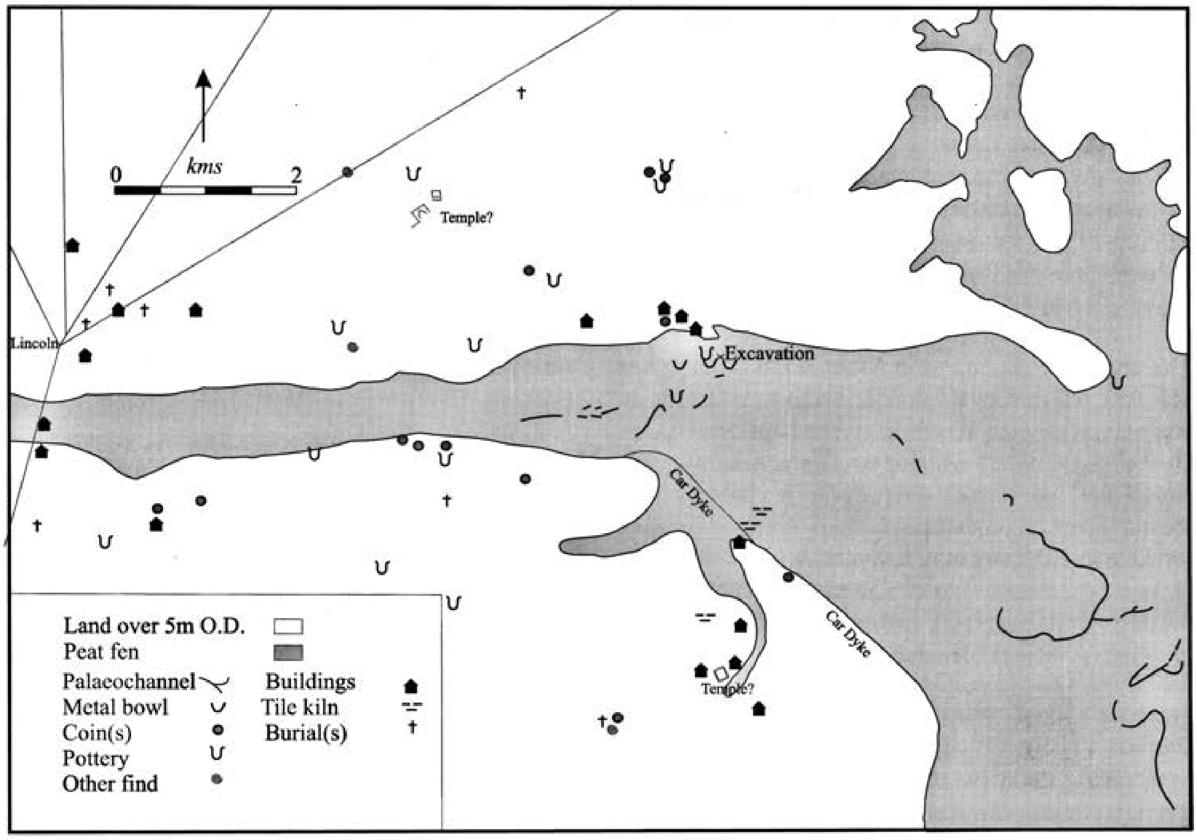

Fig. 9.16 *The Fiskerton area in the Roman period (approximate findspots are marked by open symbols).*

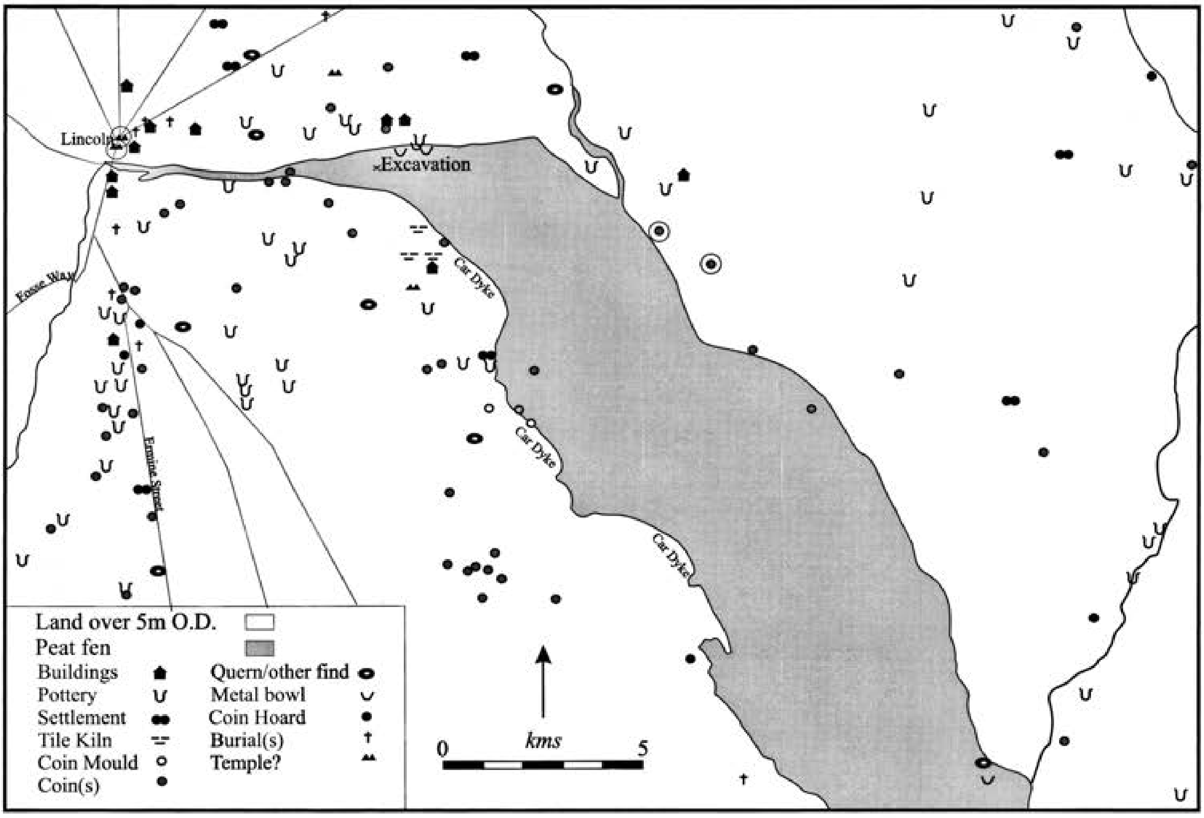

Fig. 9.17 *The Lower Witham region in the Roman period (approximate findspots are marked by open symbols).*

The possible Roman temple complexes near Fiskerton
About two miles to the northwest and south of Fiskerton, on the edge of the limestone, are two cropmarks of square, perpendicular-cornered enclosures (Winton 1998: figs 4.1.11–12). These are tentatively identified by Winton as 'villas' but their forms, especially that of the double-ditched southeast-facing one on Branston Moor, are more in keeping with the *temenos* precincts of Roman temples. Their closest parallels can be found outside the *colonia* of Colchester (Crummy 1980):

- The enclosure on Branston Moor south of the river (TF 051 682), with its double enclosure, is closely comparable in size and form to the large *temenos* at Gosbecks (temple 8), about two miles southwest of Colchester. No internal temple plan is visible within the enclosure and metal detecting over its surface has failed to unearth any material in association with it. It is, however, adjacent to two Roman sites, one at TF 049 681 which has produced fourth century AD pottery, building stone and tile, and another at TF 0522 6815 which has yielded pottery and structural evidence.
- West of Cherry Willingham school north of the Witham (TF 028 733) is a square enclosure surrounded by three overlapping rectilinear enclosure ditches, similar in size and form to the three at Sheepen (temples 4–6) and the Royal Grammar School (temple 2). No material has been recovered from this enclosure although a 15m × 20m structure can be seen at its centre.

These Branston and Cherry Willingham cropmarks are slightly further from their *colonia* than the Colchester temple precincts but their spatial arrangement, with the largest at a greater distance from the city, is comparable. Whereas the Sheepen and Gosbecks temples of Colchester may have been located in relation to the élite or royal burial places of the Late Iron Age, those around Fiskerton may have been placed here because of the existing religious significance of this part of the Witham. Further work is needed to confirm or refute this identification. There is a another possible Roman sanctuary or temple site which survives as an earthwork in Newball Wood, north-east of Barlings (Everson *et al.* 1991: 133–4, fig. 96)

Roman river finds
Roman finds from the Witham, other than those from the Fiskerton causeway, are very few. A bronze skillet (stamped with the name CARAT and sooted inside) was found around 1768 at Tattershall Ferry but unfortunately fell into the hands of George Pearson and was melted down. It probably dated to the late first-early second century AD (White 1979b: 5). An Early Roman legionary bronze skillet with the legend FLORVS.F, now in Sheffield Museum (Fig. 9.18), was found in the Witham (Moore 1974) at Aubourn in 1906. Donated to the museum by an inhabitant of Fiskerton, it was wrongly attributed to the parish. Two Roman bronze bowls found in Fiskerton parish in the 1980s by Vernon Stuffins, close to the excavations, are described in Chapter 6 above.

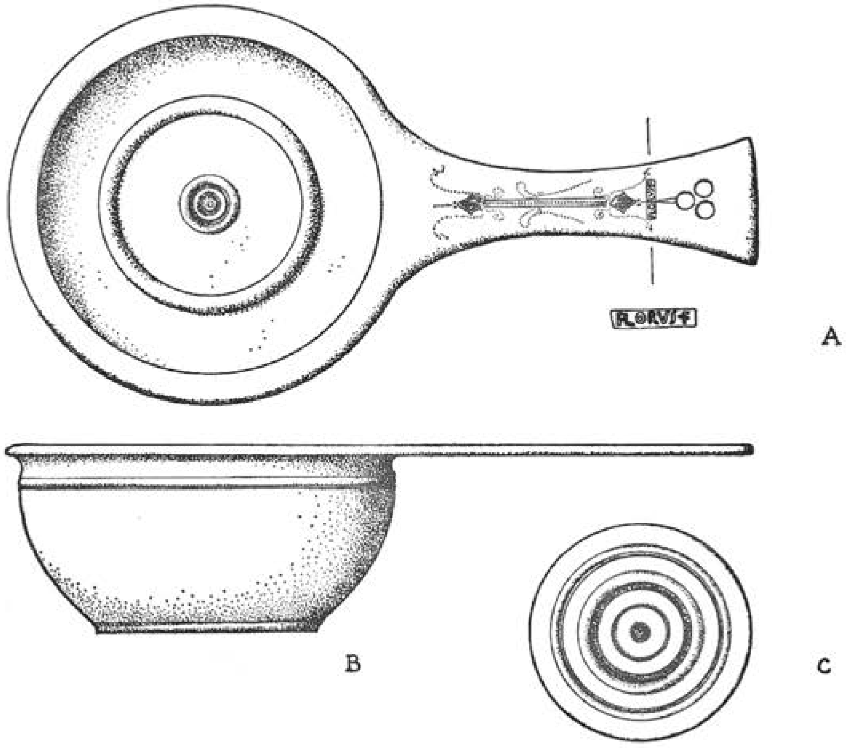

Fig. 9.18 Roman skillet from Aubourn, found 1906, now in Sheffield Museum. (Drawing by N. Lincoln, reproduced by kind permission from Whitwell 1970. © History of Lincolnshire Committee.)

ACTIVITY POST-DATING THE FISKERTON CAUSEWAY

Deposition of artefacts within the Witham did not end with the Roman period but continued with some regularity until the fourteenth century (Figs 9.19 and 9.20).

Anglo-Saxon and Viking river finds

A seventh century shield boss from an unrecorded location in the Witham was found in 1787–88 (White 1979c), and an exceptionally fine late eighth/early ninth century silver hanging bowl with Celtic decoration came from 'below Lincoln', probably the Washingborough/Fiskerton area (Kendrick 1941: 161–2; White 1979c; Bruce-Mitford 1993: 59, pl. 9). A newspaper report of 19 April 1816 describes the find of a canoe from 'near Washingborough about 4 miles from this city [Lincoln]' and goes on to record discoveries of trees, antlers and human skulls, along with the bowl, but there is no clear indication whether these were all found together (Bruce-Mitford 1993: 59).

Another piece of high-status metalwork from the eighth century is a silver-gilt ornament of three linked pins from about 300m west of the Fiskerton causeway (White 1979c). Just 600m east of the causeway, a Sheffield schoolboy found a Viking sword of the ninth/early tenth century with ornamented silver decorations on its hilt (known as 'the Fiskerton sword'; Wilson 1965: 33–5). Another sword of the same period (*c.* AD 900), bearing the inscription +LEVTLRIT, was found in the Witham opposite Monk's Abbey in Lincoln (Ewart Oakeshott 1964: pl. 1A; White 1979c). Such finds have been confidently interpreted as votive offerings for many years (Wilson 1965).

Other Viking finds from the Witham include an iron stirrup from near Lincoln and another from somewhere between Kirkstead and Lincoln (White 1979c). An eleventh century Viking spearhead may well have come from the area between Washingborough and Lincoln and another, dating between the ninth and eleventh centuries, was ploughed up in a floodplain field on the north side of the river at Greetwell, just east of Lincoln. A Viking axe-head of the early eleventh century, of unknown provenance within the Witham, was destroyed by George Pearson. He records this axe found in the Witham in 1787 and 1788 as 'found with other axes, chopping instruments, and carpenters' tools' (Pearson 1796: 445). Another Viking axe-head was found near Horsley Deeps, in 1815.

Medieval river finds

A medieval battle-axe, from Bardney, survives. This axe was found in the same area as a group of Viking or medieval ironwork: two spearheads, two daggers, a chopping knife or dagger, a felling axe, a probable parade axe and a carpenter's tool (Banks 1896). An iron helmet, probably dating to somewhere between the eleventh-fourteenth centuries, was found in the river at Washingborough (Banks 1896: 126) and a large arrowhead was found near Fiskerton (Banks 1896: 20). There are numerous medieval sword finds:

- three swords and a crossbow-bolt from near Bardney (Banks 1893: 199–201; 1896: 21);
- two swords recorded as recovered near Bardney Abbey: one dates to the period 1150–1200 and the other to 1300–1450 (Ewart Oakeshott 1964: 56–9);
- a third sword, also from near Bardney, dates to 1300–1350 (Ewart Oakeshott 1964: pl. 26A);
- a sword from Kirkstead Wath, inscribed +BENVENUTUS +/+ ME FECIT+, dates to 1300–1325 (White 1979d). Along with a 'ballock' dagger and a spearhead, it is from a group of weapons retrieved from the river's bottom with an eel spear in 1788. Pearson mentions that it was found 'with a large quantity of other arms' in the vicinity of Bardney Abbey (Pearson 1796: 445; Banks 1893: 197–98);
- a sword attributed to the Witham at Barlings, dates to the first half of the fourteenth century (Ewart Oakeshott 1964: pl. 20C) and was found either in the Barlings Eau or most likely in the Witham between Fiskerton and Stainfield (White 1979d);
- a sword from near Fiskerton dates to 1000–1220 and is inscribed SNEXORENEXORENEXORENEXOR EIS (Ewart Oakeshott 1964: 31–7).
- a sword from the vicinity of Washingborough dates to 1250–1300 (Ewart Oakeshott 1964: pl. 6C) and is inscribed + NDXOXCHWDNCHDXORVI + on one side of its blade with a series of possibly magical symbols on the other (White 1979d). Such uninterpretable inscriptions are a feature of swords made in the period 1225–1325 (Ewart Oakeshott 1964: 139).

The Barlings Eau, the small tributary on the north side of the river, is not known for its prehistoric river finds other than the likely Iron Age dagger with a gold crescent. Yet it has produced a substantial quantity of medieval discoveries. Two other daggers from Barlings Eau are probably medieval. From its confluence with the Witham comes a medieval civilian knife (White 1979d: 6). There is a Late Saxon spearhead found adjacent to Barlings Abbey, a group of spearheads, spurs and stirrups from the construction of the bridge at Langworth, and near Short Ferry bridge a coin of Edward the Confessor and a two-edged Viking/Late Saxon/medieval sword.

Other finds from the Witham include six iron candlesticks from near Kirkstead Abbey, probably of fifteenth century date, and from an unknown location an iron purse frame from the late fifteenth century along with fragments of several others. Daggers of likely medieval date were found in 1787–88 near the mouth of Blankney Delph, on the bed of the Witham near the torr (hill) of Lincoln, and on the bed of the Witham near the influx of the Sincil Dyke (Banks 1893: 234).

The Stixwould burial

One of the most remarkable finds from the medieval period was found in the bank of the Witham at Stixwould in 1848 and consisted of a human skull, corroded chain-mail, an iron sword and an iron spearhead, probably of thirteenth or early fourteenth century date.

The Stixwould find is of great interest because of the association of weaponry with human remains. In this light it is worth comparing it with an unusual Middle Saxon burial at Tattershall Thorpe on the west bank of the River Bain. The burial contains a substantial hoard of metalworker's tools (Hinton 1994), and may be a special deposition akin to that of disposal in the river. The burial is unusual for its isolated position and its burial of grave goods in a location far from the burial grounds of the period. There are few other finds from the Bain that point to a votive or riverine context. One is a fifth century sword hilt and another is a piece of animal bone carved with a picture of a reindeer and thought to date to the Viking period.

Post-Roman votive offerings

Votive offering in watery places is accepted as a standard rite in the Germanic and Viking periods in northwestern Europe and few would quibble with David Wilson's attribution of the Viking material to a religiously motivated cause (1965). The discovery of a Viking sword with vertically driven oak timbers in the River Hull at Skerne Bridge (near Driffield, East Yorkshire), in association with four knives, a spoon-bit, an adze and bones of 20 animals including horses, dogs, sheep and cattle (Dent 1984; Richards 1991: 116–17), indicates the likelihood of such depositional practices elsewhere within the region at that time.

It is with the medieval finds of the eleventh to fifteenth centuries that many have misgivings about accepting that non-Christian practices of offering into rivers may have continued. There are, however, several features of such artefacts that invite a ceremonial and purposive interpretation for post-Roman river deposition:

- The finds are predominantly of martial character.
- Most of the non-martial items from the Witham, such as the triple pins and hanging bowl, are high-status or élite possessions, predominantly those of the medieval ruling classes.
- The collection of swords from the Witham valley is one of the best known for this period between the ninth and fourteenth centuries.

The weapons are not those of a whole army defeated in battle but would have belonged to a restricted section of society. It seems unlikely that it was the aristocracy alone who were persistently clumsy or unlucky enough to lose their possessions during so many ill-fated river crossings.

Given the long tradition of votive deposition and the extent to which medieval finds occur in places with earlier depositions, it is bordering on the perverse to suggest that all the post-Roman material from the Witham derives from activities other than votive deposition. Perhaps such offerings were deposited at the demise of their owner, in the same way that Thomas Malory tells of Excalibur being returned to the water on the death of Arthur.

Christianity and the end of votive deposition

Churches were established in this part of Lincolnshire probably in the later Middle Saxon or Late Saxon period. And yet the practice of river deposition continued for another 700 or 800 years. This continuation of a pagan practice is all the more surprising given the Witham's importance in terms of its monastic centres (Stocker and Everson 2003).

The valley of the Witham contains a remarkable number of high medieval monastic sites. There are 10 abbeys and priories, four hospitals, and eight granges (Owen 1971: fig. 6; Bennett 1993). Charters record that the priories were mostly founded in the twelfth century but religious communities such as Barlings and Bardney are thought to have had earlier Christian beginnings (Everson *et al.* forthcoming). The most important, at Bardney, was probably founded in the late seventh century AD (Stocker 1993: 107). Stocker suggests that this great monastery's foundation here might have been influenced by the river's reputation as a place of former ritual significance (Stocker 1993: 110).

Although the various religious houses occupied both banks of the Witham, it was the north bank – on the island of Lindsey – which was pre-eminently a favoured location. Conventionally the establishment of religious centres in this area has been attributed to the monastic transformation of wasteland – heath, marsh and fen – into prosperous farmland by draining, reclaiming and cultivation (Owen 1971: 51). Yet the Witham area was probably not transformed by monastic houses in the way envisaged by historians (D. Stocker, pers. comm.). The land on the river's margins remained a strange area in settlement terms, with a very dispersed settlement pattern set within dense woodland. The establishment of these various monastic foundations beside the Witham raises two issues. Why did votive deposition – if that is what it was – continue for so long side by side with the monastic houses after the twelfth century? And was there, in fact, a strong spiritual sense of place which encouraged the Christian church to appropriate this land and impose Christianity over pagan beliefs?

The documentary sources are silent on these questions. Perhaps any link between the abbeys and priories along the Witham and the tradition of votive offering is merely fortuitous, associated only by the fact that the river was a wilderness to be tamed. Yet there is also the possibility that the river's religious and spiritual significance was a major factor in the area's spectacular monastic development. One form of watery deposition that occurred extensively in the medieval period was the dropping of pilgrim badges into water. Many such finds have been made in the Thames (Yeoman 1998) but there are none from the Witham, with the exception of a single probable badge mould found at Bardney (Lincs. SMR record).

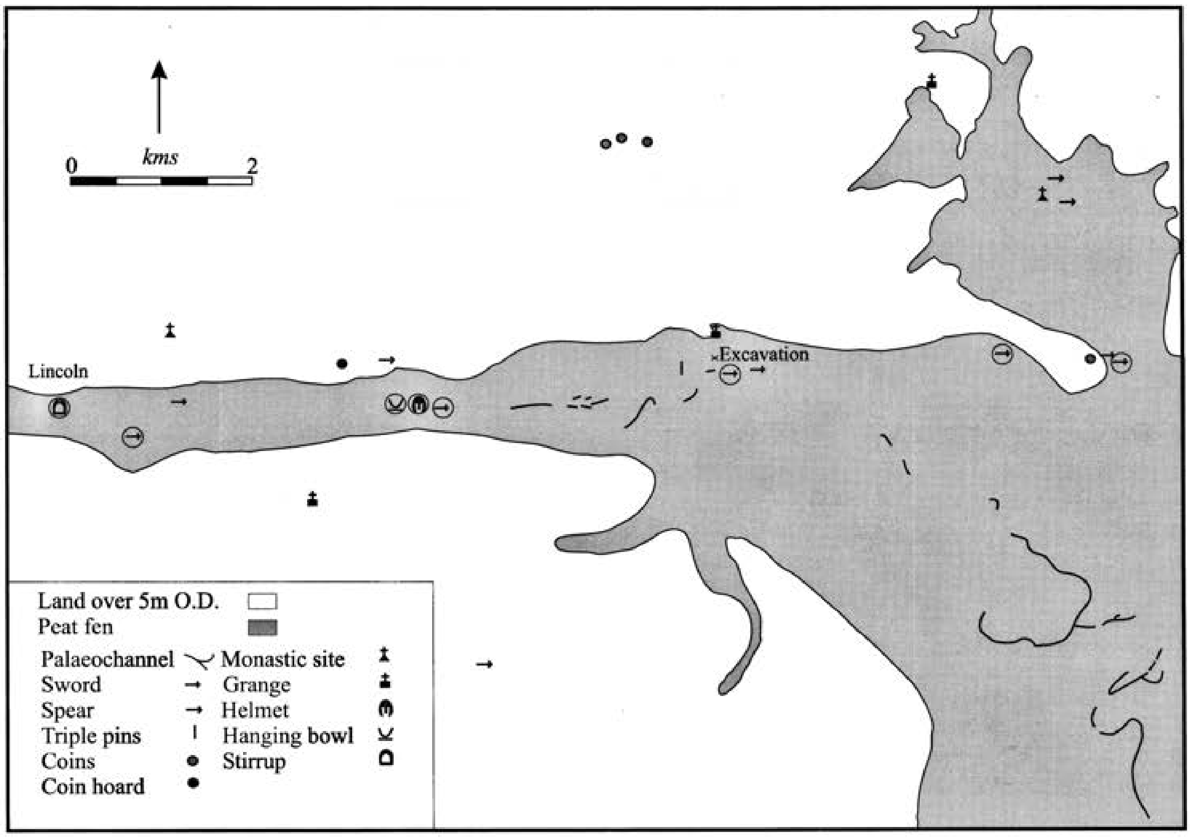

Fig. 9.19 The Fiskerton area in the medieval period showing monastic houses, hoards and river finds (approximate findspots are marked by open symbols).

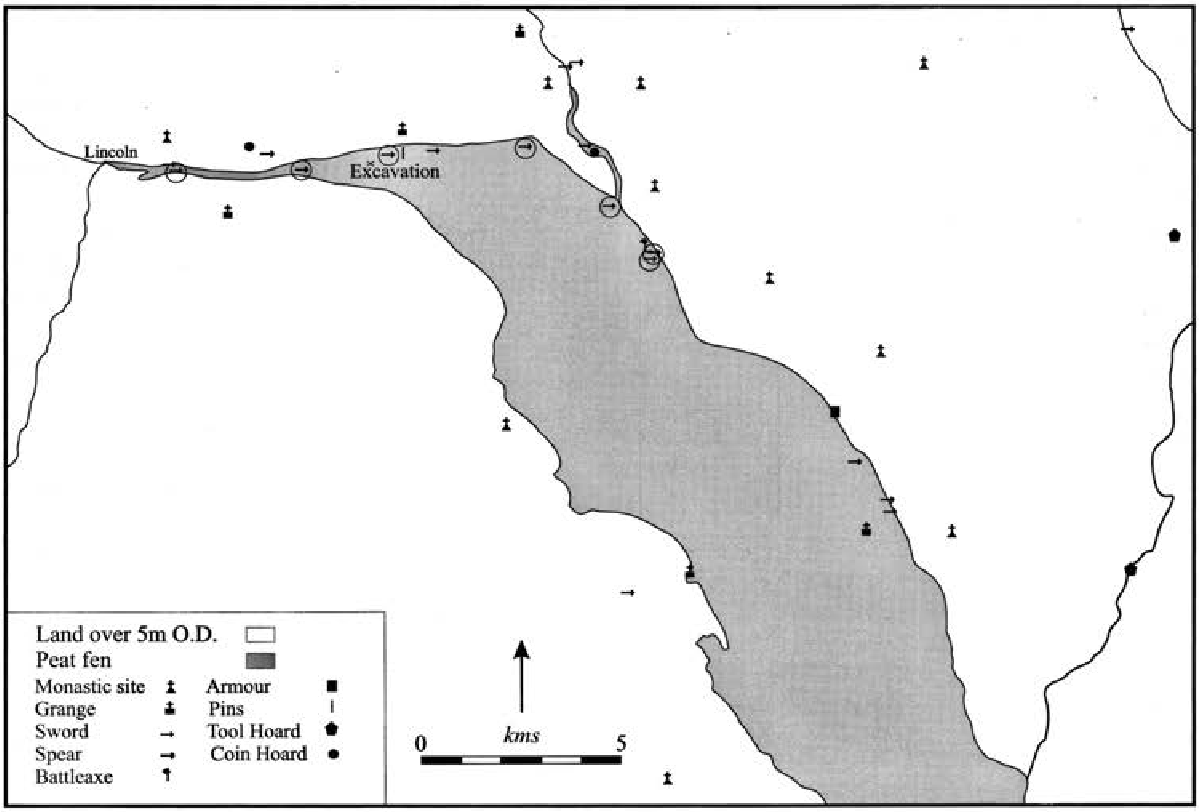

Fig. 9.20 The Lower Witham region in the medieval period, showing monastic houses, hoards and river finds (approximate findspots are marked by open symbols).

10 THE FISKERTON VOTIVE ASSEMBLAGE AND ITS CONTEXT

VOTIVE DEPOSITION IN THE WITHAM

By M. Parker Pearson and N. Field

What can be inferred about the circumstances surrounding the deposition of metalwork and other artefacts into the Witham? It is now some years since Richard Bradley poured scorn on those explanations of casual loss that invoked the 'carelessness of so many boatmen and the forgetfulness of so many smiths' (1984). Attitudes to understanding watery deposition in the later prehistoric and Roman periods have swung towards interpretations invoking votive rituals.

The discoveries at Llyn Cerrig Bach (Fox 1946) and subsequently the excavation of the Fiskerton causeway and of wooden staging at Flag Fen (Pryor 2001) in association with weaponry, tools and other artefacts have helped archaeologists to recognize the religious nature of these deposits within Britain (Parker Pearson 2000). Several sources indicate that the gods of the continental Celtic world were thought to reside in certain watery contexts (Cunliffe 1993). In the case of the deities Sequana, Rhenus and Sulis, we can link them respectively with the source of the Seine, the Rhine and the hot springs at Bath. Such studies of Iron Age watery deposition in Britain and western Europe not only place Fiskerton firmly within the context of votive deposition but also illustrate the likelihood of this practice having had an extensive time span and a wide geographical currency (Fitzpatrick 1984; Bradley 1990; 2000: 47–63).

But what of the post-Roman artefacts? Jeffrey May once wrote that 'ritual' interpretations of the Witham material could be wide of the mark, on account of the numbers of medieval swords and other items, artefacts for which he considered votive deposition was not a possibility (May 1976: 132–3). The explanation of these medieval weapons as battlefield losses has been current since about 1800 when Sir Joseph Banks explained that 'The drawn swords and naked daggers imply that several soldiers were thrust into the river and lost in the very act of fighting' (Banks 1896: 126). Andrew White has warned that no single explanation, whether in terms of prehistoric river crossing or medieval battle, fits all the facts (1979b: 2).

The traditional perspective – that finds such as swords resulted from battles – may not have been entirely dismissed in some quarters but there are good reasons why the occurrence of such objects in watery contexts can be viewed as resulting from purposive votive deposition. Stead, for example, points out that swords still in their scabbards are unlikely to have been lost in battle at a river crossing and their concentrations in selected riverbeds support a ritual explanation (Stead 1996: 89).

Comparisons with the Trent and the Thames

Bronze Age and Iron Age finds from the Trent are of interest because of its proximity to the Witham, whilst the Thames is remarkable because of the quantities of material recovered.

The Trent

The Bronze Age metalwork from the Trent has been discussed recently (Scurfield 1997). Most of the finds have been made in the Nottingham area, with more than 80 bronzes in the 18–mile stretch between the Soar tributary and Hazelford Ferry. At Clifton-on-Trent an area of timber pilings was associated with a Neolithic stone axe and axe hammer, three log boats, Middle and Late Bronze Age rapiers/swords, spears and daggers, Roman coins and pottery, an Anglo-Saxon shield boss and brooch, a bronze bowl, a stone crucible and six skulls (Phillips 1941). There are finds further north in the Isle of Axholme area and south of Gainsborough (Davey 1973; van de Noort and Davies 1993) but these are few in comparison with the large numbers of Late Bronze Age finds from the Ancholme valley and from the Scunthorpe-Broughton area in north Lincolnshire.

Iron Age metalwork from the Trent is less common. Early Iron Age finds comprise two seventh century BC bronze Gündlingen swords from Holme Pierpoint, a third from Newark (Cowen 1967: 444) and a fourth from Averham (Notts. SMR no. 3112). North of Newark, a portion of a La Tène I-II scabbard was recovered from the river at Sutton Reach (Fox 1958: 32–3; May 1976: 128–9). A La Tène *Stage II* shield boss, initially identified in the late nineteenth century as horse armour, was found in the Trent at Ratcliffe-on-Soar (Watkin 1995; Watkin *et al.* 1996; Stead 1996: 10–11, 22, 26). Another find of interest is a wooden cart or chariot wheel from Holme Pierpoint, found in association with a log boat and radiocarbon dated to the later first millennium BC (Stead 1996: 79, 81). Timber piling has also been recognized at Holme Pierpoint (Scurfield 1997: 35).

The contrast between the quantities of Bronze Age and Iron Age finds from the Trent is striking, the difference in number being far greater than that for the Witham. This differential recovery may represent a genuine decline in the deposition of metalwork into the Trent in the first millennium BC.

The Thames

There is an enormous quantity of Bronze Age metalwork recovered from the Thames (Ehrenberg 1980), which can be broadly divided into five main concentrations, around Lechlade, Wallingford, Reading, Staines and Richmond (Pryor 1998: 143). There is also much Iron Age material. Hallstatt C swords are found in two areas: between Reading and Maidenhead, and between Kingston and central London (Wait 1985: fig. 2.2; Cunliffe 1997: fig. 155). Hallstatt D and Early La Tène daggers and dagger sheaths are concentrated in the Greater London area, mainly in the five mile-stretch between Mortlake and Battersea (Jope 1961; Harding 1974: fig. 53). But La Tène swords have been found all along the river from the Oxford area to London (Piggott 1950; Fitzpatrick 1984: 179). Most are concentrated in two sections, between central London and Richmond, and between Maidenhead and Staines (Wait 1985: fig. 2.4; Cunliffe 1997: fig. 155).

The La Tène material from the Thames is copious, partly because of more frequent dredging and better conditions for retrieval than in the Witham and Trent (Fig. 10.1; after Fitzpatrick 1984: 180–1; fig. 12.1).

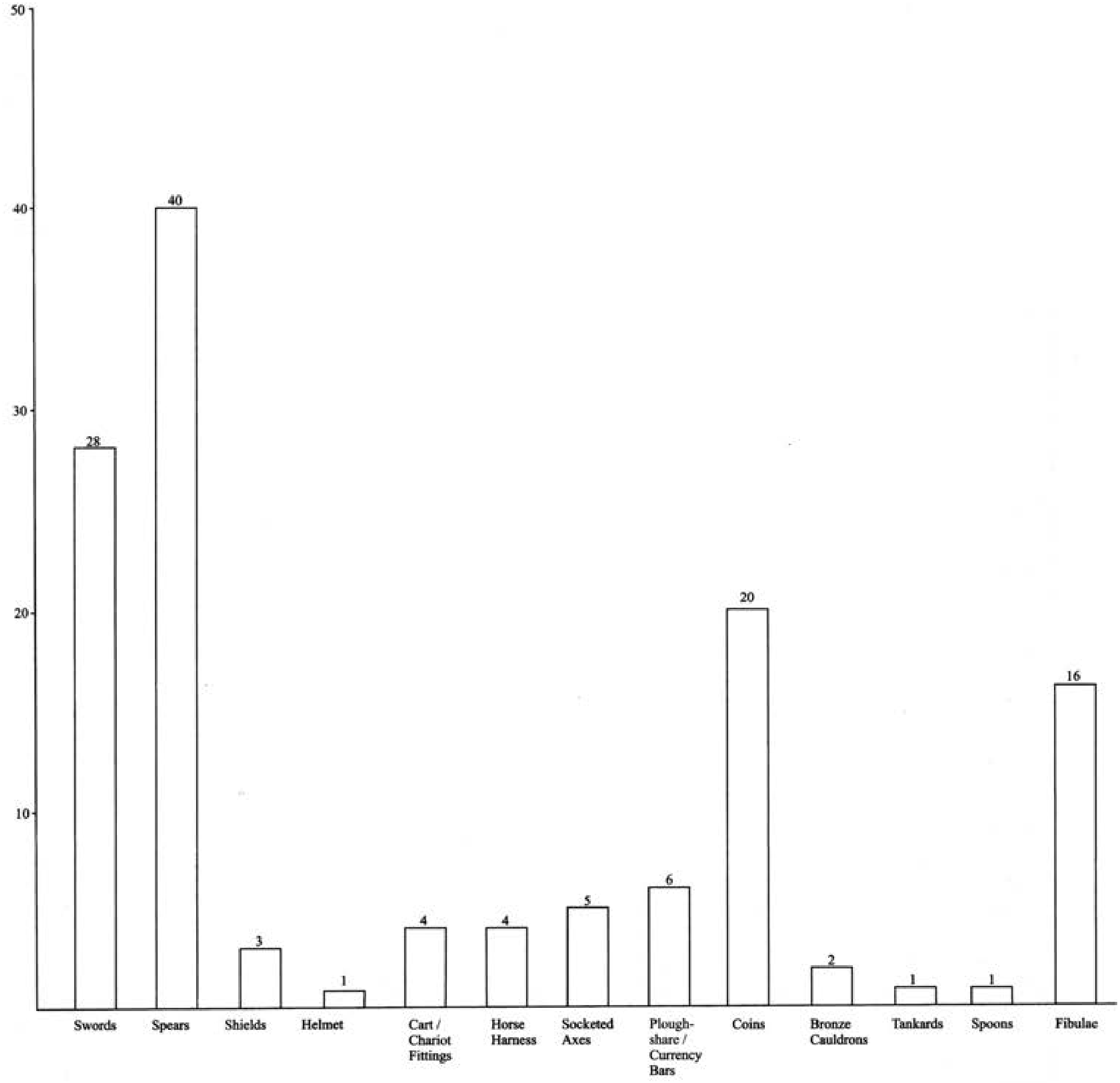

***Fig. 10.1** Quantities of Iron Age finds from the Thames (after Fitzpatrick 1984).*

Despite these larger quantities, Fitzpatrick's conclusion is interesting: the *quality* of the Witham material is just as remarkable as that from the Thames. The finds from the Thames, he suggests, may prove to be quite unexceptional, their high numbers being due to better retrieval (Fitzpatrick 1984: 181). When we consider the large number of finds excavated in such a small area at Fiskerton and the possibility that it was just one of four or five such depositional locations along the Witham in the Iron Age, then Fitzpatrick's proposition seems justified.

THE FISKERTON ARTEFACT ASSEMBLAGE

By M. Parker Pearson and N. Field

Chronology

The artefacts deposited beside and under the causeway form a remarkable group of 152 objects dated on typological grounds to the Iron Age and the later Roman period (Table 10.1) and three objects probably from the medieval period.

Taking into account eighteenth and nineteenth century finds, the quantity of weaponry and other military items from Fiskerton is remarkable. The former parish boundary between Fiskerton and Washingborough ran east-west across the post alignment and thus Iron Age finds recorded as coming from 'Washingborough parish' may well have come from the Fiskerton causeway. The finds attributed to Washingborough include a bronze sword and two iron swords in bronze scabbards.

The ornamental motifs of La Tène style decorating six of the Iron Age items from Fiskerton place them in the period broadly from the mid-fifth century BC to the early first century AD. The chronological schemes for the La Tène period can be difficult to cross-compare (see Table 4.1). Déchelette's division into three stages is maintained for *inter alia* brooch typologies in Britain (Stead 1991: 80–90):

- La Tène I (*c.* 475–250 BC)
- La Tène II (*c.* 250–120 BC)
- La Tène III (*c.* 120–30 BC)

Reinecke's fourfold division is used in French and continental schemes including those for the Swiss sites

***Table 10.1** The assemblage from the Fiskerton causeway. (Post-Roman finds comprise a medieval iron axe-head, a late medieval bronze buckle, possibly post-medieval iron blade, 91 sherds and 33 fragments of tile ranging in date from late Saxon to early modern.)*

Weaponry *17 items*	a coral-inlaid bronze sword handle; 2 swords in iron scabbards; a short sword; pieces of a fifth and sixth swords; 11 spearheads	Iron Age (swords La Tène I/La Tène)
Possible Military Items *3 items*	a bronze 'shoulder-piece' or 'epaulette'; a bronze and glass roundel (from a shield?); fragments of a bronze mount (from a shield?); (and 55 bone spearheads, see below)	Iron Age
Other Bronze Artefacts *17 items*	a 'figure-of-eight' or 'S-shape'; 3 fragments of decorated sheet; 4 rings; 4 pieces of binding; 2 bands; a plate fragment; 2 Irchester bowls	Iron Age Roman (bowls)
Metalworking Tools *11 items*	2 hammerheads; 4 files; a forming tool (?); a bench anvil (?); a punch (?) fragment; an incomplete poker (?); a rod fragment	Iron Age
Woodworking Tools *8 items*	3 shaft-hole axe-heads; 2 files (one with an antler handle); a decorated saw (with antler handle); a gouge (?); a plane blade (?)	Iron Age
Other Iron Artefacts *19 items*	2 linch-pins; a reaping hook; a broad blade (cleaver?); a fragment of ring; 3 fragments of binding; 2 incomplete bars; 2 fragments of rod or tube; 6 fragments of rod; a nail; a stud; an L-shaped nail; a spoon bit (spoon auger?)	Iron Age Roman
Coin/Ornaments *5 items*	a jet ring; 2 amber beads; a copper alloy bracelet; a coin of Trajan	Iron Age Roman
Ceramics	sherds of least 24 Iron Age pots and 27 Roman pots; 26 fragments of Roman tile	Iron Age Roman
Bone and Antler Artefacts *59 items*	55 bone spearheads; a rib-knife (?); a bi-pointed needle; a sawn antler tine; a piece of worked bone	Iron Age
Stone Artefacts *11 items*	4 whetstones; 4 limestone weights; a hammer stone; a struck flint flake; a smoothed marcasite nodule	Iron Age? Roman
Wooden Artefacts *2 items*	(beside the causeway timbers themselves) a wooden strut probably from a boat; an oak handle	Iron Age? Roman (boat)

such as La Tène itself and Cornaux (see Chapter 11) and has been adapted by Haselgrove (2001: 40–6) for the British sequence:

- La Tène A (*c.* 475–400 BC)
- La Tène B (*c.* 400–250 BC)
- La Tène C (*c.* 250–150 BC)
- La Tène D (*c.* 150–20 BC)

Recently Ian Stead has recast Jacobsthal's art styles, augmented by de Navarro's contribution (1972), into five stages (Stead 1996):

Stage I is Jacobsthal's 'Early Style', dating between the mid-fifth and fourth centuries BC.

Stage II is his 'Waldalgesheim Style', dating to the late fourth/early third century BC.

Stage III, sub-divided into the 'Plastic Style' and the 'Sword Style', is virtually unknown in Britain.

Stage IV recasts de Navarro's Style IV, introduced for certain British art of the third century BC, and includes the shield and scabbard-mount from the Witham (see Chapter 9). It has been regionally sub-divided into the 'Witham-Wandsworth Style' and the Yorkshire and Irish 'Scabbard Styles' (Stead 1996: 31).

Stage V dates from the second century BC to the first century AD and is best exemplified by the art styles of the Llyn Cerrig Bach hoard studied by Sir Cyril Fox (1946), who named an aspect of the Stage V group the 'mirror-style'. It is characterized by tendril designs and shapes more curvilinear than Stage IV (Stead 1996: 32–5).

Of the Fiskerton La Tène-type finds, the Stuffins finds of the bronze and coral sword handle fittings and the 'Museum sword' can be assigned more specifically to Stead's La Tène *Stage I*, 'Early Style' of the fifth-fourth centuries BC. The bronze and coral handle is an extraordinary item, of a shape which can be interpreted as anthropoid, with decorated bronze finials and plaques, coral-inlaid discs and domed studs (Stead 1996: 22–3, fig. 22). The other swords and their scabbards are undecorated though ***222***'s scabbard appears to have had a ring made of coral on its upper loop-plate. Their likely short lengths, less than 670mm, assign them to La Tène I (Stead 1996: 65).

Other examples of La Tène artwork are the curious figure-of-eight or S-shape (***208***), the roundel of bronze and red glass (***409***), the partial shape cut from bronze sheet (***415***), the design on the antler handle of a woodworking file (***364***) and the design on the blade of the iron saw (***288***). The decoration on the antler handle of file ***364*** is assignable to La Tène *Stage II* 'Waldalgesheim style' (late fourth/early third century BC). It has been described by Stead as crudely executed in pointillé, muddled and very inferior (Stead 1996: 25). The bronze roundel (***409***), and perhaps the cut-out (***415***), most likely derive from a shield which would presumably have been made from a wooden board with these and other items as fittings. The appearance of art on martial items such as these swords and putative shield is not surprising but its application on woodworking tools certainly is. Indeed, the decorated saw is a unique piece. The S-shape (***208***) is also unique, presenting no evidence of its purpose.

There is no Iron Age material of Late La Tène style (*Stage V*), from the second and first centuries BC and first century AD (Stead 1996: 32–5) at Fiskerton. The Roman finds, which are more precisely datable, tend to have been made from the late first century AD onwards. Most of the Iron Age finds were probably deposited in the late fourth to the third century BC and thus there seems to be a gap of perhaps 250 years between the Iron Age and Roman artefacts, with a complete absence of Late La Tène styles.[1]

Stratigraphy

The composition of the Iron Age component of the assemblage is difficult to gauge in full because not all of the artefacts can be assigned with confidence to either an Iron Age or a Roman date. The metal weaponry and tools appear to be Iron Age, along with the bone spearheads, the jet and amber, and a number of distinctive ceramic vessels. Weaponry is a consistent element of Iron Age watery deposits and tools also often occur in similar deposits of this period but nowhere in the proportions found at Fiskerton except at La Tène itself. The rarity of tools as chance finds from rivers may be due to the fact that, whereas swords and spears are easily recognizable as being ancient and romantically-associated items, tools can appear to a casual finder all too familiar and modern-looking.

The weapons and tools at Fiskerton had distinctly different distributions, the swords and spears being dropped beneath or close to the causeway, with a westwards appearance to their spread, and the great majority of the tools being deposited about 5m to the east of the causeway (Plates 8 and 9). This spatial patterning must reflect depositional choice and not post-depositional movement but we cannot say for certain whether it indicates merely different moments of deposition, explicit spatial categorizations of depositional placing in relation to the causeway, or both.

The uppermost of the metalworking and woodworking tools lie within layers **194** and **331** in Area F, lower down the sequence than the uppermost Iron Age weapons in layer **31** (Plate 12). It is highly likely that they have sunk because of their weight, thereby preventing any assessment of when the tools were deposited in relation to the

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[1] The currency bar found about 30m west of the 2001 excavation may belong to this period and hints at a possible late La Tène deposition site in the immediate vicinity (Rylatt and Palmer-Brown in preparation).

weapons. It is worth noting that similar spatial segregation of artefacts was noted at La Tène, with rings and horse-bits in one area and certain areas which produced only spears or swords or rings *etc*., although this was generally not the case in the later excavations (Vouga 1923: 25).

The presence of Roman as well as Iron Age artefacts in layers from the top to the bottom of the sequence at Fiskerton indicates that stratigraphic relationships of findspots are of no value unless the artefacts were found lying directly above or beneath structural timbers. The soft peaty mud clearly permitted extensive downward movement of artefacts and sherds (Plates 12–14). In addition, the stratigraphic sequence may have been complicated by undetectable episodes of scouring and washing-away of silts by winter floodwaters, and direct movement of artefacts by water. It seems highly unlikely that any artefacts have moved upwards through the stratigraphy and thus the uppermost layer within which artefacts of any one period are found should represent the minimum level from which they were deposited. There seems to have been some residuality caused by the causeway's later builders and users digging into earlier layers: a bone spearhead was found in layer **25** along with the medieval buckle and a fragment of bone spearhead was found in layer **3** (the flood deposit beneath the ploughsoil) with medieval tile fragments.

It seems that the horizon of Iron Age and Roman deposition was layer **31/32**, the deposit which includes the limestone rubble and many finds. This is clearly at the very end of the construction and decay sequence of the causeway and indicates that deposition post-dated the erection of many of the causeway's posts. In other words, the artefacts may not have been deposited here until after 375 BC and especially after 359–317 BC. Because the La Tène I swords were both unstratified we do not know if they were deposited similarly at this late stage in the sequence, after the timber structure of the causeway was in probable disrepair. Certainly the other swords, which might also be of fourth century date, appear in deposits that date to after 375 BC and 359–317 BC. Since Roman finds were also apparently deposited at these levels we have a problem, which may be solved by examining three possible scenarios:

1. Any deposits which accumulated over the Iron Age deposition surface were subsequently scoured so the Roman material was incorporated at this level; *or*
2. There was no new accumulation of sediments between the moments of Iron Age and Roman deposition; *or*
3. The entire Iron Age assemblage was curated for at least 250 years (and up to 500 for certain items) until the Roman period, when the whole collection was thrown in.

The first explanation is problematic because one might expect evidence of relict pockets of Late Iron Age/pre-Roman sediments which escaped scouring. The third explanation is a possibility but it does not explain why artefacts of the period *c*. 200 BC – AD 70 were not collected. The second possibility – that the sediment's surface did not alter substantially over this long period – seems the most plausible.

The chronology of the artefacts, indicating a gap of *c*. 250 years between the two periods of deposition, is interesting as is the possibility that the Iron Age deposit might have been a very short-term or even single event marking the closing of the causeway's initial period of use. To see these artefacts as closing deposits presents a picture very different to the notion of deposition rituals organized on a longer-term calendrical cycle associated with the erection of the timber posts. It is also noteworthy that the weapons were deposited at a time when the sediments around the causeway's timbers were becoming increasingly dry. Finally, the spread of dates of the Roman artefacts indicates that they were dropped in a series of depositions over at least 200 years.

Interpreting the Iron Age assemblage

The bone spearheads or 'gouges'

The large number of bone 'gouges' is remarkable. Tools of this kind are common finds on Iron Age settlements throughout Britain and comparable large assemblages are known from All Cannings Cross, Danebury, Glastonbury and Maiden Castle (see Olsen, Chapter 5, for references). A more modest group of 14 'gouges', made from sheep tibiae and metatarsals, was recovered within the large worked bone and antler assemblage from the nearby Late Iron Age and Roman settlement at Dragonby (Taylor and May with Harman 1996: 352–3). Such artefacts have been variously interpreted as multi-purpose pins/skewers/lanceheads or spoons for feeding young children (Cunnington 1923: 86), as weaving shuttles (Wheeler 1943: 303–4), and as hide-dressing tools and pin-beaters for weaving (Sellwood 1984a: 387). Olsen demonstrates that any interpretation of the Fiskerton examples as 'gouges' is unfounded, preferring to identify them as spearheads.

They have been found in contemporary burial contexts in East Yorkshire, in the graves of young men at Rudston (R 146, R 174) and Garton Station (GS 5), where they accompany multiple iron spearheads apparently thrown at the recumbent corpse prior to the grave's filling-in (Stead 1991). Their positions are the same as the thrown-in spearheads and it is hard to accept any interpretation of these examples as anything other than projectile points, or at least symbolic projectile points. The 13 found in Burial 1 at Grimthorpe, also in East Yorkshire (Stead 1968: 170, 172, fig. 16), can also be interpreted in these terms, as lanceheads rather than shroud pins.

As Olsen notes, similar bone and antler 'javelin' points, many of them hafted, have been found in the votive deposits of the same period at Hjortspring and Krogsbølle in Denmark (Rosenberg 1937; Becker 1948). Twenty-six of the 31 from Hjortspring are of tubular bone, especially tibiae of sheep/goat and some dog and deer. They are 95–130mm long and many show signs of angled cutting, rounding-off and polishing. Thirteen of these had transverse rivets of bone or wood fixed through the lateral holes at the butt ends of the spearheads and through the pointed ends of the wooden shafts. The remainder were apparently glued on to their shafts (Rosenberg 1937: 45).

The Fiskerton 'gouges' were not found with wooden hafts; their evidence of wear – frequent tip damage and a fairly light polish – suggests that many may have been used for burnishing; and the lateral holes at the butt ends show no signs of wear from hafting pegs or twine. That said, there is evidence for hafting from elsewhere. One of the Glastonbury 'gouges' contained a wooden shaft (dismissed over-hastily by Sellwood as a tool for hollowing out the 'gouge'; 1984a: 387) and others from All Cannings Cross, Wookey Hole and Hanging Langford Camp are associated with iron or bone rivets (Cunnington 1923: 86). A wooden rivet was found in place in one of the Grimthorpe examples (Olsen 1988: 358; Mortimer 1905: 151).

It is most unlikely that such a ubiquitous weapon/tool was restricted to any single use. We favour their having had multiple uses which culminated in their deposition as symbolic or actual spearheads. Thus an all-purpose artefact, which is a tool in a domestic setting, might serve as a spearhead – and need not even be hafted to serve thus – in the ceremonial context of deposition off the causeway. Finally, a similar point with a rivet hole, made of horn and decorated around its base, was found with two small stone cones in the Iron Age grave of a six-year old child at Knowth in Ireland (Eogan 1968: 365–6, fig. 37). This raises the possibility that the Fiskerton bone spearheads may have been used and deposited predominantly by children. The presence of rivet holes but their lack of shafts or rivets suggests that these 'spearheads' were dismantled prior to deposition.

Possible female-associated items

The jet ring and amber beads can be compared with toe-rings and earrings of the same materials in adult women's graves of the same period in East Yorkshire (Stead 1991). They thus appear to be the only Iron Age items at Fiskerton that had definitely feminine associations in contrast to the probably masculine activities represented by weaponry, metalworking and woodworking.

The gender attribution of ceramics is less clear-cut. Most of the Fiskerton pots are remarkable for their large capacity, their fine quality, their internal corrugations and the fact that they are unlike most other Iron Age pottery from the region. Two of them were found largely complete but crushed and placed next to one another, whereas the others are represented only by a few sherds. There are no obvious indications of sooting or contents. Whether or not the pots were specially made for deposition – irresolvable until more settlements of this period have been investigated in the region – there was certainly a process of selection that favoured the largest vessels with only one, represented by two rim sherds, being a small jar.

The problem of uniqueness

One of the difficulties with dating and interpreting the Iron Age material from Fiskerton is that so much of it is unique. The coral-inlaid sword hilt, the S-shape, the decorated saw, the bronze sheet cut-out, the fluted amber beads and the bronze 'shoulder piece' are all without parallel.

This may be partly a factor of how limited our knowledge is of the extent of variation in La Tène assemblages but it might also be interpreted as a special characteristic of the Fiskerton material itself. The latter view is persuasive for several reasons. Even after comparison to the much larger assemblage from La Tène itself (see Chapter 11), many of the Fiskerton finds remain unique. Secondly, the coral-inlaid sword handle is the most elaborate known from anywhere in Celtic Europe. Exactly what it is doing in Lincolnshire is something of a mystery, although not many miles to the north, at Kirkburn in East Yorkshire, the other 'finest example of its kind from Europe' was buried (Stead 1991: 66). There may have been a regional preference for fine-handled swords, whose attraction lay as much in their appearance as in their strength and effectiveness. Even so, these are remarkable weapons which can be expected to have been prized possessions anywhere in Iron Age Europe.

There are other exceptional items from Fiskerton such as the bronze and glass roundel. Many of these items must have been rare and unusual even at the time, and perhaps confined in their use and ownership to the highest social circles of Lincolnshire's Iron Age communities. If the pots too were special then the only truly ordinary items are the bone spearheads. It is hard to know just how common the various tools may have been: we may assume that woodworking tools and reaping hooks were relatively mundane (but normally recycled and thus rarely discarded) but the saw, for example, with its unique blade decoration, was probably not intended for daily use.

Ritual 'killing'?

The assemblage appears to comprise at least some items that were made to be used, not produced for ritual purposes alone. The metal tools, the bone spearheads ('gouges') and the Roman whetstones all show evidence of wear and use. Another interesting aspect of the metal assemblage is that none of it can be shown to have been deliberately broken prior to deposition: the swords have not been bent and nor have the tools. Similarly the many other artefacts from the river, dating to both the Late Bronze Age and the Iron Age and including many swords (see Chapter 9), have also not been deliberately broken prior to deposition. This contrasts with many of the finds from the Later Bronze Age timber alignment at Flag Fen where the interpretation of votive deposition is hard to counter (Pryor 1991; 1992; 2001). The two La Tène swords and a scabbard from Flag Fen were, like the Bronze Age metalwork, deliberately broken prior to deposition.

However, the presence of wood hafting in the sockets of the spears, axes and hammers from Fiskerton indicates that the hafts have been broken – though whether this was before or during deposition is unknown. All the bone spearheads ('gouges') were dismantled before being deposited. The incompleteness of most of the swords – broken tangs and a missing blade – is also notable. There are other broken items, including fragments of iron rods, incomplete iron bars, half an iron ring and three pieces of decorated sheet bronze. Since the roundel probably came off a shield, its breakage may also be inferred. The Iron Age pottery is clearly broken but the near-complete pots seem to have been crushed subsequent to their deposition.

Although the distinction between unbroken and broken has been taken by some as an indicator of whether watery finds are votive or accidental losses (Schwab 1992), such a division would not seem to be appropriate here. The differences in practices at Flag Fen and at Fiskerton seem to have been chronological rather than regional. Stead argues that this lack of deliberate damage is a feature of La Tène metalwork from British rivers, in contrast to many of the continental finds and with the exception of a third century scabbard from the ditch of a Neolithic henge monument at Ferrybridge in West Yorkshire (Stead 1996: 65).

What is missing from Fiskerton?

Fiskerton has been used as an example to argue that the paucity of elaborate wooden artefacts is a measure of their true scarcity in Iron Age life as opposed to our failure to find suitable Glastonbury-like waterlogged contexts where they might survive (Evans 1989). Yet there are reasons why Fiskerton might not be a good context from which to generalize about the quality and availability of finished wood products, other than to note the range and sophistication of the woodworking tools. In Europe other wetland sites of this broad period have wooden shields and umbos (shield bosses), turned wood, wooden containers, wooden handles and other tools of wood. In Lincolnshire even a nearby site at Tattershall has produced an Early Iron Age wooden 'mallet' (Seager-Smith 1998). Fiskerton has none of these – only one identifiable handle (***311***) was found in the large wood assemblage.

The most likely reason lies in the nature of its riverine environment. Slow-moving reed bed that it may have been for much of the year, seasonal rises in water levels and turbulence may well have carried seawards those items that floated. This might also have affected corpses and body parts. The low numbers of crania in the mammal bone assemblage may reflect riverine dispersal of different skeletal parts, the skull normally being transported downstream further than other bones (Boaz and Behrensmeyer 1976; Coard 1999; Coard and Dennell 1995).

The human skull fragment from Fiskerton is interesting because of its deep fissure, caused by a heavy blow with an iron blade, probably a sword. The Fiskerton cranial fragment is radiocarbon dated to the Iron Age, several centuries earlier than the sacrificial killing of the unknown, well-kempt man in the peat bog at Lindow in Cheshire, 90 miles away, in the late first to early second century AD. It is impossible to tell whether the wound was inflicted immediately pre- or post-mortem but it strikes a resonant chord with the cranial injury sustained by Lindow II, one of the traumas that led to his death (Stead *et al.* 1986). Equally, one of the eight crania from La Tène bears a series of heavily-struck cut marks (Pittard in Vouga 1923: 136) and one of the human femurs had a series of blows applied to its exterior side (Pittard in Vouga 1923: 139).

Human remains have been recovered from elsewhere along the Witham. Skulls were reported in 1816, possibly from near Washingborough (Bruce-Mitford 1993: 59), and a human mandible was recovered with undated animal bones and worked wood from an unlocated excavation in Branston Fen by A.L. Armstrong in 1946 (Heritage Lincolnshire records). Human bones were excavated at the Early Iron Age site adjacent to Washingborough pumping station in 1973 (Coles *et al.* 1979) and other human remains were found on the surface 100m-200m downstream of the pumping station by the Washingborough Archaeology Group during fieldwalking (Elsdon 1994). It is likely that these are just a few of the human bones recovered from the river and they appear to derive from wet deposits rather than from eroded round barrows.

Interpreting the Roman assemblage

The Roman assemblage is almost entirely different from the Iron Age material, consisting of bronze bowls, a bracelet, ceramic pots, tile fragments, a piece of a boat, whetstones and a coin. The tile fragments are difficult to explain but might have derived from the dumping of hardcore onto the causeway's surface during the Roman period. Apart from the oak handle (***311***) the boat strut is the only finished wooden artefact from the site not associated with the structural timbers of the causeway. The boat from which it comes may have been trapped amongst the causeway's timbers rather than being formally deposited. Other artefacts that may not owe their presence here to any deliberate or votive motivation are the flint flake, the hammer stone and the limestone weights, which may have been fashioned into fishing-net weights from the limestone rubble (layer **31**) laid on the causeway's surface.

One could explain the remainder of the finds as the result of a succession of waterside carelessnesses – dropping a bracelet, tripping up with a pot or two – but the quantities and the restricted types of artefacts make this unlikely. Instead, the deposition of the whetstones, the bracelet and the bronze and ceramic containers (and, presumably, the coin) is best interpreted as votive, even though the types of finds are not those encountered in most Roman shrines and temples.

The Irchester bowls are particularly interesting in that there seems to have been a regional practice in the East Midlands of depositing them in multiples. Together with the pots, they suggest the possibility that the main form of offering in this period may have consisted of perishables such as food, which has left either no trace or survives in the form of animal bones (some of which have butchery marks as might be expected). It may have been that occasionally the container was sacrificed with its contents. Another possibility is that they may represent the provision of gifts primarily by women. The whetstones are noteworthy because they may have been substitutes for swords during a period when all but the army were disarmed. The absence of weaponry from Romano-British votive deposits (though not from the Continent) has been noted (Bradley 1990: 186) and perhaps these whetstones served as symbolic replacements.

CELTIC ART AND ITS SOCIAL AND DEPOSITIONAL CONTEXT

By M. Parker Pearson

The élite nature of much of the British Iron Age metalwork from riverine and other watery contexts has been clearly recognized (Cunliffe 1991: 514–16). This is evident at Fiskerton with the coral-inlaid sword handle and the other pieces with curvilinear La Tène-style decoration. The many artefacts that are unique or are worked in unique ways, such as the figure-of-eight piece and the internally-fluted amber beads, similarly point to the unusual status of many of these objects.

Although there is a dearth of contemporary Iron Age material from either settlements or burials in Lincolnshire, comparisons can be drawn from those of East Yorkshire, 30 miles to the north. From cemeteries such as Garton Station, Kirkburn, Danes Graves, Garton Slack and Wetwang Slack (Dent 1982; Stead 1991; Brewster 1982) it is clear that there is a category of élite metalwork, particularly that with La Tène-style decoration (Stead 1991: 181–3), and that it occurs in burials which can be classified as those of a social élite (Parker Pearson 1999: 53–7). More broadly, commentators have remarked that the social associations of Celtic art are those of aristocratic wealth (Jope 1995: 395; Green 1996: 55–73) and that the metalworkers – makers of such material – had distinctive status in Early Iron Age society (Megaw and Megaw 1995: 370).

Fitzpatrick suggests that there were complex gendered associations between people and these curvilinear decorative motifs in southern Britain (1997: 80–2). Although the proportions of curvilinear decorated vessels of clay and wood within the Meare and Glastonbury ceramic and wooden assemblages are low (4%-15%), he and Gwilt (1997: 160–1) have noticed the special contexts in which that pottery occurs on other British sites. Fitzpatrick suggests a link between ceramics with curvilinear motifs, human bones and 'special animal deposits', as well as an association with swords, spears, helmets and shields – offensive and defensive weaponry, whose deposition was deliberate, and which are thought to have been used by adult males and arguably made by male smiths. The deposition of these items, including the tools of the smith, can be interpreted as serving to legitimate a dominant male-centred ideology through its reproduction in unassailable public rituals (Fitzpatrick 1984: 187; 1997: 81). He also concludes that there is no clearly recognizable 'female' counterpart to these 'male' objects in these depositions beyond the settlement domain.

Yet perhaps Fiskerton gives us evidence interpretable in terms of a less restricted pool of donors. Undoubtedly the rare and exceptional items, which we tend to focus on, can be understood as relating to a male-centred ideology, buttressed further by their élite status as exceptional examples of their types. On the other hand, the Iron Age ceramics, the small bodily ornaments and some of the tools are better understood as belonging to a female-focused domain. It is precisely these sorts of items which are likely to be missing or under-represented from river dredgings or earlier poorly excavated sites like Llyn Cerrig Bach and which may in reality be more numerous than the more showy weaponry and metalworking equipment.

The British contribution to La Tène art has been described as second to none, with about 35% of it coming from rivers and watery deposits (Stead 1996: 92). The quality of some of the finds from the Witham is exceptional in European terms and, like the finds from the Thames and from the East Yorkshire burials, indicates a remarkable power base through which this material was accumulated, manufactured and discarded. The presence of such masterpieces of martial art in the Witham points to a hierarchically ordered society whose principal symbols related to warfare.

The British La Tène art styles are considered, by and large, to have been locally manufactured and only two swords, both from the Thames, are though to have been imported from the Continent (Stead 1984: 50; 1996: 21). Even if the Fiskerton metalwork was made in eastern England, some of the metal sources were probably in central Europe (Northover 1984) and certain of the other raw materials such as the Mediterranean coral must have travelled long distances.

11 THE BRITISH AND EUROPEAN CONTEXT OF FISKERTON

By M. Parker Pearson

The Fiskerton causeway with its associated metalwork deposit is by no means unique in western Europe. Other causeways and watery deposition sites are known from the Late Bronze Age and Earliest Iron Age but Fiskerton is the earliest known from the La Tène period (*c.* 475–30 BC), with its initial construction in 456 BC and its final repair shortly after 321 BC. It can be compared to the Swiss 'bridges', such as La Tène, which are constructed very differently, and to the south Scandinavian weapon deposits of the same period (Fig. 11.1). Closer to Britain, it shares certain similarities with the north Gaulish Iron Age sanctuaries and with depositions in the lower Rhine basin.

Within the British Isles, there are notable offering sites at Lisnacrogher, Llyn Cerrig Bach and Flag Fen. In common with a number of other British Iron Age votive sites, Fiskerton is located on the edge of an island which, along with the River Witham itself, may have had special religious significance. The significance of Fiskerton as a religious site can be examined in terms of its context as a liminal place, not simply as a river crossing but as a location between mainland Britain and the former island of Lindsey.

CONTINENTAL COMPARISONS

La Tène and associated Swiss sites

The type site of La Tène is one of six 'bridges' in the river valleys of Switzerland dated to the Iron Age. Since none of these raised structures has been traced entirely across their river channel we cannot be certain that they were definitely bridges as opposed to jetties or even causeways akin to Fiskerton. At La Tène itself, the Iron Age structure is downstream and to the west of the 'Desor bridge' from the Roman period, and is protected by a palisade on the north bank of the river with a marsh on the south bank. Little of the area to the west of the Iron Age bridge, towards the Neuenburgersee, has been excavated and the finds derive mostly from the zone between the two bridges.

Dendrochronological estimations for the La Tène 'Vouga bridge' place its construction in 251±8/254±8 BC (Müller 1992). The associated 2,497 artefacts, largely of La Tène C1 types, included:

- 166 swords, 265 spearheads, 5 shields, 22 shield umbos, 2 helmets, 16 arrowheads and half a bow;
- 434 rings, 392 fibulae, 341 other ornaments and 93 toilet articles;
- 623 tools and 50 knives;
- 48 containers of bronze, wood and pottery;
- the bones of, in descending order, horse (30%), cattle, pig and sheep (Vouga 1923; Egloff 1992).

The tools were for:

- woodworking (axes, knives, chisels, gouges, saws, a plane, a file, a rasp and a woodworking anvil);
- metalworking (burins, chisels, bits and a light hammer);
- hide-working (piercers, crescent blades and spikes);
- fishing (hooks, gaffes and harpoons);
- agriculture (sickles, scythes, billhooks, querns);
- food preparation (cauldrons and suspension chains, bucket handles, wooden and ceramic vessels, pokers, a flesh-hook, a wooden spoon and basketry);
- chariots and horseriding (a possible saddle, horse-bits, *phalerae* [ornamental discs on horse harnesses], a wheel, chariot fittings, yokes and spurs).

Bodily ornaments (and associated artefacts) included:

- half a gold torc and parts of two iron torcs;
- beads of glass and amber, bracelets of bronze, iron, lignite and glass;
- tweezers, razors, pins, needles and shears;
- armour scales and rings of iron and bronze.

There were also dice, a tin disc, figurines of a horse and a horned animal, and gaming items. Other materials included gold coins, currency bars, weights and balances.

La Tène is a useful counterpoint to Fiskerton because it has produced many artefacts that are directly or closely comparable, above all amongst the tools. Most notable are the axe-heads (Vouga 1923: pl. 43.6–8) and the woodworking items – the file and rasp (Vouga 1923: pl. 44.21–2) and the saws (Vouga 1923: pl. 45. 1–3). Had the excavated area at Fiskerton (150 sq. m.) been as large as that at La Tène (approximately 900 sq. m. in the area

***Fig. 11.1** Votive deposition sites in Britain and Europe mentioned in the text.*

producing Iron Age finds), it might have produced an assemblage similar in size and diversity.

Other similar sites in Switzerland have produced comparable material:

- An undated 'bridge' at Thielle is associated with an axe, a bronze pin, a spearpoint, 'arms and coins' now lost, and a sword and harness fitting of La Tène D types (Schwab 1989).
- The 'bridge' at Port is also undated but around 60 swords, mostly of La Tène D1, and a similar number of spearheads and an iron helmet were collected in its vicinity (Tschumi 1940; Müller 1992).
- The 'bridge' at Les Mottes has a dendrochronological date of 330 BC for its construction but there are no finds from its vicinity (Schwab 1989; 1992; 2000: 219–20) whereas the 'bridge' at La Sauge is dated to the Iron Age on the basis of its similarity to dated structures.

- The supposed settlement deposit at Port de Jorresant contains items which are similar to those in the 'bridge' deposits: four swords (La Tène B2–C2/D1), two spears (of La Tène B2), a sword currency bar, two cauldrons and 12 sickles and scythes (Schwab 1989).
- The recently excavated 'bridge' at Cornaux was, according to dendrochronology, constructed around 300 BC, repaired in 150 BC and then repaired again in 120–116 BC (Schwab 1989; 1992). Some of the associated material dates to La Tène C but most of the finds are of La Tène D1 style, dating to *c.* 150–85 BC. They include two swords, 13 spears, a javelin, an arrowhead, a chisel, a chisel/blade, an axe, a knife, a billhook, an iron palette, a fishhook, a potin (lead alloy) coin, a bone needle-holder, and five pieces of ornament. As well as 72 horse bones, 146 cattle bones, six sheep/goat bones and four goose bones, there are complete and partial skeletons of 12 men, two women, three indeterminate, one adolescent and two children. Some of these are clearly pinned down by fallen timbers.

These Swiss 'bridges' are dated to the period broadly after Fiskerton was no longer maintained, between 330 BC and 120–116 BC. The associated finds indicate particular chronological horizons of deposition; La Tène C1 at La Tène itself, D1 at Cornaux, D1–2 at Thielle and D1 at Port. Yet there are chronological differences within specific assemblages. Some of the fibulae at La Tène date from La Tène A and B through to C and D whilst the pots date mostly to D1 (Müller 1992).

Theories

Early conjectures about La Tène abounded, and are summed up by Paul Vouga (1923: 143–56; see also Dunning 1991 for more recent views). They appear quaint to us today and slightly surprising, given that scholars of the time must have been aware of Classical references to votive deposition by the Gauls. Yet some of the theories about the site of La Tène foreshadow later ideas in stressing its liminal siting between territories:

- Desor considered it to be a *bazaar* or an *arsenal*, erected by the Helvetii perhaps after their defeat at Bibracte.
- Keller thought it was a *refugium* occupied only in times of war by the inhabitants of the region.
- Emile Vouga proposed that it was the *remains of shops* where the Gauls came to give up old things for new.
- For Gross it was an *observation post* or small *oppidum*, maintaining surveillance of the Geneva-Lake Constance route.
- Forrer considered it as initially a *semi-military station*, taking on a more civil character later. He further interpreted it as a Gaulish *customs post*, guarding the route between the Neuchâtel and Bienne lakes and serving as an *entrepôt* for merchandise.
- In 1912 Déchelette raised the notion that it might be the *toll station* of *Cabillonum* (Chalon-sur-Saône) mentioned by Caesar and Strabo, with the piled timbers being the remains of the shops and depots where merchandise extracted as toll was stored.
- Paul Vouga envisaged it as a *fortified entrepôt* under military occupation on the basis that many of the objects recovered seemed new and some were wrapped, its setting appeared defensive, and that the assemblage generally lacked feminine ornaments and the debris of family life. On the basis of certain burnt wooden beams, he further considered that this fortified *entrepôt* was partially burned, and was then totally abandoned having succumbed to attack.

Among theories from more recent work, Schwab attributes the Cornaux deposits to the devastation caused by a change in direction of the River Aar at some point before the middle of the first century BC (since there is no D2 material at Cornaux), causing the 'bridge' and its associated settlement to be washed away in the ensuing rise in water levels (Schwab 1992: 320–1). Thus, in her view, the human remains were those of flood victims and not deliberately weighed-down sacrificial offerings. She further suggests that the 'bridge' and its associated settlement at La Tène, along with a sanctuary (to account for the quantities of weaponry *etc.*), were also washed away in this flood.

Müller points out the different depositional phases at the various sites and also adds that Vouga's account indicates that many swords and spears were bent, apparently ritually 'killed'. Yet he suggests that the assemblages were not votive depositions but were suspended from the bridge until they eventually dropped into the water (Müller 1992: 325–7).

For other scholars these structures and their associated depositions are evidence of a continuation in the practice of votive offering into rivers and other watery places which has roots in earlier prehistory (Fitzpatrick 1984; Bradley 1990: 155–89). Both Fitzpatrick and Bradley point to the copious numbers of swords and other items of the La Tène Iron Age recovered in rivers from Ireland (Rynne 1983; 1983–4; Raftery 1983; 1984) to mainland Europe (Torbrügge 1970–1; Zimmerman 1970; de Boe and Hubert 1977; Fischer 1959) as well as Britain. Bradley suggests that the La Tène 'bridge' deposits and other watery contexts provide a continuation of the theme of weaponry deposition from the Late Bronze Age as well as the new theme of depositing food and materials associated with fertility.

Bradley explains the problem of the general lack of Hallstatt Iron Age finds from watery contexts in the intermediate period by suggesting that metalwork was too scarce to be squandered in the eighth-sixth centuries BC. Certain watery depositions of Hallstatt D metalwork (sixth to early fifth century BC) are known from the Jura region around La Tène, for example, but numbers of daggers and other materials are low (Dunning 1992: 86) whilst river deposits of Hallstatt D material in Britain are confined to a limited stretch of the Thames around Mortlake, with the exception of some of the Flag Fen finds.

Votive deposition in Denmark's Early Iron Age

Depositions broadly contemporary with Fiskerton are known from Hjortspring and Krogsbølle in Denmark. The former is in a tiny bog, formerly a 1m-deep lake and springhead, whilst the Krogsbølle weaponry was found on and in a stone-built track leading across a brook in a bog. Radiocarbon dates from a spear shaft and from the boat place the Hjortspring deposit at a moment in the fourth-third centuries BC. The deposit consists of:

- a 19m-long boat;
- 11 single-edged swords, 64 shields, 138 iron spearheads, 31 antler/bone spearheads, an antler cheek-piece, 10–12(?) or about 20 coats of chain-mail (the former according to Randsborg and the latter according to Rosenberg);
- a dress pin, two strap tags, needles and a bronze button;
- a possible cauldron;
- ropes and strings and a wide variety of wooden boxes, bowls, spoons, disks, handles, axe shafts, mallets and a bellows tube;
- a spindle whorl, a boat-scoop and flints;
- bones of a horse, dog, puppy and young sheep (Rosenberg 1937; Kaul 1988; Randsborg 1995: 21–33).

The Krogsbølle find included:

- at least seven swords, 25–26 iron spearheads, knives, 19 or more bone/antler spearheads and a cheek-piece
- a mallet and probable waggon axles (Becker 1948; Randsborg 1995: 42–4).

Their context, associated with a trackway crossing water, is far more akin to Fiskerton than Hjortspring. Randsborg compares the Hjortspring material to a fourth century BC group of 60 swords and 28 spearheads from Tronoën in Brittany (Duval 1990; see below) and a group of 17 spearheads from a low hill at Tidavad in Sweden (Randsborg 1995: 44, 184). Like the later weapon deposits of the Roman and Germanic Iron Age in Denmark, the two Danish deposits are often considered to be captured spoils from defeated invading armies. Randsborg proposes that the Hjortspring deposit was an offering of war spoils from a defeated army, hailing from the Hamburg area on the basis of the wooden box styles. He estimates that it represents the military equipment of a force of 66–88 warriors, arriving in three or four boats (Randsborg 1995: 64–9).

Sanctuaries in northern Gaul

Both supporters and opponents of the votive deposition hypothesis have pointed to the similarity of these various assemblages to those from religious sanctuaries, notably Gournay-sur-Aronde and Ribemont-sur-Ancre, in northern France (Bradley 1990; Müller 1992; Brunaux 1993). At the fourth-first century BC shrine at Gournay were deposited:

- the broken remains of 256 swords, 621 scabbards, 361 shields and 73 spearheads;
- 110 fibulae;
- 76 tools and other pieces totalling 2063 items;
- 1632 cattle bones, 578 sheep/goat bones, 328 horse bones, 212 pig bones;
- 60 human bones (Brunaux *et al.* 1980; 1985; Brunaux 1988).

At Ribemont the shrine contained:

- 112 weapons, mostly spearheads;
- a large quantity of human bones in its enclosure ditch (Cadoux 1984). These bones derive from some 60 adult males whose decapitated bodies appear to have been displayed above the ditch perhaps as trophies of enemy war dead (Brunaux 1993).

The structure at Tronoën, investigated in 1875 and shortly after, is identified tentatively as a polygonal enclosure, with the weapons scattered along the length of its walls and mixed with many animal bones, especially horse, and two human mandibles (Duval 1990). The weapons, some of them deliberately broken prior to deposition, date from Late La Tène I and La Tène II – from the late fourth century to the third and second centuries BC - whereas some of the tools may date to the first century BC. The finds included:

- shield fragments and a helmet fragment;
- iron rings, 49 bronze fibulae and 12 iron fibulae;
- a variety of iron tools, including razors, knives, chisels, awls and pincers;
- two pieces of gold and 20 Iron Age coins;
- pottery sherds and baked clay.

River finds in northern and central Gaul

The rivers Seine, Oise, Marne, Loire and Saône have all yielded copious finds of the Neolithic, Bronze Age, Iron Age and Roman periods, so much so that these rivers have been described as 'guardians of memory' (Bonnamour 2000a). The Hallstatt period is under-represented, just as it is in the Witham and Thames assemblages, with only a few bronze swords, iron daggers and bronze cauldrons and *situlae* [bronze buckets] (Bonnamour 2000a: 30). In contrast, finds from the La Tène period are numerous (Bonnamour 2000a and b; Blanchet 2000; Wehrberger 2000).

Fords are often locations where such finds are made and recently a group of four 'bridges' has been found in a palaeochannel of the Oise at Les Esquillons at Houdancourt (Bernard 1998: 22–31; Blanchet 2000: 140). These parallel rows of vertical timbers may have been piers rather than bridges and are up to 2.50m wide – similar to Fiskerton – although there is no metalwork in association. They lie close to a La Tène-period settlement and their dendrochronological dates indicate that they were constructed in the period between 586 and 438 BC.

In central France, the river finds from the Saône consist of swords and spears as well as currency bars, bronze vessels, fire-dogs and roasting skewers (Bonnamour 2000a: 30–31; Guillaumet 2000). A human skull with multiple sword cuts and a nail hole – presumably for display on a wooden post – dating to La Tène III from the Ronzeaux ford (Bonnamour 2000a: 35), is reminiscent of the cranial fragment at Fiskerton. By the second and first centuries BC, weaponry from the Saône had become rarer – just as it did in the sanctuary sites – in contrast to currency bars, metal vessels, skewers and tools such as axes and sickles (Guillaumet 2000: 169). The Rhône is also a prime context for La Tène swords (I. Stead, pers. comm.).

River finds in the lower Rhine basin

Dredging operations along the rivers Meuse (or Maas), lower Rhine, Ijssel, Scheldt, Demer and Waal have led to the recovery of over 30 Early Iron Age bronze and iron swords (Bauters *et al.* 1990: 47; De Mulder and De Clerq n.d.; Moens 1993; Roymans 1991: 36–7, fig. 13; Roymans and Kortlang 1999: 53–7). Most of these weapons date to the ninth-eighth centuries BC, and their deposition in water seems to stop with the appearance of weapons in graves during Hallstatt C (seventh century BC). There is then a dearth of such finds in either funerary or water contexts in Hallstatt D (sixth-early fifth centuries BC) (Roymans 1991: 62–3; Warmenbol 2000: 106).

Swords, spears, and helmets from the Late La Tène period – along with knives, axes, fibulae, coins, cauldrons, belt hooks and other metal finds – have been recovered from 15 locations within these rivers (Roymans 1990: 84–90). Along the Scheldt, dredging has produced Late La Tène swords at Oudenaarde and Appels in Belgium (Bauters *et al.* 1990: 47; Moens 1993). The river site of Pommeroeul on the River Haine, a tributary of the Scheldt in Belgium, has produced 34 items of later La Tène metalwork, including six swords (Hubert 1982). De Mulder and De Clerq (n.d.) have interpreted these depositions as ideological manifestations of territorial demarcations along the Scheldt which formed the boundary of the Nervii tribes to the east and the Menapii to the west.

Deposition continued into the Roman period in the rivers of the Lower Rhine basin and, unlike Britain, the items include swords and military equipment (Derks 1998: 140). Representativity is always a problem for Iron Age or Roman river finds. As is clearly the case in other locations such as the Witham, weapons have often been recovered, retained and reported at the expense of other less imposing, recognizable or typologically datable artefacts. Despite this bias in retrieval, there are 45 findspots of human bones from river contexts in the Netherlands (Schegget 1999: fig. 2).

Other river finds of La Tène-period weaponry and metalwork have been made along the Seine and its tributaries and in the middle Rhine, especially around Mainz. Overall, there is a bias towards recovery from the larger rivers – where dredging has taken place – and particularly at the confluences between these rivers and their tributaries. Certain locations such as Roermond (near the confluence of the Roer and the Meuse), Kessel (where the Meuse runs close to the Waal), and Rossum (where the Meuse joins the Waal), have produced clusters of material (Roymans 1991: 55; Schegget 1999). Yet the distribution of river finds, often in certain restricted locations such as confluences, is not wholly explicable in terms of recovery and post-depositional factors (Roymans 1991: 54–5). Multi-period concentrations of weaponry are found specifically in the valleys of the Meuse, Scheldt and Waal/Rhine.

The artefacts from Kessel

Recent dredging at Kessel in the Netherlands has resulted in the recovery of Late Iron Age and Early Roman period finds from a limited area of 200m by 100m. Despite the absence of archaeological excavation, most of the finds appear to have come from a clay layer about 1m thick. They include partly bent swords and scabbards, spearheads, an iron helmet, an iron umbo, axes, knives, horse-gear, fibulae, belt-hooks, harvesting tools, fragments of bronze vessels, large quantities of pottery, over 100,000 animal bones and over 650 human bones (Schegget 1999).

Of 16 radiocarbon dates from the human bones, eight date to the Late Iron Age (*c.* 250 BC–AD 1) and the remainder to the Roman period (two dates) and the post-Roman period between AD 500 and 1250 (six dates). Approximately 90% of the bones were those of adults and 75% of those that could be sexed were male. Fifteen skeletal parts bore traces of injury, all by pointed or sharp objects, mostly on the remains of adult males. The bones are estimated as having derived from depositions of whole corpses rather than partial skeletons (Schegget 1999: 214).

Schegget interprets the Kessel deposit neither as an eroded cemetery, nor eroded settlement, nor battlefield deposit, but as evidence of a ritual complex indicating a cult place of regional significance (1999: 223–5). Sacrificial deposition of weaponry and the weapon injuries both point to a martial dimension whereas the harvesting tools may relate to rituals of fertility. Whether the dead were executed captives or human sacrifices, as opposed to selected naturally deceased members of the local community, is unknown. Although little is known of their context of deposition, the finds from Kessel strike certain chords with the Fiskerton and Witham material, albeit that they are slightly later in date. Also of note is the site's reuse and continued significance into the Early and High Middle Ages, a feature also reminiscent of finds from the Witham (see Chapter 9).

In contrast to the La Tène metalwork in British rivers, many swords and other weapons from the continental rivers have been deliberately bent, broken or hacked, presumably prior to their deposition. Finally, we should remember that, in terms of travelling time by boat, Kessel and the other sites in the lower Rhine basin are some of the nearest known La Tène-period weapon deposition sites to the Witham. The people of Lincolnshire's Iron Age may well have regarded Europe's North Sea coast as more accessible than many parts of Britain. However, despite the large number of prehistoric boat finds from the Witham, none may be considered as sea-going vessels.

BRITISH AND IRISH COMPARISONS

It seems most likely that the Fiskerton assemblage was a special deposition or series of depositions into water. Yet there are various nuances to this interpretation. Was the wooden causeway at Fiskerton constructed solely for the purpose of making offerings into deep water, as Bradley considers the Swiss 'bridges' to have been (1990: 173)? Or was it a causeway to a jetty which was not only part of an important crossing and routeway but also a place where depositions were made? To what extent was the assemblage deliberately broken – ritually 'killed' - prior to its deposition? Were these deposited offerings funerary-linked items of conspicuous consumption, sanctuary collections saved up for deposition, or the equipment of defeated warriors?

Within Britain comparable contexts are:

- Llyn Cerrig Bach on Anglesey (Fox 1946; Savory 1976: 57–9);
- the deposits of the Late Bronze Age – extending into Early Iron Age – associated with the wooden alignment at Flag Fen (Pryor 1991; 1992; 2001).

We might also consider the Late Bronze Age timber structure and weaponry at Clifton-on-Trent, Notts. (Phillips 1941) and the Late Bronze Age 'hard' formed by two post rows at Caldicot, Gwent (Monmouthshire), associated with two Late Bronze Age chapes and pottery (Parry 1990; Nayling 1993; Nayling and Caseldine 1997: 49–56; Northover 1997).

Other timber causeways of Late Bronze Age date have been located in Cambridgeshire near Ely, between Fordy and Little Thetford (Lethbridge 1935; Lethbridge and O'Reilly 1936), at Stuntney (Lethbridge and O'Reilly 1936) and at Lingey Fen, Haslingfield (Pullinger 1981) and in East Sussex at Shinewater Park, Eastbourne (Greatorix 1998). Recent fieldwork on the Isle of Ely, not far from Flag Fen, has pointed to the likelihood that Middle and Late Bronze Age metalwork deposition occurred in connection with cross-fen causeways (Evans forthcoming). The depositional events may well have been linked with large-scale gatherings, rather than with small local settlement groups, and the seasonal flooding sequences of Ely's landmass point to such gatherings occurring in the winter (between autumn and spring) when the fen-edge pastures were flooded and the woodlands might be used for gathering and hunting.

A Middle Bronze Age pier or bridge, consisting of two rows of posts, has been found at Vauxhall on the south side of the Thames in association with two Middle Bronze Age spearheads (Haughey 2000: 111–12). There are recent finds of timber bridges at Testwood (sites I–III) in the Test valley: two were built in the Middle Bronze Age and are associated with a Middle Bronze Age rapier (Testwood I) and another (Testwood II) is Iron Age (A. Fitzpatrick, pers. comm.). In the Thames valley, Middle Bronze Age and Iron Age bridge structures have been found in association with human bones from 15 individuals and animal bones, pottery and querns at Eton Rowing Lake (Allen and Welsh 1996; Denison 2000). On a tributary of the Don a timber causeway links two Iron Age enclosures across a palaeochannel at Sutton Common, South Yorks. though none of the metal finds from this site were in direct association (Parker Pearson and Sydes 1997). Finally, the context of five Late Iron Age swords or daggers from Lochlee crannog, Strathclyde (Piggott 1950: 28; Wait 1985: 282), indicates an association with a rather different type of timber structure.

The best overview of Iron Age deposition in watery contexts is still that of Wait (1985), listing the contexts of around 200 'prestige' metal finds from bogs and rivers throughout Britain. He identifies six zones in which there were Iron Age regional traditions of watery deposition: the Scottish Border uplands; the River Tay basin; north Wales and Anglesey; the Thames valley; the southern Fens and Ouse; and central Lincolnshire (1985: 47, fig. 2.13). While Wait's study provides an impressive coverage of the geographical and chronological dimensions of Iron Age votive deposition (1985: 15–50, appendix 1), there is little discussion of the contexts of those sites which may best inform us about Iron Age votive practices.

Llyn Cerrig Bach

The classic British site for comparison with Fiskerton, in terms of Iron Age deposition, is that of Llyn Cerrig Bach on Anglesey, adjacent to Holy Island (Fox 1946; Lynch 1969; Savory 1976; Macdonald and Young 1995; Macdonald 1997). This large assemblage of La Tène metalwork was retrieved in unsatisfactory circumstances from the southwest margin of a boggy pool, Llyn Cerrig Bach, during construction of an airfield at RAF Station Valley near Llanfihangel-yn-Nhowyn in 1942. The finds were recovered during extraction of peat with a mechanical scoop, mostly after the peat had been spread on the airfield. There are naturally problems in assessing the completeness of the retrieval of artefacts and other remains. Fox was not notified about the discoveries until 1943 and his investigations were restricted by conditions of wartime security.

Details of organic remains are poorly understood. The initial finder, the resident engineer, wrote of finding human bones but none were identified in the small bone sample subsequently collected; Fox retrieved animal bones (cattle, sheep, pig, horse and dog) but no human bones and it is possible that for propaganda purposes he may have suppressed information about human remains (Macdonald 1997). Little is known of wooden remains. None the less, the assemblage of metal finds is large and unusual, comprising about 180 items (Fox 1946; Lynch 1969; Savory 1976; P. Macdonald, pers. comm.) which include:

- 11 fragmentary sword blades, two broken scabbard fittings, seven spearheads, a bronze dagger pommel and a shield pommel;
- pieces of chariot-wheel tyres and wheel nave-hoops, two linch-pins, a cotter pin (?), a piece of chariot fitting, a draft-pole casing, 10 (possibly 11–12) bridle-bits or parts thereof, three bronze terrets and two harness fittings;
- two slave-chains, one certainly and the other probably for five captives;
- five currency bars;
- a sickle and two pairs of tongs;
- fragments from three bronze cauldrons and part of a bronze trumpet;
- a decorated bronze terminal, nine pieces of bronze coiled decorative mounts, two bronze plaques, three decorated rhomboid bronze plaques, a circular bronze plaque, two decorated rectangular bronze strips, a rectangular bronze plate, a bronze cylinder, iron bands and a broken iron bar;
- three iron rings and a bronze ring.

These artefacts appear to have come from below a low rock platform from which, Fox surmised, the deliberately damaged offerings had been thrown into the lake. Fox was keen to link this site to Classical sources, notably Tacitus' association of the island of Anglesey with the Druids at the time of the Roman conquest and with other references to the Celts' accumulation of war trophies in sacred groves and pools. At the same time, he was sceptical of votive interpretations for finds from rivers. Recent work indicates that the offering site lay between the rock platform and a small island, to its northeast, and Macdonald proposes that the finds might have been associated with a causeway linking the platform and island (Macdonald and Young 1995).

With his dating of material between the second century BC and the first century AD, Fox further considered that these offerings were deposited over a considerable period. Recent assessment of the dates of the finds – from radiocarbon dates of 2075±50 bp (OxA-6390), 2245±50 bp (OxA-6391) and 2345±50 bp (OxA-6392) on animal bones – suggests multiple depositions between the mid-first millennium BC and the first and early second centuries AD (Hedges *et al.* 1998: 236; P. Macdonald, pers. comm.).

At Llyn Cerrig Bach, as at Fiskerton, we may be looking at a series of discrete depositions or periods of deposition separated by a significant time period without deposition. There are certain similarities in assemblage composition: weaponry is present on both sites but the slave-chains, the cauldrons, the currency bars and much of the chariot fittings and horse-gear are peculiar to Llyn Cerrig Bach. In contrast, Llyn Cerrig Bach has little in the way of tools or ceramic containers.

Lisnacrogher and the River Bann

In the British Isles the depositions of La Tène metalwork in the River Bann, in Northern Ireland, are second only to those in the Witham and the Thames. Finds from the Bann include a sword hilt, three decorated scabbards of La Tène *Stage IV* (third century BC), a plain scabbard, three bronze spear-butts, two bronze horse-bits and three bronze bowls (Raftery 1983). Other Irish river finds of Iron Age swords, spear-butts and ornaments have been made in the Rivers Shannon and Colligan, and in Lough Corrib and Loughnashade (O'Sullivan 1998: 98; Raftery 1983; Rynne 1983–84).

Towards the end of the nineteenth century, a large group of Iron Age artefacts was recovered from a bog at Lisnacrogher, in County Antrim a few miles east of the Bann. There is no knowledge about the material's precise location or whether it came from a limited or wide area. Equally, some material now labelled 'Lisnacrogher' may actually have come from other findspots in Ireland and there is other non-Iron Age material allegedly from this site. The bog apparently contained a crannog – built of timbers with mortised ends, basket-like woodwork, and encircling stakes - but its relationship to the finds is unknown. Although the assemblage must be considered with caution, it is a remarkable collection of weaponry, tools and other artefacts. These are:

- four swords, four scabbards, three chapes and two possible fragments, two spearheads, 17 spear shaft fragments, four spearshaft mounts and 19 spearbutts;
- two ring-headed pins, one gold ribbon torc, a bronze necklet, two bronze bracelets, two bronze spiral rings, four bronze penannular rings, 11 miscellaneous rings, eight decorative bronze mounts and two bronze strips,
- a bronze bowl;
- an iron axe-head, an iron adzehead, an iron sickle and an iron billhook;
- a stone bead, a wooden knife and three miscellaneous items (Raftery 1983: 287–8; O'Sullivan 1998: 98–9).

The Lisnacrogher bog lies about 25 miles west of the site of a remarkable Late Iron Age gold hoard at Broighter (Co. Derry), near the east bank of Lough Foyle, which was found during ploughing in 1896. It produced three gold torcs, a model boat with oars all in gold, a gold bowl and two gold chain necklaces (Raftery 1983; 1984; Stead 1996: 45–7).

Orton Meadows

Rescue excavation of two Neolithic-Bronze Age barrows at Orton near Peterborough revealed the existence of an adjacent palaeochannel which contained a collection of Iron Age metalwork (Mackreth forthcoming; Stead in Mackreth forthcoming). This included scabbards, chapes and blades of seven swords, a single spearhead, a group of bent currency bars strung together, an iron latch-lifter and an iron ladle-like artefact. The swords date to both the Middle and the Late Iron Age. This material is considered by the excavator to represent possibly only a small proportion of a larger assemblage deposited within what was formerly a fast-flowing river channel. It would appear to constitute another example of deliberate deposition, possibly from on top of one of the barrows (OLB1), but no large vertical timbers were noticed during the watching brief during the mechanical removal of the palaeochannel's sediments.

Brigg

A timber trackway was recorded in 1884 (Wylie 1884) and 1933 (Smith 1958a: 27–35; 1958b) in the brick-clay pits at Island Carr, Brigg in Lindsey, at a narrow crossing point within the valley of the River Ancholme. Not only is the site relatively close to Fiskerton, just 22 miles to the north, but together they lie east of the limestone escarpment, on the low ground which would have formed a natural routeway running north-south between the Humber and the Witham.

The Brigg trackway was formed of oak planks, about 5m long and mortised at each end (Wylie 1884: 110). The planks were laid transversely, mostly with their flat surfaces uppermost and their convex bark edges downwards, and were pegged down by vertical roundwood stakes 80–100mm in diameter and illustrated as being 0.45–0.50m long. The planks overlay 'small trees and branches laid in the direction of the road' on top of the glacial drift deposits. The only find in direct association, lying beneath the end of a plank, was a human mandible, from an adult who had lost her/his molars during life. The 71 other bones from the level of the 'road' were mostly those of red deer, with some cattle, pig and sheep/goat, and a dog skull (Smith 1958b: 84). The other finds made in 1884 from below the level of the trackway were a Neolithic stone axe, some 'rude pottery' and a small bone/antler artefact interpreted as a bridle fitting.

When the trackway was exposed again in 1933 a disc-headed bronze pin (Hawkes 1946) was found on its surface whilst sherds of Early Iron Age pottery and animal bones were recovered from the same level (Hawkes 1946: 12–13, fig. 3; Smith 1958a: 33). Wood from this level (but not directly from the trackway) produced a radiocarbon determination of 2552±120 bp (Q-77), calibrated to 970–390 BC (Smith *et al.* 1981: 143). A Late Bronze Age spearhead was found close to the trackway but lower down.

The finds in association with the Brigg trackway indicate that it was probably constructed in the Early Iron Age, prior to the building of the Fiskerton causeway but possibly contemporary with the hypothesized causeway at Washingborough pumping station. Indeed, the pottery from Brigg is very similar to that from Washingborough (Coles *et al.* 1979: 8). The trackway thus dates probably to the seventh-sixth centuries BC, earlier than the deposition of the Brigg Iron Age raft and dugout canoe (Atkinson 1886; McGrail 1981), both of which lay within a thick layer of silty clay above the reed-swamp peat. Pollen from the trackway horizon indicates a wooded fen carr environment, dominated by oak, alder, hazel and pine (Smith 1958a: 29–34).

The Brigg trackway and its associated finds have been variously interpreted as evidence of a nearby 'regular settlement' (Phillips 1934: 161), as a slipway for boats (Smith *et al.* 1981: 143), and as an east-west routeway that required consolidation with timbers owing to rising sea levels (McGrail 1981: 277). The recovery of Neolithic and Late Bronze Age artefacts from the Brigg trackway's vicinity suggests that this general location, like the Fiskerton-Washingborough area, may well have been not only a crossing point but also a focus for votive deposition in the centuries and millennia before. A more substantial wooden trackway, 'formed of oak piles which carried a platform', is described as running from Redbourne through North Kelsey towards Caistor, four miles south of Brigg (Atkinson 1886). It is assumed to have been built in the Roman period, owing to its situation between Ermine Street and Caistor and because of its appearance within the upper peat, with the piles driven into the apparently Iron Age silty clay which fills the Ancholme valley (Smith 1958a: 38).

Flag Fen

The chronology of artefact deposition associated with the timber alignment of Flag Fen and Fengate Power Station, near Peterborough, is largely of an earlier period to that from Fiskerton (Pryor *et al.* 1986; Pryor 1991; 1992; 1998: 131–7; 2001). Excavations along this 1km-long structure, dating to 1300–900 BC, have produced 320 bronze artefacts, estimated as 5%–7% of the likely total (*i.e.* 5000 bronzes). In addition there are ceramics, quernstones and wooden artefacts, along with animal bones. There is also a quantity of Early Iron Age material, including a fine fibula and a pair of shears still in its wooden box. The Iron Age finds can be dated to *c.* 800–300 BC, some of them contemporary with the Fiskerton finds (Coombs 1992; 2001) but, apart from two swords and a scabbard, the Flag Fen finds are different in character to those from Fiskerton. They include fibulae, swan's neck pins, a spiral ring, the bronze shears, and an iron socketed axe (Coombs 1992: 515–16; 2001; however, an iron socketed axe was found at Fiskerton during the 2001 excavations). In the Roman period a roadway over the top of the timber alignment was associated with the deposition of Roman pottery.

The Flag Fen timber structure bears many similarities to the Fiskerton causeway but it also differs in significant ways. Both cross what was open but slow-moving water but the Flag Fen structure spanned not a marsh or river but a shallow bay, between the north shore at Fengate and Northey island (a promontory of Whittlesea), crossing the principal entrance to the Nene-supplied Flag Fen basin. The Flag Fen post alignment is up to 10m wide with five roughly parallel lines of posts, the central row appearing to form a timber wall. Trimmed tree-trunks were staked into position horizontally and overlaid by roundwood on top of which were pegged-down plank layers, forming up to three walkway surfaces. The alignment was sub-divided along its length by wattlework partitions spaced every 5–6m and, about 600m from the northern shore, it expanded in width to form a large timber platform.

Pryor interprets the alignment as both a crossing and a barrier. Its northern end enters the fen on the same axis and location as an earlier droveway, probably constructed around 1800 BC. The Flag Fen alignment's timbers not only provided a routeway across the fen lake but also formed a barrier preventing or controlling access into the common grazing of the fen in summer. Whilst stressing its significance for the movement and control of livestock, Pryor also sees Flag Fen as a liminal location, close to the edge of habitable farmland, where votive offerings were made to the world of the ancestors during rites in a more intimate and private setting than the ceremonies associated with the large stockyards at Fengate on the north bank (Pryor 1992; 1998; 2001).

Though perhaps only a fifth of the length of the Flag Fen structure, the Fiskerton causeway similarly provided a long linear platform for the deposition of potentially many thousands of artefacts, of which only a tiny proportion are likely to have been recovered in the small area excavated in 1981. Many of the principal artefact categories are similar, notably weaponry and tools, though ceramic finds were proportionally less at Flag Fen. The Flag Fen structure was also built in a very different fashion. Although both causeways may well have appeared similar in height above water, Flag Fen was apparently a barrier as well as a causeway.

Flag Fen has particular relevance for understanding Fiskerton because it provides a plausible antecedent both in structural and depositional terms, drawing comparison more directly with a long-term tradition in eastern midland England than with a pan-European 'Celtic' practice originating in the Alpine region. Yet, like so many riverine sequences of deposition in western Europe, there is something of a discontinuity in the Early Iron Age/Late Hallstatt period of the eighth-sixth centuries BC. There are no Early Iron Age iron daggers or other iron weaponry of this early period from Flag Fen.

In his analysis of deposition in the Thames, however, Fitzpatrick presents a case for continuity across this time period, whilst acknowledging that there is generally a decrease in the amount of material deposited in the Iron Age in contrast to the Bronze Age (1984: 179). We could attribute this decrease to a scarcity of Late Hallstatt weaponry in the earliest Iron Age of Britain and much of western Europe, caused by fluctuations in the metal supply (Bradley 1990: 183–4). In the light of the few dagger finds of this period from the Thames and the continuation of non-weaponry deposition at Flag Fen in this period, it is likely that the practice continued but that the choice of votive items was both selective and, as Bradley suggests, constrained by availability. For the Witham valley there is evidence of Early Iron Age deposition at Washingborough, immediately west of Fiskerton. As well as the fine Hallstatt B2–3 antennae-hilted sword of bronze recovered from the river in the nineteenth century, excavations here indicate a later Hallstatt period deposition site with ceramics, animal and human bones and an ornamented antler cheek-piece (see Chapter 9, above; Coles *et al.* 1979).

The Bredon Hill massacre site and other 'settlement' assemblages

The watery contexts of sites such as Fiskerton, Llyn Cerrig Bach and Flag Fen should not blind us to the possibility that similar votive depositions may have been made on dry land. Hunter has recently reviewed the evidence for Iron Age metalwork hoards in Scotland and northern England, showing that a third of them derive from dryland contexts; he further argues for their significance as votive deposits (Hunter 1997). There are also certain hillforts and caves elsewhere in Britain which have produced metalwork assemblages that are closely comparable to that from Fiskerton.

During investigations of the Iron Age hillfort at Bredon Hill in Worcestershire, the excavators uncovered traces of what they interpreted as a massacre in the hillfort's inner gateway. This 'massacre level' dated to the end of the hillfort's occupation and was thought to represent an unsuccessful defence of the hillfort in the early part of the first century AD (Hencken 1938: 58). The skeletons found lying in the gateway were either disarticulated or only partially articulated. The bones were too fragmentary for accurate sexing or estimation of numbers but derived from at least 50 individuals, most of whom were adults 25–35 years of age.

The remainder of the massacre deposit consisted of six or seven spearheads, an iron scabbard binding and four scabbard chapes, two iron hammerheads, two further iron objects and a variety of eight bronze items. Other finds from this last period from within the inner entrance (but not specifically identified as 'massacre level') included more bronze items, a sickle, amber and glass beads, a bone cheek-piece and other items. There was also an unstratified iron horse bit from this gateway. Given the excavator's knowledge of similar sites interpreted as evidence of 'massacre' at Sutton Walls (Kenyon 1954) and Maiden Castle (Wheeler 1943), this deposit at Bredon Hill appeared to be the remains of victims of yet another massacre. Yet the inclusion of tools in the assemblage and the very fact of deposition of the artefacts and disarticulated human remains alerts us to the likelihood that this was, first and foremost, a purposefully formed deposit, albeit possibly created during an episode of mass killing.

Similar assemblages have been recovered during the destruction of hillfort interiors for mineral extraction in recent centuries at Hunsbury and Bigbury. Hunsbury hillfort in Northamptonshire produced 'several unattached skulls', two swords, four daggers, 20 spearheads and a wide variety of tools, chariot fittings, horse-gear and dress fittings (Fell 1936: 58–67). Nineteenth century gravel extraction at Bigbury Camp in Kent produced spearheads, chariot and horse fittings, tools, a slave chain and shackles

(Boyd Dawkins 1902: 211–14). Such deposits are difficult to evaluate, given the inadequate circumstances of their discovery, but they ought not to be dismissed when considering votive deposition.

We must, however, be wary of interpreting all such groups of metalwork from settlement contexts in votive terms. At Cadbury Castle the weaponry (five swords/daggers, 16 scabbards, 10 chapes, 11 spearheads and four shield boss mounts) and fragments of cauldrons and buckets from the central plateau area within the hillfort were initially interpreted as special deposits relating to a central shrine (Alcock 1972: 84, 164). Yet most of them cluster not in the area around the shrine but immediately to the northeast of it, around a group of generally earlier metalworking hearths and furnaces and later animal burials (Barrett *et al.* 2000). One explanation is that these metal artefacts are broken-up industrial raw materials (Downes 1997: 149) but they are broadly later than much of the metalworking debris and may conceivably form a special deposit of smashed equipment (Barrett *et al.* 2000: 301). The quantity and quality of finds from Glastonbury lake village (Bulleid and Gray 1911; 1917; Coles and Minnitt 1995) similarly demonstrate the potential range of ostensibly non-votive settlement-derived detritus.

Caves are worthy of consideration as possible locations for votive deposition: not only are such places hidden deep within the earth but they are often 'watery', associated with underground water sources and channels. Iron Age finds from Mendip caves have generally been interpreted as remains of cave-dwellers and yet such contexts may be better understood as votive deposits rather than as settlements. Within the stratified sequence of Iron Age and Roman layers in Wookey Hole, the apparently Iron Age finds from pre-Roman levels include:

- five spears, a dagger, a dagger handle and some iron arrowheads;
- a billhook, a small sickle, a small knife, two saws, two gouges, a chisel, six drills or awls and a linch-pin;
- three currency bars;
- seven bronze items (including a La Tène II–III brooch);
- a silver ear-ring, a glass bead and an imported second century BC coin;
- bone tools including pins, needles, antler cheek-pieces and combs;
- two querns;
- Glastonbury Ware and other Iron Age pottery;
- over 20 finds of human remains, some demonstrably of Iron Age date such as the skull associated with the ear-ring (Balch and Troup 1911; Balch 1914; Balch 1928; Mason 1950).

'The Keltic Cavern' at Burrington Coombe produced only Iron Age material – four chariot nave hoops, a bronze ferrule, a variety of unusual iron objects (a possible sickle, a 'key', an axe/adze blade, a spade rim, a clamp, a spike and a hook), a bracelet, a finger-ring, iron shackles, two antler cheek-pieces, a drilled boar's tusk, a quern, a spindlewhorl, a circular stone disc, Glastonbury Ware, animal bones and three human bones (Palmer 1921). These two assemblages are very unlike the types of finds from open-air settlements of the period with the exceptions of Meare (Gray and Bulleid 1953; Gray 1966; Coles 1987) and Glastonbury lake village (Bulleid and Gray 1911; 1917; Coles and Minnitt 1995: 152–5) where similar finds of unusual and high-status metalwork occur in surprising quantities. The cave assemblages are far more akin in structure and content to those from Fiskerton and Llyn Cerrig Bach than they are to ordinary settlement contexts.

Glastonbury and Meare themselves can no longer be regarded as unproblematic settlement sites (Coles 1987; Coles and Minnitt 1995: 206–9). The two sites at Meare are now interpreted as seasonal market places on the tribal boundary between the Durotriges and the Dobunni, whilst Glastonbury – also on the tribal boundary – is now recognized as a permanent but abnormal settlement with a domestic purpose and with undertones of a ritual nature. That abnormal element can be further demonstrated at Glastonbury by the unusual orientations of house doorways, few of which face the conventional directions of east or southeast (Hill 1996; Oswald 1997; Parker Pearson 1996). Its location is also notable, constructed as an artificial island on a clump of alder-willow carr within an area of swamp and open water (Housley 1995), a setting whose political and religious significance is discussed below. It is entirely possible that many of the occupants of the Glastonbury lake village were ritual specialists.

12 REGIONAL SOCIAL DYNAMICS IN LATER PREHISTORIC EASTERN ENGLAND

By M. Parker Pearson

DEPOSITION AND SETTLEMENT

Within eastern England we can detect a complex regionality in changing fortunes. On the evidence of metalwork deposition, different areas appear to have prospered at different times between the Middle Bronze Age and the Late Iron Age. The numbers of Middle Bronze Age rapiers deposited in the southern Fens (south Lincolnshire and Cambridgeshire) indicate the importance of this area, together with the Thames, at that time (Thomas 1999). Subsequently, the significance of the Fens for weapon deposition seems to have waned in the Late Bronze Age when the Thames became pre-eminent.

The sequences from the Witham, Trent and Humber areas provide a further dimension to this regional shifting. The Witham is devoid of rapier finds in contrast to the Trent and Humber areas but in all three areas Late Bronze Age swords are well represented. It would seem that the Witham area was not prominent within the regional politics of the Middle Bronze Age but that it became part of a wider grouping which was in the ascendancy during the Late Bronze Age just as the influence of the southern Fens was declining.

In the Early Iron Age the concentrations of Late Hallstatt weaponry in the Thames are outstanding within eastern England but the quantities of Early La Tène weaponry from the Witham are on a par with the Thames. The southern Fens continued its decline, exhibiting few finds of weaponry from any part of the Iron Age other than a handful of swords from the Middle Iron Age (Wait 1985: 22–31). At the same time, the Witham area appears to have become pre-eminent within its region over the Trent and Humber areas.

Enclosures and land divisions

We still know far too little about Early and Middle Iron Age settlement in Lincolnshire and neighbouring regions of eastern England. Perhaps settlement remains are hard to detect because enclosures were not particularly a feature of settlements, most of which were probably unenclosed as in East Yorkshire and East Anglia (Hill 1999). We have even less evidence for the laying-out of field systems in Lincolnshire during this period, other than perhaps the Greetwell triple-ditched system, even though Champion considers the establishment of field systems to have been a part of the development of control over local production that characterized eastern England at this time (1994: 140).

The triple-ditched earthworks do not form the boundaries of fields as such but tend to run in relatively straight lines, perhaps cutting off a spur of high ground or, as in the case of Greetwell, dividing a valley side. A recent discovery from Barleycroft Farm near the Great Ouse in Cambridgeshire has revealed a so far unique arrangement of seven timber post alignments which probably date to the Late Bronze Age (Evans and Knight 2001). The posts, of the same diameter as those at Fiskerton, were set in single lines which ran for between 90m and 215m, some towards the river and two approximately parallel with it. The purpose of these single post rows is not understood although one alignment has a wide entrance through it; they may have been 'screens' associated with ceremonial gatherings (Evans and Knight 2001: 94), perhaps linked to cattle and livestock display. Evans and Knight (citing Mawson 1983) raise the possibility that the posts may have been equated with people, with particular groups building particular stretches, such that each row might represent a human community (2001: 94, 96). The same is, of course, possible for the Fiskerton post rows.

Surplus and wealth

It is possible that the basis of wealth lay in surpluses of local produce such as grain or even ironwork, evidence for which has been found just north of the Humber estuary (P. Halkon, pers. comm.) and is not inconceivable for the iron-rich area of Scunthorpe and the Ancholme valley in north Lindsey. Alternatively or additionally, that wealth may have rested on those invisible exports which are made visible by the chains found at Llyn Cerrig Bach (Anglesey), Bigbury (Kent), Hunsbury (Northants.), Barton (Cambs.) and Burrington Coombe (Somerset) – slaves. The Thames, the Witham and the Humber are among the principal entry points for coastal and cross-channel trade into eastern Britain and perhaps were major waterways for the transport of live cargoes as well as other commodities. The weaponry may have been closely associated with the territorial warfare through which slaves were appropriated for local exploitation and for export. Perhaps Strabo's oft-quoted remark, written before AD 21, about the export of slaves, hunting dogs and grain from Britain was not wide of the mark.

The lack of continental imports in eastern England in the Early La Tène period has been considered as evidence of a period of isolation (Bradley 1984), an interpretation questioned by Champion (1994: 139–40) who points out that the technical and artistic knowledge displayed in the weaponry shows a very high level of awareness of continental practices. Champion identifies three features peculiar to this period in eastern England (1994: 140–1):

- the regional selection of different types of La Tène material (for example, La Tène II pottery in Lincolnshire and La Tène-style burial practices in East Yorkshire);
- discontinuities in the spatial distribution of La Tène cultural styles and burial rites;
- the disassociation of prestige items from the domestic sphere (hierarchical differentiation suggested by the weaponry is also not evident in settlement organization).

The regionality evident in features such as these has caused researchers to question the notion of a unitary insular Iron Age society (Bevan 1999). Conversely the acquisition of technical and artistic knowledge from other parts of Britain and Europe indicates that eastern England was closely tied into a network of regional exchanges. Finally, in the Late Iron Age, gold hoards and coin findspots indicate the richness of Norfolk and, to a lesser extent, Lindsey (the area between the Witham and the Humber) in that period.

Regional fortunes clearly fluctuated during the first millennium BC yet the Witham region appears to have maintained its significance through much of this long period. The wealth and presumably the political power of these communities along this eastern coast may have related to broader developments within the North Sea basin. When viewed from the perspective of sea travel, journey times were much shorter between the eastern coast of England and the Rhine and other continental North Sea rivers than from central and western Britain travelling overland. The quantities and kinds of materials which were deposited in these continental rivers are closely comparable to those from the Witham and the Thames. Although British domestic life was completely different to this part of the Continent (round houses in Britain and longhouses along the continental North Sea coast), people of these two coasts may have been in regular contact with each other. This part of the North Sea may have been a dynamic region of interaction involving many different communities and perhaps providing a stimulus for innovation and change during the first millennium BC.

VOTIVE DEPOSITS AS BOUNDARY PHENOMENA

The regional context of Iron Age votive depositions has been discussed for certain regions of Britain and Europe (Ilkjaer and Lønstrup 1982; Parker Pearson 1984; 1989; Fitzpatrick 1984; Bradley 1990: 178–82: Randsborg 1995; Hunter 1997). Many rivers in western Europe and the British Isles have produced Iron Age metalwork (Torbrugge 1970–71), albeit in relatively small amounts – in Ireland (Rynne 1983; 1983–84; Raftery 1983; 1984), southern Scotland (Hunter 1997: 113), Germany (Zimmermann 1970; Wegner 1976; Wirth 2000), the Netherlands and Belgium (Verwers and Ypey 1975; De Boe and Hubert 1977; Hubert 1982; Warmenbol 2000), and northern France (Ajot and Bulard 1977; Patte 1977; Blanchet 2000) to mention those regions nearest eastern England.

The large weapon deposits of the Scandinavian Pre-Roman to Early Germanic Iron Age are broadly interpreted as battle offerings by the victors (Ilkjaer and Lønstrup 1982; Randsborg 1995) and most of the Late Roman Iron Age offerings either side of the Lille Baelt between Jutland and Funen in Denmark are located in what can be considered as recently abandoned border zones (Parker Pearson 1984; 1989). A similar idea was developed by Bradley for interpreting the distributions of British La Tène metalwork, in which he argued that the three concentrations in the Thames, the middle Trent and the southern Fens all prefigured the boundaries of Late Iron Age tribal groupings as expressed through their regional distributions of coinage (1987; 1990: 178–9). Moving further back in time, Patrice Brun has noted the concentration of Late Bronze Age river finds in the Seine within the stretch between Paris and Fontainebleu, leading him to conclude that this was a boundary zone between the Atlantic and North Alpine metalworking complexes, further marked by concentrations of fortified sites and dryland hoards (Brun 2000).

There is some evidence from the Continent that certain of the larger rivers had sacred connotations as holy rivers in the Late Iron Age and Roman period (Derks 1998: 140–2). The Rhine was personified as the god Rhenus by the Romans and the river was probably considered holy by the indigenous population (Derks 1998: 141). Derks also notes that the larger rivers may have formed territorial boundaries whose crossing involved not only the entering of another group's territory but also passage across an ambiguous boundary associated with divine forces (Derks 1998: 142). The weaponry and equipment deposited in these rivers were thus gifts of booty to the supernatural, offered by warriors crossing the river (Derks 1998: 140). For northern Gaul, Brunaux has highlighted the distribution of Later Iron Age sanctuaries near presumed *civitas* boundaries, discussing how these *civitates* coalesced out of smaller tribal territories or *pagi* (1988: 2–4). These sanctuaries are located not in watery settings but mostly on plateaux on the frontiers or at the centre of a *civitas*. Brunaux may be overstating the case in considering every stream and pool as divinized (1988: 12).

For Britain, Wait (1985) has discussed the evidence for many Iron Age and Roman sanctuaries being placed in frontier or boundary locations. Haselgrove has noted the frequent occurrence of gold hoards in river boundary locations and of coin hoards on inferred tribal boundaries (1987: 119, 133, 137), whilst Hingley has emphasized the liminal placing of currency bar deposits on boundaries at different spatial scales (1990). Bryant has argued that Iron Age and Roman temple/sanctuary sites in Hertfordshire lay on tribal boundaries, including a recently discovered Late Iron Age hoard of swords, spearheads, horse bits and a shield boss from a former pool at Essenden (1999: 313). Finally, Creighton has integrated the distributions of Late Iron Age coins, temples and water-deposited metalwork to explore the constitution of territories and boundaries in southern Britain (1995: 298–300). In his scheme the Witham forms the northern boundary of a territory formed by the distribution of the North Eastern coin series whose southern border runs along the Nene (Creighton 1995: fig. 6). Creighton also cites evidence from medieval Irish written sources that the king would endow his learned men with lands which were often in border areas between two or more independent lordships, and he argues that similar processes may have applied in Iron Age Britain with the *druides* and *vates* occupying peripheral locations (1995: 297–8). The one such location that we know well is, of course, Anglesey whose druid communities were destroyed by Agricola's troops in AD 61.

Lindsey

In this light we can view the Fiskerton site as not merely a suitable crossing point over the Witham but also a significant boundary between the main area of the Corieltauvi (formerly described as the Coritani; Tomlin 1983) to the south and the island of Lindsey to the north. That Lindsey was physically an island in Iron Age times has been cogently argued (Fig. 12.1; May 1996: 642, fig. 24.7). It was bounded by the Humber estuary to the north, the North Sea to the east, the Witham to the south, the Fossdyke marshes to the southwest and the Trent to the west. Lindsey is distinct from East Yorkshire to the north in terms of its ceramics as well as burial practices (no Iron Age square barrows are known in Lindsey). It also differs from the area to the northwest, beyond the Humberhead Levels, where settlements were largely aceramic in the Iron Age (Parker Pearson and Sydes 1997). Earlier evidence for a distinction in material culture between Lindsey and the south, in the rest of Lincolnshire and Leicestershire, comes from the regional distinction between Dragonby ceramic styles and Ancaster-Bredon scored ware of the third-first centuries BC (May 1976: 184–6; May 1996: 644; Elsdon 1992) whilst Haselgrove's North Eastern coin series finds its northern boundary along the Witham (Haselgrove 1987).

Although coin numbers are few in eastern England, the distributions of early first century gold staters suggest three regional groupings: British I staters throughout the East Midlands, British H staters in northern and mid-Lincolnshire and British K staters in Lincolnshire (May 1976: 195–6; fig. 98). It is possible that the H staters may have been associated with a political territory or sub-territory corresponding to Lindsey. Furthermore, Lindsey stands out within the East Midlands as the area with most Corieltauvian and non-Corieltauvian coins, giving the impression that Lindsey was the primary area of coinage development and the most prolific area of circulation (May 1976: fig. 99; May 1996: 640, table 24.2). Some 521 Iron Age coins are recorded as coming from the eight major Iron Age settlements of Lindsey, possibly relating to wealth derived from sheep-farming, salt-making and iron extraction as well as from its position for trade at the mouths of the Humber, Trent and Witham.

These differences must lead us to consider the possibility that Lindsey formed an Iron Age 'kingdom' (May 1996: 642–4). The *civitas* of the Corieltauvi has been defined from Ptolemy's *Geographia* of the second century AD which places Leicester and Lincoln within the area. Tentative comparison can be made with coin distributions of the later first century BC (May 1976: 202–7; 1996: 640). These coins occur mostly in the valleys of the middle Trent, Nene, Ouse and upper Avon as well as south Lincolnshire, Lindsey and East Yorkshire. May points out that Dragonby ceramic styles, originating in Early-Middle Iron Age Lindsey, occur in southern Lincolnshire in the later first century BC and, perhaps along with the coins, point to changing circumstances of Lindsey's political identity incorporated within the larger Corieltauvi *polis*.

The existence of two major urban centres within the one *civitas* of the Corieltauvi has always been problematic (Whitwell 1982: 58). Leicester (*Ratae Corieltauvi*) would appear to have been the named town of the *civitas Corieltauvorum*, and perhaps Lincoln (*Lindum*) was the urban centre for the sub-territory of Lindsey and its immediate environs. The name of *Lindum* (and subsequently Lindsey) derives from the Celtic place-name *lindo* meaning 'pool' or 'lake' (Whitwell 1982: 39). It may well refer to the Brayford Pool on the Witham below Lincoln but might also have had a significance associated with votive deposition that applied to this five-mile stretch of the river. It shares this name element with Lindow Moss, the site of human depositions in Cheshire (Stead *et al.* 1986).

Islands and boundaries

Alternative, but not necessarily contrary, readings of the Fiskerton site – and similar votive deposits with associated structures – arise from examining the phenomenon of deposition firstly as an aspect of 'crossing' and secondly in terms of crossings to islands perceived to have special significance. Whereas Bradley (1990) perceives timber structures associated with deposition as single-purpose

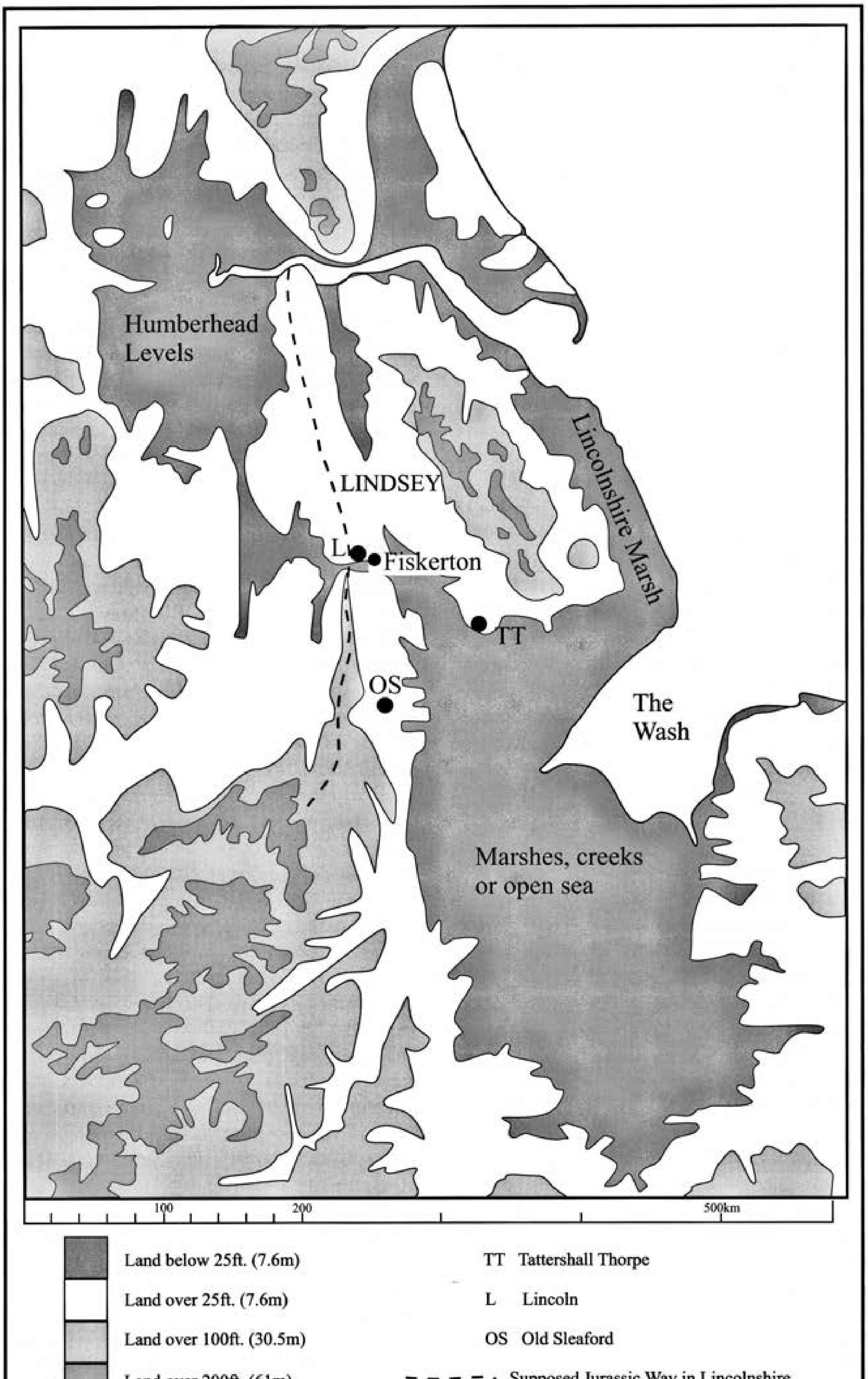

***Fig. 12.1** Lindsey as an island in the Iron Age (after May 1996).*

constructions used solely for the purpose of making votive offerings, our interpretation of the Fiskerton causeway is that it had multiple uses. It was not only a place for depositing offerings but was also a crossing, probably providing access across a reed swamp to the river's edge whence people were ferried across the deeper parts of the main channel. It is likely that Fiskerton was one of just four or five crossing points over the River Witham between Lindsey and south Lincolnshire, the others being at Lincoln, Washingborough, Bardney, Kirkstead and Tattershall. At Fiskerton the river crossing connects northwards to a possible routeway running along the springline on the east side of the limestone.

The timber causeway at Fiskerton would also have provided a place for boats to be moored and perhaps a staging, both literal and metaphorical, for a wide variety of social activities and interactions, only one aspect of which was votive deposition. It may also have acted as a point of embarkation and disembarkation for sea and river traffic. Its role as a place of deposition may have arisen from its liminal 'betwixt and between' situation, between land and water and as water to be crossed from dry land to dry land. Additionally, in the case of Lindsey there may have been an inherent significance about the dry land in question which a traveller reached by crossing the water.

As mentioned in Chapter 10, the Fiskerton causeway was only adopted as a place of votive deposition in any quantity around 375 BC, by which time post construction had largely ceased. All crossings might be liminal but only certain ones acquired the special associations which made them appropriate to make such offerings. Fiskerton had developed a sense of place whose significance increased with the post rows' age and which was to be renewed in the Roman period. Just why some causeways, and not others, might accrue this significance is a mystery no doubt bound up with particular events and personalities which became memorialised and celebrated.

Flag Fen links what was a Bronze Age island, Northey and Whittlesea, to the mainland. It may well be important that the east end of the Flag Fen trackway appears to stop on a small island immediately adjacent to Northey/Whittlesea (F. Pryor, pers. comm.). Llyn Cerrig Bach is located at the western extremity of Anglesey, close to the strait that separates it from Holy Island. Within the lake itself there is also a small island opposite the deposition site. Many of the concentrations of metalwork deposits in the Thames occur close to islands such as Wallingford, Runnymede and the islets in Syon Reach. Glastonbury lake village is an artificial island on an inferred tribal boundary. In the case of Fiskerton, we do not yet know whether the causeway leads to a bridge which crosses the entire width of the Witham or whether it ends at a small island or sandbank in mid-channel. A short distance to its east is the island of Bardney, also a site of metalwork deposition in this period.

There is a possibility, perhaps more convincing than a simple 'boundary' theory, that these places of deposition were perceived as liminal because they linked the British mainland to certain islands which were designated as places of power and sacredness. These islands may have been places of pilgrimage, habitations of the most exalted, lands of the ancestors, zones where everyday life was conducted in different ways or realms where the supernatural could be contacted. The trackways, boat jetties and approaches to such places were thus the points at which gifts were deposited, possessions renounced and offerings made. It is possible that certain peninsulas or near-islands were also accorded this special status: northwest Norfolk may have been one such place, home to Late Iron Age sacred regalia which was eventually buried at sites such as Snettisham. Like Snettisham, Lindsey is marked out as a special place in the Late Iron Age through the deposition of gold torcs at Ulceby on the southern part of the chalk wolds of Lindsey (and between northwest Norfolk and Lindsey there was ease of movement across the Wash; May 1996: 642). Evidence that certain islands were favoured as Iron Age cult sites in Gaul – on the Loire and on the island of Sena (Brittany) – is provided by Classical authors (Webster 1995: 451).

Instead of viewing the activities on the crossings to such places as the focus of the rites, we should perhaps see them as part of a greater ritual process and transition, in the movement from the landward side, across the water, to the isolated realm on the far side. Yet there are problems with this hypothesis. A number of deposition zones within Britain are not associated with islands. Secondly, the islands concerned vary in size and in the degree to which they are insular or peninsular. Thirdly, the western edge of Lindsey island, the northern section of the Trent, is not known for its deposits of Iron Age metalwork. That said, the River Ancholme does seem to have been a significant zone of deposition in the Bronze and Iron Ages and perhaps it once formed Lindsey's western boundary, which was extended southwards to the Witham by the Nettleham-Greetwell triple-ditched earthwork.

Perhaps most plausible is the possibility that Lindsey was a discrete political entity at this time, an independent territory or a tribal sub-territory of the Corieltauvi separated by water from the rest of the Corieltauvi to the south and west and the Parisii to the north. The Ulceby hoard may have marked the centre of a Late Iron Age polity that was already in existence in the Earlier Iron Age. Control of the fords and crossings over the Witham would thus have been a major factor in territorial relationships. The aristocratic, male and martial nature of much of the Fiskerton assemblage may be a result of displays of wealth and power exhibited at confrontational meetings on this and other crossing places over the Witham. The Witham was a very special river, perhaps worshipped in its own right, but its religious significance may have rested to some degree on its strategic location between political territories.

APPENDIX

OTHER ARCHAEOLOGICAL INVESTIGATIONS AT FISKERTON

Summary by Naomi Field based on reports by Colin Palmer-Brown

Perrins Cottages, High Street

In June 1994 archaeological field evaluation was undertaken to the rear of the former Five Mile Hotel, east of the parish church and 350m northwest of the causeway (Fig. 1.2; Palmer-Brown 1994).

A rubble surface comprising limestone chunks, **101**, was seen in two of the four evaluation trenches. It was mixed with large fragments of tile, sherds of pottery and animal bone and sloped from north to south, terminating at its junction with a creek or channel, **115**, running east-west. The associated tile included fragments of combed/box flue, of the type associated with Roman hypocaust systems. While perhaps implying the proximity of high-status Roman buildings (*e.g.* a villa complex) the entire assemblage appears to have been made up of 'wasters' or rejects.

A second, smaller trench was opened approximately 0.50m north of the main area. The same surface continued northwards, lying almost immediately beneath the topsoil, where the natural sandy land surface rose noticeably. There was a quantity of late Romano-British pottery within and below the rubble spread. No limit to the stone spread was recorded and, on the north side of the trench, it was cut through by the south side of a large east-west drainage ditch, **130**.

A well-defined creek **115** joined the south edge of the rubble surface **101**. Its width was not determined. Its lower fill, **102**, comprised *c.* 0.20m of grey, mottled, sandy silt containing few inclusions; this was possibly deposited as a result of slump/collapse of the channel edge. It was sealed beneath a thick accumulation of silty peat-like material, **114**, containing fragments of wood, other vegetation and a quantity of shell. At the edge of the channel, this deposit was interleaved with an extensive layer of soft silty sand, **103/120**, indicating that the formation of both deposits was (at least partially) contemporary (the peaty sediment accumulating within the very wet conditions in the channel, the more widespread sandy deposit being the result of erosion and soil creep from higher ground, perhaps encouraged by ploughing further north).

The earliest archaeological deposit, which rested over a natural, undulating, surface of compact silty sand, was *c.* 0.18m of very dark, sandy organic mud (**121**, *c.* 3.20m OD). It contained fragments of wood and other vegetation, as well as occasional chunks of stone and pieces of tile, which may have derived from the overlying rubble surface. It also contained two struck flints, probably dating to within the Bronze Age. This layer was the remnants of an ancient (boggy) land surface which lay adjacent to the palaeochannel or creek. The occurrence of prehistoric as well as Romano-British artefacts could reflect a long period of progressive development, as well as mixing caused by the soft nature of the muds, though it may be that the flints relate to a drier phase. It is possible that the wood component within **121** is the remains of a brushwood surface, thrown down as a consolidation raft prior to construction of the rubble surface that lay directly above it.

Organic silts and muds, both within and outside the channel, contain well-preserved macrofossils (wood fragments, plant remains, insect remains *etc.*), and it is reliably assumed that microfossils (*e.g.* pollen) will be equally well represented.

It is quite possible that this Roman 'hard' examined at Fiskerton was primarily of local importance, a point of access for fishermen or traders with its principal role being as a crossing point, linking settlements on either side of the river. It is, however, situated close to the head of the relict creek system discussed by Wilkinson (1987) and may have served as a loading jetty for Lincoln. Analyses of sediments from waterfront excavations in Lincoln have shown that in the Roman period the Witham was tidal, though the wider economic problem of whether it was navigable between Lincoln and the sea has not been determined. The discovery of two (?prehistoric) boats at Lincoln has been cited as evidence that the Witham was indeed navigable as far as Lincoln (May 1988) though in the absence of physical evidence (*e.g.* the depth of the principal channel between Lincoln and Fiskerton), this interpretation is, at best, questionable. It is not known, therefore, whether goods destined for the markets at Lincoln (both in the Roman and pre-Roman periods) were transported in a one-stage journey or if they were off-loaded onto smaller vessels or land-based transport at a point where the river became too shallow to support larger craft. (The status of Lincoln in the pre-Roman period is proving elusive, though Later Iron Age settlement material has been recorded on the edge of the Brayford Pool [Darling and Jones 1988]). Seen in this context, the 'hard' at Fiskerton may hold possibilities for furthering this line of investigation, given its location a short distance east of the relict estuarine head described by Wilkinson (1987).

Until recently, the importance of Fiskerton as a centre of population during the Roman period had not been assessed. The Romano-British 'hard' on the site of proposed development demonstrates in itself that some form of settlement and (perhaps) commercial activity was taking place in the area, though the large quantities of tile recovered during excavation may point more towards a local production centre than a high-status building(s) within the immediate environment. However, in one field northwest of the village, centred on TF 0440 7212, quantities of stone have been dragged up during ploughing, indicating the presence of buried walls. Limited inspection of the site confirmed that the eastern side of the field is littered with stone and large quantities of Roman tile with traces of mortar adhering to its surfaces. A single sherd of a Roman mortarium of third century date was also retrieved.

Nelson Road

Archaeological trial excavations in November 1998 consisting of four evaluation trenches and four test pits were carried out on the site of a former scrapyard east of Nelson Road (Palmer-Brown 1999). This was followed by further excavation in November 1999 (Palmer-Brown 2000). The work was carried out in advance of residential development approximately 300m north of the present course of the river and the Iron Age causeway (Fig. 1.2).

Trench 1

This trench was approximately 13m in length, 1.50m in width and located in the northern half of the site. The lowest exposed stratum (**103**, the top of which was approximately 5.30m OD) comprised natural yellow/grey sandy clay merging with patches of grey/brown fine sand. These deposits, it is assumed, represent the Kellaway sands and Ampthill clays that are common to this area beneath the post-glacial sediment sequence (BGS Sheet 114 1:50,000). Three postholes, one pit or posthole, a linear feature (possibly a beam slot) and two irregular features were exposed in the east and central areas. Most of these, excluding posthole **107**, were filled with similar soil matrices and it is possible that these represent a structural group.

A small base angle pottery sherd (9g) from a vessel of unknown form was recovered from posthole fill **104**. The fabric is unoxidized (black exterior, core and interior) with small vesicles observed in the section, suggesting the leaching-out of sparse fine shell inclusions but no shell has survived. The sherd preserves evidence of a flat base, pinched out slightly around the circumference, but the body profile cannot be determined. The uneven surfaces would be consistent with modelling by hand. The inner and outer surfaces are smoothed, with traces on the exterior of burnishing, but no traces of decoration may be discerned. Close dating is not possible but the fabric and surface finish invite comparison with pottery dating in this region from the Late Bronze Age or Iron Age periods.

Sealing the above was an extensive layer of light grey fine sand, **102**, incorporating orange mottles (leached iron). This material had a soft texture and incorporated occasional very small stones. It has been interpreted as a wash deposit, probably representing the accumulation of material derived from the higher ground to the north (which rises to approximately 10m OD). A date for the accumulation, which measured approximately 0.20m in thickness, was not established.

A similarly extensive deposit, **101**, sealed deposit **102**. This was approximately 0.20m thick and comprised mottled, light brown soft silty sand. It too has been interpreted as a wash deposit, the accumulation of which resulted from the erosion of material further to the north. No dating evidence was recovered.

Trench 2

This trench was orientated east-west and positioned south of Trench 1 over a proposed house site. Its dimensions were 15.30m × 1.50m. The sequence of deposits encountered resembled that exposed in Trench 1. Cut through natural sands at the base of the trench, the earliest archaeological features comprised two pits, two gullies and a possible tree-bole, with a later (medieval or post-medieval) ditch **211** being cut through sealing deposits. This was tentatively interpreted as part of a medieval moat.

Trench 3

This was located at the south end of the plot and revealed the remnants of a buried soil and an overlying peat horizon. One worked flint was recovered from a deposit underlying the peat, suggesting that the latter was a prehistoric accumulation at the edge of the marshland. Standing water was encountered at approximately 4m OD. Above the water line, the earliest deposit exposed, **313**, was a thick layer (more than 0.35m) of pale yellow/brown sandy silt, incorporating orange/grey mottles and occasional small rounded stones. This was exposed only within the sondage at the south end and was truncated by the north edge of a 'feature', **312**, with a very shallow profile. This was filled with mid-grey/brown sandy silt and is assumed to represent a natural water channel within the wider floodplain environment. It was capped with a narrow and localized lens of natural sandy silt, **311**, which was sealed beneath up to 0.20m of dark grey/brown (organic) sandy clay-silt, **310**. This layer yielded a single broken tertiary flake that was probably made from a river gravel.

Sealing the above was an extensive layer of mid-brown soft sandy clay-silt, **305**, which measured up to 0.14m in thickness and, close to the north end of the trench, was over what appeared to be a natural shallow channel, **307**, that was orientated east-west. The channel was filled with mid-brown soft sandy clay-silt.

Layer **305** was beneath **304**, a distinctive and extensive deposit of very dark brown peat-like material consisting of slightly sandy silty clay mixed with degraded organic material (roots, twigs *etc*). At the south end of the trench, **304** measured approximately 120mm in thickness, thinning to 70mm at the north end. A counterpart to this deposit was not seen in Trenches 1 or 2 but it was exposed in Trench 4 as well as in Test Pit 4. The top of the layer occurred at approximately 4.80m OD and the material is interpreted as representing the edge of the marshland associated with the Witham valley. As this sealed a lower deposit containing worked flint (one flake from context **310**), it is suggested that these peaty deposits accumulated in the prehistoric period. Clarification of this point should be possible given that a sample of the material has been submitted for radiocarbon determination (results to follow the submission of this report).

The peat was beneath a loose deposit of mid-grey silty sand, **303**. This was approximately 0.10m thick and was interpreted as a flood horizon.

To a large extent, the upper stratigraphy resembled the deposit sequence described for Trenches 1 and 2. The above was beneath >0.40m of pale grey/brown silty sand, **302**. For the most part the colour and texture of this deposit was constant across the trench, although at the south extreme (in the area of the deeper sondage) **302** had an interleaving relationship with a series of dark lenses that extended beyond the excavation. These lenses, **309**, comprised laminations of dark grey and very pale grey-brown sandy silt. Their interleaving relationship with **302** suggests that the two sets of deposits accumulated simultaneously. The siting of **309** over the edge of the earlier dip **312** confirms the proximity of much wetter deposits immediately to the south of the current investigation.

In the base of **302**, again on the south side of the area, was a narrow linear channel, **308**, orientated east-west. It is not clear whether this channel was natural or man-made. It was filled with very pale grey-brown silty sand, incorporating some darker grey lenses. No finds were recovered. The topsoil in this area was up to 0.43m thick. It sealed a subsoil deposit measuring between 0.10m and 0.30m in thickness.

Trench 4

This trench was located west of Trench 3 on the southwest side of the site and orientated east-west. The lowest deposits were difficult to interpret, largely because they were sampled only within a much-reduced cutting confined to the north-central area. A series of water-borne deposits within this small sondage appeared to be contained within a 'cut', possibly reflecting accumulations within a former palaeochannel, **420**. The channel was represented only by part of its north edge which sloped southwards and was therefore orientated east-west. It was 'cut' through natural orange/yellow fine sand that was exposed in the base of the trench at approximately 4.15m OD, 1.90m beneath the modern ground surface.

The above sequence was beneath a distinct and level horizon of grey-brown peaty clay, **412**. This layer measured 0.14–0.20m in thickness and was exposed in all four section faces on the west side of the trench. There is little doubt that this was the same as **304** in Trench 3 and represents the edge of an early marshland development.

The peat was beneath 0.30m of soft dirty white fine sand, **411**. Like similar deposits in Trenches 1, 2 and 3, this material appears to have accumulated as a result of erosion from higher ground to the north, perhaps during periods of rainfall. It lay beneath up to 0.35m of subsoil-type deposit **409/410**.

Interpretation

Seven worked flints were retrieved from the site, five of which were from Trench 4, but the presence of a blade fragment in Trenches 1 and 3 suggests that there may be either a very low or low density of datable lithic material across much of the site. This is a very small assemblage and as such it is difficult to establish its character and chronology. Additionally, the flakes are generally quite small. Consequently the possibility of redeposition by a variety of taphonomic processes should temper any interpretation. However, the presence of two blade fragments allows a tentative dating of at least part of the assemblage, being suggestive of an Earlier Neolithic industry.

Traces of a stone structure were exposed immediately beneath/within the topsoil in Trench 4. During initial machine clearance large chunks of limestone were disturbed on the east side of the trench. Its discovery led to further excavations in November 1999 which extended over an area approximately 35 × 20m in extent, north of and including Trench 4. Two buildings were identified in the excavation area. Building 1 was T-shaped in layout and aligned north-south. To the northeast of Building 1 was Building 2, rectangular in layout and apparently earlier in date.

Associated pottery, comprising 750 sherds and representing 277 medieval vessels and 272 post-medieval vessels, was examined by Jane Young and Claire Angus. Only one sherd of late Saxon date was found. There were 69 sherds of twelfth-early thirteenth century pottery with an unusually high proportion of shell-tempered coarse wares. 291 sherds dated from the thirteenth-sixteenth centuries with 383 sherds of post-medieval date.

Pottery associated with Building 2 ranged in date from the thirteenth to fifteenth centuries although a construction date for the building could not be ascertained. Building 1 appears to have been constructed in the fourteenth century and pottery associated with its demolition ranged in date from the mid-sixteenth to the late seventeenth-eighteenth centuries.

A few fragments of worked stone were found, including window tracery and mullion/transom fragments which predated 1400. There is not enough information available to determine the function of the buildings but they probably belonged to a complex of high status, possibly the manor. The quantity of coarse wares found suggests that the section excavated may have fallen within or close to a kitchen area. One assumes that the majority of contemporary buildings at Fiskerton would have been made out of less durable material than stone (*e.g.* timber, wattle and daub; eventually brick). It may further be tentatively suggested that the large ditch exposed at the east end of evaluation Trench 2 was a moat that surrounded this building, although it was not possible to investigate the origins of this feature which may have been recut on several occasions.

Environmental results
Six environmental samples were submitted to James Rackham for analysis. The probable prehistoric features were singularly lacking in material. Contexts **104** and **114** in Trench 1 have a very small amount of waterlogged material which includes the ephyppia of *Daphnia* sp. small freshwater crustacea; this suggests that these features contained standing water when they were open. This could have washed in as a result of floods or may indicate a high water table at the time. No other information of note can be gleaned from this material.

One sample, from context **211**, derived from a steep-sided ditch tentatively dated to the medieval period. In contrast to the others this sample is rich. The residue is composed largely of organic remains with considerable quantities of small wood fragments, twigs, plant stems, leaf fragments and other vegetable matter. The residue produced two tiny fragments of glass and a similar-sized fragment of brick. Although these could have moved down through the soil, the sediments from which they were recovered were waterlogged, much finer textured than elsewhere on site and much deeper, all of which reduce the likelihood of this material moving down through the deposits above. The glass is certainly post-medieval but accidental contamination from material on the surface of the site cannot be ruled out. Two pieces of wood have a shape and surface texture that suggest they may be chips from woodworking.

The flot from this sample includes many uncharred seed and insect fragments, fly puparia and *Daphnia* ephyppia. The seeds include blackberry/raspberry, cherry, plum and charred cereal grain including wheat.

The small collection of excavated animal bone derives from a possible prehistoric gully and deposits associated with the medieval building in Trench 4. A single cattle incisor was recorded from the gully. The finds from the medieval layers included bones of cattle, sheep, pig and goose.

Discussion

By N. Field

The southern part of the Nelson Road site coincides with the lower edge of the first river terrace. Its sinuous course contrasts with the rectilinear property boundaries surrounding it. It is possible that the edge of this piece of land was originally defined by a palaeochannel which emptied into the Witham and may be associated with the palaeochannel recorded at Perrins Cottages 100m to the west (Palmer-Brown 2000: 16). In support of this interpretation further evidence for peat deposits was found during the installation of a 90mm replacement water main in the village in 1996–1997 (Tann 1997). Intermittent peat deposits were recorded between Orchard Lane and its junction with High Street, 120m to the west of the church, and the Carpenter's Arms, on the High Street, some 200m northwest of the Nelson Road excavations. No peat deposits were observed along Nelson Road.

Rounded cobbles were recorded west of Ringwood House in Orchard Lane, associated with tile including a single piece of Roman date. Was this in any way associated with the Roman 'hard' at Perrins Cottages? Unfortunately, there was no associated dating evidence for the peat deposits in the mains trenches but the various investigations at Fiskerton have demonstrated that the natural configuration of the River Witham and its tributaries, now completely obscured by the gridded network of nineteenth century drains and modern village development, must have been extremely complex and requires more detailed mapping to establish the changes through time. The location of any associated prehistoric or Roman settlement remains has yet to be identified.

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Plate 1 *General view of the excavations looking east with the North Delph to the right and the River Witham beyond the high bank (N. Field).*

Plate 2 *Area E. Excavation of the causeway in progress (N. Field).*

Plate 3 *Area E. General view of the causeway with horizontal timbers between the posts, looking northwest (N. Field).*

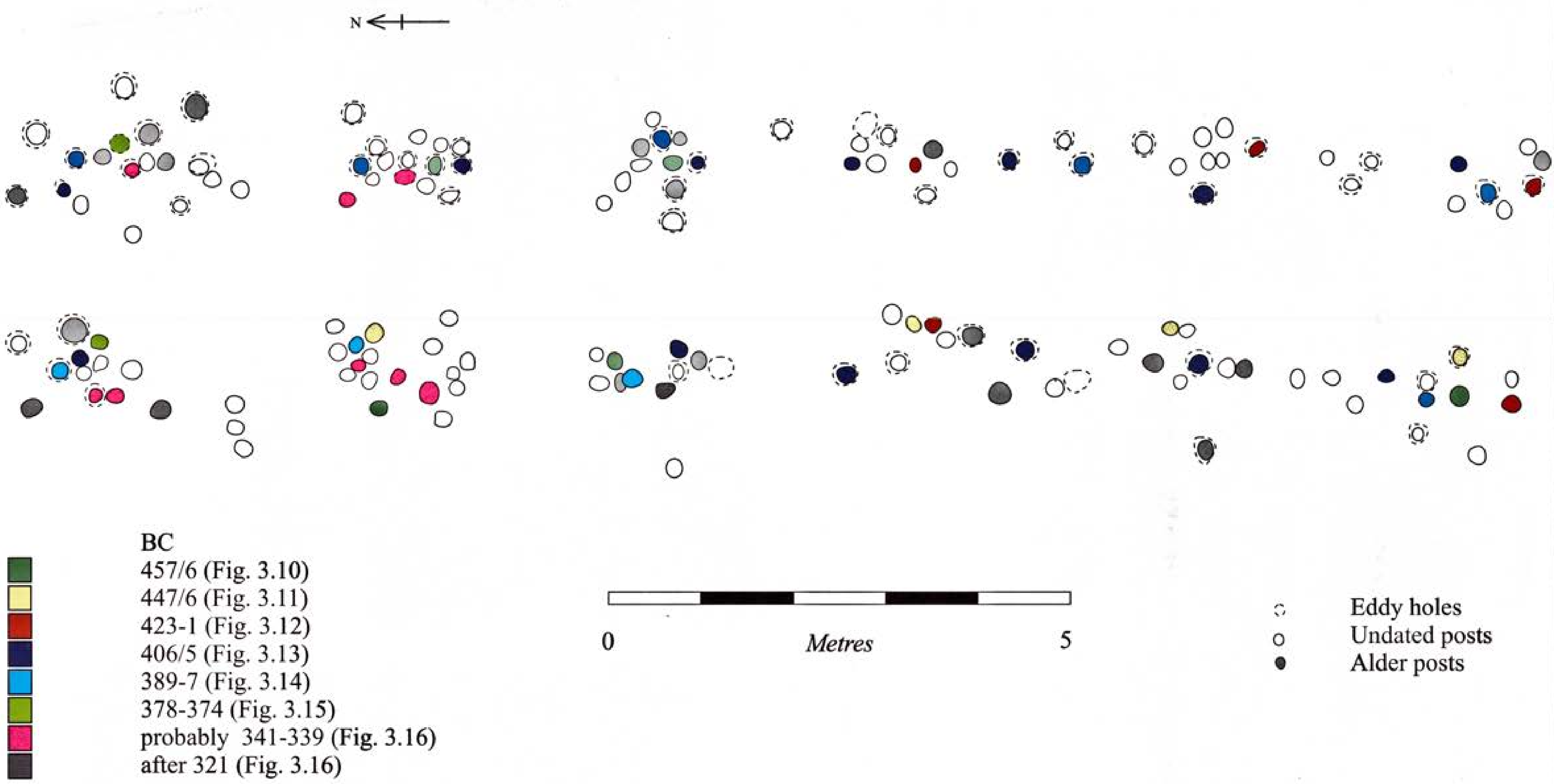

Plate 4 *Plan of the causeway showing various phases of dated posts.*

Plate 5 *The boat fragment, 65, in the northern edge of Area F. Scale 1m (N. Field).*

Plate 6 *Spearhad* ***391*** *in situ. Scale 0.50m.*

Plate 7 *Bronze 'shoulder piece'* ***237*** *in situ. Scale 0.50m.*

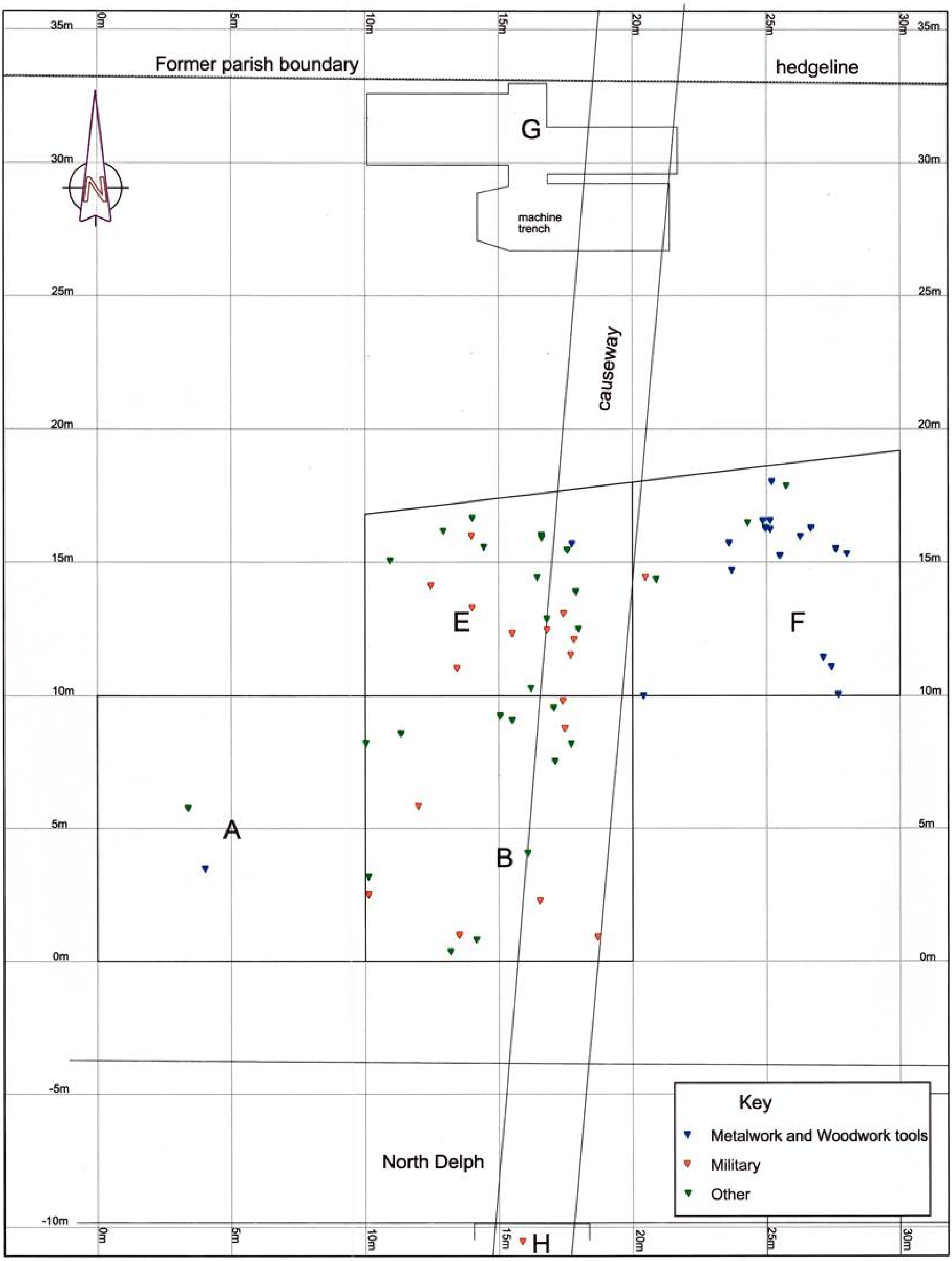

Plate 8 Distribution of all metal finds.

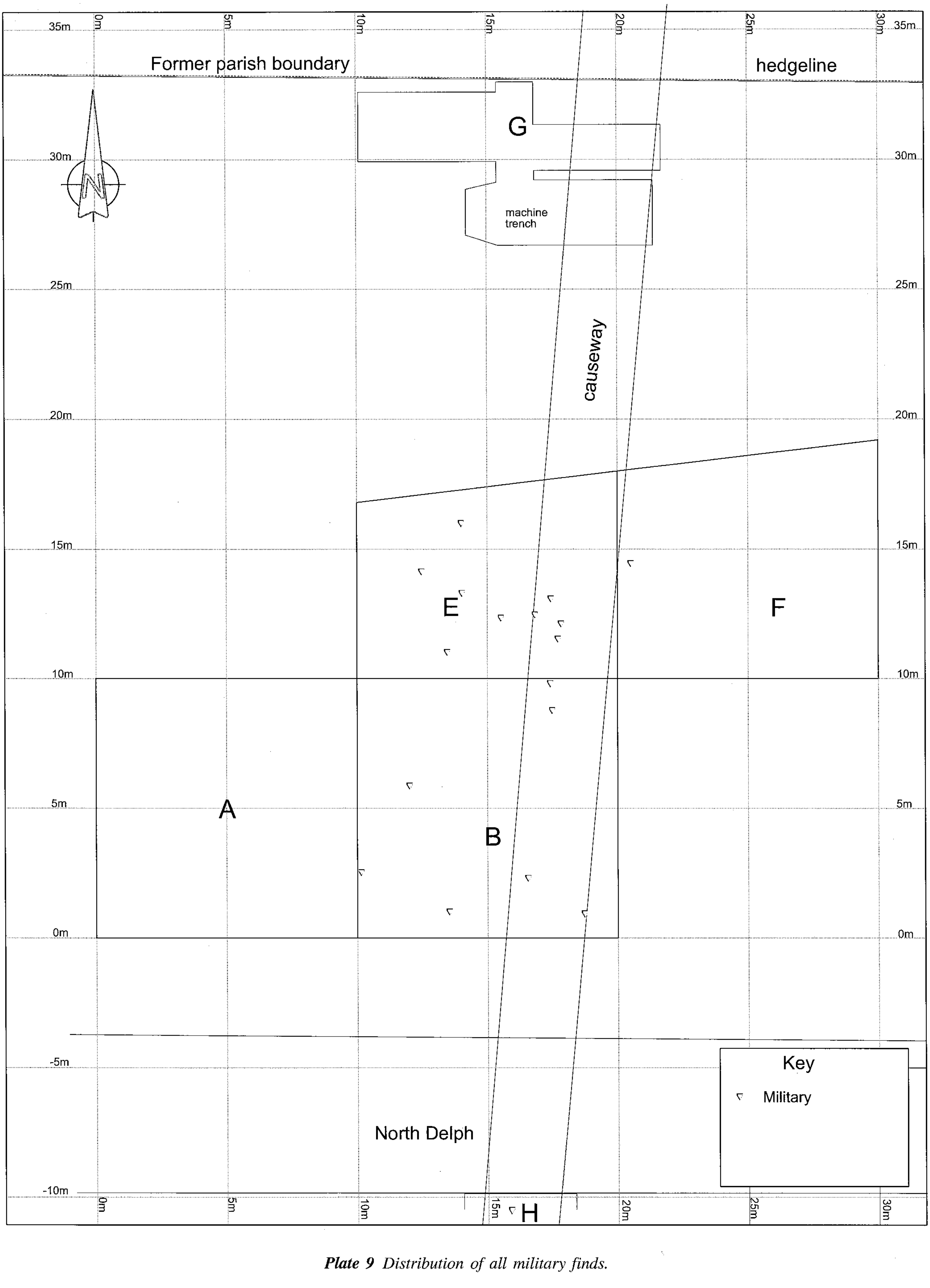

Plate 9 Distribution of all military finds.

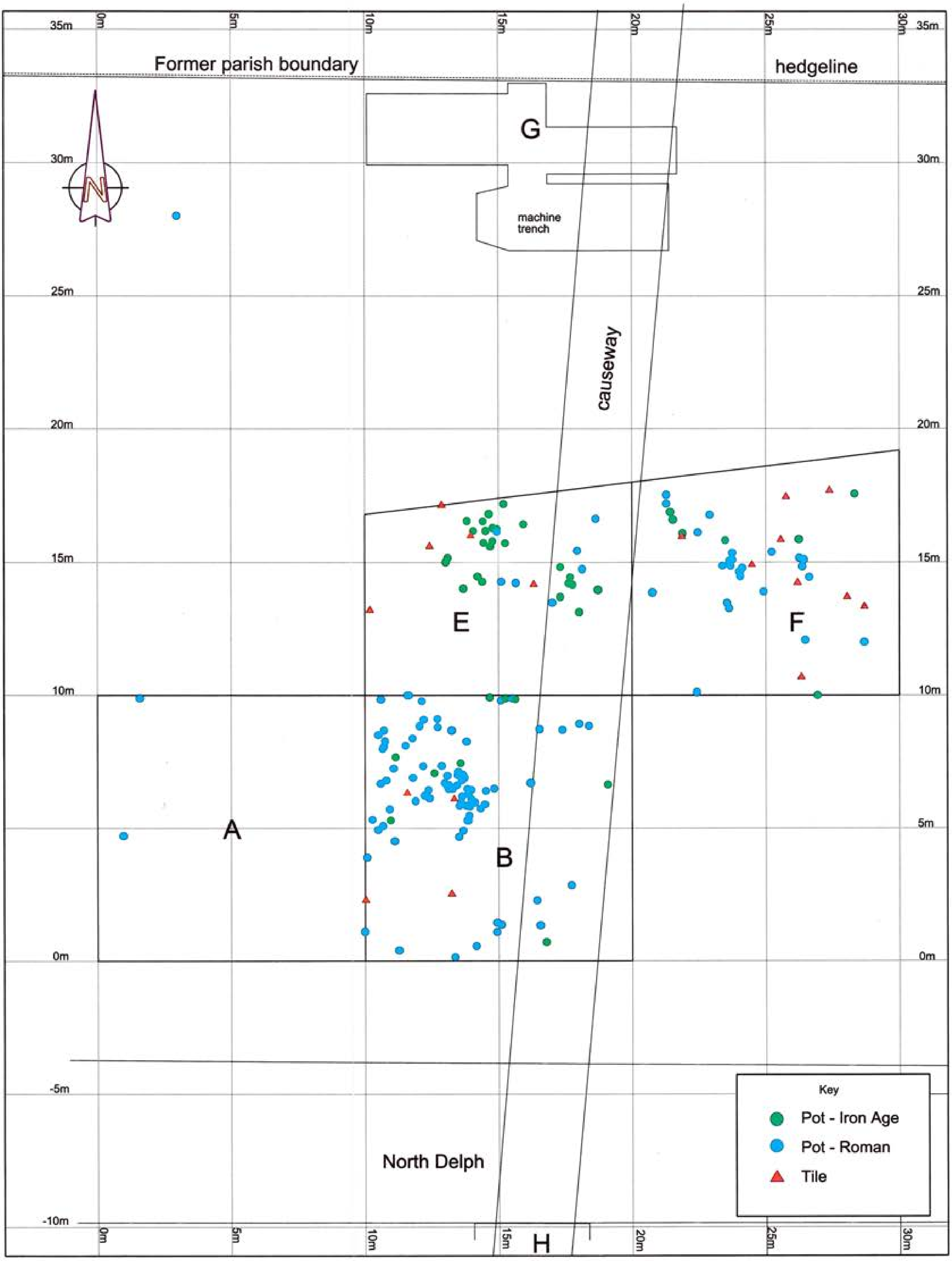

Plate 10 *Distribution all pottery sherds.*

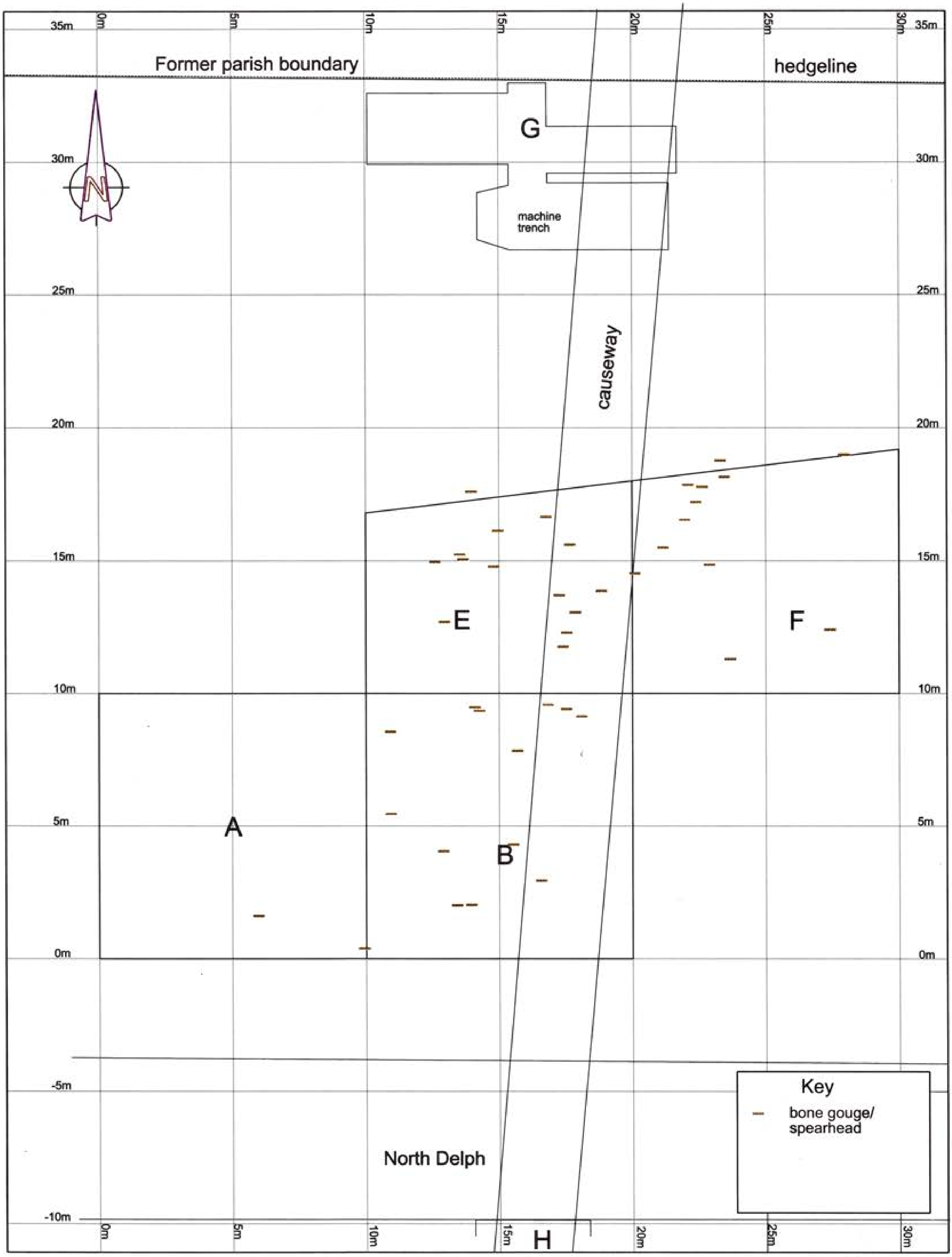

Plate 11 Distribution of bone spearheads ('gouges').

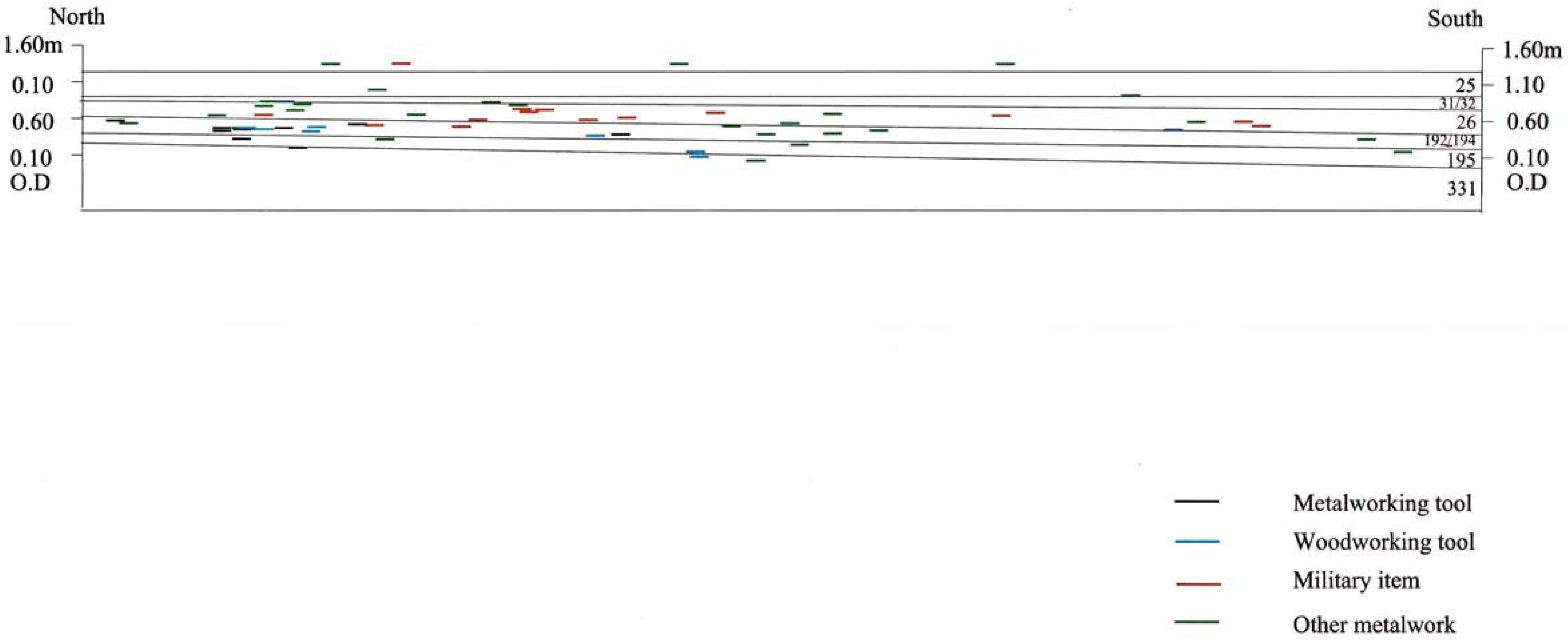

Plate 12 *The depth of all metal finds across the site.*

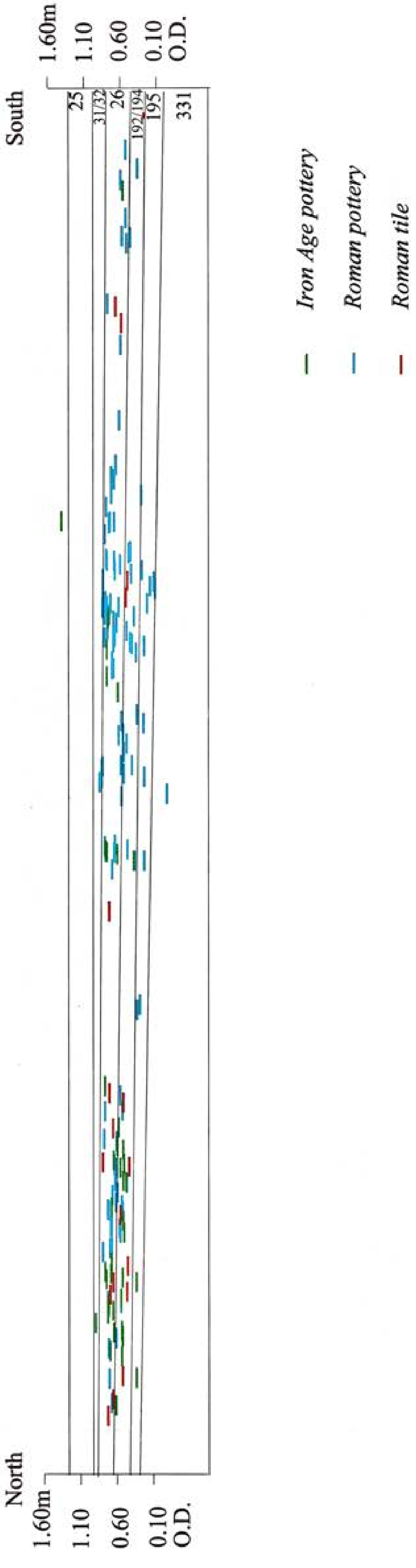

Plate 13 *The depth of Iron Age and Roman pottery and tile across the site.*

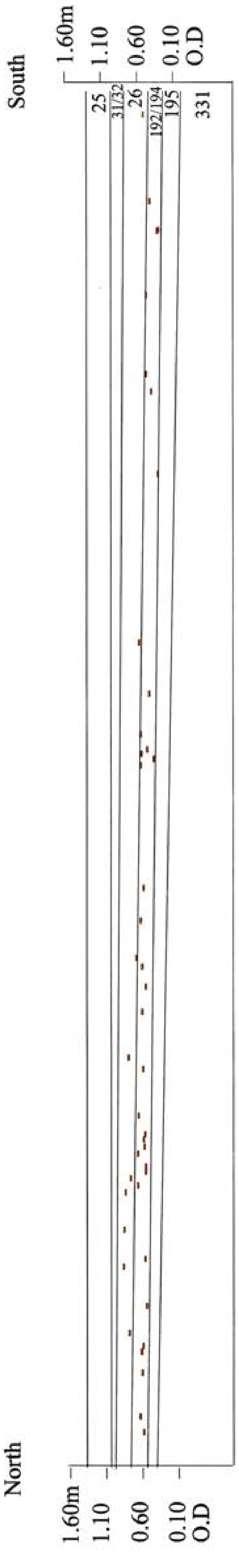

Plate 14 *The depth of bone spearheads ('gouges') across the site.*

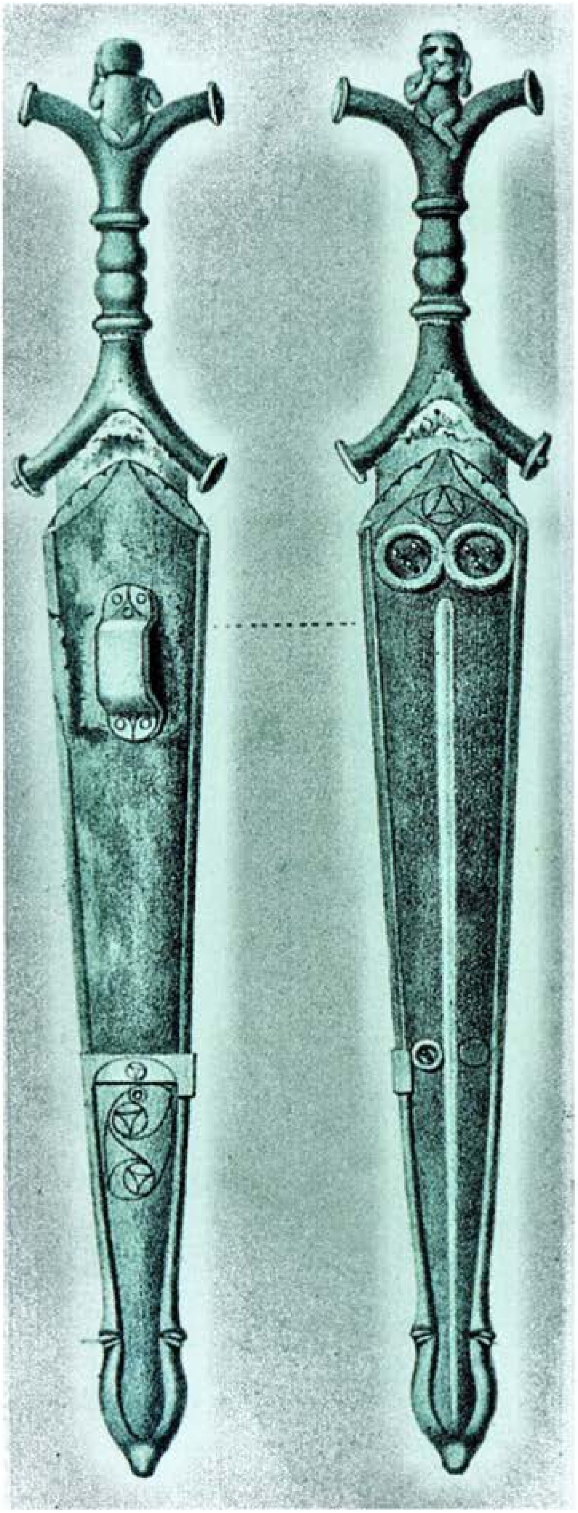

Plate 15a *Decorated sword with gilt bronze scabbard mount from the River Witham (Kemble 1863)*

Plate 15b *The anthropomorphic-hilted sword from the River Witham (Kemble 1863)*

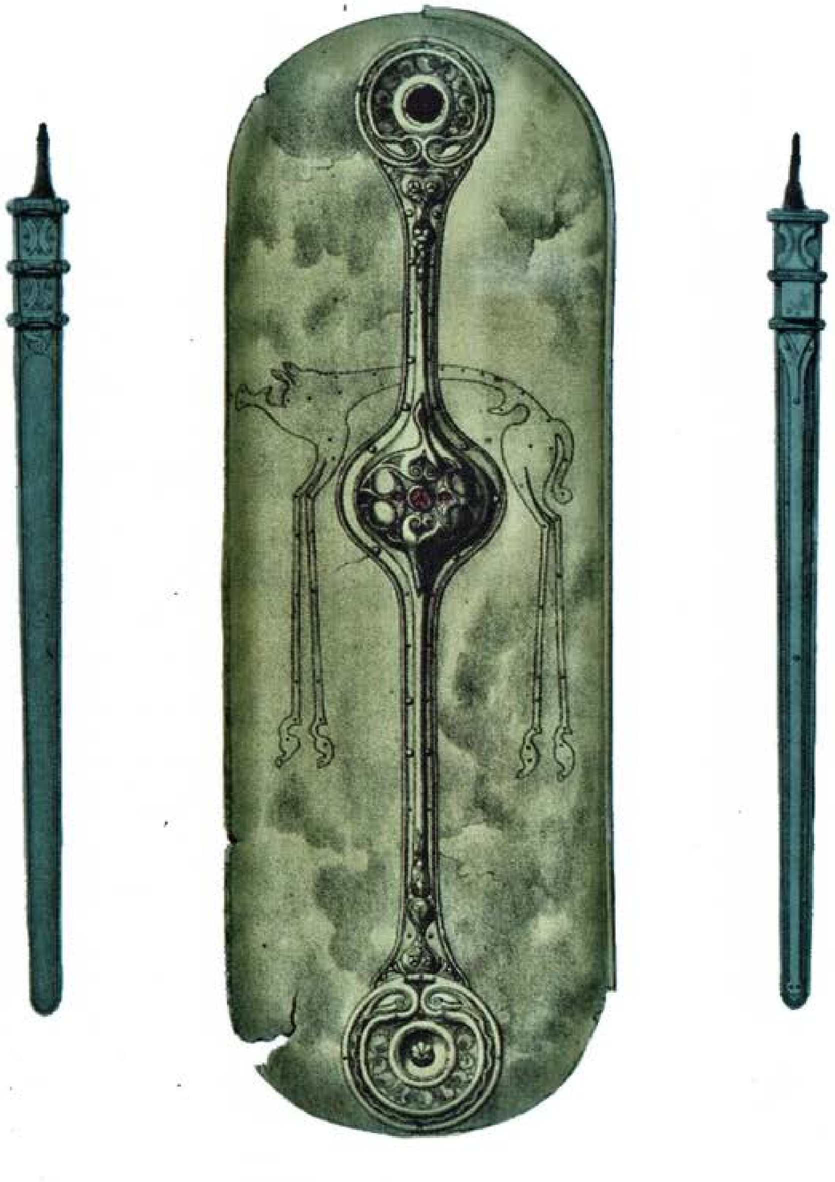

Plate 16 *The Witham Shield and a sword found at Bardney (Kemble 1863)*

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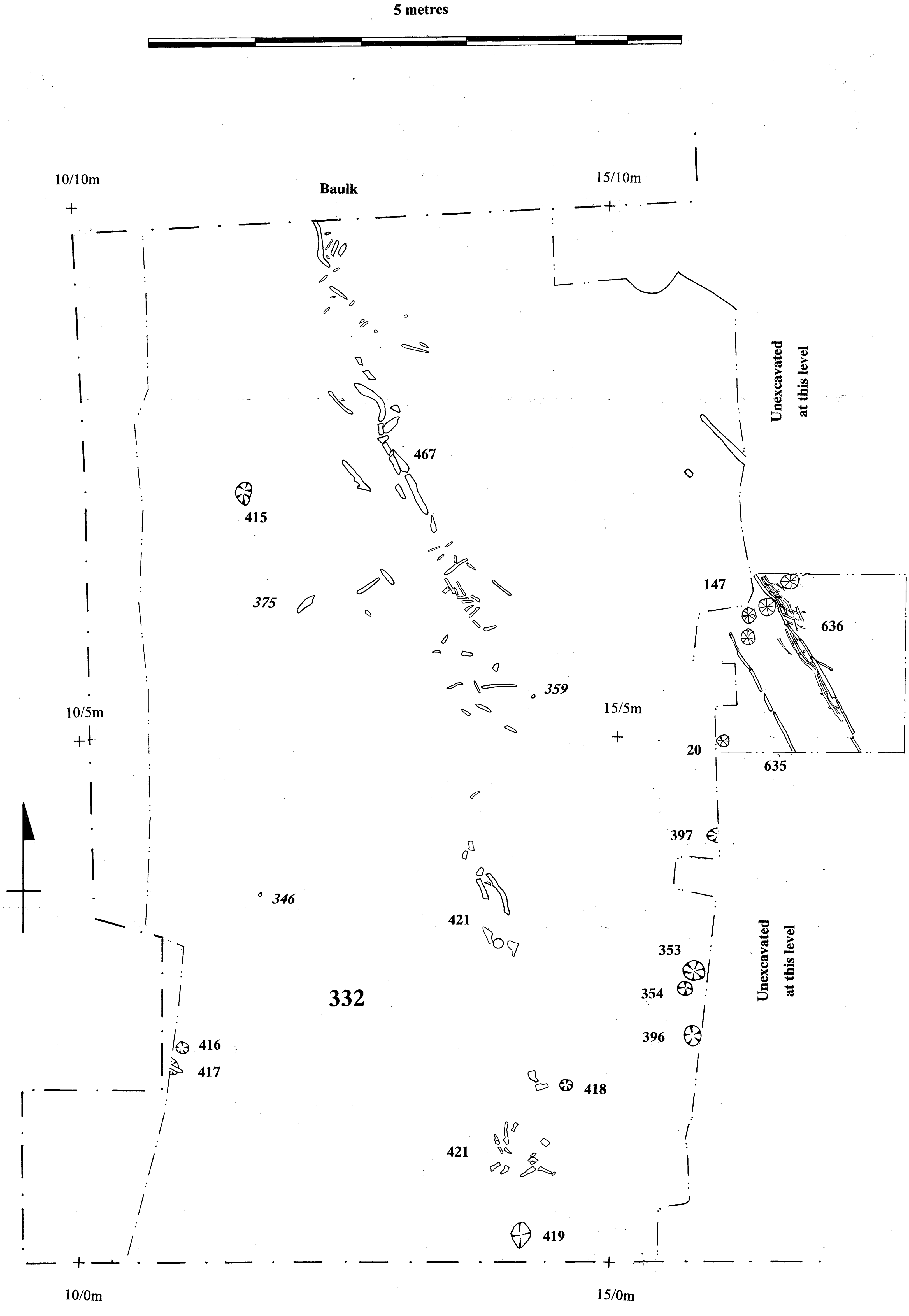


Fig. 1.5 Area B. Trench plan, showing features on layer 332 earlier than the timber causeway (N. Smith).

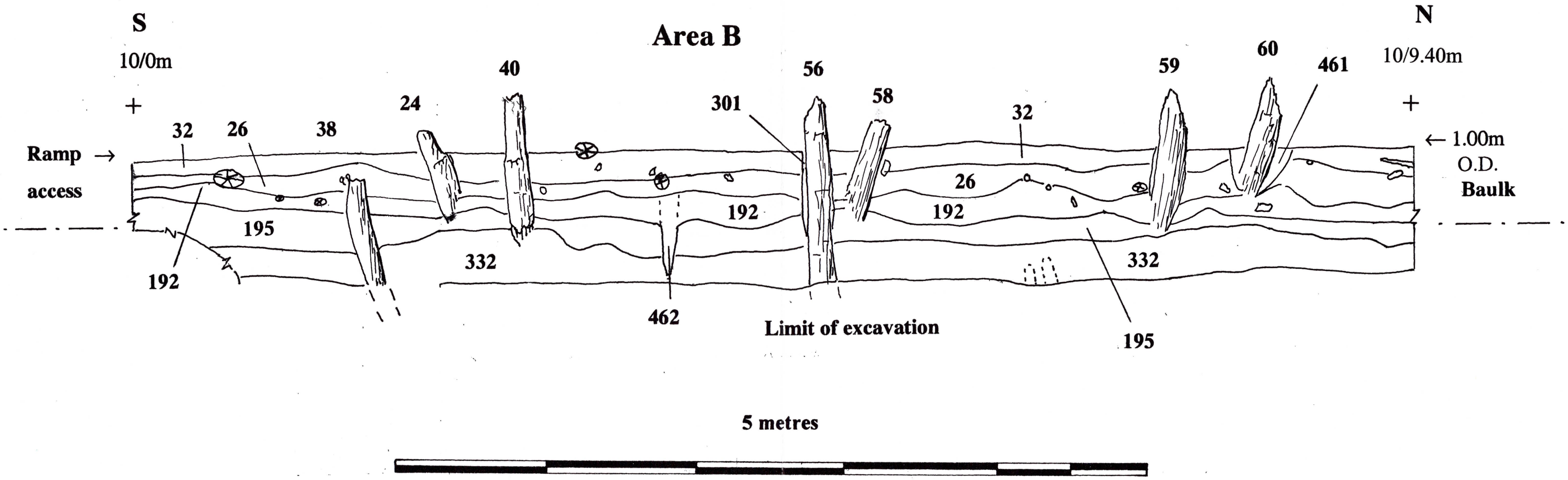


Fig. 1.13 The western alignment of single posts (M. Clark).

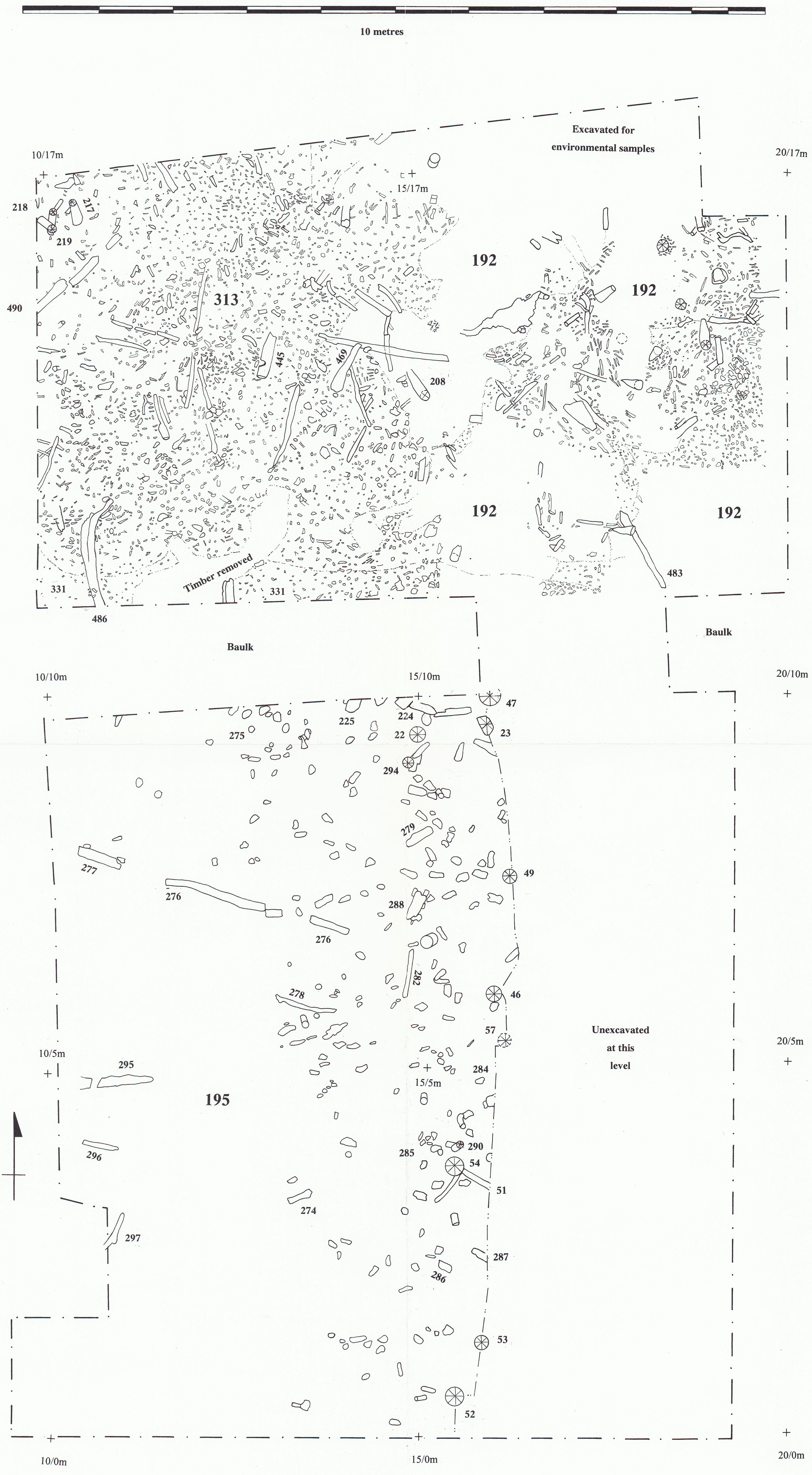


Fig. 1.14 *Area E (top) and Area B (bottom). Trench plan showing lower deposits (N. Smith).*

Fig. 1.15 Area F. The reed peat layer 331, and features below the brushwood. Limestone rubble is shown in red. (N. Smith).

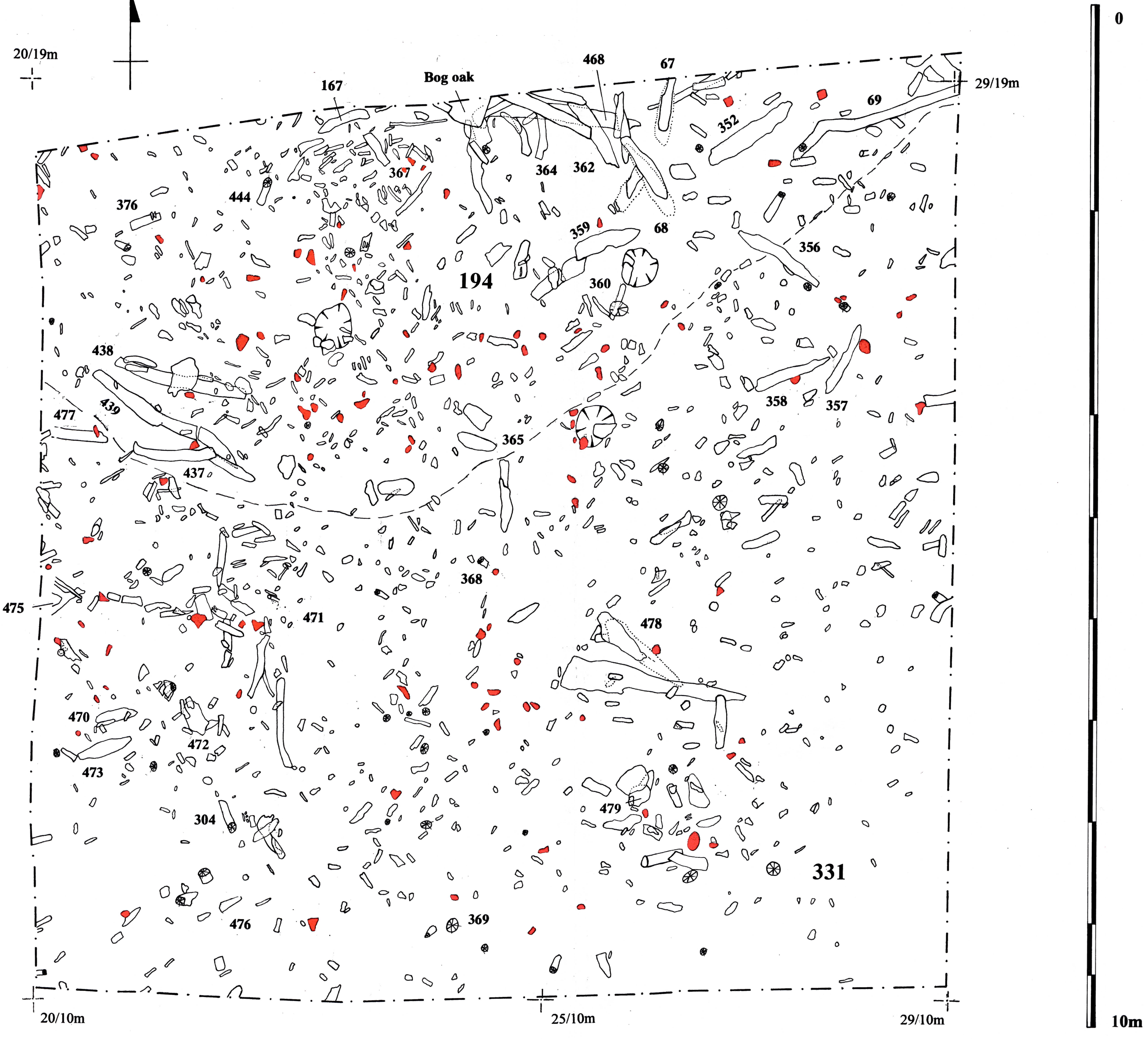
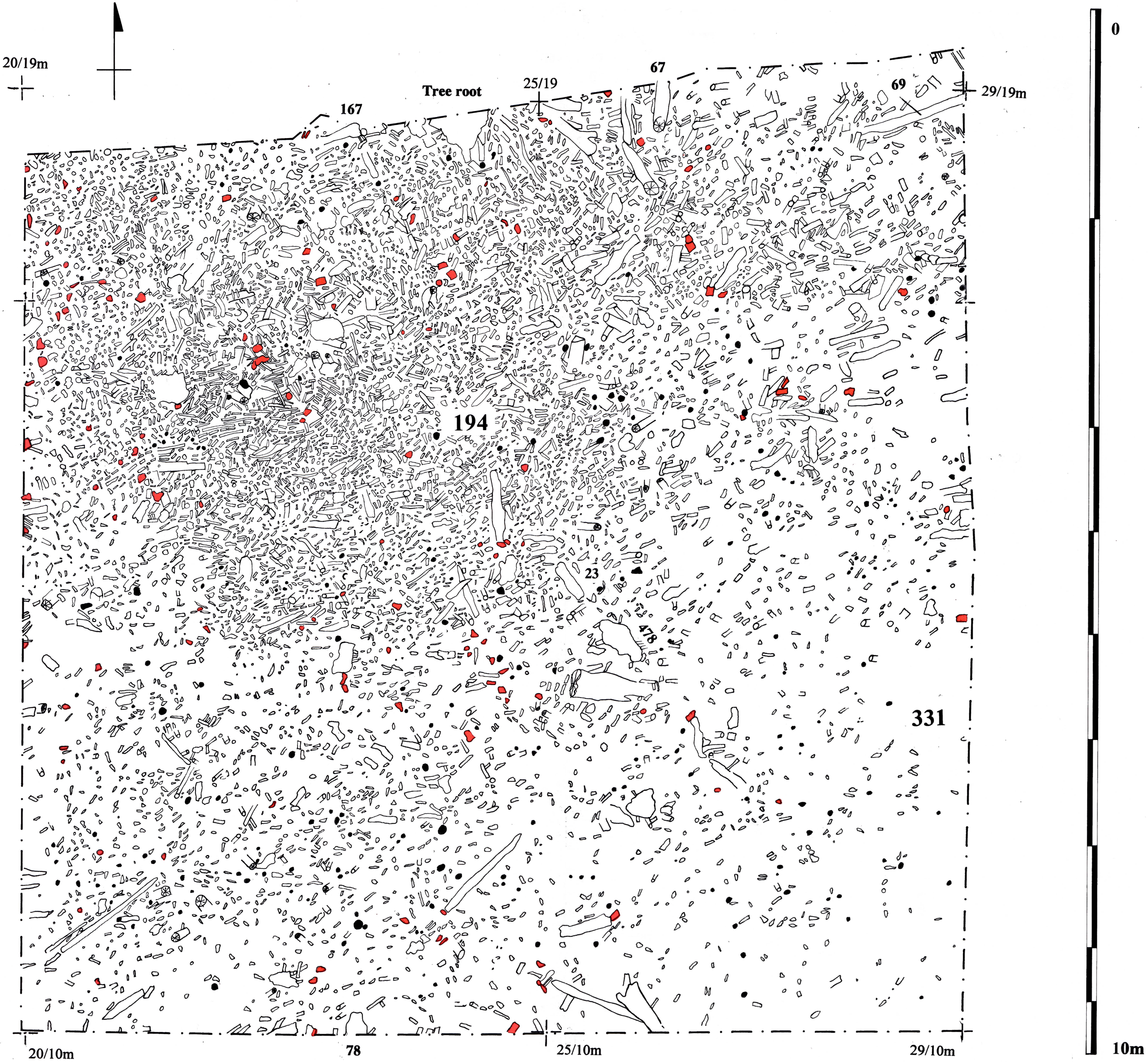


Fig. 1.16 *Area F. The brushwood layer 194. Limestone rubble is shown in red (N. Smith). Key:* • *= vertical pegs.*



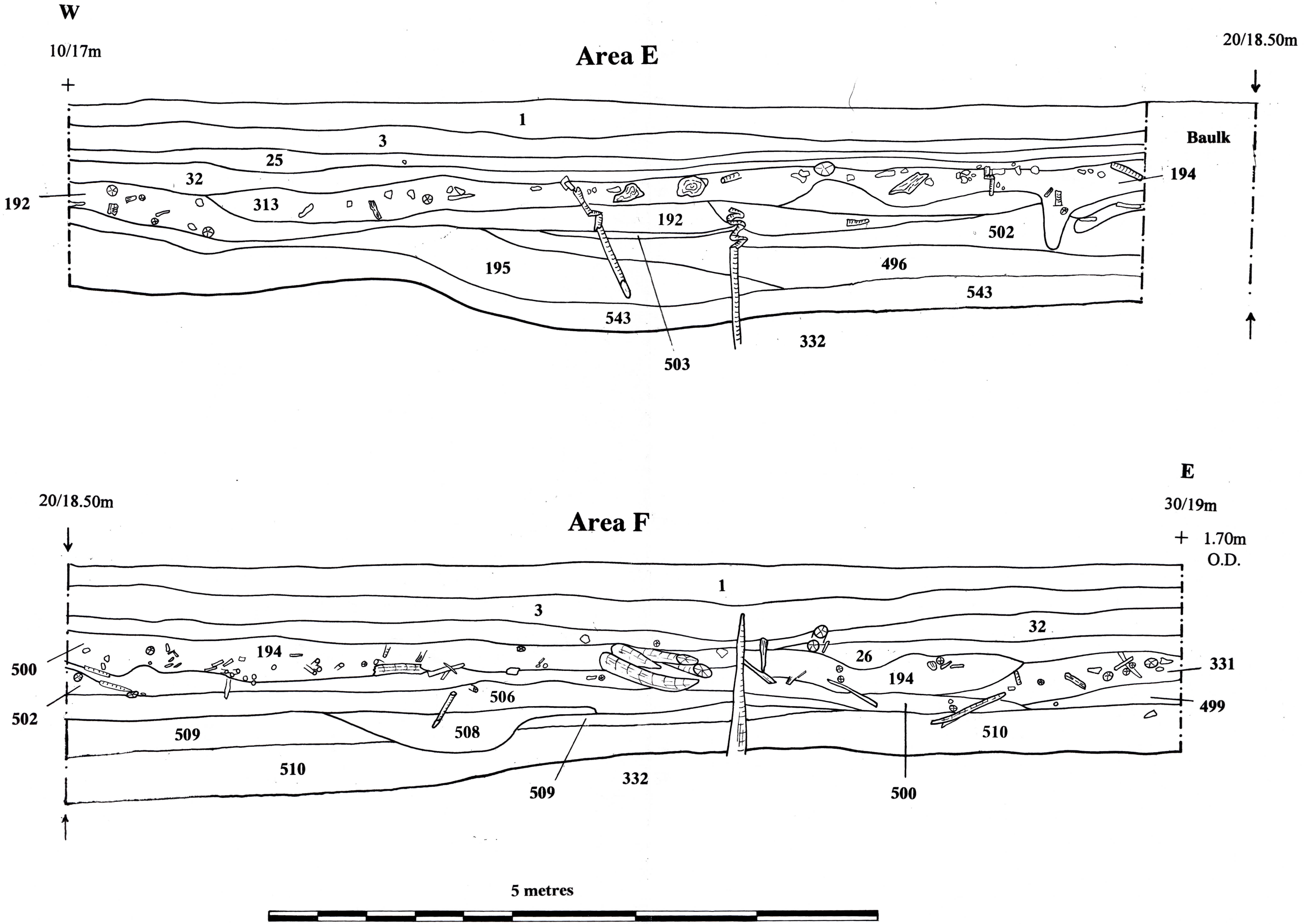


Fig. 1.18 Areas E and F. South-facing sections (N. Smith).

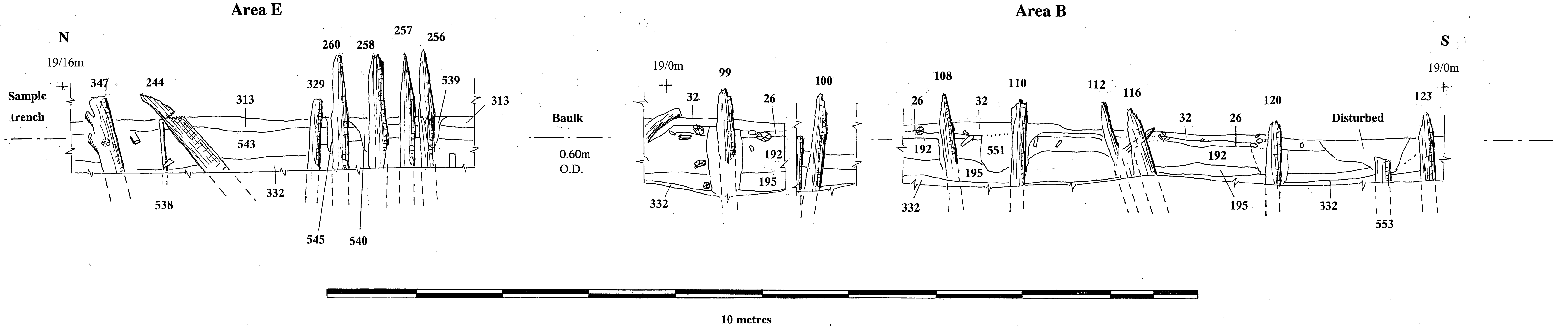


Fig. 1.19 Areas E and B. West-facing sections (M. Clark).

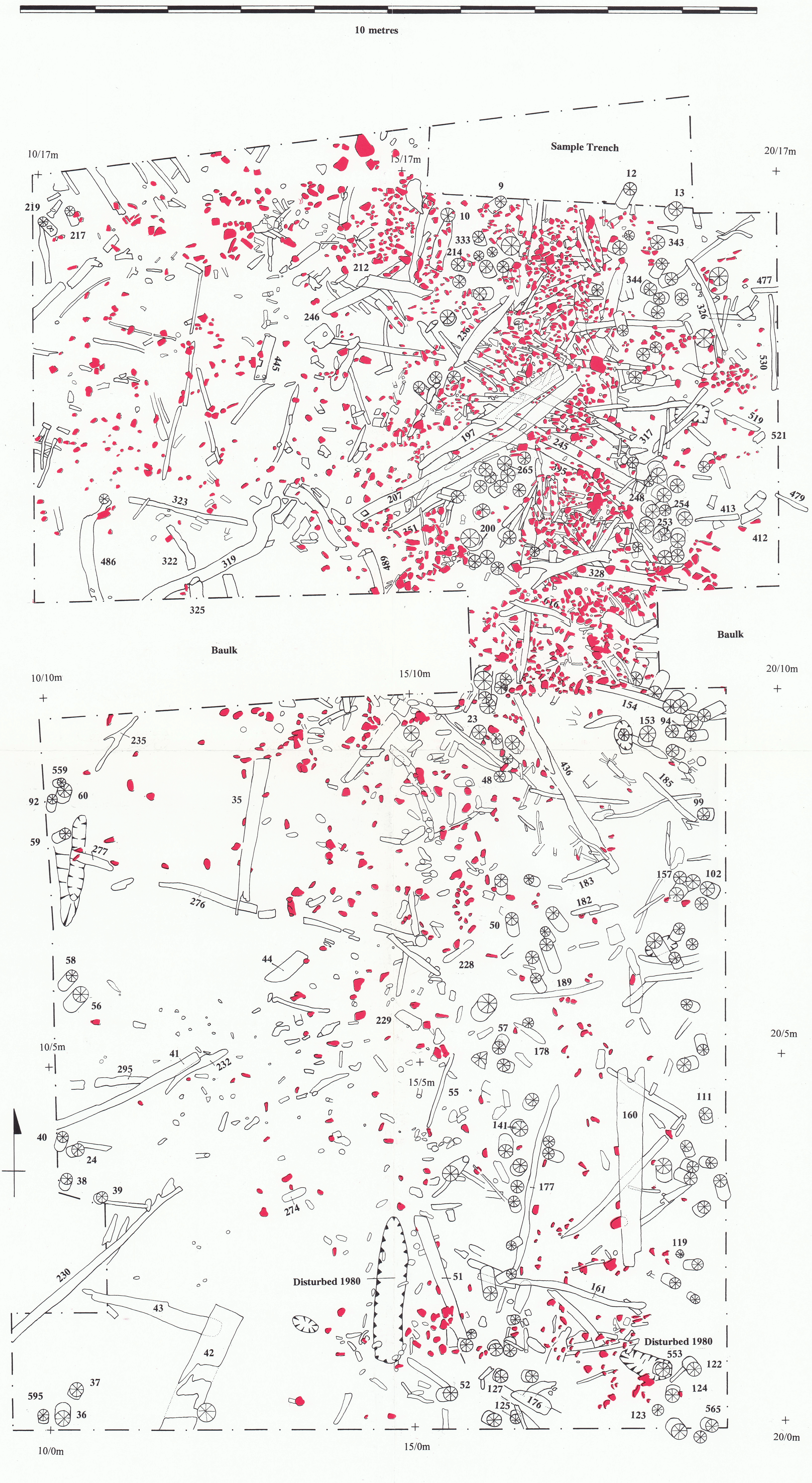


Fig. 1.20 Area E (top) and Area B (bottom). Trench plan, showing upper levels, layer 32. Limestone rubble is shown in red. (N. Smith).

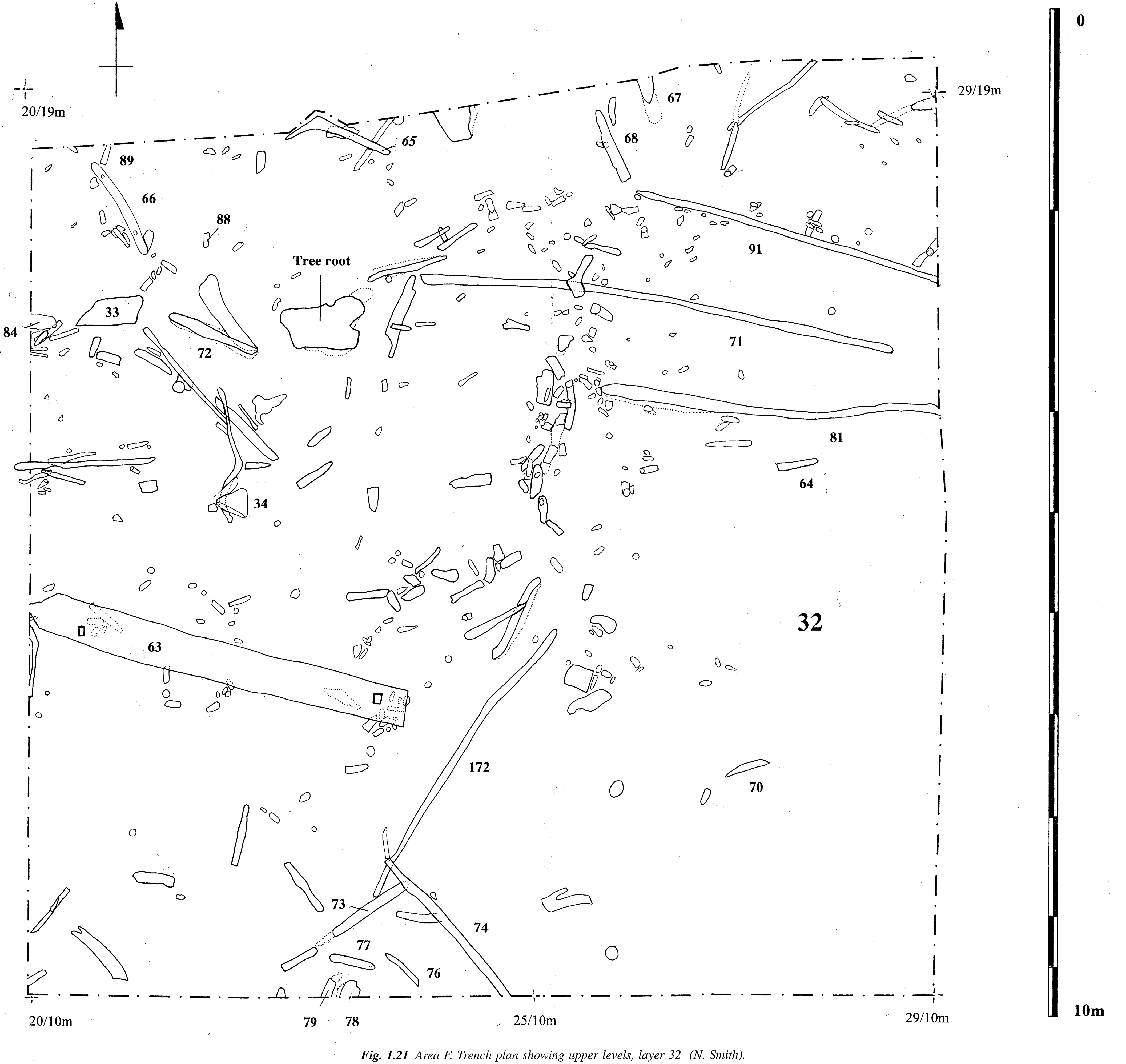


Fig. 1.21 *Area F. Trench plan showing upper levels, layer 32 (N. Smith).*

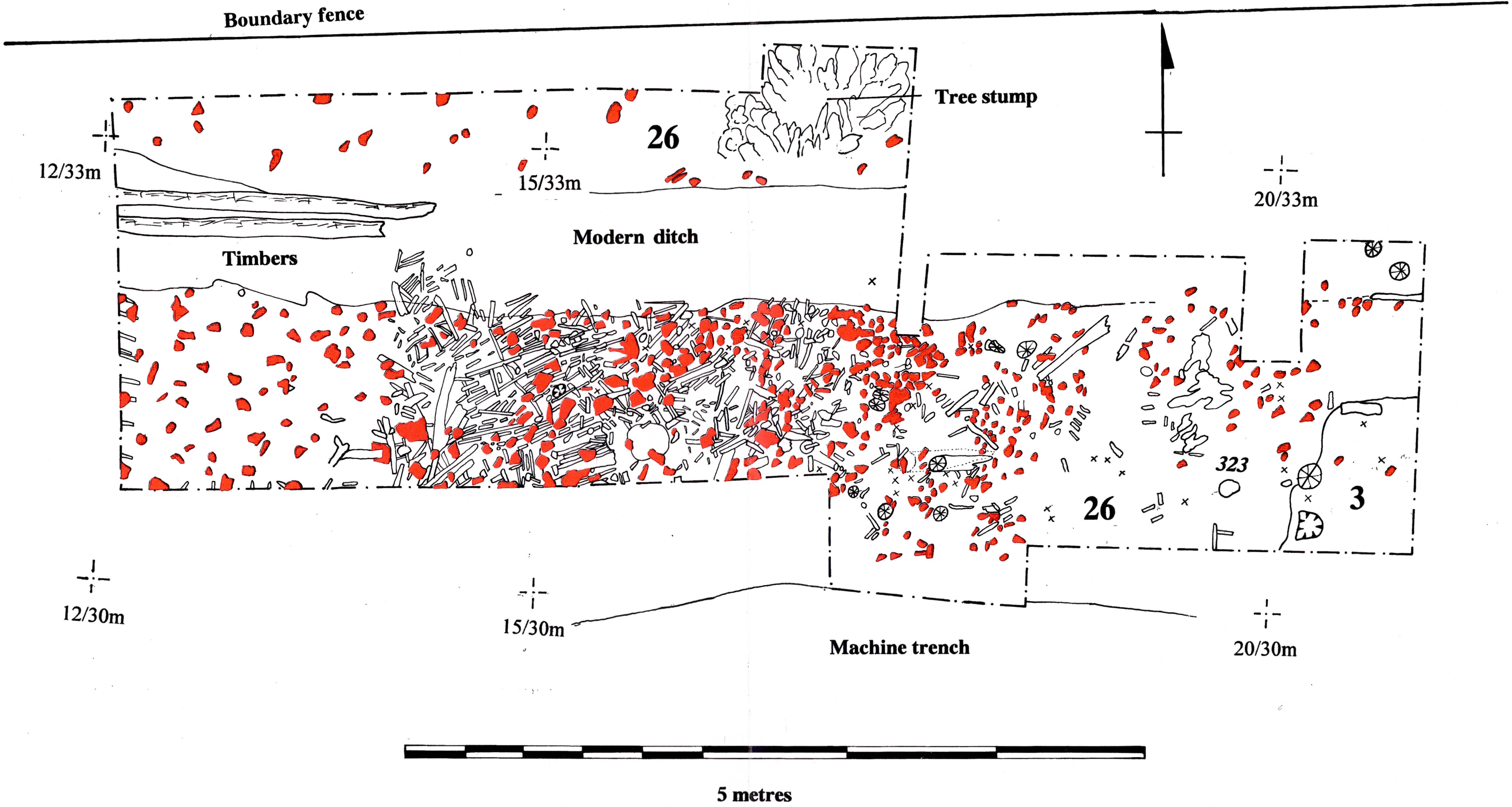


Fig. 1.22 Area G Trench plan. Limestone rubble is shown in red. (N. Smith).